NATIONAL TRUST FOR HISTORIC PRESERVATION

Historic Wood Windows

A tip sheet from the National Trust for Historic Preservation

National Trust for Historic Preservation
1785 Massachusetts Ave, NW
Washington, DC 20036
(202) 588-6000
(202) 588-6462 (fax)
info@nthp.org
www.PreservationNation.org

This tip sheet on historic wood windows was developed as part of the National Trust for Historic Preservation's Sustainability Initiative.

About the Initiative:
Historic preservation can – and should – be an important component of any effort to promote sustainable development. 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 older and historic communities, is crucial to combating climate change.

Learn more about Preservation and Sustainability on the web:
www.preservationnation.org/issues/sustainability

For more information, contact:

Patrice Frey, Director of Sustainability Research
(202) 588-6255
Patrice_Frey@nthp.org

Barbara A. Campagna, AIA, LEED AP, Graham Gund Architect
(202) 588-6291
Barbara_Campagna@nthp.org

Rebecca Williams (author of this publication), Field Representative, Northeast Office
(617) 523-0885
Rebecca_Williams@nthp.org

Introduction

There is an epidemic spreading across the country. In the name of energy efficiency and environmental responsibility, replacement window manufacturers are convincing people to replace their historic wood windows. The result is the rapid erosion of a building's character, the waste of a historic resource, and a potential net *loss* in energy conservation. Typically replacement windows are vinyl, aluminum, or a composite with wood, and none will last as long as the original window. Repairing, rather than replacing, wood windows is most likely to be the "greener option" and a more sustainable building practice.

Research shows that most traditionally designed wood-frame buildings lose more heat through the roof and un-insulated walls than through the windows.[1] A historic wood window, properly maintained and fitted with a storm window, can be just as energy efficient as a new window.[2] Replacing a historic single-pane window also may not save you much money in the long run. While the exact figure will vary depending on the type of window installed and whether or not a storm window is used, studies have found that it could take 100 years or more for a replacement window to pay for itself in energy savings.[3] According to information published in a recent *Old House Journal* article, it could take 240 years to recoup the cost of replacing a single-pane window-storm window combination with a low-e glass double-pane thermal replacement window.[4] Also, a historic wood window can easily last more than 100 years, while a new window may not last 25.

Not every wood window can be repaired and there are situations where replacement is appropriate. However, many historic wood windows can and should be repaired, especially if the windows were manufactured before about 1940. Wood windows made before this time were constructed with individual parts, each of which can be repaired or replaced. The wood itself is denser and of higher quality than what is grown today, and it is generally more rot- and warp-resistant than modern wood.

Historic windows are among the most important elements of a building. Simple repairs and routine maintenance coupled with storm windows make for energy efficiency that in most cases matches, if not exceeds, the efficiency of replacement windows. Workshops throughout the region have taught building owners easy ways to care for their historic windows. At the Woodlawn Museum in Ellsworth, ME, a grant from the National Trust for Historic Preservation helped fund a window repair workshop. *Photo courtesy of the Woodlawn Museum*

These are just some of the practical reasons to repair rather than replace historic wood windows. In addition, repairing the historic window helps maintain a building's authenticity. Once original material is removed from a building, it is gone forever. There are many more benefits to repairing your wood windows, so keep reading.

———————————————

1. Rypkema (2006); James *et al* (1996); Klems (2002). 2. James *et al* (1996); Klems (2002). 3. Sedovic (2005); *e.g.* research by Keith Heberern, calculations available at www.historichomeworks.com/hhw/education/windowshandout/windowenergyanalysis.pdf. 4. "Let the Numbers Convince You: Do the Math." Old House Journal 35 no. 5 (September/October 2007).

Wood Window Basics

Using this 12-over-12, double-hung wood window as our example, here are the basic terms used for wood window parts. This window is called 12-over-12 because there are 12 panes of glass in each sash. Both sashes are moveable so it is called double-hung. If only the bottom sash moves, it is called single-hung.

Jamb (the wood that frames the window opening)

Top Sash (upper section of window, may slide down to open)

Meeting Rail or **Check Rail** (the rail where the two sash come together)

Bottom Sash (lower section of window, typically slides up to open)

Sill (exterior, horizontal piece at the bottom of the window frame, commonly wood, stone, or brick)
Stool (interior shelf-like board at the bottom of a window against which the bottom rail of the sash rests)

A c. 1846 wood window in the former Robbins and Lawrence Armory, now the American Precision Museum in Windsor, VT.

Rail (horizontal part of sash)

Stile (vertical part of sash)

Muntin (horizontal, vertical, diagonal, or curved pieces that frame and provide mounting surface for the lights) The shape, or profile, of the muntin provides a clue to the window's age.[1]

Light/lite/pane (glass, held in place by glazing putty and metal glazing points)

1. Garvin (2002).

My Windows Are Old and Drafty, Why Shouldn't I Buy New Ones?

