

"Musings of an Energy Nerd" showcases the best of Martin Holladay's weekly blog at GreenBuildingAdvisor.com, where he provides common-sense advice about energy issues to residential designers and builders. His conclusions usually fall between minimum code compliance and the Passive House standard, which often makes them controversial to both building-science geeks and everyday builders.

Green Building Advisor

Green Building Advisor is for designers, engineers, builders, and homeowners who craft energy-efficient and environmentally responsible homes.

Should I Replace My Old Windows?

If you're trying to lower your energy bills, you've probably plugged your home's air leaks and added insulation to your attic floor. Now you may be wondering, "What about my old windows?"

There is no clear answer to this question. Sometimes it makes sense to leave old windows alone. Sometimes it makes sense to repair the weatherstripping and add storm windows. And sometimes it makes sense to replace old windows with new energy-efficient ones.

Although new energy-efficient windows will reduce your energy bills, the payback period will be longer than the windows will last. When considering what to do with old windows, comfort, historical character, and the presence of lead paint may matter as much as cost and energy efficiency. Some homeowners decide to repair old windows because new windows may not last as long as restored historic ones, because they care more about their house's character than energy savings, or because of historic preservation commission requirements.

Plus, replacing windows doesn't always reduce costs. Michael Blasnik is an energy consultant with access to utility-bill data for millions of U.S. homes. "I've looked at a lot of window-replacement data," Blasnik explained at the Building Energy 12 conference in Boston. "I've heard window salespeople say that you can save 50% on your heating bills if you replace all your windows. In fact, the amount of



energy saved by replacing all of the windows in a home is generally 1% to 4% of the heating energy usage."

Exaggerated marketing claims by companies selling replacement windows have exasperated energy experts for decades. "Window replacement has a 200- to 300-year payback period," said Blasnik. "A Wisconsin study found that a lot of the expected energy savings is lost by the reduction of solar gain. Most replacement windows have low-solar-gain glazing, so maybe half the saved energy is gone due to the reduction in solar gain. I tell people, go ahead and replace your windows if you want, but don't expect significant energy savings."

In short, says Blasnik, "The measure is not cost effective."

The authors of a 1996 study ("Testing the Energy Performance of Wood Windows in Cold Climates") concluded, "Replacing a historic window does not necessarily result in greater energy savings

than upgrading that same window. The decision to renovate or replace a window should not be based solely on energy considerations, as the differences in estimated first-year savings between the upgrade options are small."

New replacement windows

Repairing an old window can cost as much as or more than replacing it. That's why it sometimes makes sense to install replacement windows—as long as you realize that you'll never see enough savings in your energy bills to justify the high cost of the work.

One fan of window replacement is GBA reader Keith Gustafson. "In my opinion, the only way to get an antique window to be at least partly airtight involves removing it from the building [for renovation]," Gustafson writes. "In doing so, you will doubtless find that some pieces are rotten and need extensive rebuilding." Because "wood moves," and

because “those sashes were never intended to be airtight,” the windows “will continue to leak air ... and this will grow over time, especially if they are used regularly. There are good companies that make weatherstripping products, but they depend on the quality of install, and if you are paying for the labor it is going to add up.

“Once this is done, you have the honor of maintaining paint and putty on a regular and ongoing basis. I have watched panes fall out of their sashes behind storm windows. While storm windows are less expensive than new windows, they still cost money. A quick search finds a decent-looking triple-track with screen for \$150, while [home centers] have them for as low as \$60. None of these are airtight or low-e. [Home centers] will also sell you an Andersen 400 series [window] for less than \$400, or a vinyl window for less than \$200.

“It would surprise me if the bill for properly refitting windows and adding a good-quality storm window was significantly lower than the cost of installing a decent-quality replacement window. If you are doing the labor yourself, then it will be cheaper ... but people hereabouts who are worth hiring run \$25 to \$50 an hour.

“If you love the look of antique windows (which I actually happen to) or are legally required to save them, then repair sounds sensible. Take none of this to mean that you should buy a house full of windows from the guy with bad breath, a lime-green polyester sport jacket, and a magnetic sign on his truck. Restoring old windows is a labor of love, or the product of intense hatred of vinyl windows, but I think both long and short term it is not a big financial gain.”

