



Improved Weatherization Software Captures Benefits of Efficient Windows

Until recently, weatherization agencies have found it difficult to justify the investment in high-performance windows on energy-saving grounds alone. Funding constraints under the federal Weatherization Assistance Program have been part of the challenge, but another factor was that preexisting weatherization software was not set up to account for the full benefits of high-performance windows. Return on investment was understated by weatherization audit tools that did not reflect the energy performance achievable with modern windows. Today, the federal government has addressed both of these barriers by significantly increasing weatherization budgets and updating the weatherization audit software.

In May, 2009, the U.S. Department of Energy issued an updated version (v8.5) of the Weatherization Assistant, an energy auditing program developed and maintained by Oak Ridge National Laboratory for use on residential weatherization projects. The revisions modernized the software to include high-performance windows among the options for residential weatherization. Version 8.5 now includes low-e replacement windows, retrofit storm windows, and low-E storm windows. Additionally, users can choose to define the energy performance values of specific windows for evaluation by the software tool.

The Weatherization Assistant is an umbrella program centered around two separate software tools, the National Energy Audit Tool (NEAT) and the Manufactured Home Energy Audit (MHEA). NEAT is software devised for specific use with single family homes, while MHEA was developed explicitly for use with mobile homes. These programs were created to quickly and



Contractor Tim McIntosh installs a new, energy efficient window to weatherize the home of a family of nine in Baton Rouge, LA.

accurately assess the current performance of a home based on a maximum of 34 variable inputs related to the building envelope, space heating and cooling equipment (including ductwork), and central appliances. NEAT and MHEA then prioritize efficiency upgrades according to projected energy savings and a discounted savings-to-investment ratio (SIR). Weatherization agencies may select a suite of upgrades if they can prove that the upgrades will, at minimum, pay for themselves.

Until the most recent update of the Weatherization Assistant, the performance of replacement windows was assumed to achieve a maximum R-value of 2.2 (U-factor: 0.45).

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Deadline Approaching: NFRC to Require IG Certification

Participants in the NFRC product certification program must make sure that their products meet new IG certification requirements that will take effect on July 1, 2010. From then on, products will only be granted NFRC certification authorization if the insulating glass units used in those products are certified by a third-party program listed by the NFRC. The IG certification requirement also applies to products already included in NFRC's certification program.

Currently, NFRC accepts the IG certification programs offered by the following program sponsors:

- Associated Labs, Inc.
- Insulating Glass Certification Council
- Insulating Glass Manufacturers Alliance
- Keystone Certifications, Inc.
- National Accreditation & Management Institute, Inc.

An up-to-date list can be found at <http://nfr.org/IGCertification.aspx>

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Improved Weatherization Software

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Today, low-E windows – and even low-E storm windows added to existing windows – can achieve far better insulating properties, which is important when evaluating window products against a savings-to-investment ratio. Updating the NEAT tool to accurately reflect the performance of modern glazing has removed a major barrier that had prevented many weatherization agencies from pursuing window upgrades more forcefully. Additionally, NEAT can now predict the ancillary benefits of high-performance windows more accurately (tighter envelope, passive heating, HVAC downsizing opportunities, etc.).

The prior funding constraints for weatherization have been addressed by the American Recovery and

Reinvestment Act (ARRA) of 2009. Under ARRA, weatherization programs have experienced a sizeable lift in federal support. Federal investment through the Weatherization Assistant Program (WAP) will total approximately \$5 billion through 2010, with an additional \$3 billion available through State Energy Programs. Per unit spending has increased substantially from an average \$3,000 in 2007 to a current maximum of \$6,500. The Recovery Act has been a resource that really lifted-the-lid on exploring energy efficiency in single family housing. With a budget around \$6,500 per unit weatherization programs are able to move closer to lasting, cost effective energy efficiency that can continue to provide value over the lifetime of the property.

Neither the software updates nor a boost



in funding are magic-bullet solutions for the adoption of high-performance windows in weatherization, but each are significant steps forward toward a greater recognition of the capabilities of modern glazing to improve the quality of affordable homes.



