ENERGY EFFICIENCY AND HISTORIC HOMES ARE NOT ENEMIES

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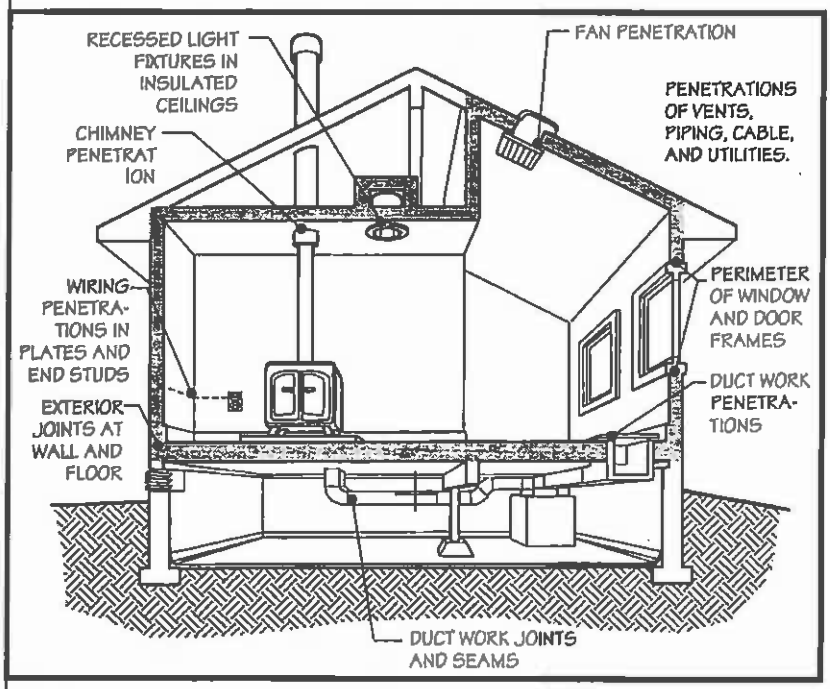
Yes, Virginia, historic homes can be energy efficient! You do not have to decide between energy efficiency or historic homes. You can make your old house more energy efficient by following the general direction of this article. Everything in it can be done by the average homeowner and is something that I have done to my own old house, or am considering in the future. Most of the improvements are relatively inexpensive, but they also rely on the people in your house to work the best. None of these weatherization measures requires you to take a second mortgage, and most can be done on a weekend in the right weather. These energy efficiency measures will also meet the *Secretary of the Interior's Standards,* which are the basis for most design review in many local municipalities.



***Critical areas for** air leakage **control.** **Photo** courtesy of: U.S. Department **of Energy,** http://resourcecenter.pnl.* ***gov/**cocoon/morf/ResourceCenter/* ***graphic/**643*

Older buildings were built to last and to be used. The U.S. Energy Information Administration found that buildings constructed in the early 20th century are more energy efficient than those built from the Great Depression to the end of century.[1] Built when heating and cooling were more difficult to accomplish, many older homes had non-mechanical energy-saving features, such as south-facing facades for solar gain, deep eaves and awnings for shading, and cross-ventilating hallways and operable windows. Over time, whether in wisdom or ignorance, we have remuddled these houses by blocking in openings for much smaller windows, closing off lightwells to increase living space, plugging or removing built-in ventilation ducts, and securing windows shut. All these measures reduce the energy efficiency that is built into many historic buildings.

Passive measures relying on changing the behavior of each occupant:

- Reduce the amount of electric lighting needed by taking advantage of daylighting as much as possible.
- Use operable shutters, adjustable awnings, and window treatments such as closable drapes or heavy curtains to keep heat out in the summer and keep heat in the winter.
- Install a programmable thermostat to control the temperature according to use.
- Put on a sweater or another layer of clothing when you are cold as your mother used to tell you.
- Service and clean mechanical equipment every six months or yearly
- Change or check air filters for mechanical equipment every month.

