

ENERGY EFFICIENCY IN HISTORIC HOMES

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KEEP IN MIND

Throughout the restoration/renovation process, it is important to take into account the energy costs of production, shipping, installation and removal associated with replacement. Life cycle analyses can help determine energy efficient decisions for historic homes. Sometimes the greenest buildings are ones that are already built.

CAN HISTORIC HOMES BE ENERGY EFFICIENT?

While modern technology has enabled us to create very energy efficient homes, historic buildings have some secrets up their sleeves. In the past, homes and buildings were constructed with the local landscape, the resiliency of materials, and climate in mind, creating naturally efficient systems. This guide will help you maximize the potential of your historic building while preserving the features that make your home or building unique!

FIRST STEP...THE ENERGY AUDIT

The first step to saving energy in a historic home is to complete an energy audit. An energy audit evaluates your home's current energy use and identifies insufficiencies in the building envelope and mechanical systems. The audit also inspects the building envelope for areas of air infiltration. Tools such as a blower door test and infrared thermography may be used to identify specific areas of infiltration, lack of insulation or thermal bridging. The type and age of mechanical systems and major appliances are also recorded.



Once results are measured, your energy auditor can recommend the most cost-effective projects, such as air sealing, added insulation, lighting improvements, and repair or replacement of mechanical systems or major appliances. Ask the energy auditor to provide an energy improvement plan that establishes priorities and alternatives. Seek solutions that save the most energy using the least destructive, invasive, and costly means. Reducing air infiltration, sealing penetrations in the building envelope, and adding insulation—particularly in the attic—can generate significant improvements at relatively little cost.

Vermont Incentives and Programs

[Efficiency Vermont](#) can provide:

- 1) Advice on how to lower your heat and electricity bills cost effectively
- 2) Technical assistance if you want to do an energy assessment yourself
- 3) A list of local qualified ENERGY STAR contractors who can provide an energy audit.

If you decide to have an on-site assessment with an ENERGY STAR contractor, you may be eligible for state incentives that can help cover part of the costs of insulation, air sealing, and appliances and heating and ventilation systems through Home Performance with ENERGY STAR.

[Weatherization Program](#) for low income Vermonters through the Agency of Human Services' Department for Children and Families

[Capstone Weatherization Assistance Program](#): Capstone will perform energy savings renovations to stop heat from leaking out of the building and reducing the loss of heat through the walls and roofs of your home (also known as weatherization). For income qualified individuals there is no charge through our **Weatherization Assistance Program**. If you do not qualify under the no-cost program, we can still help through **Energy Smart**, our award-winning social enterprise.

Central Vermont Contractors: A comprehensive list of Central Vermont Contractors specializing in energy efficiency can be found at the following [link](#) on the Montpelier Historic Preservation Committee page.

Going Solar: There are currently more than 80 solar companies at work throughout the value chain in Vermont. These companies provide a wide variety of solar products and services ranging from solar system installations to the manufacturing of components used in photovoltaic panels. You can find your local provider by checking the map at this [link](#).



IF I ONLY DO ONE THING, WHAT SHOULD IT BE?

Unless an audit specifies otherwise, reducing air infiltration is one of the least intrusive, most reversible, and most cost effective retrofit strategies. Leakage of air into a building can account for 5 to 40 percent of space conditioning costs, which can be one of the largest operational costs for buildings. In addition, unwanted air leakage into and out of the

building can lead to uncomfortable drafts. Air infiltration can be especially problematic in historic buildings because it is closely linked to increased moisture movement into building systems. Once you know where the air is coming in, the good news is that you can probably seal the leaks yourself. The Environmental Protection Agency's Energy Star website has a [Do-It-Yourself Guide to Sealing and Insulating](#) on how to do your own air sealing.



Most Common Sources of Air Infiltration

Drafts can also be reduced by simple measures such as:

1. Closing curtains, blinds, shades, or shutters at night in cold weather.
2. Using draft snakes at doors (or simply a rolled towel).
3. Closing the fireplace damper and/or using an inflatable device that fills the flue opening (sold under a variety of names) when the fireplace is not being used in winter.
4. Caulking loose window and door frames where they join walls, sealing where the foundation meets the sill, and sealing cracks in masonry and foundations.

While energy can be saved by reducing the amount of air infiltration, it is important not to seal a historic home entirely, as historic buildings were designed to —breathe. The goal is to find a good balance. Without some air movement, these structures can develop problems associated with moisture accumulation including wood deterioration, mold growth and insect infestations.

