# The Right Thing

**Do you replace or restore historic windows? What are the facts and myths in this most contentious of debates?**

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*By Walter Sedovic and Jill H. Gotthelf*

In just the past few years, both sides in the debate over replacement vs. restoration of historic windows have been called upon to clarify their stance. For those advocates of restoration, there has been a virtual watershed of support, mostly in the form of states, historical commissions and preservation organizations across North America identifying historic wood windows as "endangered" elements.

**The damage wrought by replacement windows is self-evident and increasingly pervasive. *All photos: © Walter Sedovic Associates***

On the other side of the fence, and in response to this newfound "endangered" status, replacement window manufacturers have sought to develop standards that would demonstrate their products' effectiveness in a format that would – much like the FDA's nutrition labeling system – allow consumers to more readily compare apples to apples. At least one major manufacturer, Marvin Windows & Doors of Warroad, MN, has been reaching across the aisle to develop products that respond to the concerns of preservationists when replacement is appropriate. To their immense credit, it has even joined in arguing for retention and restoration of historic wood windows as a first option.

What has been gained by all of this activity? Despite this surge toward restoration, a generation (it has been 28 years since the first fully assembled replacement window system was introduced by Andersen Windows in 1980) of listening to the marketing mantra of "replace those old drafty windows" continues to run deep in our national psyche. The preservation community, armed with increasingly useful information, is now in the position of responding: "Go ahead. Replace those old drafty windows--with new drafty windows."

Indeed, much of the current outcry against wholesale choices toward replacement has to do with how poorly many replacement windows perform. Payback periods are not promoted, and, unlike historic windows that have been in service for 50, 75, 100 or more years, replacement windows are creating a costly cycle of replacing, over and over again.

Still working against preservation, however, is the

dearth of useful facts that counter the assertion that old windows are inherently detrimental to the energy performance of a building. That notion is beginning to change; at present, people are considering the alternatives, and that alone is a huge leap in the right direction. In time, we will be armed with the facts and talking points that will facilitate a full-fledged movement toward restoration. And that is important on many levels: economic, environmental, educational and aesthetic.

**This window replacement resulted in reduced visibility and daylight.**

To help this movement along, we have assembled a list of talking points, backed by data currently available (and growing at an accelerating pace), that will help arm those in search of truth, balance and a desire simply to do the right thing.

**1. Replacement window manufacturers have now all but abandoned the claims of "U" factors that were given for the glass, not the assembly. They now favor a standardized rating system offered through the independent National Fenestration Rating Council (NFRC), which measures whole window performance.**

Misleading. While it is true that in response to the misuse of "U" values, the NFRC has been engaged in the testing and evaluation of whole window assemblies, what is not said is that every manufacturer has the option of discounting – and not revealing – two important markers: infiltration and condensation.

U-factor is the universal measure of heat gain or loss due to differences between inside and outside temperature, or the measure of how much heat may be conducted through a building element. It is the inverse of R-value, which measures a material's resistance to heat transfer. For U-values, lower numbers are better. A U-factor may refer to just the glass or glazing alone, but the NFRC's U-factor ratings are intended to represent the entire window performance, including frame and spacer material. Data requirements for the ratings have been relaxed, to permit the exclusion of condensation, air infiltration, visible transmittance (VT) and light-to-solar gain, the ratio between solar heat gain coefficient (SHGC) and VT.

Simply put, that means that a consumer may very well be purchasing a replacement window system that allows as much or more infiltration as their existing windows. While in the past, the argument favoring historic windows was largely based on anecdotal information, preservationists have tools already at their disposal to discount replacement window arguments: namely, standardized tests defined by the American Society for Testing & Materials (ASTM) that allow for both field and laboratory testing of infiltration. Employing these testing methods will clearly reveal the performance of existing windows and help put to rest claims that new windows perform better.

Also missing from the equation is visual transmittance (VT) and light-to-solar gain (LSG). LSG is important as a component of sustainable performance since glass and films used to receive low (i.e., positive) SHGC ratings often reduce the amount of visible light and therefore require a correspondingly increased use of artificial lighting. Clearly, consumers will benefit as more information is provided on labels, and despite efforts, we are not too much further along in understanding the performance of one window over another, and certainly not over the performance of an existing historic window assembly.

