

## Window Weatherization Tips & Strategies

Windows are the most visible, yet commonly under-appreciated components of older and historic homes and buildings.

While being very beautiful, original historic windows also serve a great purpose – they impart a building's inside-outside connection. They provide ventilation and light, and can function as emergency egress. Above all, they offer clues to a building's history because they are integral aspects of architectural design.

However, despite all of these attributes, windows are an easy target and are all too often blamed for energy loss. Commonly, people jump to replace their historic windows because companies promise that their replacement windows will not only save them time and money, but that their products and services are the "green" thing to do. In fact, a thriving industry has grown around the perceived need to replace rather than restore.

Have you ever wondered why there are no replacement fireplaces? Fireplaces with ill-fitting or missing dampers leak more heat than windows do, but salesmen don't leave flyers for new dampers in your mailbox, do they?

One reason why it is tempting for homeowners to replace their original historic windows is because they can immediately see a difference when a window is replaced. And, even though a project like sealing air leaks will ultimately save more energy than replacing windows, there is relatively low demand for air-sealing services. As Tom Kenny, manager of C&O Conservation, has said, "I provide something that is invisible." The following frequently asked questions are intended to not only inform and inspire, but to demonstrate how you can keep your old windows, achieve energy efficiency, and be "green" throughout the process.

**Q**

**Why do the original windows of my older home matter? What do they contribute to my home?**

**A**

**For so many reasons, the original windows of older and historic homes and buildings are what make them places that matter.**



Keeping your home's original windows is more than just the "green" thing to do. Just ask historian and author James Garvin, who has said that "any historic building with its original sashes and glazing therefore retains a higher degree of architectural integrity than a comparable structure in which the sashes have been replaced. Where original sashes survive, their preservation should be a paramount concern of the building's owner."

Consider it this way: If you had a beautiful piece of art that was custom designed, crafted by hand, made from native old-growth wood, and imbued with clues to its age and crafting traditions, would you throw the authentic piece in the dumpster if a simulated plastic version suddenly became available?

Seems ridiculous, right? However, this is precisely what people all over the country are doing when they rip out their historic wood windows and replace them with new windows.

Windows are character-defining features of any home. Everything from their size, placement, proportional relationship to the wall space, style, and materials contribute to how a building looks and feels. Just ask historian and author James Garvin, who has said that "any historic building with its original sashes and glazing therefore retains a higher degree of architectural integrity than a comparable structure in which the sashes have been replaced. Where original sashes survive, their preservation should be a paramount concern of the building's owner."

Here is some additional food for thought:

### **Reason #1: Old Windows are Built with High-Quality Materials**

Wood windows made prior to the 1940's are likely to be made from old growth wood. Why does this matter? Old growth wood has distinct physical characteristics that can make it superior to new materials. For instance, this wood is denser and more durable, rot resistant, and dimensionally stable than modern wood. Also, wood used to make windows constructed prior to the 1940's was most likely harvested locally, making it better suited for local climate conditions.

Modern wood derived from tree farms grows fast due to management practices and the application of fertilizers. This is not necessarily bad because we need a steady supply of lumber for all sorts of uses. However, when it comes to selecting wood for windows, speedy growth is not always better. Fast-growing wood not only has growth rings that are further apart, but also a higher percentage of earlywood or sapwood. This earlywood is rich in sugars. Wood with more widely-spaced growth rings is less dense and therefore not as durable. The sugars feed the tree as it grows, but are also attractive to insects who don't care if the wood is a live tree branch or your window sill.

The slower and more naturally the tree is allowed to grow, the denser the structure. This results in a stable, dense wood that mills well, holds paint and stain well, is not as attractive to insects, and has natural rot resistance thanks to a higher percentage of latewood.

What does this mean for older windows? In short, a new wood window will not last as long as the original. What about mahogany or other hard woods? They may be an option, and will tend to be denser and of higher quality than plantation-growth southern yellow pine, for example. However, these high-grade wood products can be expensive. Also, if window replacement is being considered for sustainable reasons, it is far greener to retain and repair an existing window than to have timber shipped thousands of miles to be manufactured into a new product.

### **Reason #2: Old Windows "Fit" Their Openings**

Historic windows were made and custom installed to fit their specific window openings. Each opening is probably a little bit different, especially because natural materials react to their environment. For example, wood typically shrinks during dry weather and will swell with increased humidity. Older windows may have shifted and changed with their openings as the building aged. After 100 plus years, they may no longer be exactly square, but they still fit the opening.

