Your Home Energy Audit

Home

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Audit Date

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01:00 PM

Audited By

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HEAT Squad
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Thank you for having me in your home and allowing HEAT Squad to help make your home more energy efficient.

As you will see in this report there are opportunities to save money, energy and be more comfortable in your home. A comprehensive energy retrofit has benefits beyond fuel savings such as increased building durability and increased comfort. Please consider these recommendations and look into low interest NeighborWorks financing to help make these recommendations an affordable reality!

Please let us know how we can help you moving forward.

Inside Your Report

Concerns

We listened to you!

As our client, we want to make sure we are addressing all of your concerns for your home. If we have missed any concerns in this report, please let us know right away.

Save Money

Reduce fuel usage and lower your energy costs.

Increased Comfort

Regulate temperatures throughout house. Keep rooms warmer during Winter months and cooler and dryer during Summer months. Eliminate drafts.

Lower Your Carbon Footprint

If the projects outlined in this report are completed, you are looking at an overall Energy Reduction of 26%, a Carbon (CO2) Savings of 5 tons. That's great!

Moisture Issues

Improve ventilation to exhaust excess moisture from washrooms, laundry, kitchen and baths. Eliminate pathways for moisture to infiltrate attic, basement and crawlspace spaces.

Project Cost - $3000 EVT + $2000 VLITE + *($450+$400+$500)

If you complete all of the air sealing and insulation measures outlined in the following report you will be eligible for the estimated Efficiency Vermont Rebates listed above. If you change the work scope or reduce the amount of work completed, you will likely receive less rebate money.

In order to receive any incentives, the project must get at least a 10% reduction in air leakage as measured by the HEAT Squad follow-up blower door test. Additionally, any health and safety issues would need to be addressed and remedied before incentives are approved. Incentives are 50% of your total project cost not to exceed $3,000 or $1,000 (per income). Efficiency Vermont rebates are subject to change and are good through 12/31/2021.
VLITE rebates are 1/2 Project Cost up to $2000 after EVT rebates are applied.
*Current average rebates for Heat Pump Appliances through Efficiency Vermont and GMP
Check Efficiency Vermont Rebates for a comprehensive list of all available rebates and incentives.

Solutions for Your Home

Totals

Approximate Cost

$ 13,100

This is a ballpark guess. Ask your contractor for a detailed bid.

Estimated Savings

$1,206 per year

This is an estimate of how much you could save starting in Year 1. Savings will only increase as energy prices rise over the years.

Impact of upgrades

Energy Reduction	26%
Carbon (CO2) Savings	5 tons
Equivalent cars removed from the road	1.0/yr

Call us today to ask a question or discuss the next step!

DETAILS	APPROXIMATE INSTALLED COST	APPROXIMATE ANNUAL SAVINGS
Reduce Air Leakage by approx 35%	$ 1,000	$ 263
Insulate Basement Walls	$ 4,800	$ 370
Vermiculite | Asbestos		
Airseal & Insulate Attic Flat	$ 4,100	$ 261
Upgrade Water Heater	$ 3,200	$ 312
New Heating Systems		
Moisture Mitigation		
Health and Safety		
Home Performance Opportunities		

Reduce Air Leakage by approx 35%

AIR LEAKAGE

Approximate installed cost

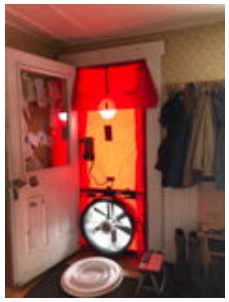
$1,000

Energy Savings

Approx. $263

Why it matters

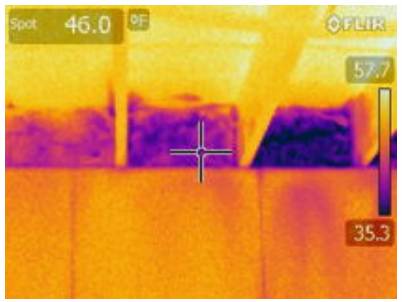
Air sealing is typically the most cost effective improvement you can make to your home. What ends up having the most profound impacts on reducing air leakage rates are retrofits to entire sections of your home's thermal boundary. Installing or establishing air barriers in attics, sloped ceilings, kneewalls, basements, and crawlspaces where none are present will dramatically increase the comfort of your home and help you save significant energy.



