Word On Windows
a publication of the Efficient Windows Collaborative and the Alliance to Save Energy Spring 2001, Volume 3 Number 1

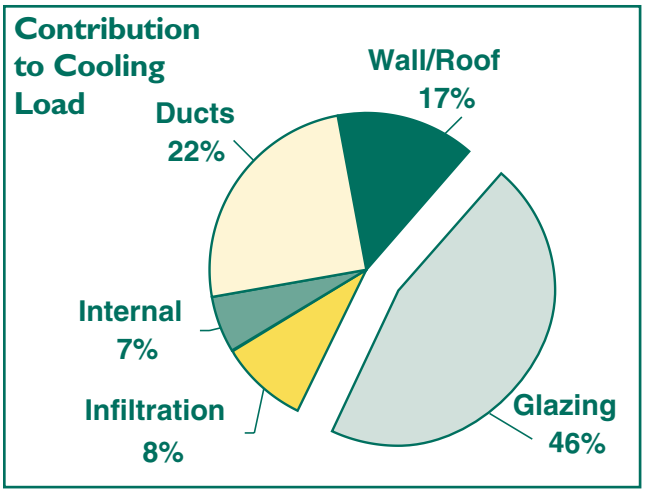
Power Crises Across Country Call for Windows that Reduce Cooling Needs

By Ken Nittler, P.E. WESTLab
Ken is a partner in the California and Texas Window Initiatives and owns WESTLab, an NFRC accredited simulation laboratory

It is hard to open a newspaper—any newspaper—without reading about the power crisis that threatens to cripple California. Another example is Texas, where electric utilities have been mandated to meet 5% of their load growth with energy efficiency by the beginning of 2003 and 10% by 2004. In these states and many others, reducing peak load and capacity are critical to maintaining economic viability. States and the federal government are gearing up to put significant resources into efficiency campaigns.

Should better windows be part of these efforts in warmer climates? You bet!

Here's why: With the emergence of widely available low solar gain low emissivity glass coatings (spectrally selective coatings), windows can now be a major part of the solution to controlling unwanted solar heat gain without the use of costly add-ons like shade screen or applied films in new construction. And controlling solar heat gain is the key to reducing cooling energy use and peak demand.



To illustrate why low solar heat gain windows are so important in cooling climates, consider a new home built with R-13 walls, R-38 roof and clear dual pane aluminum framed windows with an area equal to 20% of the floor area. Place this home in a hot climate and ask the question: where does the heat come from that the air conditioning needs to remove? The figure shows one way to answer this question by calculating the design cooling load and graphing the share due to each building component.

In this scenario, the windows account for 46% of the design cooling load. This translates to a big opportunity to save cooling energy and demand with better windows. Simply switching to one of the low solar heat gain low emissivity products that typically cut solar heat gain by 50% could easily cut the portion due to windows in half. And adding thermally improved window frames can cut even more. The necessary products are available and cost effective and have many non-energy benefits that add value like increased comfort and reduced UV transmission.

Better windows are arguably the single biggest opportunity left to improve the building envelope, especially in cooling climates, and deserve a place in utility energy efficiency and market transformation programs.

INSIDE

Hard Coat Solar Control Low-E Glass Hits Market

Builders and consumers in the South have a new solar control glass option that can improve comfort, while helping their homes comply with rigorous energy efficiency codes and Energy Star program requirements.

Designed for solar control in cooling-load dominated southern tier states, Pilkington LOF's new Solar E glass combines solar control and thermal (U-value) performance in a color-neutral, durable, pyrolytic Low-E glass. Solar E is produced using Pilkington's leading-edge chemical vapor deposition coating technology.

The product gives the residential new construction and retrofit markets a new, advanced technology, glass option that can be used in a window in the south.

Using Solar E glass in a 3/4"IG unit,

Continued on page 2

Window Warriors Forge Florida Battle Plan

Declaring "war on inefficient windows", the EWC, the Florida Solar Energy Center and the Florida Energy Extension Service last Spring held the "Windows Summit 2000: Florida's Future in the Making".

