U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Window Retrofit Option

Existing Window Performance Upgrade: Air Sealing & Operation

Although these original wood windows are fitted with conventional storm windows, the owner also wanted to upgrade the existing windows to work more smoothly and to be less drafty.

Photo: Peter Yost

Description

For historic, aesthetic, or economic reasons, homeowners may choose to keep and upgrade existing windows. An upgrade should not only improve window operation, it should also reduce air leakage (movement of air in and out of the home through cracks in the window assembly). Air sealing improves a window's airtightness, reducing unwanted heat loss through windows in cold weather and heat gain in hot weather, increasing indoor comfort by reducing drafts, and reducing excessive drying of interior air in heating climates.

Although regional and national businesses in Europe offer patented systems for upgrading existing windows (for example the ***Ventrolla System*** or the ***Quattro Seal*** approach), window upgrades in the U.S. are less formalized and usually carried out by specialty local contractors.

A window performance upgrade typically includes new seals or gaskets at the window head, sill, and meeting rail of the two sashes, as well as tube or leaf seals at the vertical edges of the sashes; replaces sash cord-and-pulley systems with spring balances; and squares up sashes to ensure full contact with the window frame. Sometimes an upgrade involves repairing sash frames, window glass, or window glazing (putty).

A window performance upgrade is not complicated but requires specific skills and experience. If existing windows contain lead-based paint, the upgrade has to comply with the U.S. Environmental Protection Agency (EPA) ***lead-safe work practices rule*** and may require a certified professional.

Overall Thermal Performance

Air sealing upgrades improve window thermal performance by reducing unconditioned air leakage in (infiltration) or conditioned air leakage out (exfiltration), thus reducing heating and cooling needs and improving occupant comfort.

Air sealing windows can reduce wintertime condensation potential by increasing the surface temperature of the window glass, but reducing air leakage also has the potential to increase wintertime interior relative humidity.

When To Consider

- Window replacement is too expensive.
- Exterior storm windows are already in place.
- Existing windows are drafty.
- Preserving appearance of existing windows is desirable.
- Climate is cold, and air sealing is a top priority for comfort and energy efficiency.

When to consider this retrofit—Ownership

x	Homeowner
x	Apartment Renter – Long Term
	Apartment Renter – Short Term
	Live in a Condo
x	Live in a Historical District

When to consider this retrofit—Window conditions

x	Existing window single-glazed
	Existing window double-glazed, no low-e*
	Existing window double-glazed with low-e (non-low-e films)

* low-emissivity coating

Key Benefits

- Saves energy (particularly in cold climate)
- Improves comfort
- Restores window operation at reasonable cost
- Maintains look and "feel" of existing windows
- Improves acoustic performance

Key Drawbacks

- Does not affect solar gain control or thermal insulation of a window
- Requires trade contractor

Aesthetics

- Maintains look and feel of existing windows

Tips/Cautions

- Care must be taken to follow lead-safe practices as indicated by window frame and sash conditions.
- Care must be taken not to affect window operability.

Recommended Installer

	Do it Yourself
x	Contractor
	Manufacturer or supplier

Complementary Options

- In cold climates: low-emissivity exterior storm windows, window quilts, or insulated cellular shades
- In warm sunny climates: awnings or solar control surface-applied films

Operation

	Motorized
	Sensor
x	Manual

Considerations

	1	2	3	4	5
Ease of Installation (1 = easier)			x	x	
Availability (1 = more available)				x	
Cost Details (1= lower cost)		x	x		
Average Total Cost for 30- by 60-inch window					
Cost	$200				

Digging Deeper

Energy Modeling Tools for Professionals

x	*RESFEN*
x	*EnergyPlus-based modeling tools*
x	*WINDOW 6*

This window upgrade included truing sashes to fit the opening, adding leaf seals (see the white seal on the left, against the outside edge of the interior jamb trim), and routing in a beefy sill gasket.

Photo: Peter Yost

References

"Should Your Old Windows Be Saved?" Fine Homebuilding, May 2010"

"The Effects of Energy Efficiency Treatments on Historic Windows," Center for Resource Conservation, Jan 2011

To find window upgrade service providers, use these internet search terms: window restoration, wood window repair, wood window air sealing

For more information visit: ***www.windowattachments.org***

U.S. DEPARTMENT OF ENERGY

Energy Efficiency & Renewable Energy

EERE Information Center
1-877-EERE-INFO (1-877-337-3463)
www.eere.energy.gov/informationcenter

Printed with a renewable source ink on paper containing at least 50% wastepaper, including 10% post consumer waste.

DOE/EE-0595 • June 2011