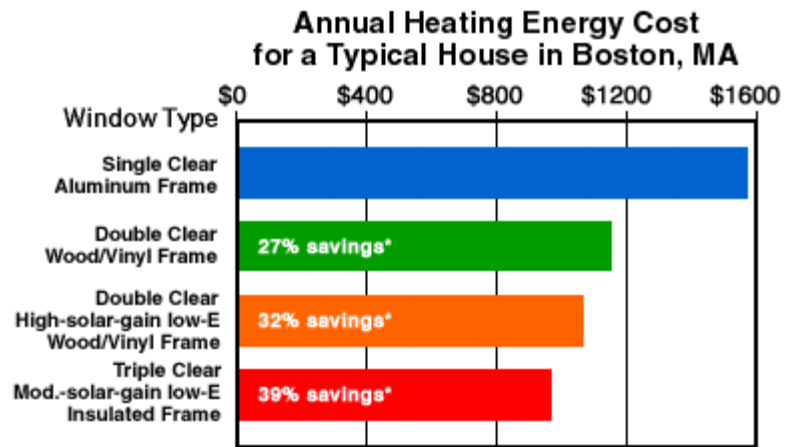


Windows, a Clearer View on Energy Savings

By James Quarello

Windows are one of the most noticeable parts of our homes. They let us see the world outside and let light inside. They are also a gapping hole in the thermal envelope of our homes. A significant amount of heat is lost through the windows. This is because glass is an extremely poor insulator. Due to this characteristic windows have evolved to the thermal multi-paned types today. But is replacing your “old” windows with a modern thermally superior variety going to make a huge difference in your utility costs? The short answer, very likely no.

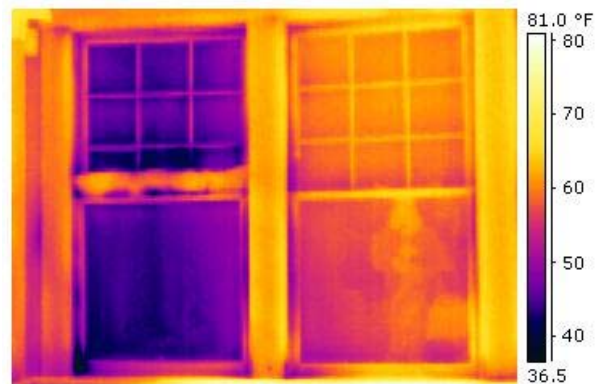
In my experience clients have related claims by window installation companies of energy savings of as high as 40 percent by installing new replacement windows. This number was very likely derived from the chart to the right from the Efficient Window Collaborative. The problem with the chart is the base line window is not a realistic example. An aluminum framed, single paned window is not common. In fact I can never recall ever seeing one in the seven years I have been inspecting homes, although I have seen numerous thermal double paned aluminum windows. The baseline example in the chart would be the absolute worst thermally performing window possible. A more realistic and accurate example would have been a wood framed single paned window.



*Compared to the same 2000 sq. ft. house with clear single glazing in an aluminum frame.

But let’s say you already have thermal double paned windows. They are old, worn and drafty. If you replace the old thermal windows with new double low-E windows the expected savings is about 5 percent according to the above chart. That is the difference between double clear (green bar) and double clear with low-E (orange bar).

Let’s take another scenario; a single paned window outfitted with storm windows. This configuration is a double paned window but not thermally sealed. In the infrared image at right the window on the left is not equipped with a storm while the right window has a storm in place. As is very apparent the difference in temperature is great. In fact it is approximately 15 ° F. What you may also notice is the storm window decreases the drafts. The left window has a cloth draft preventer along the center seam. That is also the coldest part of the window.