Over 80 fabricators, suppliers, builders, utility reps and educators attended the two day event in May at the University of Florida in Gainesville, Florida. "The Summit was well worth while," said Malcolm Barnes of Florida Power Corporation. "It was good to hear the information on the impact windows have on heat gain and HVAC sizing from someone else."

The first day of the Summit was dedicated to informing industry players about EWC activities in Florida. Alecia Ward, then EWC program manager, led individual meetings for the window industry, utilities and builders respectively. "I found out my company makes these kinds of windows!" said one salesman. The day culminated with a reception and trade show sponsored by AFG, Cardinal, Guardian, Pilkington-LOF and PPG.

Day 2 was a train-the-trainers session geared for University of Florida Cooperative Extension Educators. This group of educators answers questions from over 1 million Floridians each year on a myriad of topics in the major metropolitan regions. "I didn't know there was so much to know about windows," said Marie Hammer, Professor of Housing, Cooperative Extension. "So much research has been done since the first energy crisis and the technology has changed so much. Windows have become an important component."

In the months following the summit, EWC has seen positive effects. Window industry representatives are looking into new technologies appropriate for Florida. UF educators are providing more up-to-date information to consumers daily. Over 600 builders learned about labeling through the Build Green & Profit continuing education course last summer. By all accounts, the summit was a welcomed way to kick off the new millenium.

Arlene Stewart, southeast regional representative for the Efficient Windows Collaborative, teaches distributors about the Florida energy code and EWC activities at the first of 12 training session in Spring 2001.

Northeast's Window Initiative Promises to Increase Market for Efficient Products

Following the example of program successes in California and the Northwest, the Northeast Energy Efficiency Partnership (NEEP), a market transformation agency of utilities in the Northeast, has turned its attention to increasing sales of Energy Star windows, concentrating on the replacement market.

In 2001, NEEP will develop a marketing and promotion campaign in New Jersey and New England that will:

- raise consumer awareness of Energy Star windows and their benefits,
- increase industry production and use of efficient windows, and
- increase the regional market share of Energy Star windows to at least 50% of all window sales within 2 years.

NEEP plans to retain one or more contractors to work directly with manufacturers, retailers, builders and developers to promote Energy Star Windows. The agency will also study installation practices to determine how and whether they should be addressed by the initiative.

"Hard Coat Solar …" Continued from page 1

for example, (1/8" lite of Solar E glass on the #2 surface, 1/2 " air space, 1/8" lite of clear glass in a 24"x48" casement style vinyl window with butyl-metal spacer and zero air infiltration), provides a solar heat gain coefficient of 0.35 and a U-value of 0.35. These numbers satisfy the Energy Star Windows requirements for cooling-dominated southern markets.

The pyrolytic, or hard coat, means that the Solar E glass:

- does not have to be protected in a sealed IG unit;
- does not require edge deletion;
- is resistant to handling scratches;
- has an unlimited shelf life (ideal for replacement windows); and
- is temperable.

The hard, durable surface means that Solar E glass can withstand exposure and can be used as an add-on panel or even as a single glazed window, with the coating facing the interior. "This application opens the way for energy efficiency in many single-lite aluminum residential windows, which are as common as alligators in Florida and other southern states," said Paul Gore, residential products manager.

Effective Energy Codes Reference NFRC Ratings as Necessary Yardstick

by Eric Devito and Garrett Stone

Energy efficiency requirements in codes today play an enormously important role in ensuring the quality and performance of windows installed in residences. Building codes have long addressed (and continue to address) key window-related safety and structural issues such as tempered glazing, sufficient light and ventilation, wind load capabilities, and adequate emergency escape and rescue openings. More recently, energy efficiency and conservation requirements have been developed and codified to protect consumers as well by ensuring that at least minimum energy efficiency requirements for building components (like windows) are met, while promoting the installation of even more energy efficient products.

