

# Word On Windows

a publication of the Efficient Windows Collaborative and the Alliance to Save Energy

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## Combining Comfort, Energy Efficiency, and Affordability

Energy efficiency in new home construction is not reserved exclusively for the deep pockets crowd, as Ryan Homes is demonstrating with its Carborne prototype located in the Beaver Creek community, Rochester, N.Y. So pleased was Ryan with its successful packaging of added comfort and efficiency into an affordable first home, that the production builder has decided to offer similar designs nationwide, according to Energy Design Update newsletter.

Taking advantage of design and research assistance from the Consortium for Advanced Residential Buildings (CARB), one of four Building America teams sponsored by the US Department of Energy, Ryan accepted the challenge of reconfiguring a starter home model that normally sells in the \$80,000 to \$110,000 market. Although the existing model already met 1995 Model Energy Code and New York State energy code, the goal for the CARB team was to further improve comfort, lower energy bills. . . and not cost any more to construct.

The result: Ryan's Carborne, a two-story, 1,244 square feet home with full basement and attached garage that saves 30 percent on energy costs (qualifying for a five-star Energy Star rating). All this comes with a \$94,000 price tag.

Efficiency goals were met by increasing the levels of insulation in roof, walls and foundation; tightening up the house (using taped Energy Brace sheathing); and specifying high performance windows. The windows were estimated to contribute about 15 percent of the projected energy savings on heat.

For the first time, Andersen Windows' "Builders Select" series incorporated

### *Ryan Homes leads the way with innovation for first-time buyers . . .*

low-e, argon-filled glazing. Efficient windows and other envelope improvements allowed designers to downsize the furnace and to place supply registers on the inside side of the rooms, rather than out by the windows, thus reducing duct runs.

#### **EFFICIENT WINDOWS CREATE IMPROVED COMFORT**

"Our tests showed that the mean radiant temperatures inside the Carborne house are higher, on average, than those in the control house located nearby," says Pawan Kuman, a building scientist with Steven Winters Associates, one of the partners in the Consortium. "While the walls are slightly warmer, thanks to the increased insulation, it is the higher performance windows that make the big difference. Even though the supply registers do not go out to the exterior walls in the Carborne prototype, a person standing in front of a window would likely feel warmer than he would in the control house."

Focus groups who had been consulted during the pre-design phase were queried for their reactions after the house had been completed. Participants supported the use of energy efficient windows, HVAC systems and insulation,



and said they would be willing to pay a higher first cost for them. One member commented that the energy efficiency features would be a good investment for the future ease of reselling.

*For further information see the June 1998 issue of Energy Design Update (pp 7-10) or call Don Clem, SWA, (203) 587-0200.*

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## Don't Neglect Comfort Benefits In Promoting Efficient Windows

BY DARIUSH ARASTEH AND PETER LYONS

Prospective window purchasers may be interested in energy savings, but the comfort provided by high-performance windows is an even more persuasive selling point. With an understanding of the effect of windows on thermal comfort, window specifiers and sellers can do a better job meeting clients' needs for comfortable spaces.