Beyond the passive measures, the amount of air infiltration from small cracks and holes on the exterior of your old house can be the equivalent to leaving a window open all winter (see illustration above). The whole house needs to be examined on a yearly basis to make sure no new holes or cracks have developed. The best way to check for possible

[1] US. Energy Information Administration, *Emissions of Greenhouse Gases Report.*

areas of air infiltration is to light an incense stick and watch the smoke while moving it around any opening in a wall. A couple tubes of caulk used around windows and doors where they met the siding can do wonders. Larger gaps or cracks may require spray foam. Generally, spray foam should be used sparingly to minimize the risk of trapping moisture. Installing weather-stripping, either permanent spring bronze or temporary foam, to windows and doors will reduce air infiltration. Just make sure that they shut when done and realize that it might take some trial and error to get it right. The same goes for installing foam gaskets in electrical outlets and switches on exterior walls. All these items are available in most hardware and discount stores and are relatively inexpensive. Just these measures can reduce your energy usage significantly.

Think of your body as a house. If you are cold, you would put a hat on your head. Insulate your attic first, but that does not mean to fill the whole space. It still needs to ventilate properly. Just adding three and a half inches of insulation in your attic can save more money than replacing windows and with a much quicker payback in your investment. The next step is to insulate your foundation and/or basement. Crawl spaces must have a layer of heavy mil-plastic sheeting spread across the space, lapped up the walls a few inches and secured in place with sand or rocks. This moisture barrier will help keep the space dry. Then consider adding insulation between your floor joists secured with wire anchors or string in basements and crawl spaces if reasonably accessible and if it doesn't interfere with electrical and plumbing already in place.

Weatherization measures meant to protect value:

- Sealing cracks and adding insulation are the most efficient ways to weatherize your home.
- Adding weather stripping to all exterior doors and windows
- Installing foam insulation gaskets under covers on all outlets and switches on exterior walls.
- Sealing the basement by insulating all access doors and sealing all cracks in the foundation walls, inside and out.
- Adding insulation to accessible attic space and floors above unheated crawlspaces and basements. Insulation vapor barriers should always face the heated space.
- Sealing and insulating all attic doors or hatches.
- Adding exterior storm windows to single-pane windows. Make sure they are properly sealed, caulked, and have open weep holes at the sill for moisture to escape.
- Adding appropriate storm and screen doors.
- Insulating all hot-water pipes and furnace ductwork. Check all pipes and ductwork for leaks.
- Closing fireplace dampers when not in use or considering adding an inflated chimney balloon plug or insulation if warranted.
- Planting trees or adding awnings or arbors on south and west elevations.

Old buildings must breathe just like people. Bathrooms, kitchens, and laundry areas need to be ventilated to the exterior. If mechanical ventilation is unavailable, opening a window and running a fan is beneficial to the health of your house and your family. Moisture and mold problems can occur from vents that empty into attics or crawlspaces. We live differently then we did before World War II. Today, a family of four doing normal activities—showering, cooking, using a dishwasher, etc.—can produce ten to 16 pounds of moisture a day in a single family home. If ventilation has been increased but moisture is still a problem, dehumidifiers should be considered.

Storm Windows: Interior versus Exterior

While interior storm windows may perform better than exterior storm windows, they also have some potential drawbacks. One is that they tend to be more prone to water condensation between them and the window sash. This condensation can cause the windowsill, frame, and sash to deteriorate if not monitored carefully. Interior storm windows also hinder opening the window for ventilation because the panels must be removed in order to open the window, thus negating a building's passive heating and cooling system. Finally, interior storm windows do not provide any protection for the window sash from the elements. As a result, the greater monetary savings that might result from an interior storm window's greater energy efficiency may be offset by the cost of more frequent and extensive maintenance of the window sash. Property owners should take all of these factors into account when considering using interior storm windows.