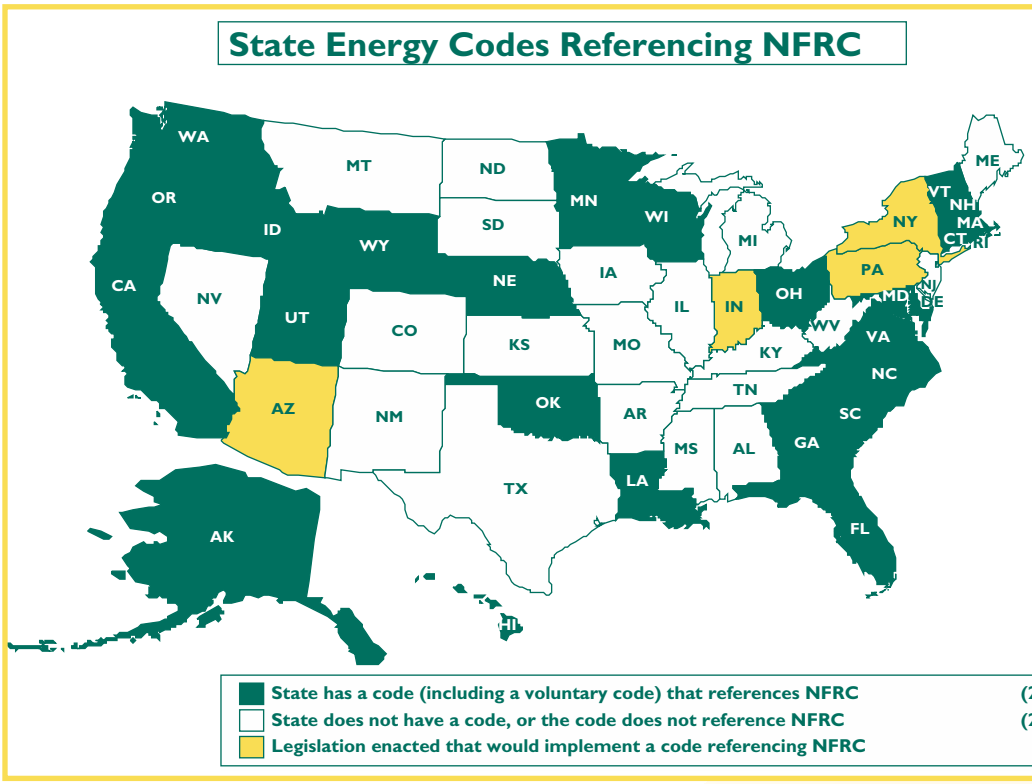
Energy-related code provisions can influence window selection in many ways, including, for example, limits on air infiltration and varying energy requirements based upon climate and building orientation. One of the most influential and straightforward ways a code can encourage more efficient windows is by requiring NFRC testing, certification and labeling of window products. NFRC's uniform national rating system for energy performance of fenestration products provides accurate, fair, and reliable energy-related performance information. NFRC ratings help builders and code officials quickly, easily, and most important, accurately determine whether a window complies with code requirements. Ultimately, the fenestration industry itself benefits from energy codes that reference NFRC because they can increase knowledge and awareness of efficient window products. Without the NFRC yardstick to measure energy performance, none of the other code requirements, such as maximum U-factors and solar heat gain coefficients (SHGC), can be accurately applied or enforced.

A few states like California have led the way by successfully implementing state energy codes that have encouraged or required the use of more efficient windows. These codes were a primary motivator for the development of the NFRC system in the first instance. However, the effort required to develop such codes individually and specifically for each State is extraordinary, and poorly designed energy codes do little to further the use of energy efficient windows in construction. Moreover, since product manufacturers and other industry participants often operate regionally or nationally, codes that vary by state create a tangled web that is difficult to penetrate. As a result, these individualized energy codes are limited to only a few states.