It is important to promote air circulation and/or reduce moisture levels in crawl spaces and cellars with dirt floors, especially in the summer months. In basements and crawl spaces with earthen floors, installing a polyethylene vapor barrier and securing it to the foundation walls will also reduce the amount of vapor and moisture moving through your house. In addition, if your heating, cooking, water heating, or other appliances have a pilot light, it is imperative that they are properly supplied with air and are vented correctly. Your utility, appliance, or energy audit professional can help make sure your appliances are in good operating condition. Relatively simple actions such as using a range hood when cooking and a bathroom vent when bathing can also help reduce moisture build up in your home.

HISTORIC WINDOWS: REPLACE OR RENOVATE?

There is a common misconception that replacing historic windows will save energy. This argument, often used to sell replacement windows, is simply not true. There are ways to improve the performance of historic windows that do not require their replacement. Energy leaks in old windows are often due to poor maintenance. Caulking, weather-stripping, and replacing deteriorated glazing compound to seal air leaks should always be done before considering replacing historic windows.



Why should I restore my historic windows?

- Historic windows can usually be repaired while most new windows cannot be repaired, or even recycled, and may wind up in landfills.
- Wooden historic windows are often constructed of hardier materials, such as old growth timber, that are resilient and more weather resistant than new windows.
- When historic windows are properly restored and a good storm window is added, their energy savings are comparable to insulated glass windows. Adding a storm window brings the U-value, or the indication of heat flow through a window, close to that of insulated glass. Adding exterior storm windows to highly decorative or multi-light windows may conceal important details. In these situations, interior storm windows may be preferable.
- Restoration avoids the energy intensive production, shipping, installation and removal associated with replacing windows. Restoring existing historic windows makes the best use of existing resilient materials and promotes conservation.

Check out: <http://www.ptvermont.org/help/windows.php>

“The greenest buildings are ones that are already built”

Is it expensive to restore a historic window?

According to the [Field Study of Energy Impacts of Window Rehab Choices](#), first year energy savings between a restored wood window with a good storm window vs. a replacement window was \$0.60. Yup, less than a buck! Almost every retrofit option offers a better return on investment than replacement windows.

Ultimately, before implementing energy conservation projects, the existing energy-efficient characteristics of a historic building should be assessed. Conducting a window inspection is a good way to assess the overall condition of your windows and to determine whether repair or replacement is the better alternative.

CHANGE YOUR BEHAVIOR – THE LOW IMPACT AND LOW COST WAY TO SAVE ENERGY!

Significant energy savings can be achieved by modifying or changing your behavior. These actions are often low or no cost and have a low impact on the character of your historic home. Don't underestimate the power of behavior modification.

Things to try:

- Lower the thermostat in the winter and raise it in the summer.

- Install a programmable thermostat to automatically turn down the heat when you are sleeping or away from the house.
- Turn off lights when you're not in the room, reduce the number of lights used, maximize natural light, and switch light bulbs to energy-saving LEDs.
- Use operable windows, shutters, awnings, and vents as originally intended to moderate temperature.
- Use drapes and curtains to reduce drafts around your windows.
- Clean radiators and forced air registers to ensure proper operation.
- Have your furnace and boiler cleaned and serviced at least once a year. Clean the furnace filter at least once a month during the heating season.
- Make sure furnace ducts are sealed and hot water pipes are well insulated.