**2. Replacement window manufacturers offer the option of reusing existing frames and replacing just the sash, at a more economical cost.**

Misleading. As stated above, it is the whole window assembly that determines the performance benefits. Infiltration through a window occurs in many locations, not just the

**Windows are not the only elements maligned by inappropriate replacements.**

sash. Reusing an existing frame that is not tight, within a wall system that leaks will produce the same effects that existed before the replacement window was installed. Any window system – new or old – must be part of a weather-tight system from the sash to the walls.

Further, several independent studies have shown that windows contribute only 10-12% of overall infiltration to the building envelope. Much more infiltration occurs at roof eaves, foundations and even through wall receptacles, dryer and plumbing vents and fireplaces. Concentrating funds to these elements has a much greater potential of providing a quick payoff than replacing windows. Replacing sash alone is not holistic, and very likely not economical. It is far better in the long run to replace or restore the entire window assembly.

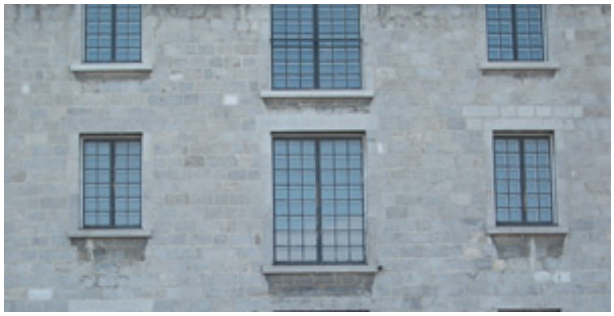
**3. Replacement windows are maintenance free.**
No. As Michael Jackson, FAIA, chief architect of the Illinois Historic Preservation Agency pointed out in a recent presentation, "Embodied and Operating Energy: Balancing the Eco-Equation," "maintenance free" means it can't be repaired. This truism is critically important when deciding whether to replace or restore. Vinyl, fiberglass and aluminum windows – and insulated glass – are formed using materials and techniques that by and large are not conservable. Once they deform, fade, warp or fail in other ways, there is virtually nothing that can be done but turn to replacements--again.

**4. Replacing historic wood windows with new wood windows is a fair trade-off.**
Not likely. The quality of new wood from managed forests, tree farms and fertilized stock is no match for that of early, natural-growth wood that comprises historic window frames and sash. "Wood density is a good predictor of economic value and strength of wood products, determined by the simultaneous increase in late-wood percentage and tree ring density. The short rotation and intensive treatments associated with industrial forestry prolong the growth of low quality juvenile wood, while postponing the growth of the stronger and more stable mature wood." This is according to a report published in May, 2007, by Robert A. Andrus for Willamette University, "How Tree Rings Reflect Wood Quality: Evidence from Industrial and Sustainably-Managed Stands."

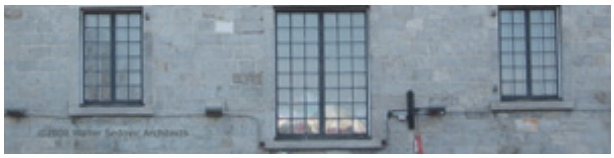
Current wood-grading standards for density were developed during the period of old-growth forestry and may not be applicable to woods harvested from today's industrial forests.

The bottom line is, new wood is not comparable to early wood. Beyond that, other factors that lead to windows of less desirable qualities include methods of milling, drying and joining woodwork; all of these affect durability and performance. Aesthetically, modern mullions – even when attempting to emulate historic profiles – can be exceedingly large, obscuring sight lines and reducing visible light. It remains an unfortunate reality that after much discussion regarding this topic throughout the preservation and sustainability communities, noted landmark commissions still cling to the idea that replacement windows are acceptable as long as they somewhat copy the superficial elements of their historic counterparts.