Fortunately, nationally accepted uniform energy standards are starting to correctly incorporate NFRC into their requirements. In this regard, both the Model Energy Code (MEC), now called the International Energy Conservation Code (IECC) (which contains both residential and commercial building energy requirements) and ASHRAE 90.1 (commercial building energy requirements only) incorporate NFRC ratings. The 1995 edition of the MEC took the first big stride forward to specifically address window energy efficiency by incorporating the NFRC U-factor method to rate windows, glazed doors, and skylights. The 1995 MEC requires that U-factors:

- be determined in accordance with NFRC-100;
- be determined by an accredited, independent laboratory;
- be labeled and certified by the manufacturer; and
- if the NFRC procedure is not used, that a very limited default table (containing no low-e or gas fill values) appearing in the 1995 MEC shall be used to determine the U-value.

Each of these requirements is critical to ensure accurate, reliable, and comparable fenestration performance values are



In addition to the States indicated above, the following cities, to name a few, have adopted residential energy codes that reference NFRC:

- Tucson/Pima County, AZ
- Denver, CO
- Washington, DC
- St. Louis, MO
- Philadelphia, PA
- Austin, TX

utilized in the code. Later codes, specifically, the 1998 and 2000 IECC, and the 2000 International Residential Code (IRC), have each retained this NFRC requirement, and have even taken further steps by now requiring NFRC-200 (or a limited default table) for determining SHGC. (The 2000 versions of these codes are all part of the new suite of I-codes, which are model construction codes published by the International Code Council, and which will be under consideration for adoption by most code jurisdictions over the next few years.) The latest revision to ASHRAE 90.1 contains similar requirements, as well as utilizing NFRC's visible light transmittance and air leakage ratings. With the incorporation of the NFRC rating system, codes have also been able to move foward and require more specific maximum U-factor and SHGC ratings.

24)
22)
(4)

Many states have simply adopted the MEC or IECC, as opposed to going to great lengths to develop their own codes. In all, 24 states have adopted a code that references NFRC in some fashion, and another 4 have legislation pending that would adopt a code referencing NFRC. Unfortunately, not all states have taken these steps. Many states still maintain energy codes based upon earlier editions of the MEC, like the 1992 and 1993 editions, which do not reference NFRC; a number of states allow less accurate and credible options to NFRC ratings, including expanded defaults; and some states have not adopted mandatory (or even voluntary) energy codes. Moreover, even if a state has adopted a code that requires NFRC, the code is of much less value if it is not fully implemented or actively enforced at the state or local level.

While in many cases, an outdated or unenforced version of the MEC as the state energy code is still better than no

Continued on page 6

Non-Energy Benefits Outrank Savings

How do you quantify benefits other than energy efficiency that consumers value in high performance windows? In the past, aside from asking consumers if they would pay more for certain benefits, it has been decidedly difficult to get a good answer.

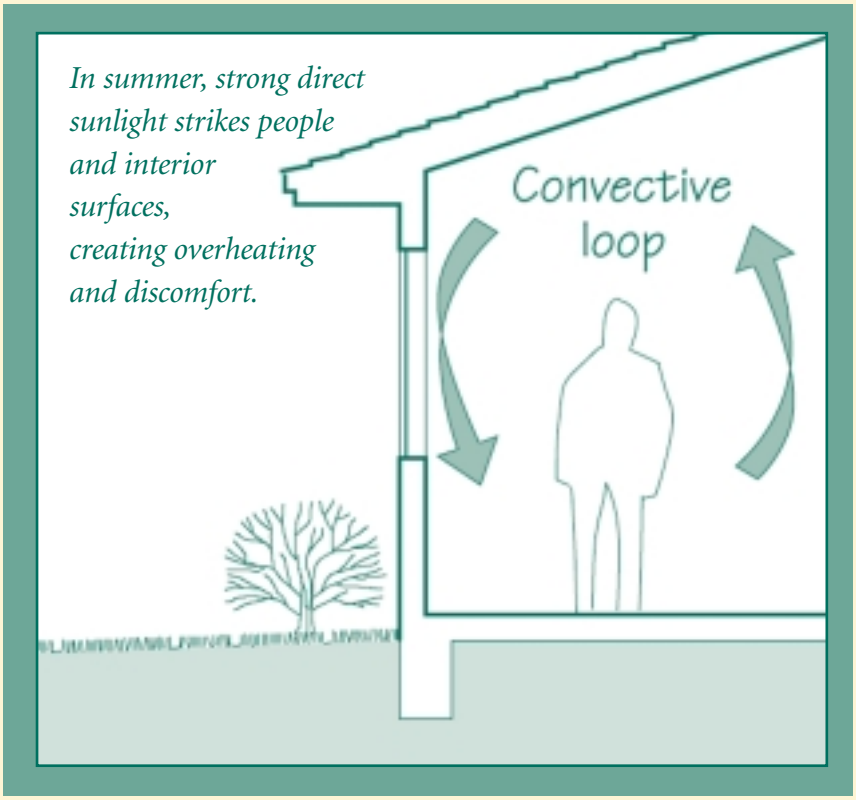
Researchers speaking at the American Council for an Energy Efficient Economy (ACEEE) Summer Study last August told of a novel approach. They attempted to gauge customer value by asking residential and commercial building owners to characterize the value of non-energy benefits relative to precise energy savings the building owners received from the measures on their monthly utility bill. Rather than just itemizing a list of topics that might be viewed as benefits by participants, the researchers developed this technique to help consumers feel comfortable estimating the relative importance of the benefits.