If new stock replacement windows are installed in historic openings, there is very little chance that they will fit well. The resulting gaps around the windows will be just as – if not more – drafty as the historic windows that were tossed. Often, the size difference between the stock window and the historic window opening is compensated for by reducing the overall size of the opening. The result is a smaller window, less light, distorted proportions, and trim that doesn't match the opening.

### **Reason #3: Old Windows Can Be Repaired**

Traditional windows are made from individual parts. Each piece – the rails, stiles, muntins, stops, sill, stool, jamb, etc. – can be individually repaired or replaced in kind. Vinyl, aluminum, fiberglass, and composite windows are manufactured as a unit, and the components generally cannot be repaired. When a part fails, or the insulated glass seal breaks, or the vinyl warps, the entire unit must be replaced. In addition to being a "green" alternative, repairing and increasing the energy performance of existing wood windows is good for the local economy, as hiring a window repair specialist to refurbish windows creates skilled local jobs.

### **Reason #4: Old Windows Perform Well and are Energy Efficient**

A growing body of studies is demonstrating that a historic wood window that is properly maintained, weather stripped, and has a storm window can be just as energy efficient as a new window. While additional testing will provide more evidence, many people find that using a window-storm combination is even more efficient than having a new double-pane window unit alone. This is because the air space between a historic window and the storm provides several inches of added insulation.



**Should I really believe the hype about replacement windows being better than older original ones?**



**No. If your existing windows are wood and were made before the 1940's, they can perform just as well, if not better.**

### **Myth #1: Replacement Windows Will Save You Money**



The average person in the United States stays in the same house for between five and seven years. When it takes upwards of 40 years to recoup in energy savings what was spent to replace windows, many owners will never see the "savings" or fully recoup their expenses.

On average, replacing windows with new, higher-quality replacement windows (when properly installed) could save you about \$50 a month on your heating or cooling bills. However, this is after spending an average of \$12,000 dollars to install the windows (the average home has between 24 and 30 windows, replaced at an average of \$500-\$1,000 each). If you heat your house an average of six months a year, the savings are about \$300 a year. At this rate, it would take 40 years to even begin to recoup in energy savings the amount spent on the new windows. (Note: These figures assume that the windows are paid in cash or with zero percent financing. If the amount of interest paid on the total cost of the window replacement project is added, the payback period will be even longer.) By following some no- and/or low-cost methods to improve your home's energy efficiency, you can easily save that same \$50 a month on your heating bills without an outlay of thousands of dollars.

Even more important is the payback, or rather the lack thereof. The average person in the United States stays in the same house for between five and seven years. If it takes upwards of 40 years to recoup in energy savings what was spent to replace windows, the average person will never see their "savings" or recoup their expenses. Furthermore, the typical replacement window fails within about 20 years. So, in the time it would take to recoup the expenses of original replacement windows, statistically, the replacement windows will already have had to be replaced at least once.

#### **Myth #2: Replacement Windows are Guaranteed**

Many window replacement companies promise that by installing their windows, you will save 40% on your heating or cooling costs, guaranteed. However, if you read the fine print, you'll find that if you don't save that 40%, the maximum amount they will refund you is \$500. So, after spending thousands of dollars to replace your windows and then experiencing little appreciable energy savings, the guarantee isn't equivalent to your investment.

Many replacement windows also come with "limited lifetime warranties." Again, take the time to read the fine print. Even the better quality replacement windows limit the "lifetime" warranty on the glass to 20 years, installation to two years, and the non-glass components to ten years. You'll note that the "lifetime" better describes the lifetime of the product, not your lifetime or the lifetime of your home. Even more revealing is the fine print that describes what is not covered by the limited warranty. Also, notice that the warranties are only good if the company that issued them is still in business when you need have the window replaced. Not all warranties are transferable, or are only transferable within a certain amount of time from when the windows were installed. This means that if you purchase a house that has already had its windows replaced, your windows may no longer be covered by any warranty.