Your home is very leaky, as measured by the blower door test. Your blower door number was **4972 CFM50** and that equates to heating the volume of air in your house **40 times a day** or a **16.5" x 16.5"hole in your building shell**. To put that in context, the average Home Performance with Energy Star home is measured at 8 air changes a day.

Your extremely high air leakage rate is less about specific areas of leakage and more a result of systemic thermal boundary and air barrier flaws in the building envelope. There was never any intention when the home was built, 200 plus years ago, for the home to be airtight. There is no house wrap, no blocking, open interior wall tops, etc. There is no air barrier in the attic space, the exterior walls are not air tight (and largely empty), and the basement is very leaky as well.

What ends up having the most profound impacts on reducing leakage rates are systemic retrofits to entire sections of your home's thermal boundary such as those completed by a BPI certified Home Performance Contractor. Installing or establishing air barriers in attics, sloped ceilings, knee walls, basements, and crawlspaces where none is present is the way to most effectively reduce your home's air exchange.



Spray Foam solution to uninsulated and leaky box sill:

Reduce Air Leakage by approx 35%

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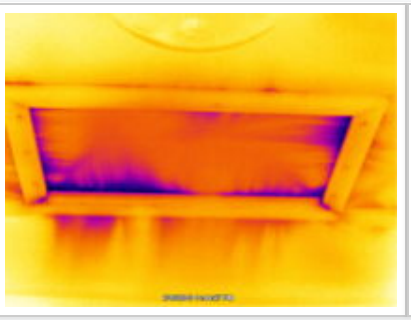
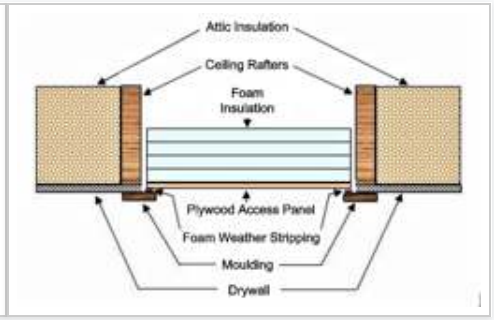
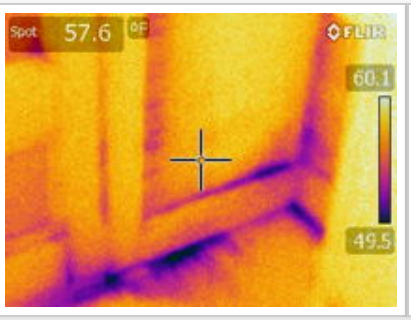
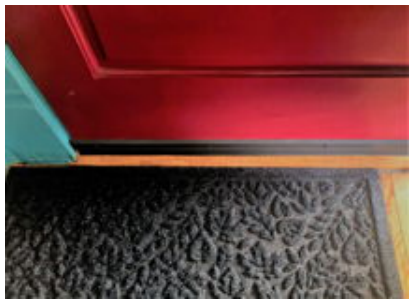




Air leakage at Attic Hatch and typical solution.





Air leakage at exterior doors: Pay close attention to where the bottom sweep meets the threshold.