In the study, presented by Lisa A. Skumatz, residential consumers felt that the non-energy benefits of windows were even more important (110%) than the energy savings. They were even more enthusiastic about the non-energy benefits of HVAC modifications, finding them close to 120% more valuable.

The non-energy benefits most frequently mentioned for efficient windows were:

- higher housing value, nicer
- house less drafty, more comfort
- may not have to move
- easier to clean, windows open
- reduce fading

There were very few negatives mentioned by window-owners surveyed. The majority had no complaints, but some mentioned that contractors didn't finish on time.



Collaborative *News*

Dear EWC Members and Friends,

What a great time for energy efficiency! The Efficient Windows Collaborative is going to take full advantage of this cold winter and energy price and supply situation to drive home our message about the benefits of energy-efficient windows.

As you know, the EWC was established in 1997 to educate a full spectrum of audiences in the residential windows market about the many aspects of efficient windows. The central message, that efficient windows reduce energy consumption thereby saving money and cutting air pollution associated with power generation, is more pertinent today than ever before.

During its first three years, the EWC succeeded in becoming a significant force in U.S. windows markets.

- 300,000 people are using the EWC web site each year;
- Over 90 companies and other stakeholders have become EWC members;
- EWC staff and partners have conducted hundreds of trainings and presentations, reaching thousands of people in the windows, building, utility, and other arenas;
- The program has distributed thousands of fact sheets, books, CDs, and other educational materials on windows technology.

Our work plan for 2001 estimates an increased level of effort for the Collaborative. We plan to:

- Gear up significant regional initiatives in Florida, Texas, and the Midwest;
- Support expansion of features and information resources on the web site;
- Increase the number and variety of training and education events;
- Increase media activity to drive more traffic to the web site and promote other training and education resources;
- Consider a new initiative for commercial fenestration technology and systems;
- Explore selected initiatives to extend the Collaborative's work overseas.

Please be forthcoming with your suggestions. We look forward to working with you.

Kate Offringa
Program Manager

We'd like to extend a warm welcome to our newest EWC members:

Ameritech Construction Corporation
Custom Window Systems
Elite Exteriors
Great Lakes Window
MI Home Products
National Certified Testing Labs
Gorell Windows & Doors

Residential Windows

A guide to new technologies and energy performance

Second Edition

Based on the latest research, Residential Windows: A guide to New Technologies and Energy Performance, Second Edition, offers home owners, architects, designers, and builders a fascinating look at the state of the art today as well as the windows of the future, and the information necessary to evaluate windows and make intelligent choices. Since the publication of the first edition, research has yielded much new information on window technologies, their performance, and their benefits. This revised edition covers every aspect of window design and technology from the basic mechanisms of heat transfer to new products and ratings. It includes a much expanded section on energy performance, new sections on skylights and installation, and new tools for making window purchasing decisions for your house.

