



Weatherizing for the Future The Role of the Replacement Window Market

To say that energy-efficient replacement windows help homeowners weatherize for rough seasons is stating the obvious. Yet it is not only the weather that makes the replacement windows market so important. For many window manufacturers, a solid foundation in the replacement market is what has helped them weather the worst effects of the ongoing ebb in new home construction. Moreover, as both presidential candidates promise to lead on the issues of climate change and energy security, replacement windows will have a crucial role to play in bolstering the energy efficiency of the vast U.S. building stock.

Certainly, the replacement market faces its challenges too, as a difficult economy

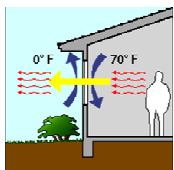
also affects people's ability to invest in home upgrades. And among home energy improvements, window replacement is not usually the lowest-hanging fruit in terms of cost. Yet almost half of the existing residential window stock in the U.S. is estimated to still be single-pane. There remains a huge potential for the replacement window market to weatherize the economy for an energy-constrained future.

A strong climate and energy policy that reaches higher than the lowest-hanging fruit would open up significant market opportunities for energy efficiency technologies. In a recent study, the American Council for an Energy Efficient Economy (ACEEE) estimates that over the next two decades, the right set of policies and financing mechanisms could cost-effectively reduce national energy use by 20 percent below business as usual. This is estimated to boost annual investment in energy efficiency from about \$300 billion in 2004 (including \$10 billion for improvements in existing homes) to more than double this amount by 2030.

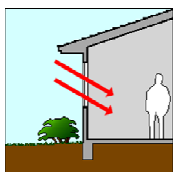
Which set of policies is needed to tap the energy efficiency potential in the housing stock? In the near term, the ongoing subprime mortgage and credit crisis places a heavy burden on the federal government that might delay promising policies. Yet one important measure – the extension of several energy efficiency tax incentives including the home energy improvement credit that had expired at the end of 2007 – passed Congress together with the \$700 billion Wall Street rescue package on October 4, 2008 (see article on the right).

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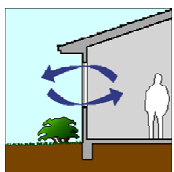
The Energy Impact of the Existing Residential Window Stock



Heat loss: About 20% of heating energy is lost through windows. This equals 1.3% of total U.S. energy use.



Heat gain: About 40% of cooling demand is due to heat gained through windows. This equals 0.9% of U.S. energy use.



Air leakage: The numbers above would be larger if infiltration was taken into account. The magnitude of air leakage nationwide is hard to estimate.

Almost half of the residential stock is still single-pane.

Sources: Arasteh et al. LBNL
2007 Buildings Energy Databook

Congress Extends Energy Efficiency Tax Incentives

On October 3, 2008 President Bush signed into law the Emergency Economic Stabilization Act of 2008. In addition to the \$700 billion bailout package for Wall Street, this act also includes provisions of far less epic proportions but nonetheless great importance for energy-efficient windows: the extension of renewable and energy efficiency tax incentives, including tax credits for energy efficiency improvements to existing homes. These tax credits differ in some details from those that expired at the end of 2007, while in most parts, including energy-efficient fenestration, they remain unchanged.

Tax Credit for Efficient Fenestration

- For windows installed in 2009
- 10% of purchase price
- Maximum credit: \$200 for windows and skylights, \$500 for doors and window film
- All ENERGY STAR windows and skylights qualify

More information: www.energystar.gov

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Commercial Buildings Initiative Eyes Zero Energy by 2030

On August 5, 2008, David Rogers, the Department of Energy's Deputy Assistant Secretary for Energy Efficiency, announced DOE's support for a Zero-Net Energy Commercial Buildings Initiative (CBI). This initiative had been authorized by the Energy Independence and Security Act (EISA) of 2007 as a partnership among DOE, the private sector, national laboratories, and non-governmental organizations. The mission of CBI is to create a coordinated, long-term national strategy for public-private collaboration that integrates deployment, demonstration, and innovation to achieve "net-zero-energy" commercial buildings. DOE's first major step in support of the Initiative is the establishment of a collaborative among five national laboratories to combine their innovative resources and create technology research, validation, and



commercialization priorities critical to the success of net-zero energy buildings.

Further major steps will need to follow to allow the Commercial Building Initiative to set full sails. CBI's mission goes beyond technology market introduction. The provisions in EISA provide CBI with a goal that is in line with the American Institute of Architects 2030 Challenge: transform the commercial buildings sector so that by 2030, new commercial construction in the United States will use net-zero energy. For the

pre-2030 building stock, the goal is to achieve net-zero energy by 2050. Net-zero energy means that aggressive energy efficiency measures reduce demand to a minimum, while renewable resources fulfill the remaining energy requirements. These goals are for buildings of every type of use—office towers (both client-owned and leased), industrial facilities, shopping malls, hospitals, schools, government facilities and the like.