Air leakage at doors leading to unconditioned space and typical solution:

Reduce Air Leakage by approx 35%

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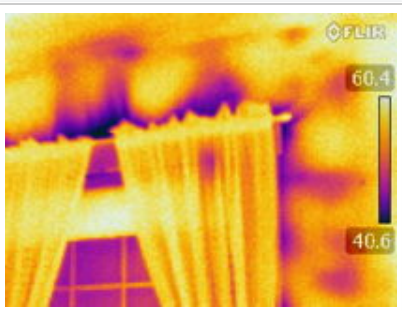
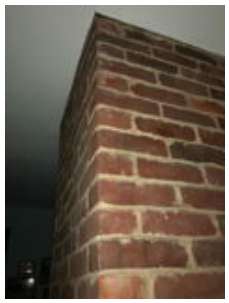


Air leakage at window casements and typical solution:

Air leakage at baseboards and typical solution:



Air leakage at chimney chase and typical solution:

Reduce Air Leakage by approx 35%

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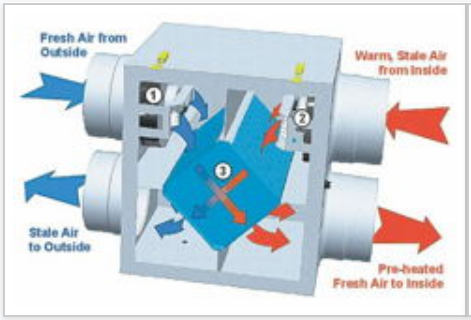

There are opportunities to reduce air flow through your house, though additional air sealing is unlikely to bring your home below the Building Tightness Limit. If you drop below this limit, mechanical ventilation will be necessary and required by Efficiency Vermont in order to receive rebates. The best solution is to install a balanced Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV). Another allowed solution is to install an exhaust only timer switch/es on bath fan/s to meet the requirement. We can help you decide which path is right for you and talk you through the pros and cons of each. Sometimes combustion appliances are required to be modified to provide additional air for complete combustion and to prevent back drafting.

Insulate Basement Walls

BASEMENT

Approximate installed cost

$4,800

Energy Savings

Approx. $370

Why it matters

Insulating your basement walls will increase the overall temperature of your basement and make the floors above more comfortable. If heating systems are located in the basement the systems will function more efficiently. This is the most often recommended weatherization measure due to it's relative simplicity, and high return on investment.

Spray or install rigid foam insulation on the interior surface of the basement walls, to achieve a minimum of R15.
Any exposed foam must include a 15 minute thermal barrier. It is recommended the entire height of the wall be insulated and is necessary where interior wall finishes will be installed.

Spray foam insulation on the interior surface of any uneven basement walls like stone, to achieve a minimum of R15. Any exposed foam must include a 15 minute thermal barrier.

Remove existing fiberglass if present in box sills and replace with either spray foam or rigid foam to achieve a minimum of R15. If rigid foam is utilized, care should be taken to assure complete air sealing of box sills and top plate(s).

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Repair or replace your existing basement door with a well-sealed and insulated (to R15) door such as the sandwich-style door above:

Any moisture issues must be addressed prior to reducing air infiltration. All exposed earth or wet basement floors should have a sealed vapor barrier to prevent moisture caused mold and structural damage. The vapor barrier should be protected from damage in areas of foot traffic. If the basement has significant water infiltration other treatments may be required to keep or get the water out.

Vermiculite | Asbestos

CUSTOM MEASURE

Approximate installed cost

Why it matters

Vermiculite insulation was observed in your Attic Flat Area. It may contain asbestos. Once remediated, the following recommendations for attic area can be followed:
Efficiency Vermont Incentives are not payable for areas where vermiculite or any asbestos-containing material (ACM) is present and likely to be disturbed.
Learn more about asbestos and vermiculite through these resources:

EPA Asbestos Webiste

Vermont Health Department Asbestos Website

Zonolite Attic Insulation Trust

It appears there may be asbestos wrap on the heating pipes / ductwork. This is a possible health risk and will need to be safely remediated by a certified contractor if work is to be done in the area.

Airseal & Insulate Attic Flat

ATTIC

Approximate installed cost

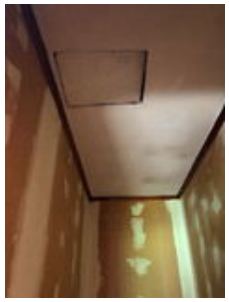
$4,100

Energy Savings

Approx. $261

Why it matters

Adding insulation to your attic can lead to a significant reduction in your energy costs. This process will be combined with careful air sealing of the attic to ensure the new insulation performs at its maximum level.