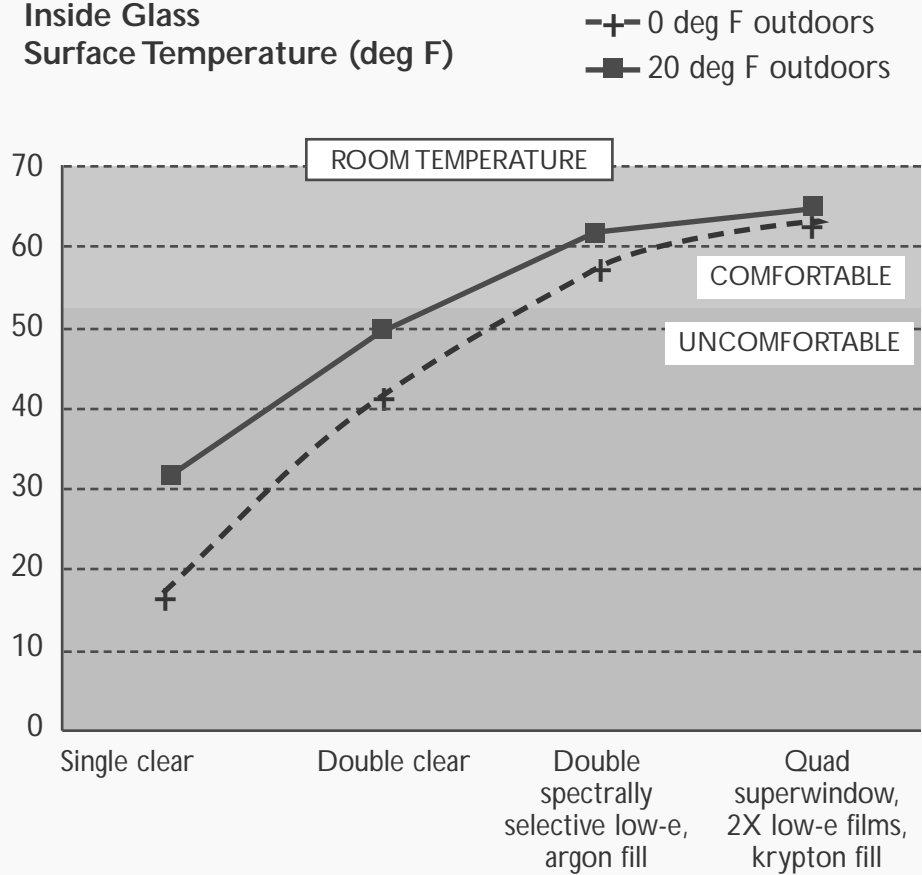
When it is cold outside, a window's interior surface temperature drops. The more efficient the window, the closer the interior surface temperature will be to room air temperature. Super-efficient windows with multiple low-e coatings and gas fills will have surface temperatures very close to room temperatures. A warm window surface is important, because comfort is a function of radiant heat transfer between people and their surroundings. As warm bodies approach cold surfaces, we give off heat and we feel uncomfortable. This is true even when only part of our body is exposed to a cold surface, as, for example, when sitting around a campfire on a cold night.

Another reason for winter discomfort is that the cold surfaces of an inefficient window produce convective currents or drafts in a room. Both radiant heat loss and convective currents from cold windows cause people to turn up thermostats.

In hot weather, radiation works the opposite way. The hot interior surface of an inefficient window will radiate heat to people nearby. Sunlight traveling through the glass will also make occupants uncomfortable. As inside surfaces heat up, they too will radiate heat.

People often close blinds to shield themselves from discomfort, even though this means they can no longer enjoy the view from the window. Or, occupants will use air conditioning to counter the effects of warm window surfaces and sunlight.

Inside Glass Surface Temperature (deg F)