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Congress Extends Energy Efficiency Tax Incentives

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Other incentives, such as the credit for energy-efficient new homes and the deduction for energy-efficient improvements to commercial buildings, have not yet expired. The new home tax credit, which provides \$2,000 to builders of homes that achieve a 50% reduction in heating and cooling energy consumption relative to a comparable dwelling, is extended through 2009. The tax deduction for reductions of HVAC, hot water, and interior lighting energy use in commercial buildings is extended for five years through 2013. The Emergency Economic Stabilization Act also extends the manufacturer's energy efficient appliance tax credit and introduces a new

credit for qualified plug-in electric drive vehicles.

Information on the exact provisions of the different tax credit and tax deduction extensions will be posted by the Alliance to Save Energy at www.ase.org/content/article/detail/2654.

Tax credits vs. tax deductions: In general, a *tax credit* is more valuable than a similar *tax deduction*. A tax credit reduces the tax dollar-for-dollar. Tax deductions lower the taxable income. For individuals in the highest 35-percent tax bracket, the income tax is reduced by 35 percent of the value of a tax deduction. A tax credit reduces the income tax by 100 percent of the credit.



WORD ON WINDOWS is produced with funding from the Windows and Glazings Program at the U.S. Department of Energy in support of the Efficient Windows Collaborative. For more information on the Collaborative, contact:

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I-Codes: What Changed for Fenestration Energy Efficiency?



The final action hearing of the International Code Council® (ICC), held from September 17th through the 23rd in Minneapolis, ended the code cycle leading to the 2009 versions of the I-Codes, the

family of codes developed by the ICC. The proposed changes voted upon at the final action hearing included several items of relevance to fenestration energy efficiency. Residential fenestration energy efficiency requirements are included in the International Energy Conservation Code® (IECC) and in the energy chapter of the International Residential Code® (IRC). Commercial fenestration energy efficiency is covered by the commercial chapter of the IECC. For the warmer climate zones, substantial changes were approved to the residential fenestration provisions in both the IECC and the IRC. Significant changes had also been proposed on the commercial side, but there, only incremental changes to fenestration energy efficiency requirements were finally approved.

Residential: Much of the discussion about proposed changes to the residential fenestration energy efficiency requirements revolved around questions of how much U-factor and SHGC can be lowered in the warm climate zones 1 through 3 without causing conflicts with concerns such as hurricane resistance, visible transmittance, and cost effectiveness. Finally, lower U-factor requirements for climate zones 2 and 3 were accepted with an

exception for impact-rated fenestration that keeps the requirements at existing levels. The revisions are shown in the table below, with the 2006 IECC requirements struck through and the new requirements underlined. The U-factor requirement of climate zone 4 was brought in line with that of climate zones 5 through 8. These changes apply to both the IECC and the IRC. With regard to SHGC requirements, however, the approved changes diverged between these codes. The question of whether cooling energy savings and peak demand

reduction justified an SHGC of 0.30 and whether this would have an impact on visible transmittance was resolved differently for each code. In the IECC, the SHGC requirements for climate zones 1 through 3 were substantially reduced from 0.40 to 0.30. In the IRC, SHGC was reduced only to 0.35, and the requirement for impact-rated fenestration remains at 0.40.

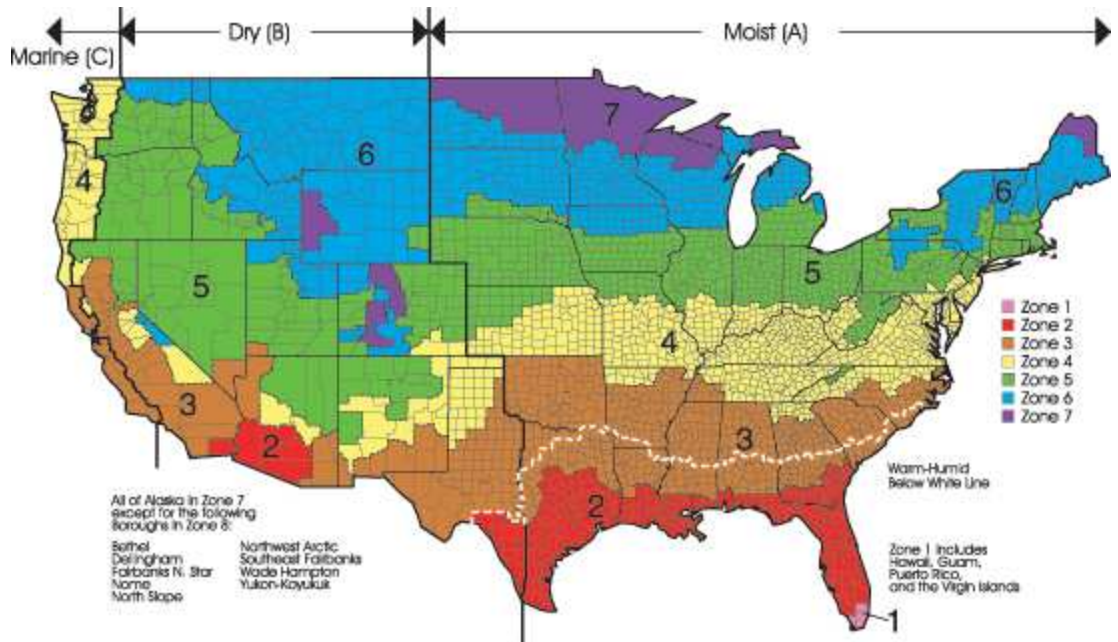
Commercial: The only change from the requirements for commercial fenestration in the 2006 version of the IECC was a reduction of the U-factor requirement for curtain wall and storefront fenestration from 0.45 to 0.40 in climate zones 7 and 8. This brings the U-factor requirements for these fenestration types in line with the requirements in ASHRAE Standard 90.1-2007.