NFRC to Require IG Certification

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The requirement for IG certification has been established by the NFRC to further solidify the market trust in NFRC certified products. In particular, IG certification procedures include proof of gas content before and after durability testing.

IG certification has also been demanded by the Department of Energy as a prerequisite for ENERGY STAR eligibility. With NFRC now set to require IG certification, DOE accepts this requirement as sufficient for ENERGY STAR.

Because the demand for IG certification is expected to become heavier as the July 2010 deadline approaches, NFRC

program participants who have not done so yet are advised to ensure IG certification for their products as soon as possible. NFRC estimates that based on the inspecting, curing, testing, reporting, and certification processes, a minimum time period of 21 to 26 weeks should be scheduled for complete IG certification.

Detailed questions on the certification process and procedures can be answered by the listed IG certification program sponsors. Manufacturers who purchase their IG units from other companies are encouraged to contact their supplier to determine if their IG units are presently certified under one of the programs listed by the NFRC.



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New National Policies Proposed for Energy Efficiency in Existing Buildings

Energy efficiency has demonstrated cost-savings potential, yet significant market barriers prevent its full realization in many existing buildings. Split-incentives, for example, regularly occur when the person making capital investments does not pay the energy bills (such as in a landlord-tenant relationship), so he or she has little incentive to invest in energy efficiency upgrades. Similarly, prospective property sellers may not be confident that they will own a property long enough to see a return on their investments or that the value of energy efficiency improvements will be transferred into property value at point of sale. Moreover, even those purchasers who would see the full return on their investment face informational barriers that prevent well-informed decision-making about product and property energy use. National legislation for existing buildings can help overcome these market barriers and increase cost-effective investment in energy efficiency.

Existing National Programs

National programs and policies already in place significantly improve energy efficiency in existing buildings. ENERGY STAR, for example, lets consumers know about energy efficient products, thus reducing informational barriers. Similarly, tax-credits, appliance rebates, and low-income weatherization programs reduce barriers to investment by reducing the high upfront cost for energy efficiency. Each of these programs requires continued improvement and support.

Proposed National Policies

Complementing those national policies already in place, the House of Representatives-passed American Clean Energy and Security Act (ACES) and American Clean Energy Leadership Act (ACELA), passed by the Senate Environment and Natural Resources committee, authorize new policies to advance energy efficiency in existing buildings. These policies include:

Energy Efficient Retrofits: Both ACES and ACELA contain provisions to facilitate retrofits in existing buildings. The provisions in both bills (ACES Section 202 and ACELA Section 262) would provide grants to residential and commercial building owners for building retrofits. These grants would be administered by State Energy Offices. The programs would prescribe levels of financial support for certain retrofits based on the building type, the level of energy savings achieved, and whether the savings estimates are based on designed or demonstrated energy savings. By providing grants to buildings ineligible for low-income weatherization, these provisions would expand the potential for energy efficiency retrofits in a larger pool of buildings.

Building Labeling: Section 203 of ACES contains a provision to establish a building energy performance labeling program. The proposed building labels would display achieved or designed performance data on building energy consumption based on recommendations from the Environmental Protection Agency (EPA). In addition, the EPA would work with State Energy Offices to encourage the adoption of the building energy labels and with the Department of Energy (DOE) to develop a business and consumer education program to increase awareness about building energy efficiency and the labeling programs. A late amendment to ACES prevented the building labeling program from applying to existing buildings, but the corresponding ACELA provision (section 281) still applies to both new and existing buildings. ACELA section 281 also has a requirement for some federal buildings to implement the building information program. Building labels have great potential to increase consumer awareness and reduce informational barriers about building energy consumption, thus contributing to lasting energy savings.

Energy Efficient Mortgages: Section 289 of ACES contains provisions that would encourage greater utilization of energy efficient mortgages. Energy efficient mortgages incorporate estimated energy cost-savings from energy-efficiency improvements into the calculation for a borrower's mortgage eligibility, thus allowing the borrower to either finance energy efficiency improvements or qualify for a larger mortgage. There is no corresponding provision in ACELA. Energy efficient mortgages could increase consumer awareness of building energy consumption and provide financing for energy efficiency upgrades. More information is necessary, however, to estimate the likely penetration of the additional financing from energy efficient mortgages.