Openings used for access to the attic such as hatches and scuttles, doors into knee walls, and drop-down stairs should be considered an exterior door by air sealing and insulated. Walk up attic stairs are easiest being air-sealed and insulated along the horizontal plane if the floor is the thermal boundary.

Any attic work must first start with creating a comprehensive air barrier along the attic floor. This can be accomplished with caulking or spray foam all penetrations from the ceiling below and the attic floor. another method to fully seal the attic flat is with a continuous layer of closed cell spray foam that allows less cellulose on top to meet the desired R value.

The current level of insulation in the attic is low and uneven. Taking the R Value to a consistent 60 will vastly improve the comfort and efficiency of your home.
A thick blanket of cellulose can be installed after air sealing to bring your attic to the recommended R60 energy code. Cellulose is a recycled newspaper product and is treated to be both fire and rodent resistant.

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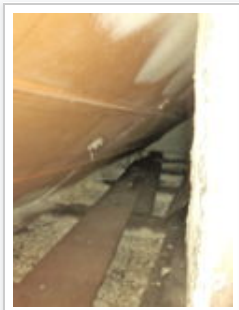
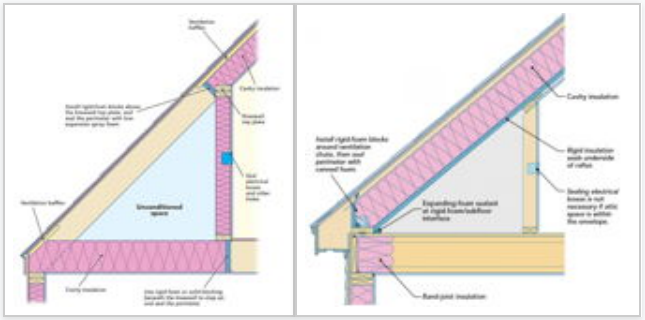


Knee walls are vertical walls with attic space directly behind them. They are often found in houses with finished attics, dormer windows, or above a garage areas. The knee wall should be conditioned to the same values as an exterior wall and encapsulated to prevent air movement through the fiberglass on both side of the wall. Another option is to insulate the stud cavities with spray foam.



Re-configuring your knee wall space from your current configuration (on the left) to the configuration on the right will not only add R value, but also reduce opportunities for air leakage and bring the knee wall space inside the thermal envelope.

Upgrade Water Heater

WATER HEATER

Approximate installed cost

$3,200

Energy Savings

Approx. $312

Why it matters

High efficient hot water heaters save energy and are safer due to carbon monoxide. Older units run the risk of leaking. Consider replacement if your hot water heater is 13 or more years old.

Your current back-up water heater (atmospherically vented gas) appears to be approaching end-of-life cycle, is not properly vented and should be replaced or repaired. The vent connector at a water heater needs to pitch upwards towards the vent, and should not have any quick turns, especially right at the draft hood.

When the time comes, install a heat pump water heater. These units look like a traditional hot water heater (with the heat pump unit on top) and create hot water at approximately 250% efficiency. Compared to a conventional electric water heater at 100% efficiency.

These units also dehumidify while making hot water at no additional cost. If you run a traditional dehumidifier (even an Energy Star one) there are significant additional electrical savings that are not reflected in the savings number above.

Limited Time Offer of up to $600 on all sizes of qualifying Hybrid Heat Pump Water Heaters. There may be an additional rebate based on income.

New Heating Systems

CUSTOM MEASURE

Approximate installed cost

Why it matters

Upgrading primary and secondary heating systems will not only help save on fuel through greater efficiencies but also help improve indoor and environmental air quality and reduce the risk of poisoning by carbon monoxide.

Your existing boiler may be approaching end-of-life cycle. When the time comes, consider upgrading your heating system to a 95-98% efficient, sealed combustion system. You will not only save on fuel, but you will reduce your risk of poisoning by carbon monoxide.
Not included in estimate but reflected in improved savings.