### A BETTER WAY

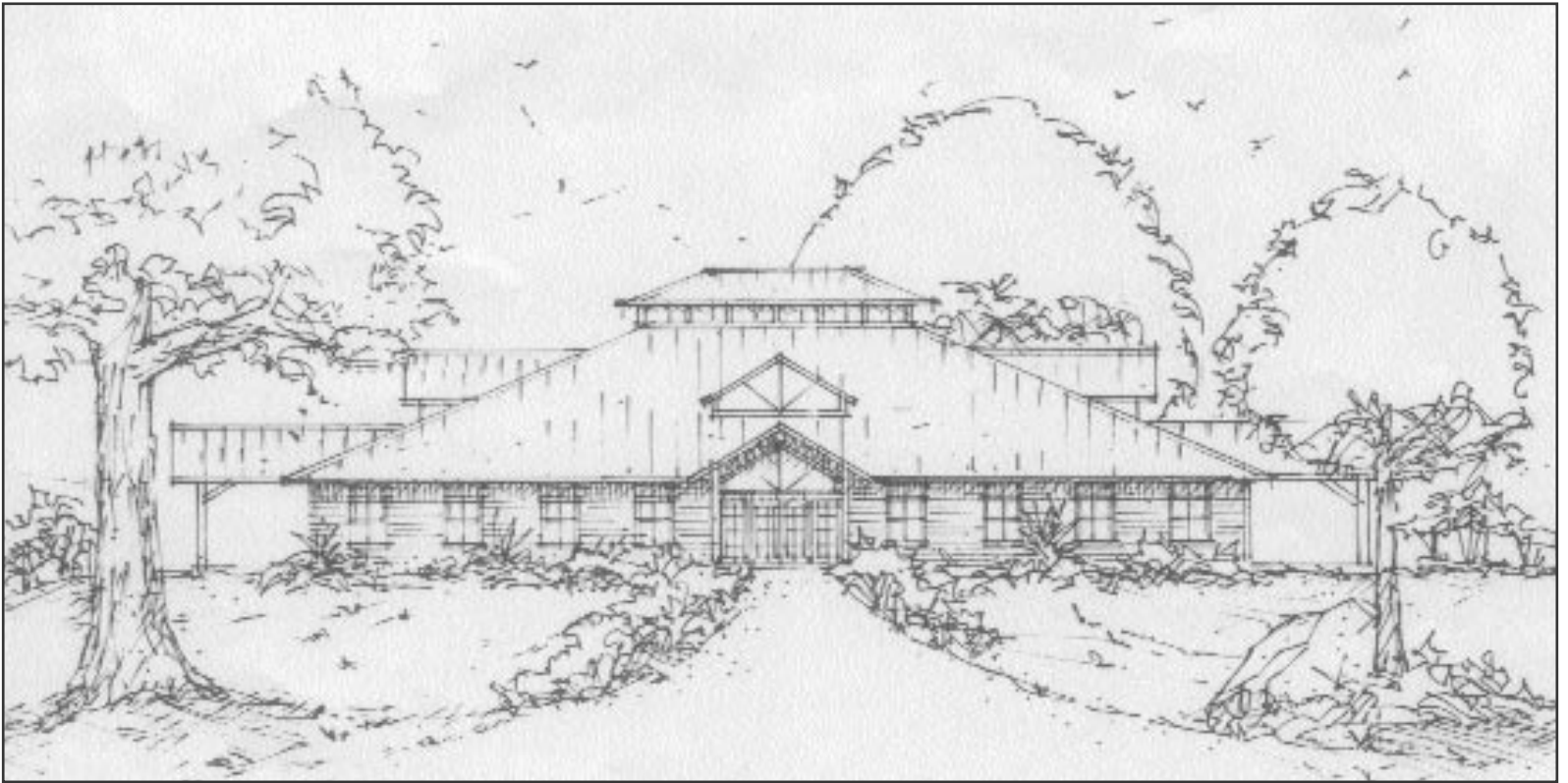
Consumers need to be educated to understand that installing efficient windows is better than drawing blinds and relying on HVAC systems to solve thermal comfort problems. Not only do HVAC systems often create non-uniform interior conditions, only partially relieving thermal discomfort, they also break down and may be unavailable on days of peak electricity demand.

Consumer comfort can be better guaranteed by offering high-efficiency windows with a low-e coating. Because low-e products insulate well, they will prevent cold window surfaces

in winter. For climates where summer cooling is an issue, look for spectrally selective low-e coatings or tints; these windows allow in the visible sunlight while reflecting off all the invisible heat associated with it.