#### **Myth #3: Replacement Windows are Maintenance Free.**

Replacement windows are not maintenance free, though they may be easier to clean. This maintenance-free claim is most often used with companies that sell vinyl and aluminum windows. These windows simply cannot be maintained nor repaired. Traditional wood windows are composed of interlocking parts made from natural materials, and any part can be repaired or replaced. Vinyl, aluminum, fiberglass, and composite windows are manufactured as a unit and the components cannot be repaired. When a part fails, or the insulated glass seal breaks, or the vinyl warps, the entire unit must be replaced.

#### **Myth #4: Replacement Windows are the Environmentally-Responsible Choice**

Going green is about more than just energy performance. To determine real environmental impacts, one must take into account the embodied energy of the new and existing windows, the environmental impacts of manufacturing new products, and the expected lifecycle of the product. Embodied energy includes the energy required to extract the raw materials, transport them, make them into a new product, ship the product, and install it. Existing historic windows have all of this energy embodied in them. Tearing out historic windows for replacement units not only wastes embodied energy, it requires additional energy to remove and dispose them. This is on top of the energy required to create and install the new windows.

Statistically, it is virtually impossible to recoup, in energy savings, the amount of money spent on replacing historic wood windows with new windows before the new windows need to be replaced. The average person in the United States stays in the same house for between five and seven years. When it takes upwards of 40 years to recover in energy savings what was spent to replace the windows, the expense will never be recouped. Other studies have found that it can take as much as 222 years to recoup in energy savings what was spent on installing the replacement windows (Note: Calculations by [Keith Heberern](#)). Furthermore, the typical replacement window often fails within about 20 years. So, in the time it would take to recoup the original replacement windows, statistically, the replacement windows will already have had to be replaced at least once.



**I've seen the case made for and against the restoration of original windows. How do I know if I should replace or rehabilitate my windows?**



**This is a question that many owners of older homes face. Something to keep in mind – not everything you read about replacement windows is true.**



Many window replacement companies promise that, by installing their windows, 40% of your heating or cooling costs will be saved, guaranteed. However, the fine print reveals that if that 40% is not saved, the maximum total refund is \$500. So, after spending thousands of dollars to replace authentic historic windows, the refund isn't even close to what was actually spent on the new windows. Go figure!

Windows are often significant character-defining features of older and historic buildings. This alone is important and should not be overlooked or discounted in favor of perceived energy savings. With routine maintenance, and sometimes the installation of storm windows, an older window can perform well and continue to function for years to come. Rarely can a new replacement window match the design aesthetic or material of original windows.

This is not to say every old window should be saved. Yet, all too often, windows are replaced unnecessarily without considering the impacts or a cost-benefit analysis. Instead, owners might consider asking some questions first and exploring the options.

- Are my windows an important architectural or defining feature of my home?
- Are there ways I can retrofit my windows to achieve greater energy efficiency?
- Will replacement windows last as long as my originals?
- Are there more cost-effective approaches available other than replacement windows?
- Will replacement windows "fit" the character of my home or detract from it?

### **Does Energy Efficiency Trump Preservation?**

Going green is about more than just energy performance. To determine real environmental impacts, one must take into account the embodied energy of the new and existing windows, the environmental impacts of manufacturing new products, and the expected lifecycle of the product. Embodied energy includes the energy required to extract the raw materials, transport them, make them into a new product, ship the product, and install it. Existing historic windows have all of this energy embodied in them. Tearing out historic windows for replacement units not only wastes embodied energy, it requires additional energy to remove and dispose them. This is on top of the energy required to create and install the new windows.

### **What are the Real Costs of Replacement Windows?**

After spending about \$12,000 dollars on properly installed, high-quality replacement windows (the average home has between 24 and 30 windows, replaced at an average of \$500-\$1,000 each), a typical household might save about \$50 a month on heating or cooling bills. However, if a house is actively heated or cooled for an average of six months a year, the savings amounts to only \$300 a year. At this rate, it would take 40 years to even begin to recoup in energy savings the amount spent on the new windows. (Note: These figures assume that the windows are paid in cash or with zero percent financing. If the amount of interest paid on the total cost of the window replacement project is added, the payback period will be even longer.) By following some no- and/or low-cost methods to improve your home's energy efficiency, you can easily save that same \$50 a month on your heating bills without an outlay of thousands of dollars.

### **They Call Them "Replacement" Windows for a Reason**

Many window replacement companies promise that, by installing their windows, 40% of heating or cooling costs will be saved, guaranteed. However, the fine print reveals that if that 40% is not saved, the maximum total refund is \$500. So, after spending thousands of dollars to replace authentic historic windows, the refund isn't even close to what was spent on the new windows.

