

Highly-Insulating (R-5) Windows and Low-e Storm Windows Volume Purchase Program

How Utilities Can Participate

Windows have traditionally been a large source of heat loss within buildings. Substantial improvements have been achieved with insulating glass and low-E coatings, but the potential for even greater heating energy savings with highly-insulating windows still remains largely untapped.

What are Highly Insulating R-5 Windows?

Highly-insulating windows with a whole-window R-value of 5 (a U-factor of around 0.2) are the top tier of energy-efficient windows for cold and mixed climates available today. This compares to ENERGY STAR windows with an R-value of 3. Increasing the R-value from 3 to 5 reduces average heat loss through the window by 30% to 40%.

Energy Savings with R-5 Highly Insulating Windows

Windows in the U.S. account for 30% of building heating and cooling energy, representing an annual 4.1 quadrillion Btu (quads) of primary energy consumption. In addition, windows have a large impact on peak energy demand and on occupant comfort.

- In cold and mixed climates, R-5 windows save considerably more energy than conventional windows and can be cost effective when produced in volume. The figures on the right show the life-time energy cost savings and incremental cost of R-5 windows

* The U-factor measures heat transfer in Btu/hr-sq ft-°F. U-factor and R-value are inversely related.



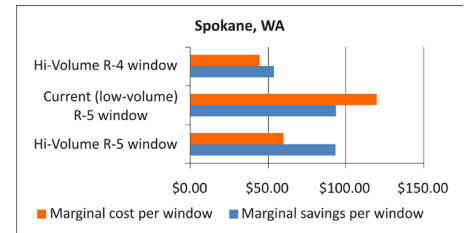
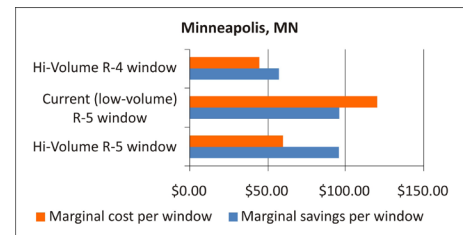
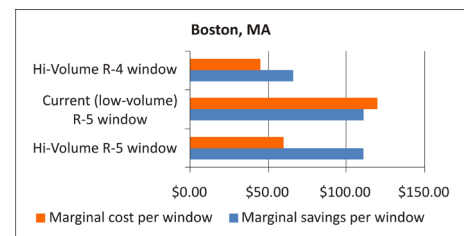
compared to typical ENERGY STAR windows – assuming that through high-volume purchases, the price differential for R-5 windows is reduced from \$8/ft² to \$4/ft².

Overcoming Barriers to Widespread Adoption of R-5 Windows

Principal barriers to widespread adoption of R-5 windows are cost, lacking economies of scale, and lacking awareness in the market. To overcome these barriers, the Building Technologies Program (BTP) of the Department of Energy (DOE) is employing a three-pronged strategy:

- First, BTP is working with industry and potential buyers to drive down the production cost of R-5 windows to a price differential of \$4/ft² or less compared to today's typical ENERGY STAR windows. BTP is issuing production engineering awards to window manufacturers to achieve this goal without sacrificing performance. Second, in order to establish economies of scale, BTP is organizing a volume purchase of R-5 windows, and third, BTP is planning to build greater awareness of highly insulating windows by establishing more stringent ENERGY STAR criteria.

Marginal Cost vs. Marginal Savings for Highly-Insulating Windows in Cold Climates



Although presently, R-5 windows tend to be niche products that can be cost-prohibitive, there is a large energy and cost savings potential from volume demand and supply.

The Pathway to Zero Energy Buildings

The Building Technologies Program has embraced the strategic goal of developing net-zero-energy buildings to reduce national energy consumption. A net-zero-energy building is a residential or commercial building with greatly reduced needs for energy through efficiency gains (60 to 70% less than conventional practice), with the balance of energy needs supplied by renewable technologies. Highly insulating windows are a key stepping stone to achieving net-zero-energy buildings. Likewise, there is a considerable interest by builders and developers in many utility service territories that are planning or constructing homes and neighborhoods to meet net-zero energy goals.

R-5 Windows Volume Purchase

A volume purchase involves a number of steps:

- Identification of buyer base including potential governmental and private sector customers
- Communication with manufacturers about appropriate technical and economic criteria based upon customer expectations
- Specification and interested manufacturers bid

Successful bidders are chosen based on meeting technical and economic criteria and their products are placed on a purchasing schedule. Customers then have the opportunity to purchase the listed products from that schedule.

Schedule for volume purchase:

- Volume purchase RFP: December 2009
- Manufacturer proposals: February 2010
- Qualified vendors contacted: March 2010
- Window products available: Spring 2010 – mid 2011
- Phase II volume purchase: February 2011

Utilities Must Be Involved

In many regions of the U.S., utility programs have helped successful market transformation toward ENERGY STAR windows. Now that ENERGY STAR windows have reached a large market share, the time is ripe for introducing to customers an even higher performance tier that has not yet widely spread in the market but can save substantially more energy than business as usual. In cold and mixed climates, R-5 windows on average reduce window heat loss by 40% and overall space conditioning costs by 10% relative to common ENERGY STAR windows.

Promotion of R-5 windows through utility programs could include customer education about window selection criteria as well as incentives for installing R-5 windows in new construction and retrofits. Due to the initially small market share of R-5 windows, free ridership can be avoided and program expenditures focus on performance levels exceeding those promoted by other programs

such as energy codes and tax credits. Incentives can be reduced once a solid foundation through greater market adoption and awareness of R-5 windows has been achieved.

In the future, BTP will be providing additional support to help successfully transform the market for R-5 windows. This support will include a follow-on manufacturer production engineering solicitation to further improve performance and drive down costs, a Phase II volume purchase, and visibility and recognition mechanisms for builders who are early adopters of R-5 windows.

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EERE Information Center
1-877-EERE-INF (1-877-337-3463)
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For More Information on the Volume Purchase Program
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