1. **More heat is typically lost though your roof and un-insulated walls than through your windows**. Adding just 3 and 1/2 inches of insulation in your attic can save more energy than replacing your windows.[1]
2. **Replacement windows are called "replacement" for a reason.** Manufacturers often offer lifetime warrantees for their windows. What they don't make clear is that 30% of the time, a replacement window will be replaced within 10 years.[1]
3. **Replacement windows that contain vinyl or PVC are toxic to produce and create toxic by-products.** Installing these in your house is not a 'green' approach.[2]
4. **If your wood windows are 60 years old or older, chances are that the wood they are made of is old growth**—dense and durable wood that is now scarce. Even high-quality new wood windows, except for mahogany, won't last as long as historic wood windows.
5. Studies have demonstrated that **a historic wood window, properly maintained, weatherstripped and with a storm window, can be just as energy efficient as a new window**.[2]
6. According to studies, **it can take 240 years to recoup enough money in energy savings to pay back the cost of installing replacement windows**.[3]
7. **Each year, Americans demolish 200,000 buildings. That is 124 million tons of debris, or enough waste to construct a wall 30 feet high and 30 feet thick around the entire U.S. coastline.**[4] Every window that goes into the dump is adding to this problem.
8. With a little bit of practice, **it can be easy—and inexpensive—to repair and maintain your wood windows.**[5]
9. Not a DIY-er? There are people near you who can do it for you. **Hiring a skilled tradesperson to repair your windows fuels the local economy and provides jobs.**[1]
10. **Historic wood windows are an important part of what gives your older building its character.**

1. Rypkema (2006). 2. Sedovic (2005). 3. *e.g.* Calculations by Keith Heberern available at www.historichomeworks.com/hhw/education/windowshandout/windowenergyanalysis.pdf. 4. Hadley (2006). 5. *e.g.* www.historichomeworks.com

Basic Maintenance

There are many good, practical books and magazine articles to guide a handy person in the basic maintenance of wood windows. Several publications are listed in the references section of this tip sheet. To get you started, here are some of the keys to many years—and generations—of life with older wood windows.

1. Keep the exterior surfaces painted, including the glazing putty. Paint protects the wood and putty from water and extends their service life. Be especially attentive to horizontal surfaces where water may collect.

2. Glazing putty will eventually dry out and is meant to be periodically replaced. You can do spot repairs initially, but eventually it will be easier to re-glaze the whole sash.

3. Keep movable surfaces, such as the inside jamb, free of paint build-up so that the sash can slide freely.

4. If your sashes are hung with cord, keep the rope free of paint. This will improve the window's operability. Cord will eventually dry out and break but can be replaced. When replacing the cord you can also re-hang the weights so that the sash will be balanced.

Winter Tips

Most of the heat transfer occurs around the perimeter of the sash rather than through the glass. So the tighter the seal around the window and between the upper and lower sash, the more energy efficient the window will be. Here are some tips to help you save on your heating bills.

Check the lock. Most people think the sash lock is primarily for security. It does help with security, but the lock's most important job is to ensure that the meeting rails are held tightly together. A tight fit greatly reduces air infiltration.

Weather stripping—add it or renew it. Adding weather stripping to your window can increase the window's efficiency by as much as 50%. It's an inexpensive way to boost your window's efficiency. There are many different kinds from which to choose. Refer to the articles listed at the end of this tip sheet. The staff at your local hardware store should also be able to assist you.

Storm windows—use them! There are many styles from which to choose, including storms that can be fitted on the interior of the window. Many studies have shown that a wood window in good condition fitted with a storm window can be just as energy efficient as the more expensive replacement window. Due to the thermal exchange properties of wood, there is also a growing interest in traditional wood-framed storm windows as they transfer less heat than metal-framed storms.

Condensation. If you find condensation on the inside of your primary window, cold air leaking through the storm window is likely the culprit. If the condensation is forming on the inside surface of the storm window, warm air from the building interior is leaking in around the primary window. When warm and cold air are present on opposite sides of glass, condensation forms (think of a cold glass of lemonade on a hot day). When condensation forms on your window glass, water can collect on the horizontal wood parts of the rails, muntins, and sill, which can lead to paint failure and rot. To reduce condensation, you need to limit the amount of leaking air. Add or replace weather stripping, make sure the sash are meeting properly and that the sash lock is tight, and check the seal around the exterior of the storm window and caulk if necessary. When caulking around the perimeter of exterior storms it is important to leave weep holes at the bottom so that any condensation or infiltration that does occur can drain out.

What About Lead?

If your windows retain paint that was applied prior to 1978, chances are there is lead paint on them. Just because there may be lead paint on the windows does not mean they are unsafe or that they need to be replaced. There are steps you can take to protect yourself and others if you suspect lead paint may be present. **Before beginning work, consult your local or state ordinance to determine the legal method for handling and disposing of lead paint in your area.**

- Children and pregnant women should not be allowed in the work area.
- Do not smoke or eat or drink in the area you are working in and wash your hands and face before doing so.
- Wear disposable gloves and eye protection.
- Use a respirator if there is friable paint, or if you are scraping or sanding paint.
- Use a wet sanding technique to minimize dust.
- Vacuum using a HEPA filter.
- Wash your work clothes separately from your household laundry. You can also wear a tyvek suit to protect your clothes. Take it, and your shoes, off before you leave your work area.
- Place tarps under your work surface to collect loose paint. Seal off the work space from other rooms and from HVAC systems. Cover any furniture and other items in the work area with

(Continued on page 4)

Lead continued

6 mil plastic taped to the floor.