THE ENERGY EFFICIENCY GURU: MORE ADVANCED STEPS

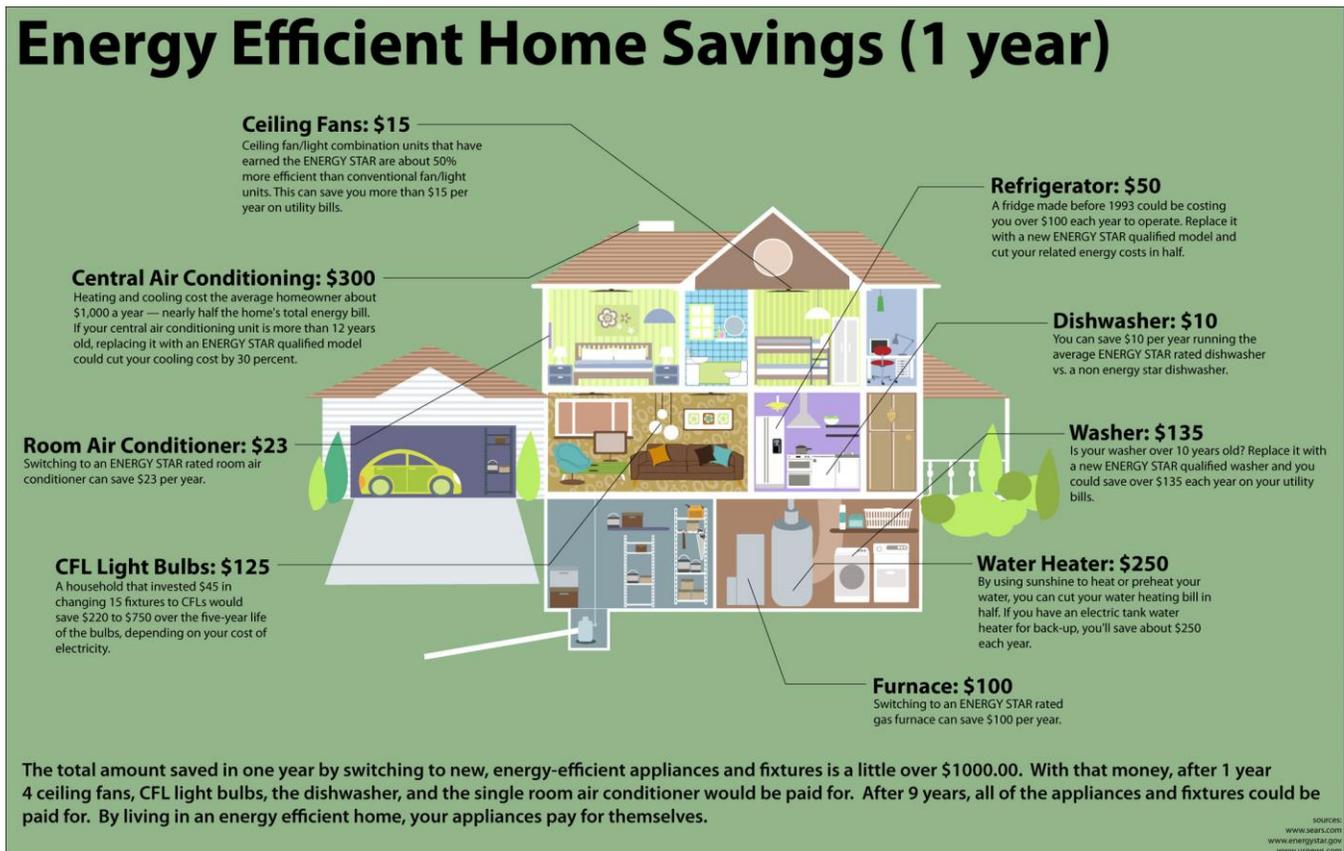
Insulation

If you are going to insulate anywhere, attic spaces are often the most significant source of heat loss. After attics, insulating basements can also have value for efficiency and comfort. But before adding insulation, make sure you have effectively air sealed the space.

Ducts and pipes can also be sources of conductive heat loss. Wrapping insulation around heating and cooling ducts and hot water pipes can stop heat loss and enhance the efficiency of these systems. Use insulation that is intended for this purpose and install it according to the manufacturer's recommendations for the best results

Select Energy Efficient Appliances

When choosing new appliances for your historic building, select products labeled ENERGY STAR, which meet energy efficiency guidelines set by the Environmental Protection Agency and the Department of Energy.



Select Efficient HVAC and Electrical Systems

Important Resources:

[EPA Energy Advice for Owners of Historic and Older Homes](#)

[Preservation Trust of Vermont: Help for Historic Properties](#)

[Department of the Interior: Improving Energy Efficiency in Historical Buildings](#)

The need for modern mechanical systems is one of the most common reasons to undertake work on historic buildings. This often involves installing new heating, ventilation or air conditioning (HVAC) systems.

Early heating and ventilation in America relied upon common sense methods of managing the environment. Builders purposely sited houses to capture winter sun and prevailing summer cross breezes; they chose materials that could help protect the inhabitants from the elements, and took precautions against precipitation and damaging drainage patterns. While historic buildings may naturally moderate temperature, they are also not easily adapted to house modern precision mechanical systems.

No set formula exists for determining what type of mechanical system is best for a specific building. Each building and its needs must be evaluated separately. Most mechanical systems require upgrading or replacement within 15-30 years due to wear and tear or the availability of improved technology. Therefore, historic buildings should not be greatly altered or otherwise sacrificed in an effort to meet short-term systems objectives.

Careful planning must be provided early on to ensure that decisions made during the design and installation phases of a new system are appropriate. The Department of the Interior provides a helpful guide for [heating, ventilating and cooling historic buildings.](#)

Thank you for reading this brief overview of actions you can take to make your historical home more energy efficient. Click links to learn more and tailor actions to your home or building. Good luck in all your energy saving endeavors!