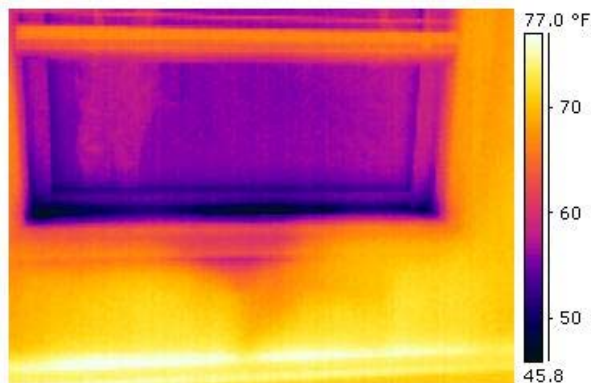


These windows are original to this 1914 built home. So you would believe that replacing the windows in this home would be very beneficial. The truth is through the assistance of a complete energy audit the windows were found to be a poor improvement. There were 27 windows of this general size in the

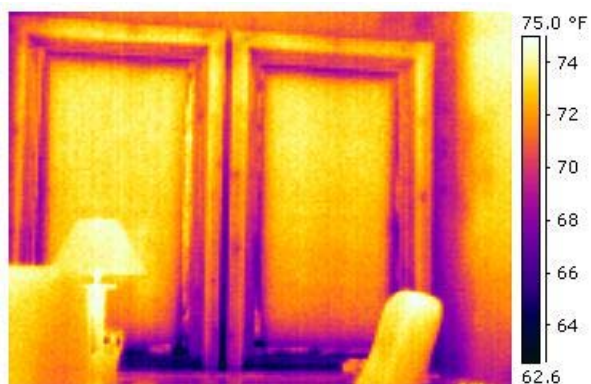
home. Replacement cost was estimated at \$9500. The estimated yearly savings was \$320. The time to payoff the windows through realized energy savings was 30 years.

One parameter that can not be estimated is the draftiness of the windows. The air infiltration through leaky old windows can be a significant factor in comfort and energy costs. Therefore it could be reasonably inferred that the figures just given may be considered conservative. That due to the elimination of drafts the energy savings and certainly the comfort level of the home would be greater than estimated.

Here's another example. The window in the IR image at right is 12 years old. It is a thermal double paned window. This window is a low quality, "spec" window and is substantially leaking air causing further heat loss and discomfort. Notice at the bottom of the image is the baseboard heater. The quality of this window is so poor that the heat has almost no effect on the glass.



The next IR image is of a good quality replacement thermal double paned window. Notice the glass is about the same temperature as the walls around the window. What is worthy of mentioning here is the heat is forced air with the duct located well above and to right of these windows.



The cold area at the base of windows is actually from aluminum foil the home owner placed there due to a perceived draft. The foil is reflective to IR and as such appears colder.

As is evident replacing windows to gain energy savings is a complex process. Changing windows can be in some instances a bad energy saving choice.

The tag at the right from the National Fenestration Rating Council should be on any window you are considering purchasing. Manufacturers voluntarily submit their products to NFRC for certification. However in order to meet the ENERGY STAR® criteria a product must be NFRC certified.

A detailed explanation of each criteria found on the NFRC Label can be found on their web site @ www.nfrc.org/label.aspx

Before considering replacing windows in your home an energy audit would be highly recommended. Through this process from an independent auditing service the cost effectiveness of a planned window replacement can be sensibly evaluated. If it is determined that a window replacement makes economic sense for your home, following the quality parameters from the NFRC will aid in finding the highest performing window for your energy improvement budget.

 National Fenestration Rating Council® CERTIFIED	World's Best Window Co. Millennium 2000+ Vinyl-Clad Wood Frame Double Glazing • Argon Fill • Low E Product Type: Vertical Slider	
	ENERGY PERFORMANCE RATINGS	
U-Factor (U.S./I-P)	Solar Heat Gain Coefficient	
0.35	0.32	
ADDITIONAL PERFORMANCE RATINGS		
Visible Transmittance	Air Leakage (U.S./I-P)	
0.51	0.2	
Condensation Resistance		
51	—	
<small>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrc.org</small>		