Fuel switching: When planning an upgrade, consider an upgrade to a renewable energy source such as with pellet or advanced wood systems. Rebates through Efficiency Vermont are currently for up to $6,000.
Not included in estimate above but reflected in improved savings.

Consider replacing your present wood stove with a new cleaner and more efficient wood or pellet stove. This not only presents an opportunity to save on cord-wood but can provide better indoor air quality.
Rebates available through Efficiency Vermont.
Not included in estimate above but reflected in improved savings.

Moisture Mitigation

CUSTOM MEASURE

Approximate installed cost

Why it matters

Moisture in your home can present health and safety concerns by leading to mold and bacterial growth. It can create conducive environments for pests and threaten the structural integrity of your house. It is important to correct your moisture problem as close to the source of the water origin as possible. The best solution is to prevent the water from entering your home.

Attics

Any moisture in the attic needs to be addressed by eliminating the path of entry. Fix any leaks. Removing the source of condensation by directing all vents to the exterior and not allowing warm moist air from the house from entering the cooler attic. Air sealing will often accomplish this. Proper ventilation of the attic will allow any small amount of moisture that finds its way in to have a chance to dry out.

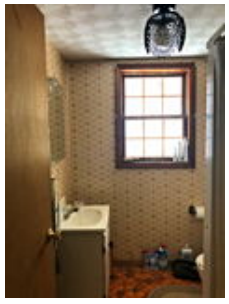
Basements

Leaks in the plumbing should be repaired and condensation eliminated or collected and removed.

Install gutters or divert water from entering your basement. The water must be directed away from your foundation.

Intercept the water as it enters your basement and direct it out and away from the building. This can be accomplished by collecting it and sending it out via a daylight drain or sump pump. This is often accomplished by installing an interior curtain drain or referred to as a “French Drain”.

Dirt floors should be covered with a durable vapor barrier and all joints and seams sealed to keep the moisture out of the house. If the space will be used , it should be protected from damage.



Mold & Moisture

A suspect mold or mold-like pathogen was observed in the second story bath. Molds need both food and water to survive; since molds can digest most things, water is the factor that limits mold growth. Molds will often grow in damp or wet areas indoors. Common sites for indoor mold growth include bathroom tile, basement walls, areas around windows where moisture condenses, and near leaky water fountains or sinks. Common sources or causes of water or moisture problems include roof leaks, deferred maintenance, condensation associated with high humidity or cold spots in the building, localized flooding due to plumbing failures or heavy rains, slow

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leaks in plumbing fixtures, and malfunction or poor design of humidification systems. Uncontrolled humidity can also be a source of moisture leading to mold growth, particularly in hot, humid climates. The CDC recommends a simple solution of soap & water for areas < 10 sq. ft.

Health and Safety

CUSTOM MEASURE

Approximate installed cost

Why it matters

CO is the largest cause of injury and death from gas poisoning resulting in more than 500 deaths per year. Even at low concentrations it reduces our nerve reaction times and can cause headaches, nausea and drowsiness. After cigarettes, radon exposure is the second-leading cause of lung cancer in the United States.

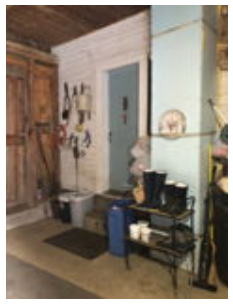
Carbon Monoxide

Low Level **Carbon Monoxide Monitors** with a digital display are highly recommended in homes with fuel burning appliances and/or attached garages.

It is required that Carbon Monoxide (CO) and smoke detectors are installed and maintained on every level of the home per manufacturer's instructions and guidelines as referenced below:
CO Guidelines

Most carbon monoxide detectors last an average of five years. Although the product's lifetime will vary depending on your make and model, you can still get the most out of your detector by wiping it down regularly to keep it clean from dust and debris.