**5. Installing storm windows will lead to condensation.**
Quite possibly. In discussing storm window applications, the choice is often based on aesthetics, or ease of installation and maintenance, rather than on specific regional and environmental conditions. Properly fitted storm windows



outfitted with laminated or low-e glass may help to offset the emergence or amount of condensation present, which forms when warmer, moisture-laden air comes into contact with colder glass surfaces. This effect may be mitigated by thoughtful design and selection, and even improved upon over time with alternate choices of weather-stripping systems and glass types.



**Traditional storm window systems offer not only superior performance and energy efficiency, but can also be a graceful complement to the historic sash.**

**6. Replacement windows are more energy efficient and are therefore sustainable.**

Not true. If you're not already reconsidering replacement based on energy considerations alone, consider these other non-sustainable features of many replacement windows. A poorly performing window that requires replacement after just a few years means additional debris in our landfills, resources extracted for production and energy for manufacturing and transport, none of which is sustainable. Also, the materials that comprise many replacement windows – aluminum, vinyl and glass – are among the greediest in terms of energy consumption, resource depletion and inability to recycle. All leave a heavy environmental footprint.

**Replacing sash while ignoring the primary sources of infiltration can have detrimental and costly results.**

**7. In order to be energy efficient, windows need to have argon-filled, low-e, insulated glass.**

Not true. It's a fallacy to believe that there is a one-size-fits-all solution to proper window assembly. Environmental conditions, including orientation, play heavily into the choices offered for glazing. Laminated glass is an appropriate substitute for insulated glass and has many ancillary benefits. It can incorporate historic blown (wavy) glass, it can be field cut, it is safety glass, it is less expensive initially, it won't fail and fog when the desiccant seal fails, it may be outfitted with low-e glass, and it has excellent noise abatement characteristics. Plus, it can be installed in existing or new true-divided-light sash and won't require enormous mullions to support it.

**8. Storm windows are cumbersome and high maintenance, requiring removal, storage and reinstallation each year.**

Not true. Multiple manufacturers offer elegant wood storm windows that can be outfitted and custom designed for virtually all historic window configurations. They are available in a variety of styles – hinged; multi-paned with laminated, low-e and blown glass; and interchangeable screens – that work in concert visually and functionally with operable historic windows. They can be installed (and removed) from the interior or left in place if desired, without affecting the ability to open windows, and allow for natural ventilation throughout the year. Of course, they may also be removed and stored seasonally, if desired. They are a relatively inexpensive solution, with demonstrated superior energy-saving benefits that translate into short payback periods. Plus, storm window systems are reversible and easily upgraded.

A 2007 report by Keith Haberern, licensed architect and engineer and chairman of Collingswood (NJ) Historic District Commission, supports this statement. It shows that the payback time for adding a single-pane storm window to an existing single-pane window is 4¼ years. On the other hand, the payback time for replacing a single-pane window with insulated glass window is 41½ years, and for replacing a single-pane window and storm with a low-e insulated glass window, it's 222 years!

**9. Replacement windows increase property value.**

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Highly dubious. Interestingly, this claim has surfaced with increasing regularity as the argument for payback has become universally disproved. Credible data regarding elevated or declining property values relative to window replacement installations have yet to appear. Arguably, as more becomes known about the shortcomings of many types of replacement systems, data will prove that retaining historic windows actually provides for more stable (or increased) property values; in fact, historic commissions already are advocating just that.

**10. Replacement windows pay for themselves.**
Nonsense. Replacement window manufacturers generally have backed off this once ubiquitous claim, simply because it's patently untrue. As discussed herein, varied studies have shown that far better payback periods are realized through restoration, careful glazing choices, the incorporation of well-designed storm window systems and a healthy cynicism about unproven, off-handed claims. Facts and research are quickly putting this – the most blatant of them – to rest. **TB**

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**1. Sanzi** *(02/25/2012 09:55:11)* reply

**window replacement vs storm windows**

thank you for your very insightful article.
I was beginning to come to this realization, and this article has cemented my decision to find quality storm windows instead of replacing my solid wood windows that still function after 90 yrs!

AND THE REVIVAL