

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

## What Commercial Building Buyers Need to Know

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



## 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:

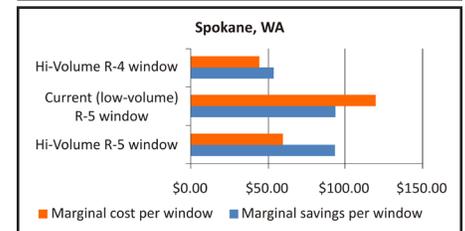
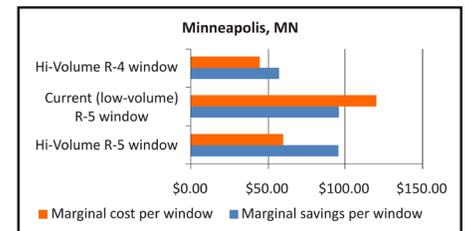
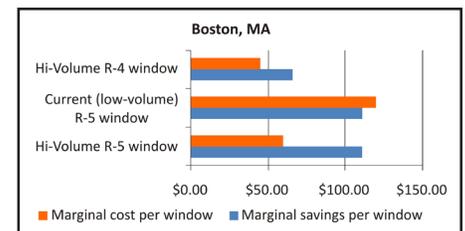
First, BTP is working with industry and potential buyers to drive down the production cost of R-5 windows. BTP is issuing production engineering awards to window manufacturers to achieve this goal without sacrificing performance. Second, in order to establish economies of scale, BTP is organizing a volume 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.

## 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.

## 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.

## 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

Customers then have the opportunity to purchase the listed products from that web site. Manufacturers are able to lower their price at any time, but may not raise it, and are able to delist products at any time.

### 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

## Commercial Buyers Can Get Involved!

**Significant energy savings from low-e window technology are possible in the commercial buildings sector** where the current penetration of low-e technology is modest. Full adoption of low-e technology would save 0.4 to 0.5 quads over sales.

### The Cambria Office Facility

A prime example is that of the Cambria Office Facility ([www.commercialwindows.org/case\\_cambria.php](http://www.commercialwindows.org/case_cambria.php)), a 34,500 ft<sup>2</sup> facility designed and built in Ebensburg, PA. This facility incorporates highly insulating, triple glazed windows at an incremental cost of \$15,000 compared to traditional double glazed windows. These windows permitted the complete elimination of the perimeter heating system priced at \$25,000. The air conditioning system was also downsized from 120 to 60 tons, saving \$40,000 of which 15 tons or \$10,000 was directly attributable to the triple glazed windows. Operating energy costs for this facility are less than

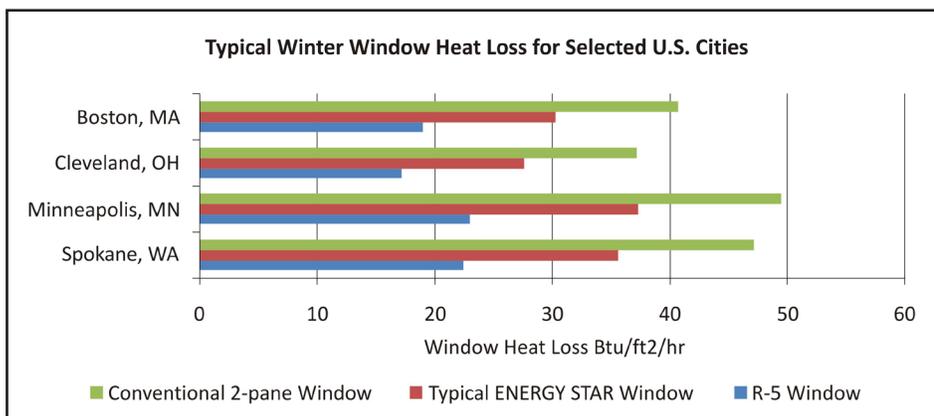


a similar-sized office building in PA with traditional double-glazed windows.

### More Advantages for Light Commercial Buyers

In cold and mixed climates, light commercial buyers can save energy and money through the use of R-5 windows which may permit considerable savings from use of HVAC units.

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.



The rate of heat loss determines the window surface temperature and the need for perimeter heating.

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