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www.wascowindows.com

How much energy can really be saved by replacing windows?

David Paulus, PhD., P.E.

How much energy will WASCO windows save me?

The exact savings on your energy bill are difficult to predict, due to year-to-year changes in the severity of winter and warmth of summer, as well as changes in energy costs. Even if these factors are ignored, the percentage savings you will see remains dependent on what type of windows your house has now, how good of condition your windows are in, and how well insulated your home is.

If the exact savings can't be predicted, can WASCO give a typical range?

For a typical existing construction house¹ in Milwaukee, savings (on the *heating/cooling portion* of the energy bill) can range from 20% for a house with leaky, wood single pane windows with no, or ineffectual, storm windows to 8% for a house with insulated glass windows, or single pane windows with good storm windows. If your house is better insulated than the “typical” house, your percentage savings will be greater (although the dollars saved would be similar). If your house has relatively more windows per square foot of floor, energy savings can be greater. Likewise, if your house has relatively few windows, the savings will be less.

Your competitor claims greater energy savings than the above numbers. How can this be?

Claims of excessively high energy savings are often made by unrealistic assuming the existing conditions. For example, performing calculations based on an existing house that is well-insulated, except for a large number of leaky, aluminum single-pane windows will result in a calculated savings significantly higher than the 20% stated above. These assumed existing conditions usually are likely much different than the **real** existing conditions inside your home! Another trick used by some manufacturers is to quote the maximum possible savings in peak cooling bills, instead of the total energy costs for a house over a whole year.

How can some companies guarantee energy savings?

A quick internet search turns up companies guaranteeing as high as 40% savings. Unfortunately, engineering simulations show that such claims are false. Companies make such guarantees by limiting the duration of the guaranteed energy savings and setting high standards for proof that their products did not perform as advertised. Then, they build into their price the added cost of honoring the guarantees of the few who successfully complain.

Why does WASCO offer low and high SHGC options?

The American Recovery and Reinvestment Act (stimulus act) of 2009 stipulates that only windows with a U-Factor of under 0.30 and a solar heat gain coefficient (SHGC) of under 0.30 qualify for the federal 30% tax credit. Both the dual and triple pane with Cardinal LoE³ meets both of these requirements.

¹ See the tables of assumptions at the end.



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However, in Wisconsin's climate, a higher SHGC, especially on southern windows actually **reduces** annual energy costs. WASCO therefore offers high SHGC packages using cardinal LoE179 glass to take advantage of this free source of renewable energy.

Legislation has been introduced that will allow the superior high SHGC products to receive the tax credit.

Why doesn't WASCO offer triple panes in the double-hung windows?

The overall thickness of the triple pane (1.375") does not allow it to fit in sliding window designs.

Does WASCO recommend the high or low SHGC glazing?

If the tax credit is not an issue, WASCO recommends high SHGC glazing for all windows except for north-facing windows with a clear view of the night sky. Low SHGC windows are also good options for the customer willing to trade efficiency for comfort, or for west facing windows in rooms with summer heat problems.

Useful Websites

www.nfrc.org The National Fenestration Registration Council

windows.lbl.gov Windows and Daylighting Group, Lawrence Berkeley National Laboratory

www.efficientwindows.org This website has online calculators for energy costs. WASCO is a member of this organization.

About the Author

David joined WASCO Windows, the family business, full-time after more than a decade of industrial and academic experience. (He worked in the factory summers during high school, and has consulted for the company many instances since then.) He worked as an engineer for Cleaver-Brooks (a Milwaukee-based manufacturer of boilers), where he did structural as well as thermal design, and for Siemens Power Generation in Milwaukee and Germany, where he developed software for analyzing field test results. He has taught thermodynamics and power plants at Marquette University in Milwaukee, and most recently was a senior research associate at the Technische Universität Berlin in Germany, where he worked for the Institute for Energy Engineering in the area of Energy Conversion and Environmental Protection.



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Assumptions used in the simulation:

Simulation program:	ResFen 5.0
Location:	Milwaukee
House type:	2-Story existing frame (Envelope WV1)
Foundation type:	Basement
HVAC system type:	Gas furnace/AC
Total floor area:	2000 ft ²
Total window area:	300 ft ² , equally divided among the four sides
Electricity cost:	0.131 \$/kWh
Gas cost:	1.182 \$/therm

Window data used:

	WASCO Double Hung, low SHGC	Leaky, single glazed windows	Older clear insulated glass windows
U-Factor (Btu/hr-ft ² °F)	0.30	0.84	0.49
SHGC	0.19	0.63	0.56
Air leakage (cfm/ft ²)	0.03	0.6	0.3