*Darius Arasteh and Peter Lyons are staff scientists at Lawrence Berkeley National Laboratory where they are part of a team effort to quantify window comfort information. For more information, contact Dariush at (510) 486-6844 or at [D\\_Arasteh@lbl.gov](mailto:D_Arasteh@lbl.gov).*

## Florida “Summer House” Will Demonstrate Sustainable Design and Construction



Founded in 1977, Kanapaha Botanical Gardens in Gainesville has grown to become the second largest botanical garden in the state of Florida. Home to some of the state's largest botanical collections, the 62-acre site soon will serve another educational purpose.

The Summer House project, now under construction, will educate builders, consumers and members of the local community to the practical advantages of energy efficient and sustainable construction. Developed as a collaborative effort between the North Florida Botanical Society, Alachua County, the City of Gainesville, the Center for Construction and Environment at the University of Florida, and Gainesville Regional Utilities, the building will showcase sustainable design principles and protection of the environment.

Upon completion, the 11,200 square

foot botanical and environmental education center will host over 50,000 visitors per year.

Designed to last for one hundred years and to be recyclable at the end of its life, the building relies on new technology as well as historically-proven design

### *Advanced technology in a time tested design...*

principles. The building is designed in the North Florida vernacular called a four-square Georgian design. Deep overhangs and wraparound porches on the north, east and west sides will shade walls and create comfortable outside activity areas.

The north-south facing clerestory windows and 4-way dormers allow for natural daylighting, while high windows

permit deep penetration of daylight into interior spacing. The windows and doors will include high performance glazing.

Building users will be able to rely on an “Owner’s Manual” with guidelines for daily building operation to maximize energy efficiency. Windows will be operable to encourage occupants to control their own comfort level. The east-west cupola also has operable windows which will vent heat and create a natural convection cooling system. Every system in the Summer House will be reproducible in a residential building. Interactive computer displays and participatory energy use demonstrations will be featured in the lobby.

For further information on the Summer House, or to become involved as a donating sponsor of the project, please call Brad Guy at the University of Florida in Gainesville (352) 392-9029.

## California Window Training Starts to Show Results

The California Window Initiative (CWI), led by window experts James O'Bannon, Steve Easley, Ken Knittler and Bill Mattinson, is taking the concept of market transformation and applying it in concrete ways to the residential windows market in California. Certainly, the California market will be a bellweather for other regions. California accounts for almost 10 percent of total national residential sales and the state has had a longstanding tradition of support for energy efficiency.

Backed by funding from the California Board for Energy Efficiency, and administered by both Pacific Gas and Electric and Southern California Edison, the CWI group of window experts developed a training model that educates glass and window manufacturers, retailers and distributors, production builders and remodelers about the features and advantages of selling and installing energy efficient high performance windows (for background, see Spring '98 issue *WoW*).

The CWI experts found that, while products containing the features of high performance windows are widely available, few people involved in the sales cycle clearly understand these new technologies and their correct applications. As a result, they were not actively promoting them to customers. The results were that consumers are not receiving the best products currently available.

To counter this trend, CWI is under contract to provide almost 500 free training sessions to targeted clients in the residential windows market in the state of California. The training covers a number of key energy concepts, California labeling requirements and window selection criteria.

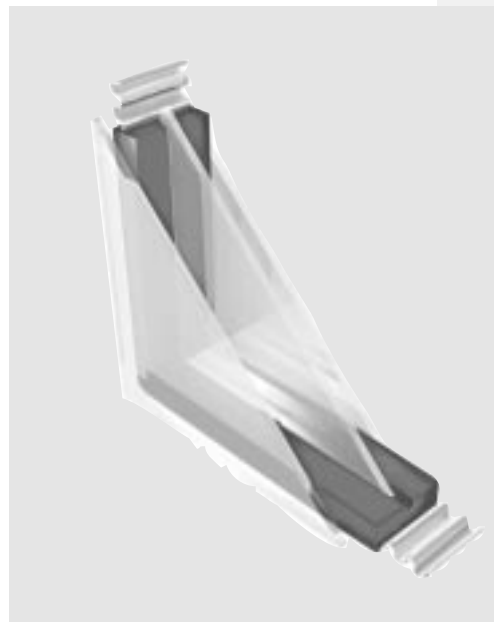
Results thus far have been very encouraging. Upon completion of one training session at a large window wholesale/retail outlet, the owner instructed his staff to place the entire

current stock of window products on immediate mark down so that they could be sold and replaced with windows employing high performance features. The CWI team feels that that this is a concrete example of market transformation, where a single training session results in concrete action—changing the type of product that is available in the residential windows market.