- Eating a nutritious diet rich in iron and calcium will reduce the amount of lead absorbed by your body if any does happen to be ingested.
- For more tips on how to work lead-safe, see "Lead Paint Safety: A Field Guide for Painting, Home Maintenance, and Renovation Work" available at www.hud.gov/offices/lead/training/LBPguide.pdf and the National Park Service Brief #37, "Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing" at www.nps.gov/history/hps/TPS/briefs/brief37.htm.
- John Leeke's website www.historichomeworks.com also has practical tips on lead-safer work practices.

References

This list is a place to start—it is not intended to be comprehensive, nor does the inclusion of a business or organization serve as an endorsement.

American Precision Museum. Windows on Preservation: restoring windows at the American Precision Museum, ed. John C. Leeke. Windsor, VT: American Precision Museum, 2005. Available at www.lulu.com.

Cambridge (MA) Historical Commission. "Window Guide." Available at: www.cambridgema.gov/Historic/windowguide.html

Garvin, James. A Building History of Northern New England. Hanover, NH: University Press of New England, 2002.

Hadley, James. "The Home of the Future?" ArchitectureBoston 10, no. 2 (March/April 2007): 44-47. www.architects.org/documents/publications/ab/marapr2007/HomeOfTheFuture.pdf

Historic Homeworks www.historichomeworks.com

James, Brad, Andrew Shapiro, Steve Flanders, and Dr. David Hemenway. "Testing the Energy Performance of Wood Windows in Cold Climates." A Report to the State of Vermont Division for Historic Preservation. 30 August, 1996. www.ncptt.nps.gov/PDFfiles/1996-08.pdf

Jordan, Steve. "Strips and Storms: Techniques for tuning up sash windows for winter." Old House Journal (November/December 2004): 46-51. www.oldhousejournal.com

Leeke, John C. Save Your Wood Windows: an alternative to vinyl replacement windows and vinyl windows. 2004. Sample pages available at www.historichomeworks.com/hhw/reports/reports.htm.

Klems, Joseph H. "Measured winter performance of storm windows." University of California: *Lawrence Berkeley National Laboratory,* August 23, 2002. Available at http://repositories.cdlib.org/lbnl/LBNL-51453

Mattinson, Bill, Ross DePaoloa, and Dariush Arasteh. "What Should I Do About My Windows?" Home Energy Magazine (July/August 2002): 24-31. www.homeenergy.com/19-4.html

Myers, John H. "The Repair of Historic Wooden Windows" Preservation Brief Series # 9. The National Park Service, www.cr.nps.gov/hps/tps/briefs/brief09.htm

National Park Service. "The Secretary of the Interior's Standards for Rehabilitation" www.nps.gov/history/hps/tps/tax/rhb/stand.htm

New England Window Restoration Alliance www.windowrestorationne.org

New York Landmarks Conservancy. Repairing Old and Historic Windows: A Manual for Architects and Homeowners. Washington, D.C.: The Preservation Press, 1992.

Rypkema, Donovan D. "Economics, Sustainability, and Historic Preservation.." Forum Journal 20, No. 2 (2006): 27-38.

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 36, no. 4 (2005): 25-29. www.apti.org/publications/Past-Bulletin-Articles/Sedovic-36-4.pdf

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

Shapiro, Andrew and Brad James. "Retain or Retire? A Field Study of the Energy Impacts of Window Rehab Choices." In Window Rehabilitation Guide for Historic Buildings, edited by Charles Fisher III, Deborah Slaton, and Rebecca Shiffer. Washington, D.C.: Historic Preservation Education Foundation, 1997.

Sullivan, James. "Preserving windows to the past. History-minded vinyl critics say wood remains the best." Boston Globe, 30 July 2006. [Cited July 31, 2006.] www.boston.com/news/local/articles/2006/07/30/preserving_windows_to_the_past?mode+PF7/31/2006.

Additional Help

With nearly half of greenhouse gas emissions attributed to the construction and operation of buildings, older and historic buildings are central to our efforts to address climate change. The **National Trust for Historic Preservation's Sustainability Initiative** promotes the reuse of existing buildings, reinvestment in existing communities, and green retrofit of older and historic buildings to help lower carbon emissions. For more information visit www.preservationnation.org.

Additional help may be available from your **State Historic Preservation Office** (SHPO). Find your SHPO at www.ncshpo.org/. Private **statewide and local preservation groups** serve as the network centers and representatives of local preservation activities within their states. The nine **Regional and Field Offices of the National Trust for Historic Preservation** (NTHP) bring the programs and services of the NTHP to preservationists within their regions. Find your nearest NTHP Regional Office and state and local preservation organizations at www.preservationnation.org/about-us/partners/statewide-local-partners/contacts.html