It's also a good idea to test your CO detector monthly. Start by pressing the "test" button to ensure the siren works. If your detector is older, you can purchase a carbon monoxide test kit to ensure that it's fully functional. If the detector doesn't go off when you test it, it's probably time to buy a new one.



Attached and Tuck-under Garages Your attached garage, makes it particularly important to monitor Carbon Monoxide and contain potential motor vehicle emissions, pollutants and VOCs from entering the home. Creating a tight air-pressure and fire barrier in the garage space is of vital importance and required before projects can be eligible for Efficiency Vermont Rebates.
Motor vehicles should never be left running inside (even with doors open) and should be moved to the outside immediately after ignition.

Health and Safety

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Fire Alarms All homes should have at least one working smoke alarm installed in the living space in accordance with Vermont Law and the Vermont Fire & Building Safety Code.
Vermont Fire & Building Safety Code
Alarms should be tested, maintained and replaced prior to expiration date.

Fuel Oil Tanks Fuel oil tanks should be inspected at minimum every three years. The new regulations require that above-ground storage tanks (ASTs) meet certain safety measures. Please find the checklist for the new requirements here:
Customer Checklist
Tanks should also be clear of surrounding clutter and obstacles to make the inspection process easy for the technician.

There are currently two rebate programs in the State of Vermont to help people remove and replace faulty fuel oil tanks.
Information is available here:
Financial Assistance
Tank Rebate

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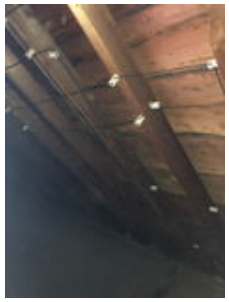

Knob & Tube Wiring If active knob and tube wiring is located in the areas where work will be performed, contact an electrician for replacement and deactivation before the scheduled work. Work cannot proceed where active knob & tube is in place.

Radon One in seven Vermont homes has elevated levels of radon. Radon is a naturally occurring radioactive gas that has no color, smell or taste. Radon comes from the decay of uranium, which is a radioactive element found naturally in the Earth's crust. Over billions of years, uranium decays into radium, and eventually, radon. Radon is present in outdoor air, and radon levels can build up inside people's homes.
In Vermont, the average radon level in the outside air is 0.4 pCi/L and the average level in homes is about 2.5 pCi/L. The EPA has set 4.0 pCi/L (picocuries per liter of air) as the action level for radon.
Energy improvements can help lower radon levels in homes. If radon levels remain high after energy improvements; a radon mitigation system can be installed to exhaust air from underneath your foundation to outside.
Unless you test for it, there is no way of knowing if radon is present in your home.

Request your free kit if you haven't tested already:
Call: 800-439-8550 (toll-free in Vermont)
Email: radon@vermont.gov
Vermont Radon

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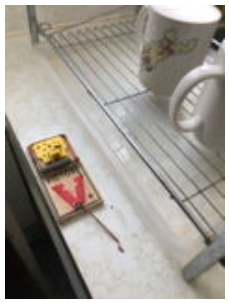
Lead Safe Practices
Contractors completing projects in homes built before 1978 must follow all state and local regulations pertaining to lead safety.
More information on Healthy and Lead Safe Homes Programs can be found here:
Lead Safe Homes



Pest Control One of the side benefits of comprehensive weatherization is eliminating entries and corridors where pests can travel.
Pests, such as mice, are a health and safety concern as they can carry diseases such as hantavirus, salmonellosis and listeria through their urine, droppings, saliva and nesting materials (often fiberglass insulation).
Reducing pest populations will help to create a healthier and safer indoor environment.