Additional feedback received by the CWI team indicates that most participants find the training will be an invaluable resource for their sales and marketing staff.

One participant, a sales manager for a large window manufacturer, stated he expects to see at least a 30% increase in our sales volume of high performance windows based on the information gained.

The no-cost training from the CWI experts is only available in the State of California until the end of 1998. Interested parties should contact Clay Lewis at (800) 600-9050. ■



## SPOTLIGHT On Collaborative Members

### TRUSEAL TECHNOLOGIES

TruSeal Technologies Inc., headquartered in Beachwood, Ohio, is a world leader in insulating glass and glazing technologies, providing sealants for residential windows and insulating glass fabrication. TruSeal Technologies Inc. was formerly the Sealant's Division of Tremco Inc. In June 1997, Tremco divested the business, along with other noncore assets. TruSeal was formed through the efforts of Kirtland Capital Partners, a Cleveland, Ohio-based private investment company, and a group of TruSeal managers headed by August "Gus" Coppola, president and CEO. Their mission is to help customers build, market, sell and install state-of-the-art insulating glass and window products worldwide.

TruSeal's Swiggle® Seal product was the first warm-edge insulating glass sealant system to be patented and marketed around the world. The company supports its Swiggle Seal technology with the only comprehensive edge seal warranty in North America.

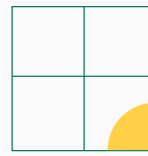
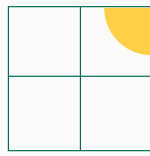
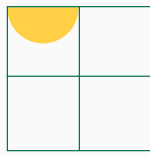
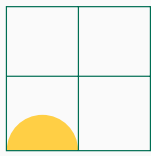
Stainless Swiggle Seal was introduced as an advanced thermal performing product. It produces one of the best results in Energy Rating evaluations based on the CSA A440.2 standard for "Energy Performance Evaluation of Windows and Doors."

Swiggle Seal products reduce heat loss around the glass, which reduces condensation and the chance of insulating glass failure. Swiggle Seal improves edge-of-glass temperatures by 9 degrees and condensation resistance by 80 percent over conventional aluminum spacers.

The latest addition to the Swiggle family of technologies is Grooved Swiggle TL, a simple, fast and economical approach to the manufacture of triple I.G. units. The key attributes of this technology include:

- \* Superior total window R-value performance;
- \* Reduced field liability as compared to conventional methods of triple fabrication;
- \* Reduced cycle times in production; and
- \* Ability to incorporate high performance glass and gas options.

Today, Swiggle Seal is sold in 54 countries, with more than 1000 customers worldwide.



# Collaborative*NEWS*

## Florida Update

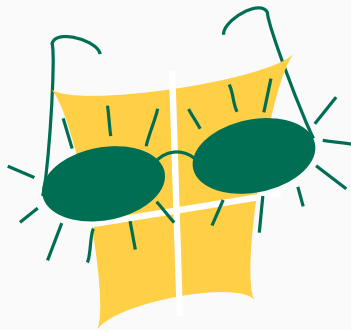
**E**fficient Windows Collaborative continues to make progress in fast-growing Florida. In August, the EWC hosted a meeting in conjunction with the Southeast Builders (SEBC) in Orlando, FL.