Property Assessed Clean Energy Bonds: Several sections in ACES could enable – though do not explicitly authorize – Property-Assessed Clean Energy (PACE) bonds, a type of municipal clean energy financing. PACE bonds would allow property owners to finance clean energy efficiency retrofits through a loan voluntarily attached to the borrower's property tax bill. The goal of PACE financing is to provide secure, long-term loans that could be transferred along with the sale of the property in order to accelerate investment in energy efficiency retrofits. Currently, several states have passed or are considering bills that would allow for this type of municipal financing, and some are running pilot projects. By enabling streamlined and transferrable energy efficiency financing with federal bond guarantees, PACE bonds could make home retrofits more attractive to property owners and lead to increased investment in energy efficiency upgrades.

For more information, please contact the Alliance to Save Energy at policyinfo@ase.org.

NFRC Component Modeling Approach in Pilot Phase

The National Fenestration Rating Council (NFRC) has released its Component Modeling Approach (CMA) for a pilot phase, with full implementation being scheduled for January 1, 2010.

January 2010 is when California will put into effect its new *Title 24 Building Energy Efficiency Standards*, which require that fenestration energy performance for nonresidential buildings is based on NFRC Label Certificates. CMA will be the preferred method for certification, as it meets the needs of the state's code officials to enforce the use of energy-efficient fenestration. Other states may follow California's lead in adopting CMA as their certification approach for nonresidential fenestration code compliance.

What is CMA?

The CMA certification program enables whole-product energy performance ratings. The overall concept of CMA is similar to that of NFRC's residential program: simulate, validate, and then generate a label, or in the case of CMA, a label certificate.

In contrast to the residential program, however, the software-based CMA enables project creation from predefined and NFRC-approved components, from which a project-specific label certificate is issued. The different components have performance values that are maintained in a NFRC-approved component library.

The completed CMA program and software tool will provide the following benefits to stakeholders in the building industry:

- A standardized rating methodology with quality control requirements.
- Third-party verified certification of overall product performance for code compliance.
- A user-friendly software application for easy assembly of components and performance calculations.
- Energy performance data for projects



can be readily exported for use in bidding, performing energy analysis, and specifications.

- A public directory of approved components, certified products and other label certificate information accessible for quick verification.
- A user-friendly online tool for architects and specifiers to verify performance and determine the effect of components on the over-all energy efficiency of a window system.
- A paper trail that ensures that products are provided as specified.

Parties Involved in CMA

The required parties involved in the CMA process are:

- *Glass Supplier*, uses center-of-glass components from the International Glazing Database (IGDB).
- *Frame Manufacturer*, contracts with an Accredited Simulation Laboratory (ASL) to simulate frame components.
- *Spacer Supplier*, contracts with an ASL to simulate IG spacer components.
- *Specifying Authority*, specifies the fenestration products and systems. Once the energy indices for a fenestration system have been generated, the Specifying Authority is issued a CMA Label Certificate for the project.
- *Accredited Simulation Laboratory (ASL)*, performs simulations using WINDOW and THERM as per NFRC 100 and NFRC 200.

- *Accredited Testing Laboratory (ATL)*, provides performance validation testing if necessary.
- *Approved Calculation Entity (ACE)*, can be independent or employed by a manufacturer or assembler of the approved components to generate a label certificate. Calculates the values for the fenestration system using CMA Software and has the authority to issue CMA Label Certificates.
- *Certification and Inspection Agency (IA)*, provides quality assurance by reviewing the ACE calculations and performs a documentation trail audit of the fenestration certificate to ensure that the systems listed reflect the actual installed systems for a particular project.
- *NFRC*, develops and administers the CMA certification program.