A more controversial proposal regarding curtain wall and storefront fenestration failed in the hearing. The proposal would have permitted that for this fenestration category,

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Prescriptive window requirements in the 2009 IECC/IRC compared to the 2006 IECC/IRC requirements				
Climate Zone	Fenestration U-factor	Skylight U-factor	Fenestration SHGC	
			IECC	IRC
1	1.20	0.75	0.40 <u>0.30</u>	0.40 <u>0.35**</u>
2	0.75 <u>0.65*</u>	0.75	0.40 <u>0.30</u>	0.40 <u>0.35**</u>
3	0.65 <u>0.50*</u>	0.65	0.40 <u>0.30</u>	0.40 <u>0.35**</u>
4 except Marine	0.40 <u>0.35</u>	0.60	no requirement	no requirement
5-8 and Marine 4	0.35	0.60	no requirement	no requirement

* For impact-rated fenestration, the U-factor requirements remain 0.75 in climate zone 2 and 0.65 in climate zone 3.
 ** For impact-rated fenestration, the SHGC requirement in the IRC for climate zones 1-3 remains at 0.40.



I-Codes: What Changed for Fenestration Energy Efficiency?

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AAMA Standard 507 be used as an alternative to NFRC 100 and 200 for rating U-factor and SHGC. The committee voted to disapprove this proposal on grounds that it did not include third-party oversight requirements for manufacturers determining the fenestration ratings.

Whole-building energy efficiency:

Many of the debates leading up to and during the hearing focused on the idea of advancing the code to reduce energy use in residential buildings by 30 percent. This idea was inspired by ASHRAE's goal of achieving 30 percent energy savings through the future ASHRAE

Standard 90.1-2010 and the US Department of Energy's call for a 30 percent improvement in new federal, commercial and residential buildings. A "30% Solution," a comprehensive package of residential IECC revisions, was proposed by the Energy Efficient Codes Coalition (EECC). The EECC was formed by energy efficiency advocates in mid-2007 and has a broad range of supporters including government, utilities, environmental groups, industry and others. "The 30% Solution" was supported by 64% of the building code officials voting, just short of the required two-thirds needed to adopt it. Despite defeat of the comprehensive package, several

individual elements were adopted along with proposals by other parties. Together, these ensure major advances for energy efficiency in the 2009 IECC and IRC. Although thirty percent energy savings was not achieved in Minneapolis, a majority of officials voted in support of most of the energy efficiency proposals, and statements from the EECC and other participants make it clear that reaching this and even higher goals will remain an aspiration for future code cycles.

For more information on the ICC and the hearing results, view www.iccsafe.org. For more information on the EECC, go to www.thirtypercentsolution.org.

Commercial Buildings Initiative

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Much of the technology to build net-zero energy commercial buildings exists today, but is expensive, and requires rare expertise. Moving these technologies and the needed design expertise into the mainstream will require further research and development, financing, as well as closer coordination among the whole range of relevant actors. For instance, it means involving architects, mechanical engineers, lighting engineers as well as specifiers in the building envelope design process.

The federal appropriations have not yet been secured that would allow significant steps toward the close public-private collaboration crucial for CBI to gain momentum. In the meantime, however, DOE and the U.S. General Service Administration are doing their part to dramatic building energy savings through the above-mentioned collaboration among national laboratories and through two newly-formed Offices of High-Performance Green Buildings. These two offices, one for each agency, are headed

by David Rogers (DOE) and Kevin Kempeschroer (GSA) and seek to find ways to meet EISA's targets for building energy use reductions.