Alecia Ward and John Carmody made short presentations and facilitated discussion between the stakeholders. Topics included:

- \* building networks with progressive builders in the region;
- \* clarifying the NFRC process and making it easier for builders to understand the difference between NFRC rated products sold by competitive manufacturers; and
- \* creating a baseline understanding of how windows fit into an energy efficient home and why they can make a significant difference in quality.

In addition to the home builders, representatives of the Florida Energy Extension Service (FEES) were in attendance. Florida has an extension service with an agent in each county office. These agents coordinate continuing education training and county outreach efforts across the state. EWC staff is coordinating with FEES to use these extension agents as a vehicle for delivering more information to Florida consumers, builders, contractors, and utilities about the advantages of highly efficient windows.

Attendees were very excited about the initiative. Participants suggested contacts with suppliers, local cooperatives, and the media that can be used to advance the Collaborative's efforts.



## Spreading the Word

**D**ariush Arasteh presented information on energy-efficient residential windows to the NARUC (National Assn of Regulatory Utility Commissioners) Committee on Energy Resources and the Environment at their July 26 meeting in Seattle. This committee is comprised of public utility commissioners from many states interested in promoting cost-effective energy efficiency programs. Dariush summarized available energy efficient technologies, the status of efficient window technologies in the marketplace, the NFRC rating system, and E\* and EWC programs.

## Web Site Improvements

**T**he Efficient Windows Collaborative web site ([www.efficientwindows.org](http://www.efficientwindows.org)) has been enhanced recently to provide more information on the benefits and performance of energy-efficient windows. In the BENEFITS section of the site, there are illustrations of heating and cooling energy savings, improved comfort, reduced condensation, increased light and view, reduced fading, and reduced HVAC system costs. The greatest improvement to the website is found in the WINDOW SELECTION section. By clicking on a particular state on the US map, an enlargement of that state appears. For each major city within a state or region, a page appears with a comparison of heating and cooling costs for several window types on a typical house. These costs are based on DOE 2.1E computer simulations using local gas and electric rates.

### CUSTOMIZED INFORMATION AVAILABLE

The internet format allows users to seek more detailed information about each window type. In some cities, the user can select various conditions such as amount of glazing, overhangs, and window orientation to see how glazing performance changes. For example on a typical 2000 square foot house in Jacksonville, Florida

the annual energy savings due to using spectrally selective low-E windows is 30% (\$140 per year) when compared to single-glazed aluminium windows. However, if the same house has large unshaded windows facing west to enjoy a view, the savings are 45% (\$290 per year).

This energy performance information will be available for at least 50 US cities on the web site. In addition, for each location a fact sheet can be downloaded and printed directly from the website.

## Energy Star Windows Hits the Streets in Northwest

**H**omebuyers in the Pacific Northwest are getting the word this summer and fall that Energy Star Windows are what they need to ask for when shopping for a new home. Seven of the nine homebuilders participating in Portland, Oregon's month-long "Street-of-Dreams" installed Energy Star Windows in their model homes. Over 80,000 visitors donned baby blue slippers to step inside the designer decorated showcase homes. Those that did not attend may have caught some of the related TV coverage that specifically discussed advantages of efficient windows. This fall, Energy Star Windows staff will be making regular appearances at home shows, state fairs and other consumer gatherings in the region. The program now boasts over 70 industry partners.



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# Interview



Stephen Selkowitz heads the Building Technologies Department at Lawrence Berkeley National Laboratory, overseeing research and development work in four major areas: energy

efficient windows, lighting systems, commercial buildings, and building simulation

**WoW:** *You have been at LBL and involved with windows for 22 years now. Without the solid, sustained work of your team at LBL—and the efforts of those in industry and government in supporting you—it would be hard even to imagine the existence of organizations like the Efficient Windows Collaborative. How do you view the interaction of R&D and market development?*