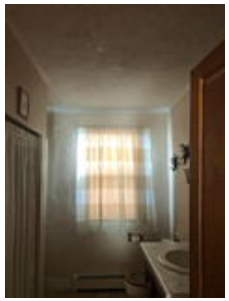
Home Performance Opportunities

CUSTOM MEASURE

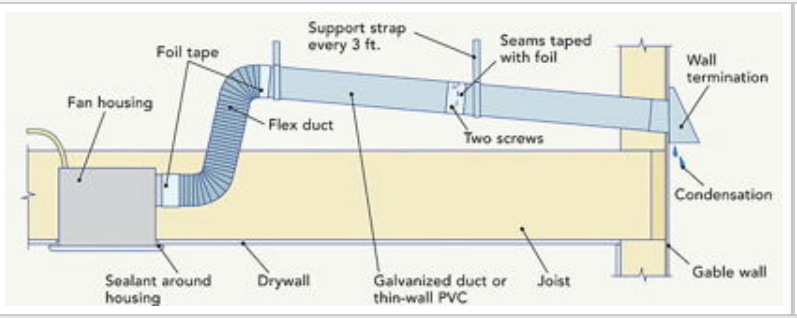
Approximate installed cost

Why it matters

Making our homes more energy efficient not only saves us money but increases comfort and can be beneficial to the health and well-being of the occupants.



High Performance Bath Fans
It is highly recommended that exhaust fans be installed in all bathrooms. It is particularly important where showers and baths are located. This work is best done before you attic insulation is installed. Installing an energy efficient and quiet model like the Panasonic Whisper Green Models with a timer switch that provides automatic runtime will allow ventilation should your house require it.
The models are equipped with built-in backdraft preventers as well as top quality flaps at termination.



The fans should have rigid ductwork where possible that slopes to the exterior termination flap to direct any condensation out of the attic.
All fans need to be ducted to the exterior in order to receive Efficiency Vermont incentives.

Upgrade to LED
Continue to replace incandescent light bulbs that are used more than an hour per day with LED bulbs. These bulbs typically

Home Performance Opportunities

CUSTOM MEASURE

Approximate installed cost

Why it matters

Making our homes more energy efficient not only saves us money but increases comfort and can be beneficial to the health and well-being of the occupants.

reduce lighting energy use by 75%. The technology has come a long way in recent years and LED's now offer a broad spectrum of warm light and are dimmable. There is an LED option for virtually every style of bulb out there.

Buy your bulbs in Vermont to take advantage of Efficiency Vermont's outstanding subsidies. With these subsidies most bulbs cost less than $5 a piece.

Thermostats

The location of your thermostat can affect its performance and efficiency. Read the manufacturer's installation instructions to prevent "ghost readings" or unnecessary furnace or air conditioner cycling.

To operate properly, a thermostat must be on an interior wall away from direct sunlight, drafts, doorways, skylights, windows, vents and fans. It should be located where natural room air currents–warm air rising, cool air sinking–occur. Furniture will block natural air movement, so do not place pieces in front of or below your thermostat. You may also consider replacing for a programmable thermostat. In which case you will want to make sure your thermostat is conveniently located for programming. Energy.gov.

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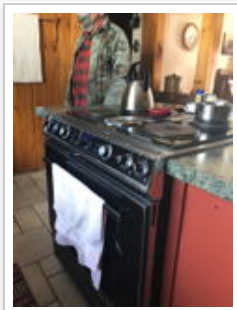
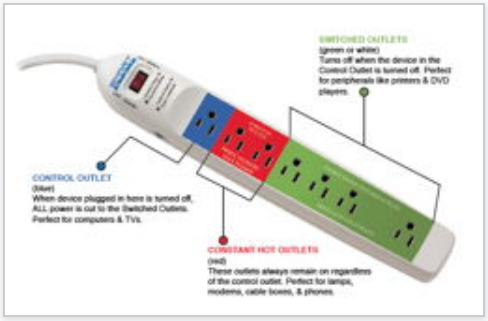


Range Hood

It is highly recommended that kitchen range hoods be installed especially with propane or natural gas fueled cookstoves. Particulate matter from cooking, even with electric, can infiltrate the home and create indoor air quality issues. The range hood can also be run at intervals to assist with air changes in the home.



Smart Strips

Consider using “smart strips” in your home. Anything that is plugged into an outlet tends to draw a “phantom” current, even when it is not on.

Water Sense

Save water and protect the environment by choosing WaterSense labeled products in your home.