Many replacement windows also come with "limited lifetime warranties." It is important to take the time to read the fine print. Even the better quality replacement windows limit the "lifetime" warranty on the glass to 20 years, the installation to two years, and the non-glass components to ten years. "Lifetime" better describes the lifetime of the product, not the lifetime of the building. Research that Donovan Rypkema has compiled indicates that 30% of the time, a replacement window will be replaced within ten years. Even more revealing is the fine print that describes what is not covered by the limited warranty. Additionally, the warranties are only good if the company that issued them is still in business when you need to have the window replaced.

As you can see, replacement windows are called "replacement" for a reason.



**Storm windows are often presented as options for weatherizing original windows. Will installing those really help control my energy loss?**



**Adding either interior or exterior storm windows will improve both the energy efficiency of your windows and the comfort level of your home's occupants.**



There are a variety of different interior and exterior storm windows on the market that can help your original windows perform just as well – if not better – than those ugly vinyl things. Not only can they be custom made to fit your home's special windows, but they are also eligible for a [\\$1,500 federal tax credit](#). It definitely pays to check out this option!

There are many different types of storm windows to choose from. If you live in a historic district, your local preservation commission may have some guidelines to help inform your options.

### **Interior Storm Windows**

There are a number of interior storm window systems available. Most have aluminum frames with glass or plexiglass glazing. The unit is often attached to the inside of the window opening with a system of magnetic strips, hook and loop fasteners, etc. Interior storms are preferred by some people because they do not obscure the historic wood window details from the exterior; they can be custom made to fit individual window openings; they are easy to install in upper story windows without ladders; and can be easily installed and removed as needed. They also tend to be low-profile, do not obscure the window or light, and can be made to accommodate screens for warm weather use. The most often noted downside to interior storm windows is that they do not protect the historic wood window from the elements. This means that the primary window may need to be maintained more frequently than if it were protected with a storm window. Like all storm windows, interior storms need to be properly installed and vented so that condensation does not collect on either the storm or the primary window.

Another option for the DIY-er is to build an insulating panel for a window's interior. Click [here](#) for details on how to build these panels for your windows. [The Midcoast Green Collaborative](#) found that, by installing these insulating panels, the average house in their service area would save 100 gallons of oil in the first year alone.

### **Exterior Storm Windows**

Exterior storm windows can be made to fit virtually any window opening and window type. Aluminum storm window assemblies are the most common, but vinyl, fiberglass, composites, and wood assemblies are also options. Options abound, and you don't have to sacrifice style or ease of operation. If you have an unusual window opening or are having difficulty finding a storm window/screen assembly that suits your needs, try a storm window specialty company such as [Allied Window](#).

Remember, purchasing a qualified storm window will not only improve energy efficiency and protect your historic windows, but is also eligible for a [\\$1,500 tax credit](#).

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**I understand that my home's original windows can and should be restored, but how should I go about finding someone locally to do the work?**



**It can be difficult to find quality craftspeople and contractors, but they are out there, and more and more are entering the field to meet this need.**

The answer may be as close as your phone book.

The best place to start in many areas is likely your [local or statewide preservation organization](#). These organizations may be able to suggest the names of reputable window repair contractors in your area.

Preservation architects, consultants, and preservation trades people can also be good sources of information. If you live in an area where there is a historic preservation program or a preservation carpentry program, these may be able to offer suggestions as well. Other than that, additional leads might be found on the following websites:

- Trades Network
- [Old House Journal](#)
- [New England Window Restoration Alliance](#)

Your nearest [regional and/or field office](#) of the National Trust for Historic Preservation may also be able to point you in the right direction.

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**I want to get started now. Are there any easy, low-cost ways to make my home's original windows more energy efficient?**



**Of course there are! Making the windows of your older or historic home more energy efficient does not have to break the bank.**

Here are four easy tips to get you started:

- Caulk around the window opening on the exterior.
- Caulk around the window trim on the inside.
- Add weather stripping to the window sash. There are many types of weather stripping to suit various window types, budgets, and needs.
- Use a storm window or thermal panel.

Source: The National Trust for Historic Preservation Website at:

<http://www.preservationnation.org/issues/weatherization/windows/>