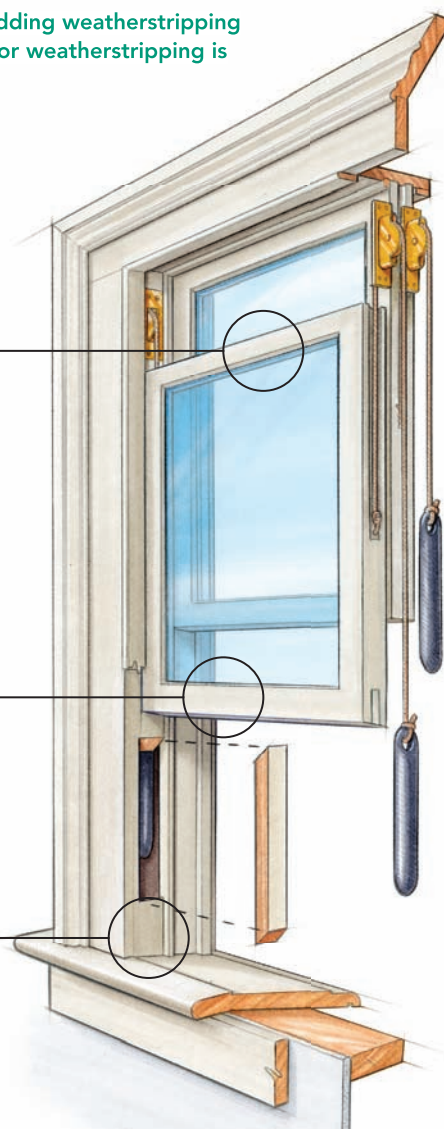
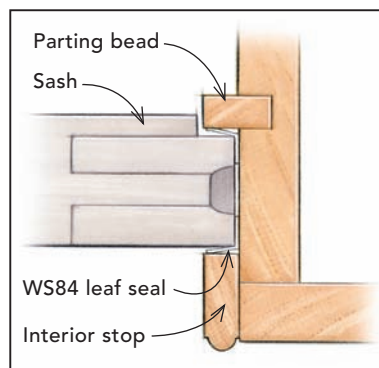
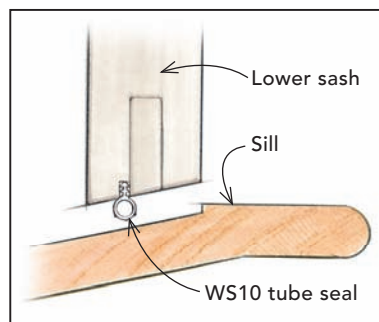
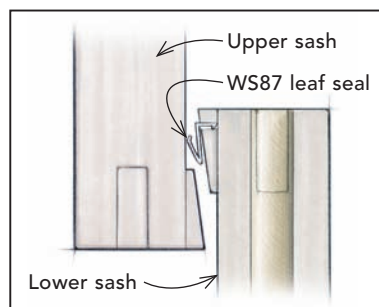
If you install replacement windows, you should have a good understanding of moisture management and flashing. Remember that building codes require every bedroom to have at least one window that is large enough to provide emergency egress. A bedroom window with a small rough opening may require a casement rather than a double-hung to meet egress requirements.

Storm windows can make a big difference

While many older homes still have their original single-glazed windows, almost

MAINTAINING CHARACTER AND ENERGY EFFICIENCY

Old windows can be made less drafty by adding weatherstripping in a few important places. A good source for weatherstripping is conservationtechnology.com.



all such homes (especially those in cold climates) have had triple-track storms installed by now. Single-glazed windows with triple-track storms don't perform quite as well as new double-glazed windows, but their performance is surprisingly close. The annual difference in energy bills may amount to just \$1 or \$2 per window.

If your single-pane windows have storm windows that are in good shape, it makes sense to keep what you have. Of course, storm windows are only effective if they are closed during the winter. (A surprisingly high percentage of triple-track storm windows are left open all winter long.)

If you live in a cold climate and your windows don't have storms, consider install-

ing low-e storm windows. Research has shown that an old single-glazed window fitted with a low-e storm window performs nearly as well as a new double-glazed low-e window. According to a 2007 Lawrence Berkeley National Labs/NAHB Research Center study by Craig Drumheller, the average payback period associated with the installation of new low-e storm windows on older homes in Chicago was 4.3 years.