In addition, a collaborative of six leading organizations of the building energy efficiency field has held workshops and is involved in strategic planning in support of the Commercial Building Initiative. These include the Alliance to Save Energy, the American Institute of Architects, ASHRAE, Lawrence Berkeley National Laboratory, the US Green Building Council, and the World Business Council for Sustainable Development. For more information, see www.zeroenergycbi.org.

Tax Holidays for ENERGY STAR® Products in Two Southeastern States

During sales tax holidays in Virginia and North Carolina, consumers can save up front when they buy selected ENERGY STAR® products including windows and doors. In Virginia, consumers can save the state sales tax on eligible products costing up to \$2,500, while North Carolina has no dollar limit on the tax-free purchases.

The tax holiday dates are as follows:

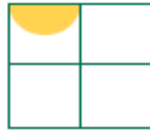
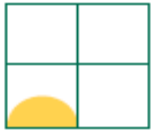
Virginia: October 10-13

www.tax.virginia.gov/site.cfm?alias=EnergyStarQualifiedProductsHoliday

North Carolina: November 7-9

www.dorn.com

from October 2nd to the 5th, Georgia also offered a tax holiday, and according to the Southeast Energy Efficiency Alliance (SEEA), similar tax holidays are being discussed in other Southeastern states as well. SEEA encourages these along with other policies that promote much-needed energy efficiency in the Southeast.



The Role of the Replacement Window Market

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In addition, a housing bill signed by the president in July 2008 recognizes energy improvement mortgages as an under-utilized opportunity that deserves stronger promotion.

It is too early to tell which policies might be put to the forefront by a new Administration and Congress. In any case, a very important factor will be the shape of the comprehensive climate policy that, according to both presidential candidates, can be expected within the next few years and will increase the value of energy savings. Even though it is typically less expensive to save energy through more efficient new construction, a 2007 report by McKinsey & Company estimates residential building shell retrofits as higher on the cost effectiveness scale for reducing carbon emissions than energy supply alternatives to fossil fuels such as nuclear, wind, and solar power.

In addition to Washington's policies, utility demand side management programs can also help stimulate energy efficiency improvements in existing homes. The upcoming increase in stringency for the ENERGY STAR® windows criteria will enable utility companies to promote ENERGY STAR replacement windows with a lower rate of free ridership. The ENERGY STAR revision process is followed with interest by the Consortium for Energy Efficiency, an organization with a membership of utility companies and state energy offices that together invest over \$3 billion

annually in energy efficiency for the public.

Stimuli for existing home improvements do not always have to come in the form of financial incentives. The Department of Energy has developed the EnergySmart Home Scale (E-Scale) which is used to display home energy ratings and can inform prospective homebuyers of a home's energy performance at the point of sale. E-Scale is currently used for new construction only, but could also be adopted for existing homes. In fact, the legislature of the Canadian province of Ontario is currently debating a bill that would require home energy audit reports including a list of suggested retrofits before the sale of new as well as existing homes.

The effect that such information can have on the demand for energy efficiency retrofits is exemplified by European experiences. Based on a European Union directive, EU member states require that energy performance certificates including recommendations for improvements be made available whenever a building is constructed, rented, or sold. The expected demand growth for energy improvements can be felt in the window market. A study by Interconnection Consulting finds that after a long downward trend, Austria's replacement window market is now growing at an annual rate of five percent, mainly due to the energy performance certificates. A similar effect can be observed in the UK, while the weakened window market in Germany, where the certificates have not been

introduced before July 2008, is still awaiting a positive stimulus. McKinsey & Company estimates that Germany's plan to reduce its 2020 greenhouse gas emissions to 30 percent below 1990 (about 15 percent below current levels) bears a growth potential of 30 percent for the German window market.

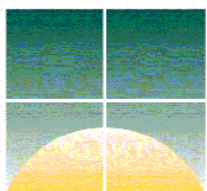
In the United States as well as worldwide, policymakers are currently being forced to deal with the shockwaves of the credit crunch, making long-term energy efficiency goals seem that much more distant. And yet, policies that facilitate energy improvements in existing buildings are as crucial for the economy as ever: they create business opportunities and foster domestic expertise while raising home values and weatherizing the U.S. building stock for a future when the reduction of energy waste and carbon emissions becomes even more of a national priority.

Notes: This article concentrates on the residential window replacement market. To read more about emerging efforts on upgrading the commercial building stock, see the article about the Commercial Buildings Initiative on page 3.

The ACEEE report "The Size of the U.S. Energy Efficiency Market" can be found at www.aceee.org.

The McKinsey and Company studies mentioned, "Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost" and "Capturing the European Energy Productivity Opportunity" can be found at www.mckinsey.com/mgi.

Efficient Windows



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Do You Have News You'd Like to Share?

We're always interested in reporting on new developments in the residential and commercial fenestration markets. If you have something you would like to share with us, please contact Nils Petermann at ewc@ase.org.