In some situations, though, interior storm windows may be the most appropriate choice. For example, historic buildings that pre-date the advent of storm windows and are intended to appear exactly as they did when built may benefit from unobtrusive interior storm windows. Such buildings usually have sophisticated climate control systems for heat and humidity, and their condition is monitored more closely than those of an average

property owner's home. Metal casement windows or other swing-out windows for which exterior storm windows are not available may also require interior storm windows, but in most cases, they will prevent the window from being opened from the inside. Interior storm windows may be the only reasonable choice for curved windows, such as fanlights above doors or other windows. Of course, interior storm windows consisting of plastic sheeting affixed with double sided tape as a temporary measure when the winter winds are howling are a time tested and honored tradition of building restoration projects.

People often groan when I start talking about storm windows in general. Few people want to go through the routine of carrying storms or screens up the ladder to install on the house every six months. When clear-aluminum triple-track storm windows came on the market after World War II, people no longer had to remove their wood-framed storm windows on a yearly basis. Yes, these aluminum storms get a bad rap, but they are not permanent and can always be removed. They also protect the primary windows from the elements. Their biggest drawback is that the fixed upper panel prevents ventilation through the operable upper sash of the window; but in many cases, the upper sash doesn't move either by design or because it has been fixed in place. Even my little c. 1936 house has the upper sashes nailed, screwed, or painted in place, which makes them less efficient.

Insulate exterior walls or not? One day my visiting father from the Midwest was working on my house and decided to relocate an outlet on an exterior wall. He turned around with a somber expression and told me my house didn't have any insulation in my walls. I fell over laughing to his bewilderment. I told him, of course, I knew my house didn't have insulation, and it wasn't necessary in our climate (in Oregon). This issue is an ongoing discussion with preservationists and insulation/weatherization contractors. One of the issues preservationists want to avoid is "woodpeckered" houses, where siding has been drilled for blown in insulation leaving behind highly visible plugs or patches after installation. Insulation is also an expensive process and often not a cost-effective measure for homes with original lathe and plaster walls and historic siding on the exterior.

A c. 1936 window that needs to be repaired and not replaced. Photo courtesy of the author

Adding insulation to historic wall cavities needs to be done with caution. Improperly installed insulation can prevent moisture from escaping and lead to paint failure from condensation, termite infestation, and structural damage. During the energy crisis in the late 1970s and in the 1980s, many insulation products pumped into houses to save energy ultimately failed or caused bigger problems. Some were toxic with a formaldehyde base or other chemicals which we now realize are unsafe. In some cases, insulation installed in the past has settled or turned to dust, thereby negating any insulation value. Most new insulating products—"green" or not—have not been around long enough to determine their long-term effects on historic homes. A large number of the foam insulations are meant to be permanent and are not removable from any building components, historic or otherwise.

Conclusion

Recent renewed interest in energy efficiency and environmental sustainability has given rise to the misconception by many that old houses are inherently inefficient, when, in fact, the opposite is true. Local preservation commissions can help property owners get the most out of their old house by providing simple, easy to follow advice such as is given above, and by referring them to additional sources of information.

In addition to the work of the State Historic Preservation Offices and local preservation advocates, the National Trust for Historic Preservation is taking the lead in promoting the links between sustainability and historic preservation. Historic preservation can and needs to be an important component of any revitalization effort to promote sustainable development in any community. The conservation and improvement of our existing built resources,

including re-use of historic and older buildings, greening the existing building stock, and reinvestment in established and historic communities, is crucial to combating climate change. We can all do our part for energy conservation by starting at home.

Additional Resources

Lord, Noelle, "Embracing Energy Efficiency," *Old-House Journal,* September/October 2007, pp.40-45.

National Institute of Building Design, Whole Building Design Guide
http://www.wbdg.org/index.php"Sustainable Historic Preservation.

National Park Service, Technical Preservation Services. "Weatherizing and Improving the Energy Efficiency of Historic Buildings." *http://www.nps.gov/history/hps/tps/weather/index.html.*

National Trust for Historic Preservation, Weatherization Guide for Older & Historic Buildings, *www.PreservationNation.org/weatherization.*

Sedovic, Walter and Jill H. Gotthelf, "What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows." *APT Bulletin: Journal of Preservation Technology,* 34:4, 2005.

"Woodpeckered" house due to blown-in insulation. Photo courtesy of the author.

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