The authors are John Carmody, University of Minnesota; Stephen Selkowitz, Lawrence Berkeley National Laboratory; Dariush Arasteh, Lawrence Berkeley National Laboratory; and Lisa Heschong, a partner of the Heschong Mahone group.

Word on Windows was 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:

Kate Offringa
EWC Program Manager
Alliance to Save Energy
1200 18th Street, NW, Suite 900
Washington, DC 20036
phone: 202-530-2245; fax 202-331-9588;
email: koffringa@ase.org

For editorial submissions and questions:
Karen Anderson
Alliance to Save Energy
phone: 202-530-2239 or
301-949-6524;
email: kanderson@ase.org

SPOTLIGHT *On Collaborative Members*

Guardian Industries

Advocates efficient windows
Educates member companies

Guardian Industries (www.guardianindustries.com) is a forward-thinking glass production corporation that is working hard to see that the lumber yards and building products companies for whom it bulk purchases and the companies who distribute its products are all on the same wave length—high efficiency windows.

Guardian Industries recently acquired Cameron Ashley Building Products (CABP), a leading North American distributor of building products. CABP distributes its products, including windows, through its extensive 151 branch network to independent building materials dealers, professional builders, large contractors, mass merchandisers and national co-ops in all 50 states and Canada. CABP is busy offering training

in the benefits from high performance windows and the art of selling energy efficient windows. The Efficient Windows Collaborative is participating in some of these training programs. Guardian is also active in promoting to its companies the benefit of joining the EnergyStar Windows program. With an estimated $1 billion in annualized sales, Cameron Ashley is a major competitor in the building products industry and an influential voice in promoting efficiency.

Guardian Industries also owns a majority share of Builder Marts of America or BMA, a company that helps retailers by identifying the highest quality product lines and negotiating the most advantageous agreements with suppliers. In 1999, BMA acquired Ace Hardware LBM Division to form the largest non-cooperative buying group in the industry. A year later, the company purchased Tru-Serv's LBM Division. Today, BMA is the largest lumber and building materials group in the industry, with sales this year projected to exceed $2.3 billion. BMA serves over 4,500 retailers, a significant portion of whom focus on the pro-contractor segment. In millwork sales, windows and skylights account for 24 percent of all sales.

Windows are also part of BMA's innovative installed sales program, OpportunityPLUS. The comprehensive turnkey system provides all the tools an independent building material dealer would need to launch a quality installation program. The system includes business monitoring, installation training, sales training, cooperative advertising, education to increase sales and web site support.

"Effective Energy…"Continued from page 4

energy code at all, there are also instances where a state energy code can have a negative impact on window selection. For example, in 1995, the Michigan legislature repealed the MEC and opted for a state-developed code utilizing obsolete center-of-glass R-values as opposed to NFRC certified and labeled U-factors. This outdated approach can result in severe negative consequences because, depending upon the window frame type, center-of-glass R-values can actually substantially overstate (or understate) the energy performance criteria of the window unit.

Properly designed building energy codes and standards that take advantage of the NFRC process are essential tools to ensure that all new homes built or existing homes remodeled today utilize the most cost-effective energy efficient windows available. Code provisions related to energy efficiency that are easy to understand, document, and enforce can be the most cost effective and permanent mechanism available for increasing the use of energy efficient windows.

Manufacturers who rate, certify and, most importantly, label their products with all NFRC ratings are both already compliant with codes in states that require NFRC and prepared for states that are moving toward NFRC requirements. These manufacturers are also in the best position to educate their existing and potential customers, as well as local code officials on the benefits and meaning of the system. Other members of the building industry can also demand NFRC ratings on the products they use and within the codes that they comply with and/or enforce. A big opportunity to achieve these goals will come as the new I-codes are considered for adoption in each jurisdiction.

Garrett Stone and Eric DeVito are with the law firm Brickfield, Burchette, Ritts & Stone, P.C. in Washington, D.C. They represent manufacturers of building products and other interested stakeholders regarding energy efficiency, building codes and standards, and other regulatory issues related to building construction. Mr. Stone is a member of the National Fenestration Rating Council Board of Directors and Chairman of the NFRC Regulatory Affairs Committee.