How CMA Works

The concept behind CMA is to provide performance data from the three primary components—glass, frame, and spacer—to obtain an overall product performance rating. CMA will take these three components from a library and combine them into an assembly to determine the performance of an entire glazing system. For each of the three components, there is an approval process that must be followed to get the component into the library:

Glazing: Determine the optical spectral data by using WINDOW in accordance with NFRC 300 and 302. Data is submitted to Lawrence Berkeley National Laboratory (LBNL) for evaluation and peer review. After the data is approved by NFRC it is then assigned a unique identification number and posted to the International Glazing Database (IGDB). An announcement is sent to the parties involved including the manufacturer, Accredited Simulation Laboratory (ASL), Approved Calculation Entity (ACE), and Inspection Agency (IA).

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Component Modeling Approach in Pilot Phase

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Frame: Simulation of the thermal performance data of frame cross-sections are performed by an ASL using THERM in accordance with NFRC simulation requirements and NFRC 100. If necessary, validation testing is performed by an accredited Testing Laboratory. An IA reviews and checks the frame data. Approved frame data is uploaded to the CMA Frame Library and a unique identification number is issued.

Spacer: There are three paths to approval of the spacer component. Path I is for a generic spacer system (generic spacer, sealant, and geometry). Path II is for a specific system (specific spacer, default sealant, and limited geometry). Path III is for a detailed spacer system (specific spacer, specific sealant, and detailed geometry). For each path, the effective conductivity of spacer geometry and materials (K_{eff}) must be determined in accordance with NFRC 100 – by NFRC for Path I, by an ASL for Path II, and for Path III it is determined by an ACE at the time of product configuration.

$$K_{eff} = \frac{L}{R_{tot} - 1/h_o - 1/h_i}$$

L = spacer length, R_{tot} = overall thermal resistance of a given spacer, h_o = outside heat transfer coefficient, and h_i = inside heat transfer coefficient.

For Path I, generic spacer types are determined. NFRC staff confirms appropriate spacer category and corresponding thermal performance. A generic identification number is assigned. For Path II and Path III the spacer manufacturer submits drawings to an accredited simulation laboratory that simulates the spacer performance. An inspection agency reviews and approves the spacer data. Approved spacer data is uploaded to the CMA Spacer Library and assigned a unique identification number.

The overall product rating calculation is performed by the Component Modeling Approach Software Tool (CMAST) by

accessing the performance libraries of approved components (glazing, frames, and spacers). The performance of a whole-product fenestration system is calculated first by selecting the frame assembly, then by placing a glazing assembly in the frame, and then placing a spacer system in the glazing assembly. A U-factor, Solar Heat Gain Coefficient (SHGC), and Visible Transmittance (VT) rating for the whole product is obtained as a result. This information is then reflected in a NFRC Label Certificate for code compliance. CMAST can also output project data and fenestration system performance data for bidding, energy analysis, specifications, etc. A public directory of approved components, certified products, and other label certificate information is available.

CMAST is available as a web-based or client-based application. The web-based application is for those occasionally using the software to look up label certificates. Advanced users such as the ACE, ASL, and IA, can use a Windows-based client to interact with the system and complete their most frequently performed tasks. The Windows-based client, upon request from the user, will synchronize the local database with the web-based NFRC CMA database.

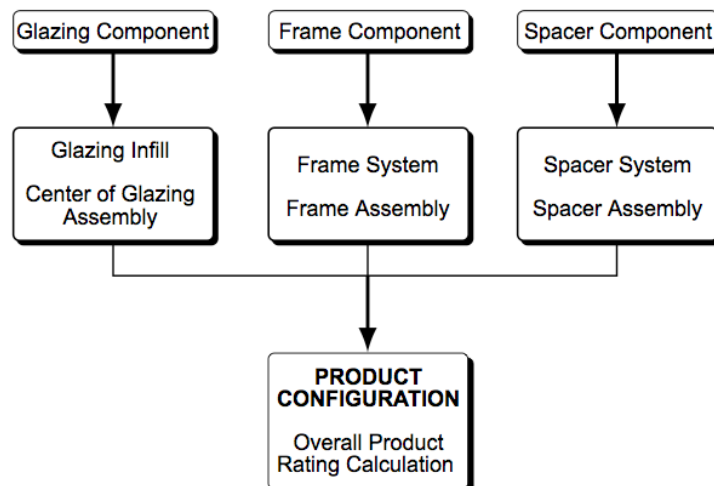
To access the CMAST web application or download the software, view http://nfrc.org/sb_aboutprogram.aspx. This site also includes information about CMA trainings and the program documents.