There are two types of low-e coating: sputtered (called soft coat) and pyrolytic (called hard coat). Only pyrolytic coatings are durable enough for storm windows. When used on a storm window, the low-e coating faces the interior. Since most pyrolytic coatings have a higher solar-heat-gain

coefficient (meaning that they allow more solar gain) than most sputtered coatings, pyrolytic coatings are particularly appropriate for cold climates.

There is a caveat to low-e storm windows: they work well when installed over single-glazed windows, but should never be installed over newer double-glazed low-e windows. According to an article in *Environmental Building News*, "Modeling performed for Lawrence Berkeley National Labs by sustainability consultant Thomas Culp, Ph.D. has uncovered the potential for serious overheating problems when low-e storms are added to low-e windows: in hot weather, in direct sunlight, temperatures up to 185°F may be reached. That kind of heat can cause premature aging or failure of the insulated glazing unit's seals."

Old single-glazed windows are high-solar-gain windows. On a sunny winter day, that's good news. However, on a hot summer day, it's bad news, especially if the windows face west. If you live in a hot climate, you probably worry more about cooling costs than heating costs. Solar gain through windows is a major contributor to cooling loads, so it makes sense to address solar gain in rooms that overheat.

Solar gain can be addressed by shading with a trellis or awning or by installing solar-control window films. An effective but expensive option is to install replacement windows with low-solar-gain glazing.

Comfort is worth paying for

Before fixing or replacing your windows, ask yourself if the windows have storms, if they operate smoothly, and if the existing weatherstripping does an adequate job of keeping out drafts. If the answer to all three questions is yes, you may not need to do anything at all.

If you live in a cold climate and your house has older single-pane windows and no storms, invest in low-e storm windows. If you live in a hot climate, you may want to invest in window film to reduce solar gain.

It's hard to justify any other improvements to existing windows on the basis of energy savings. That said, if your windows are drafty, or if you feel cold when you sit beside a window on a winter night, you may be happy to spend \$400 or \$500 per window for improved comfort. And if lead paint is an issue, it's worth paying for lead abatement to protect your family's health.

Add FineHomebuilding to your tool set

Become a member and get instant access to thousands of videos, how-tos, tool reviews, and design features

Start your FREE trial at Finehomebuilding.com/2join

NEW: High Performance - Low Profile



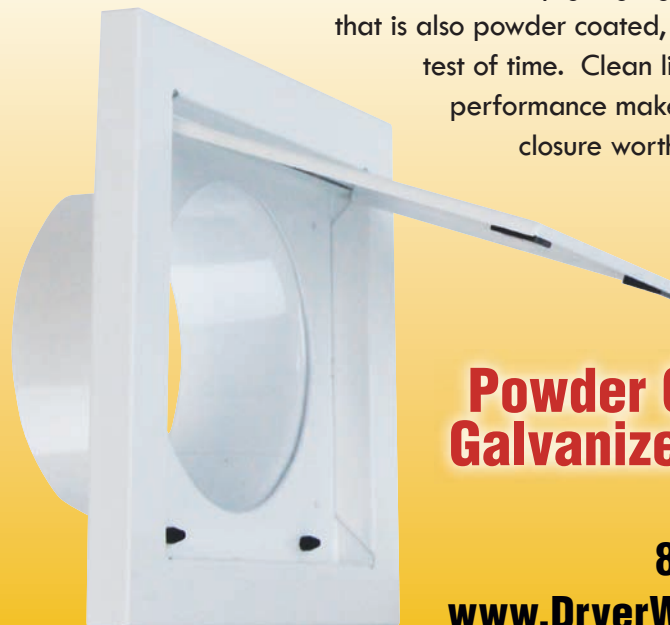
DryerWallVent

**Venting
Never Looked
So Good**

Vent Performance that Enhances Aesthetics

The people who brought you the Dryerbox® are taking that quality commitment outdoors. Today, exterior terminations get the attention they deserve as components that actually enhance aesthetics.

Built in the USA of heavy gauge galvanized steel that is also powder coated, they stand the test of time. Clean lines and superior performance make this new vent closure worth a closer look.



**Powder Coated
Galvanized Steel**

888-443-7937

www.DryerWallVent.com