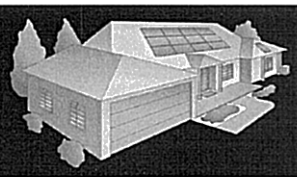


Highly Insulating R-5 Windows Volume Purchase

What Builders 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 windows by 40%.

R-5 Highly Insulating Windows Save Energy and Money

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. Windows have an even larger 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 economic savings of high volume R-5 windows compared to typical ENERGY STAR® windows in selected cities— assuming a price differential of $4/ft.[2]

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

Barriers to R-5 Windows Commercialization

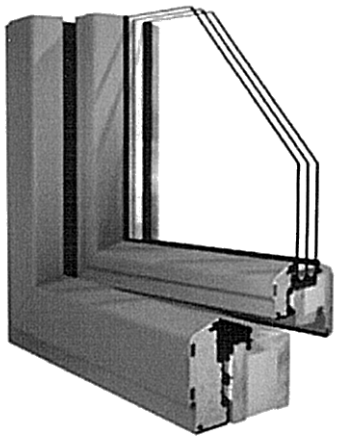
The principal barrier to widespread market commercialization of R-5 windows is cost. To overcome this barrier, the Department of Energy (DOE) is working with industry and potential buyers to achieve a price premium of $4/ft^2 or less compared to today's typical ENERGY STAR® windows. Additionally, R-5 windows can be marginally thicker and heavier than traditional windows.

R-5 Windows Market Transformation

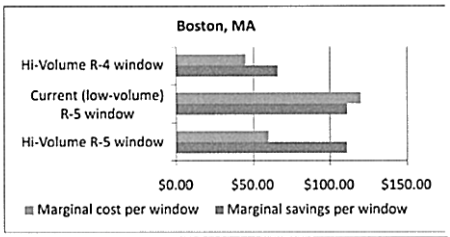
In order to overcome the principal cost barrier of R-5 windows, the DOE Building Technologies Program (BTP) is employing a three pronged strategy to increase demand and lower costs. First, BTP is making production engineering awards to window manufacturers to drive down the production cost of R-5 windows without sacrificing performance. Second, in order to increase market demand, BTP is organizing a volume purchase of R-5 windows and third, is also working to establish more stringent ENERGY STAR® requirements.

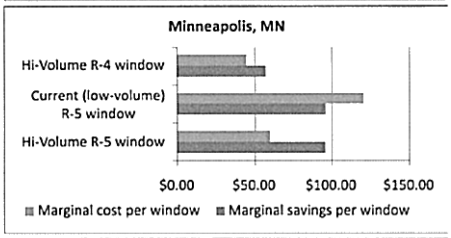
The Pathway to Zero Energy Buildings

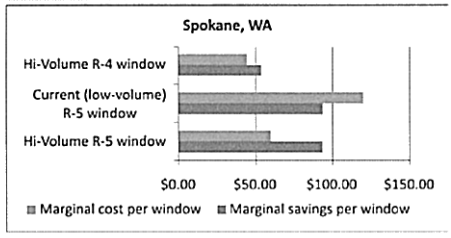
The Building Technologies Program has embraced the strategic goal of developing net-zero-energy buildings to reduce national energy consumption. A net-zero-energy building is a residential or commercial building with greatly reduced needs for energy through efficiency gains (60 to 70% less than conventional 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

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: January 2010
  - — Manufacturer proposals: March 2010
  - — RFP winners announced: May 2010
  - — Windows available: Jan. – March 2011
  - — Initiate Phase II volume purchase: April 2011

Builders Must Be Involved

In cold and mixed climates, builders can reduce capital costs through the use of R-5 windows which may permit elimination or redesign of perimeter duct heating systems, and installation of smaller HVAC units. The figure below exhibits the advantages in peak heating load reduction through the use of R-5 windows.

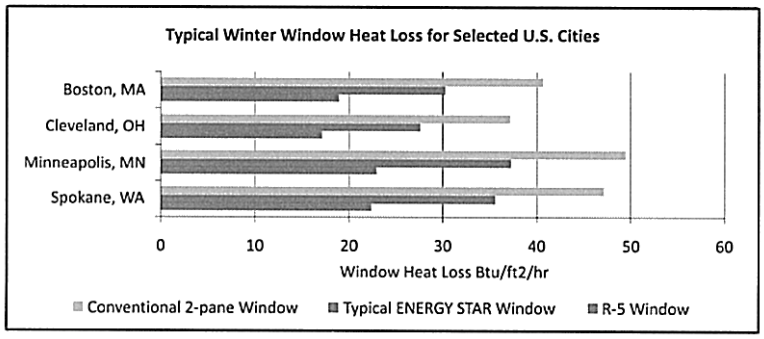
A prime example is that of the Cambria Office Facility (www.commercialwindows.org/case_cambria.php), a 34,500 ft2 facility designed and built in Ebensburg, PA. This facility incorporates highly insulating, triple glazed windows at an incremental cost of $15,000 compared to traditional double glazed windows. 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 significantly lower than those with traditional double glazed windows.

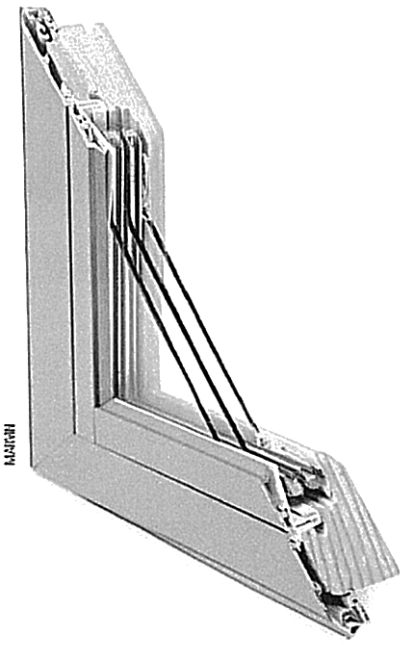
Highly insulating windows also allow builders to pitch market differentiation and a green edge. Home and business owners can cost-effectively lower lifetime energy costs, while improving temperature uniformity and room comfort, and potentially acoustic characteristics. Depending upon their structure, three pane R-5 windows can moderately to significantly lower noise levels compared to standard two pane windows.

In order for the volume purchase to succeed, the participation of national builders is a must. Specifically, BTP is requesting input on the types, sizes, and quantities of R-5 windows of interest along with permissible price premiums and warranties. Most importantly, BTP is requesting the commitment of national builders to purchase R-5 windows in volume if prescribed performance and cost specifications are 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.

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





Questions?

Visit www.R-5WindowsVolumePurchase.com or send your questions to R-5windows@energetics.com

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

U.S. DEPARTMENT OF ENERGY

Energy Efficiency & Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable and affordable

May 2009