TAKING IT TO THE STREETS
WINNING THE WAR FOR WINDOWS

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Let's face it: we live in a consumer culture where quick-fix, "maintenance-free" products are all the rage. For preservation advocates, this mindset can spell trouble. The window replacement industry has led the charge by offering a variety of technologically advanced models that claim astronomical energy savings and ease of use. For property owners with poorly-maintained, single-paned wood window sash, this opportunity for a quick upgrade can seem like the best possible option, especially with the purported "greenness" of replacement touted by the window industry. A closer look at all the issues surrounding what is considered "green," however, reveals that restoring old wood window sash can be much more beneficial to the homeowner and the planet.

Why the Focus on Windows?

Before delving into the question of window restoration as a green concept, we should first consider the importance of old windows as an integral component of a historic building. Often referred to as the "eyes" of a building, windows can be one of the most important character-defining features by providing scale, profile, and composition to a façade. Preservation guidelines from the National Park Service advise that "windows should be considered significant to a building if they: 1) are original, 2) reflect the original design intent for the building, 3) reflect period or regional styles or building practices, 4) reflect changes to the building resulting from major periods or events, or 5) are examples of exceptional craftsmanship or design." ("Preservation Brief 9: The Repair of Historic Wooden Windows." Technical Preservation Services, U.S. Department of the Interior, 1981). All told, those "old windows" that property owners are repeatedly encouraged to discard have significant characteristics, from both from a visual and structural standpoint, that the majority of window replacement models cannot reproduce.

Heightened public awareness of climate change presented the replacement window industry with an opportunity to market replacement windows as an environmentally sound product in the name of energy efficiency. Increasingly, local preservation commissions are presented with C of A applications for replacement windows by well-meaning property owners who believe they will not only lower their heating bills, but also help the planet. Commissions must go beyond saying no because replacements aren't sound preservation, and help property owners understand why saving their existing windows is better for the environment. This article provides the information you need to guide property owners to responsible decisions. The inherent "greenness" of wood window restoration can be broken down into two major categories: sustainability and energy-efficiency:

Sustainability

An important part of preserving historic buildings is the retention of original components. Like most structural elements of older, wood-framed buildings, historic wood windows were milled from old-growth lumber that can last centuries, even when not properly maintained. Their sustainability is complemented by the fact they were carefully constructed with mortise and tenon joinery to fit tight into the window openings of a house with extreme care and craftsmanship. Mass-produced wood replacement windows are typically constructed of new-growth lumber, often with glued-together

finger joints and are highly susceptible to rot. The preservation of an old window maintains an irreplaceable, sustainable resource.

In addition to craftsmanship and the durability of the wood, historic wood windows are also sustainable in that they are easily repairable. With the abundance of allegedly "maintenance-free" replacement window options on the market today, it's not surprising that property owners are often inclined to do away with old wood windows. "Maintenance-free," however, is a misleading claim. Any product that is in constant operation and is susceptible to seasonal fluctuations and weathering will need maintenance. Replacement windows typically have plastic and metal parts that become outmoded over time, making them difficult (if not impossible) to repair. Vinyl windows are prone to denting, warping, and fading in high temperatures. In most cases, wood replacement sash have aluminum or vinyl exterior cladding meant to protect the wood. If, however, moisture finds its way in, through weep holes or other infiltration sources, the new-growth lumber shielded beneath the cladding can quickly rot.

No, that's not dirt and grime you see on the upper sash of this vinyl window; it's fog between the two panes of insulating glass due to seal failure.
Photo courtesy of the author.

Another major claim of the window replacement industry is the benefit of insulating glass. Insulating glass involves two panes of glass with an inert gas sealed in the space between them; these windows are called "double-glazed." Their design, however, does not lend itself to sustainability. Windows with insulating glass typically come with only a 15 to 20 year warranty. When the sealant fails, the window will lose its insulating quality, the glass will fog, and the entire window may have to be replaced. Historic wood windows with a single pane of glass can be repaired with tools found at a local hardware store and can last up to 10 times longer than a replacement model. Homeowners should be aware that the payback period for restoring wood windows and installing quality storm windows is significantly shorter than installing replacement windows. In sum, the term "replacement window" means just what it says—it will have to be replaced again and again.

An inclusive view of sustainability has to be taken when considering the "greenness" of a product. Restoration of older wood windows reduces both landfill waste and the production of the energy-consuming, synthetic materials found in many replacement windows. Moreover, hiring a local window restoration specialist to work on your windows helps sustain local economies as *labor* intensive, opposed to *materials* intensive, concept.