**SELKOWITZ:** I see them as tightly coupled, with R&D always trying to produce a more elegant, higher performance, lower-cost solution. But research simply becomes an academic exercise unless there is technology transfer—pushing and pulling the ripe technology into the marketplace. We haven't begun to exhaust the clever things we can do with the next generation of windows, particularly in the commercial sector. For example, we are working on glazings for light control, redirecting daylight, managing the quantity and quality of light that comes into a building to reduce glare and improve comfort and performance. We have to always keep in mind what the consumer needs. Windows are for letting in light, for view, and for visually connecting with the outdoors. Electrochromic technology, a key element in "smart" windows with switchable glazings, presents an example of meeting consumer needs more elegantly. Not only must the basic coating R&D be completed, but time and effort will be needed to familiarize the market, with demonstrations and research, as to where applications of the technology will be most valuable and most cost-effective at first. And while markets are transforming, costs will

be coming down, as development continues and as production volume increases.

**WoW:** *Speaking of cost-effective, how would you suggest we go about changing what appears to be an entrenched assumption in some parts of the country that advanced windows are not worth the extra cost?*

**SELKOWITZ:** It amazes me that some parts of the country, buyers and builders are convinced that quality windows are a necessity; while in other regions, they are viewed as a luxury. Builders have to make trade-off decisions. Will a jacuzzi sell the house more quickly than more efficient windows?

I'd like to see consumers approach new home purchasing the way we do buying a new car. There are multiple options available, some cosmetic, some functional. All have costs associated with them, but all costs are not equal. Buyers can usually select the special features they want. We need to convince consumers that the difficulty and cost of making changes to the building shell after the purchase decision should give preference to those efficiency options. If the choice is between low-e windows and some other upgrade that could be easily made later, it will be a lot smarter to get the better windows and opt for the other upgrade at a future time. For buyers of production homes, we need them to make these kinds of preferences known to their builders early on.

The second thing we need to do is to promote the value-added side of windows. Comfort is something everyone can relate to. It can be measured and demonstrated. And we're currently looking again at the feasibility of a rating that correlates to the premature replacement of fabrics due to fading, which has significant costs. After a customer says "yes" to better windows, we have to make it easy for them with financing that doesn't itself present a hurdle. Once you add on the benefits of improved comfort and reduced noise and fading to the energy savings, you may find advanced windows falling more on the necessity side of the options, rather than on the luxury side.

**WoW:** *You've been adding up the frequent flyer miles lately, most recently with trips this year to Russia and Australia. Are you anticipating some market opportunities internationally?*

**SELKOWITZ:** We traveled to Russia this Spring, before the economic upheaval. I had visited three years prior and we were encouraged this time to find signs of a small, emerging efficiency industry. Credit has to go to DOE for organizing this trip, which served both to encourage the Russians in developing an efficient window industry and to explore market opportunities for our U.S. companies. We visited a number of glass and window plants, including an insulating glass operation now located in a former top-security, missile base. We observed scattered signs of retrofit—sometimes incongruous examples such as new white vinyl windows starkly standing out against old brown wood frame windows in the rest of the building. There was only a rudimentary market infrastructure and a lack of capital. We wanted to understand the financing dynamics of deals, very different from here. All in all, we came away with a better understanding of the potential (huge) and the risks (just as large).

In Australia, I addressed an audience of about 400 window manufacturers and suppliers at the annual conference of the Residential Windows Association. The populated portions of Australia enjoy a mild climate and energy supply is still relatively plentiful and cheap so there has not been much market pressure to date to make the transition to high performance windows. Penetration of efficient windows won't happen overnight, but with a new national environmental mandate and a window rating system in place, changes are starting to come. I found the California experience (changing from single glazed, commodity products to higher performance, value added windows) helpful to share with this audience.

**WoW:** *So, can we count on you for another 20 years of leading us in window efficiency research?*

**SELKOWITZ:** When I came to LBL from teaching and running my small consulting firm, I wasn't thinking of staying so long. I just asked two things: that I have fun at my work and that it made a contribution. As long as the answers continue to be positive, I'm happy to carry on.