

# WEATHERIZATION OF HISTORIC BUILDINGS: FREQUENTLY ASKED QUESTIONS

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## **Introduction**

This paper provides basic information about weatherizing historic buildings, including a description of best materials and methods. With modern energy codes and costs, building owners are looking for the most energy efficient building possible. But some methods of increasing efficiency do not work for older buildings and can even result in significant damage. The methods are arranged from the easiest and most effective, to the more complicated and costly. More detailed information is available in *Preservation Brief 3*, available from the National Park Service at <http://www.nps.gov/history/hps/tps/briefs/brief03.htm>.

## **AIR INFILTRATION**

***What's the best way to reduce air infiltration in an old building?*** Air infiltration generally accounts for about half of all the heat loss in old buildings. Weatherstripping doors and windows both inside and out is the easiest way to reduce infiltration. It requires little skill and the cost is low. Adding foam outlet and switch sealers is also a great way to reduce air infiltration.

## **ATTIC INSULATION**

***What type of attic insulation should be used to reduce heat loss?*** Attic spaces are a major source of heat loss in historic buildings. There are a variety of insulation options, including fiberglass batts and blown-in vermiculite or cellulose. The key is to place the insulation between the attic floor joists if the space above is unoccupied or between roof joists if it is regularly used or heated. With either installation it is important to have the vapor barrier pointed down toward the heated space, and to have the attic adequately ventilated.

## **STORM WINDOWS**

***Are inexpensive aluminum storm windows a good option?*** Exterior storm windows are a good solution, and if they are installed correctly will give a better R-value than double insulated glass. They are also better for historic buildings because they do not require removing historic windows. Exposed metal might not look so good, but a coat of paint can often make them blend in better if anodized aluminum trim is not available. Interior storm windows are not a good idea because they can cause serious moisture problems on the windows.

## **MECHANICAL SYSTEMS**

***Is replacing the furnace the best solution?*** Replacing existing mechanical systems for a more efficient system is a great way to reduce energy consumption, provided new ductwork does not have to be installed. New ductwork sometimes requires that the ceilings be lowered, which can obscure architectural details that are important to the building's character. However, new ductwork can be accommodated in out of the way locations or non-significant areas. Radiant heat systems are also good solutions that don't require ductwork.

## **PASSIVE SYSTEMS**

***Aren't most historic buildings designed to reduce energy use?*** Many older buildings have natural ventilation and lighting built in. If windows are painted shut, a little elbow grease can get them working again. For optimal air circulation with double-hung windows, open both the top and bottom sash. To increase daylight deep in the interior of a building, uncover any existing transom windows. Use blinds or curtains to reduce heat gain on east and west facing windows.

***What about modern passive systems?*** These include solar and wind power. Solar systems can be effective on some large commercial buildings that do not have highly prominent roofs. They are less effective in the Pacific Northwest than in other regions of the country. Wind power can also help add passive energy to an electrical grid, but it generally requires significant structural components to hold it up, a feature that most existing buildings were not designed to manage.

## **BASEMENT & CRAWL SPACE INSULATION**

***Should basements be insulated?*** Crawl spaces and unheated basements tend to result in significant heat loss, just like attics. Insulate between the floor joists with the vapor barrier pointed up, and provide adequate ventilation. If there is a furnace in the basement or if the space is heated, insulation should be placed along the foundation walls with the vapor barrier pointed in. Either batt or rigid insulation is appropriate.

## **WALL INSULATION**

***Does wall insulation have a big impact on reduced energy use?*** No. A smaller percentage of heat is lost through walls than other locations, and installing wall insulation in historic buildings, especially wooden ones, is very tricky. It's best not to demolish or damage any historic material, whether it's interior lath and plaster or exterior siding. The cost of insulating walls is usually not recovered in a reasonable period of time. Wall insulation often causes deterioration because of inadequate ventilation or inability to see problems. If walls must be insulated, the best solution is to carefully remove the exterior siding so that it can be re-installed. However, if interior plaster or other finishes have been removed, installing from inside is the best option. Use batt insulation with the vapor barrier facing inward. Another solution, blown insulation, is more troublesome because there is no vapor barrier. All adjacent interior walls must be painted with impermeable paint and adequate ventilation must be provided in the wall cavity. Expanding foam is not a good solution because it emits moisture when it cures, and it often shrinks enough to significantly reduce thermal capacity. Rigid insulation can be added inside a building, with the vapor barrier facing in, but this material is highly flammable and needs to be fireproofed. Adding new insulated siding on the outside eliminates or damages historic materials and covers up potential rot or insect problems.

## **REPLACEMENT WINDOWS**

***Are vinyl replacement windows a good investment?*** Probably not. Vinyl windows tend to warp and crack over time. If the building still has original windows, it's better to add storm windows. They are a cheaper solution, so owners are more likely to recover the cost of investment and the historic look and material of the building is preserved. If existing windows are too deteriorated to repair or are poor modern replacements, then new insulated windows are a good solution. Metal and/or wood are reasonable options as long as the window size, number of panes, muntin size, and frame size closely match the historic ones. If metal is used it should have a thermal break. Use care in selecting double insulated glass as it eventually loses its seal and gets foggy or moldy between the sheets of glass resulting in loss of performance, visibility, and eventually the need to replace the entire unit.