Energy-Efficiency

Much like sustainability, energy efficiency is an important factor in the "green" discussion, and is often the primary reason homeowners look to replace their windows. The generally erroneous notion is that older wood windows are not as energy efficient as today's double-glazed replacement models. In making their case, window replacement companies will often compare their product to an unrestored wood window with little or no weatherstripping and a poor (or no) storm window. With proper repair and maintenance, coupled with weather stripping and a quality storm window, *a single-glazed historic wood window will have a comparable level of energy efficiency to that*

A restored double-hung sash window with a quality storm window provides energy-efficiency and maintains historic character. *Image courtesy of the Cambridge Historical Commission.*

of a double-glazed replacement window. Industry guidelines indicate that the addition of a storm window to an existing single-glazed window will reduce the energy loss through the window area by approximately 50%. As replacement window manufacturers will attest, the best insulation on a small scale is dead air space. The extra dead air space created with a sealed storm window (typically 2") means more insulation and increased energy efficiency. Replacement window dead air space between the double-glazing is only 1/16 to 1/32 of an inch. Although it is often argued that storm windows have a negative impact on the historic character of wood windows, an important point to consider is that storm windows have been used for over 100 years. Storm windows are a fully-reversible alteration that protect the original fabric of the building and can make the window assembly as energy-efficient as replacement windows.

It is important to note that infiltration of air, rather than heat loss through the glass, is the principal culprit affecting energy efficiency; it can account for as much as 50% of the total heat loss of a building. Moreover, most of the heat loss in an old house occurs in areas other than windows. Insulation in walls, attics, and between floors, and weather stripping around doors will help prevent loss of heat. Replacement window manufacturers also often misquote U-values as the value through the center of the glass (the location of the best U-value) and not for the entire unit. A U-value is a rating of energy efficiency for all the combined components of a window or door—the lower the U-value, the greater the efficiency. An optional feature of replacement windows is "low-e" (low emissivity) glass, a microscopically thin, virtually invisible, metal or metallic oxide layer deposited directly on the surface of one or more of the panes of glass. The low-e coating reduces the infrared radiation from a warm pane of glass to a cooler pane, thereby lowering the U-factor of the window. The same effect can be achieved with low-e storm windows and/or energy-saving window film that can be applied directly to single-glazed windows.

The Bottom Line

Preservationists have always maintained that the "greenest" building is the one that already exists. When one considers the numerous reasons why the restoration and appropriate retrofitting of historic buildings is good for the environment, the case for keeping old windows grows stronger. The Federal Government has taken notice, too; the passing of the American Clean Energy and Security Act by Congress in June included the Retrofit for Energy and Environmental Performance (REEP) program, which will provide incentives for homeowners to make energy upgrades in older buildings while maintaining historic character.

Does every old wood window qualify for a restoration job? Certainly not. Excessive rot and deferred maintenance may require the installation of new windows. But homeowners should not be so quick to buy in to the "toss-out-the-old-windows" claims by the window replacement industry if their existing windows have a few broken panes of glass or loose glazing. Restoration can be time-consuming and in some cases more expensive (depending on the quality of the replacement model), but is much more environmentally responsible; and when considering the long payback periods of replacement windows, it is the best long-term option for the property owner. By reaching out to property owners and contractors, local preservation commissions can help them understand that there is a perfectly feasible alternative to achieve the same claims by the window replacement industry. Remember, it's not good because it's old; it's old because it's good!

BIBLIOGRAPHY

Cluver, John. "Still No Substitute." *Period Homes* (November 2006).

Fisette, Paul. "Understanding Energy-Efficient Windows." *Fine Homebuilding* 114 (1998).

Klems, Joseph H. "Measured Winter Performance of Storm Windows." Lawrence Berkeley National Library (2002) <http://repositories.cdlib.org/lbnl/LBNL-51453/>

Leeke, John. "In Defense of the Old." *Smart Homeowner Online* (March/April 2002) <http://www.smarthomeowner.com/articles/4448/>

Lord, Noelle. "Embracing Energy Efficiency." *Old House Journal* (September/October 2007).

Mattinson, Bill, Ross DePaola and Dariush Arasteh. "What Should I Do About My Windows?" *Home Energy* 19/4 (July/August 2004).

Myers, John. "Preservation Brief 9: The Repair of Historic Wooden Windows." Technical PreservationServices, U.S. Department of the Interior (1981) <http://www.nps.gov/history/hps/tps/briefs/brief09.htm>

National Trust for Historic Preservation. "Historic Wood Windows: a Tip Sheet from the National Trust for Historic Preservation." <http://www.preservationnation.org/about-us/regional-offices/northeast/additional-resources/2009-Revised-Window-Tip-Sheet.pdf>

Piper, James. "Windows: Repair or Replace?" *Building Operating Management Online* (January 2004) <http://www.facilitiesnet.com/bom/article.asp?id=1547&keywords=>

Sedovic, Walter and Jill H. Gotthelf. "The Right Thing: What are the Facts and the Myths of the Replace vs. Restore Historic Windows Debate?" *Traditional Building* (June 2008)

Sedovic, Walter and Jill H. Gotthelf. "What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows." *Association of Preservation Technology Bulletin: Journal of Preservation Technology* 36:4 (2005).

Shapiro, Andrew M. and Brad James. "Creating Windows of Energy-Saving Opportunity." *Home Energy Magazine Online* (September/October 1997) <http://homeenergy.org/archive/hem.dis.anl.gov/eehem/97/970908.html>

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