Showering is one of the leading ways we use water in the home, accounting for nearly 17 percent of residential indoor water use—for the average family, that adds up to nearly 40 gallons per day.

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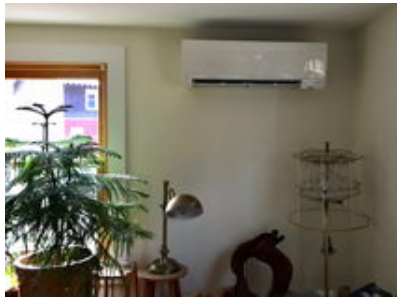
IAQ Monitors Consider adding an Indoor Air Quality Monitor such as the Air Visual Pro or Foobot to observe levels of pollutants in the home. The Air Visual Pro helps detect Co2, Particulate Matter and monitors Relative Humidity and Indoor Air Temperature. In addition to these conditions and pollutants, the Foobot can detect VOC levels in the home.



Install a cold climate heat pump, like the Mitsubishi Hyper Heat or similar models from Daikin or Fujitsu. These units are specifically designed to perform even in our extreme cold climates in Vermont.

Solar Power
Consider finding out if your home is a good candidate for solar power.

With a photo voltaic solar system you can produce electricity on your own property and offset the power from your utility. Including efficient heat pump technology you can now heat your home and hot water and control the fuel source.

Financing

About financing

The loan scenario(s) listed are examples only and are not a formal offer of financing. Rates, terms and closing costs and eligibility requirements may vary.

Energy Loan

THE MATH

Job Cost	$ 13,070
Cash down and/or Incentives	$ 0
Loan amount	$ 13,070
Your loan payment: 5.00 % @ 120 months	$ 139
Estimated energy savings	$ 101
Net Monthly Cost	$ 38

TERMS & CONDITIONS

Minimum Loan	$ 2,500
Maximum Loan	$ 40,000
Min. Cash Down	$ 0
Rate	5.00 %
Term	120 months
Min. FICO Score	620
Closing costs	250

DESCRIPTION

Can be used for Thermal Shell improvements, Weatherization, Heating and Ventilation, Heat pump Technology Energy Efficient Appliances and Renewable Energy

Tania M. Therrien, Loan Officer, (802) 797-8612, ttherrien@mwwvt.org

Metrics

About the metrics

These metrics are for the whole house in a pre and post-retrofit state.

The 'Baseline' savings numbers will likely not be the same as the actual energy consumption of the home. These numbers are weather normalized and then projected based on the 30 year weather normals data from NOAA. In other words, this is the modeled energy consumption of the home for a typical year, not the year that the utility bills were from.

FUELS	BASELINE	IMPROVED	SAVED
Total Fuel Energy Usage therms/year	2,357	1,674	683
Wood Energy Usage cords/year	7.05	5.40	1.65
Propane Energy Usage gallons/year	214	79	135
Oil Energy Usage gallons/year	536	373	163

METRIC	BASELINE	IMPROVED	SAVED
Electric Energy Usage kWh/year	5,340	5,769	-429
Total Energy Usage MMBtu/year	254.00	187.00	67.00
Fuel Energy Cost $/year	$ 3,939	$ 2,660	$ 1,279
Electric Energy Cost $/year	$ 908	$ 981	$ -73
Total Energy Cost $/year	$ 4,847	$ 3,640	$ 1,207
CO2 Production Tons/year	23.2	18.0	5.2
Payback years			9
Total Energy Savings			26%
Total Carbon Savings			23%
Net Savings to Investment Ratio SIR			1.6
Net Annualized Return MIRR			7.0%

HEATING & COOLING LOAD CALCULATIONS		
Heating Load Btu/hr	Base: 95,502	Improved: 67,896
Cooling Load: Sensible Btu/hr	Base: 26,594	Improved: 22,433
Cooling Load: Latent Btu/hr	Base: 3,878	Improved: 2,801
Winter Design Temperature	Outdoor: -8°	Indoor: 70°