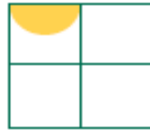
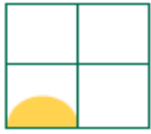
Program Fees, Pilot Phase, and Early-Adopter Discounts

For frame and spacer components entered into the CMA library during the pilot phase (through December 2009), manufacturers do not have to pay NFRC any fees until the start of 2011. For components submitted after the end of the pilot phase, manufacturers will have to pay annual component fees, but an early adopter discount of 33% is available during the first full year of the program (scheduled to start January 2010). The present trial version of the CMAST software is available for free, and once CMA is fully implemented, an updated version will be available for a 6-month free trial period.

The fees per component, per program participant, and per software license depend on the component type, NFRC membership, and other factors. This information is included here: http://nfrc.org/sb_aboutprogram.aspx.

CMA Procedure





Green New York Act Promises Opportunities for Energy Efficiency Retrofits

Due to budget constraints, many homeowners and commercial building owners can only afford incremental improvements to their homes and buildings, while leaving some of their biggest energy drains, such as inefficient windows, untouched. Now New York State has initiated a measure to help consumers and businesses take this first-cost hurdle.

The newly created Green Jobs/ Green New York Act of 2009 will offer a new financing path for residential and commercial energy efficiency upgrades. Under the new act, the New York State Energy Research and Development Authority (NYSERDA) will establish a Green Jobs/ Green New York program with the goal of making 1 million homes and businesses more energy efficient. The loan program will allow qualified home owners access to as much as \$13,000 and qualified commercial business owners to as much as \$26,000 for retrofits.

The bottom line for consumers and contractors is that there is no upfront cost. Through this program, utility companies use privately invested funds to pay for retrofits by means of on-bill recovery financing. For homeowners and building owners this means that once the retrofit is complete, a fee is added to the monthly utility bill to allow the utility company to recover the retrofit cost.

Generally, this amount added to the utility bill is smaller than the utility cost saved by the upgrades. If the property is sold the remaining portion of the loan is transferred to the new owner allowing for people who rent to participate. For window contractors this means customers have more access to their services. On the residential side alone the annual number of general retrofitting jobs in New York State could increase several times the current 25,000 homes per year. Under the new act at least 50% of all retrofits must come from residential projects.

This act is a significant step forward for improved energy efficiency, allowing most New York property owners to participate and subsequently lower their total annual energy expenses. For window contractors operating in New York, this is an excellent opportunity to encourage the installation of well-insulating windows without squeezing the customer's budget. A bill similar to New York's is currently being promoted in Oregon State.

New national policy for energy efficiency retrofit programs is also being proposed in both houses of Congress (see page 3).

Information on the Green Jobs/ Green New York can be found at www.nysenate.gov/initiative/green-jobs.

Solar Decathlon Returns to Washington

For the fourth time since 2002, Washington DC will host the Solar Decathlon for three weeks in October 2009. The Solar Decathlon is a competition among 20 teams of college and university students who compete to design and build the most energy-efficient and innovative solar-powered houses.

The event, held on the National Mall, will attract countless visitors from around the world, especially when the houses are open to the public on October 9-13 and October 15-18. The participating schools come from across the U.S., Canada, Germany and Spain.

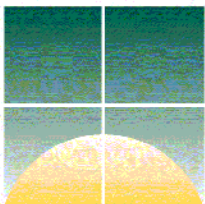
The window and glazing companies contributing to the competition include a range of North American and European manufacturers, among which are EWC members Cardinal Glass, Inline Fiberglass, Marvin, Milgard, Pella, SAGE Electrochromics, and Southwall Technologies. The window systems designed for each house promise to be impressive in their own right, but the goal of the Solar Decathlon is to integrate all components of the house into a system that performs beyond the sum of its parts.

For visitors of the National Mall, the Decathlon will be an opportunity to combine in one walk the grand old architecture of the Lincoln Memorial or the Capitol with a little glimpse of what cutting-edge residential architecture of the 21st century has to offer.

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.

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