

Crosswinds Communities Brings Energy Efficient Design to Great Lakes Area

While Michigan does not lead the nation in promoting energy efficiency in building codes, the state can boast a nationally-ranked home builder that is breaking new ground in innovative system design for improved energy performance and comfort.



The Consortium for Advanced Residential Buildings (CARB) has joined with Crosswinds Communities, one of Michigan's largest builders and developers, to design and test a prototype four-bedroom home that will join the company's product line beginning in March 1999. Featuring structural insulated panels, or SIPs, the system engineered home is likely to yield a 30-40% reduction in energy use and is priced

to appeal to first-time home buyers.

SIPs are constructed of an inner core of highly insulative expanded polystyrene or polyurethane foam bonded between two sheets of oriented strand board. Because SIPs are load-bearing, structural elements, builders don't have to do framing or additional insulation for the exterior envelope of the house. Manufactured in controlled factory settings, the panels arrive at the site pre-measured and meeting exact specifications and are speedily put in place with far-reduced on-site construction waste.

Normally SIPs have pre-cut window and door openings, but in this project, energy efficient windows manufactured by the Andersen Corporation will be pre-installed and transported to the site as part of the SIP panel. This method, believed to be the first such effort, will provide for easier distribution, assembly, and rapid enclosure of the home.

FURNACE SIZE CUT IN HALF

Window size and locations required for natural daylighting were optimized with the use of computer simulation programs to assure even distribution throughout the home over the course of a day with a minimal heat loss. The use of both Andersen's high performance low-E glass product and optimized locations result in improved thermal performance and enable the reduction of the furnace size by nearly half. A centrally located stair well will distribute light throughout the home while promoting convective

passive cooling with the use of motorized skylights above. Other innovative features of the prototype include:

- Precast concrete foundation for ease of installation during cold weather;
- A frost protected shallow foundation for an optional family room;
- Programmable balanced fresh air distribution system;
- Two-stage, high-efficiency, sealed combustion, gas fired furnace and water heater;
- Fiberglass, urethane foam-filled entry door with thermal resistance several times greater than standard doors;
- Flexible stainless steel gas piping and manifold system;
- Self-contained electrical devices that do not require splicing of electrical wiring;
- Energy Star labeled lighting fixtures with instantaneous start devices and appliances that cost less to operate; and
- A built-in recycling station.

Demonstration of energy-efficient, high performance residential construction is particularly noteworthy in Michigan. In 1995, the Michigan legislature repealed the Model Energy Code that was then in effect—the only state ever to do so. In developing a weaker substitute, the state ignored NFRC labeling and other consensus approaches in its new code requirements.

Crosswinds is ranked 79th among Builder Magazine's listing of the largest residential builders, with 850 starts and \$86 million in revenues last year. The firm is located in the Detroit suburb of Novi, Michigan and has its own mort

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High Efficiency Windows Tested in Alberta Sustainable Home

By JORG D. OSTROWSKI

Consumer demand for highly insulated, non electrochemical high performance windows will increase as long as comfort, daylighting, view, sunshine and lower utility bills are sought after by building users. Here in the rigorous and unforgiving climate of Alberta, we designed, installed and tested several ultra high-performance windows in a 3-bedroom sustainable home/office in the suburbs of Calgary. The purpose of this exercise was to push window technology as far as possible.

Window type, size, location, performance and details were predicated on criteria that included:

- affordability,
- reduction of heat loss,
- maximum day-lighting,
- maximum passive solar penetration and heat gain,
- increased comfort, noise reduction, and humidity control,
- low maintenance,
- maximum air-tightness,
- good indoor air quality (no out-gasing),
- low embodied energy,
- maximum use of renewable resources,
- UV blockage,
- good corporate citizenship (environmental record), and
- bringing the outside inside.

Technology highlights included: one window that used four low-E coatings, three windows using the new low E "anti-reflective" (AR) prototype film from the Southwall Corporation and several first time commercially produced U .18 windows (ER = -6.5 W/m²). In addition, one fixed unit in the Greenhouse has one of the highest (if not the highest) Energy Ratings (ER) in Canada (ER= +17.8 W/m²)

due to an extremely high shading coefficient (SC) of 0.92.

Southwall Corporation manufactured the low-E prototype, which went directly from the drawing board to the field. As such it did not get certified for total window U-value. The closest we could come is a production R12 configuration simulated by an independent lab in a wood casement window to have a total U of .18. (Manufacturer claimed this prototype had an R 16.6 center of glass, which would likely have resulted in an estimated U value of .17.)

To meet environmental and energy criteria, other interesting features included: wood frame construction; "Willguard" factory applied finish; Tremco's "Swiggle Strip", and Southwall's "Heat Seal" Warm Edge spacer bars; appropriate use of Krypton, Argon & air filler gases; low iron glass, mirror reflectors on inside jambs, and white finish on outside jambs & sill for maximum sun and daylight penetration.

Preliminary indications show that Tremco's "Swiggle Strip" glazing bar is more effective than anticipated. Also, our super ultra-high performance window (with a SC of .38) has almost no perceptible difference in visible light transmission compared to nearby windows (with a shading coefficient of .82). "I will say I was amazed at the clarity of the prototype window and could not tell the difference when looking at different windows from 10 feet away," reported Al Dueck of Willmar, the window supplier.

To demonstrate retrofit strategies, several window coverings were installed for display and testing: dual-purpose (solar) venetian blinds, tracked window



quilts, honeycombed shades and storm window kits.

Our corporate partners for this project were: Willmar Windows, Southwall Corporation, Tremco Ltd., Praxair Inc., CAN-BEST Testing Labs, Velux, Window Quilt-Northern Cross Industries, Hunter Douglas Canada Inc., RCR-International Inc., Springs, & PPG.

Total window cost for the project was less than \$16,000 (excluding shades, but including prototypes). The house featured unique window and door products from Willmar Windows, designed to suit specific needs. The project team chose different windows for different areas of the home. Where windows were in close proximity to people, such as in the living room, higher insulation values were desirable. The highest insulating windows were placed towards the north (bedrooms) and west (living rooms) where heat loss would be the highest. West-facing windows (including a casement) are prototype (\approx u.17) with Heat Mirror glazing, allowing maximum heat retention in the winter and superior control of summer-time solar gain. In the kitchen, where humidity control was a concern, a window was selected that was originally designed for the Manitoba Advance Home project. South-facing windows are triple pane igu's based upon proto

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New Zealand's Ambitious Window Energy Rating System

By JOHN BURGESS

In 1994 the Australasian Window Council (AWC) kicked off a project to sort through the issue of the performance of domestic window systems in dwellings.

The intention was to rate the effect that a glazing system had on a house when the same window was installed in all the glazing openings in the house, in all the disparate climate zones around Australia and New Zealand. Australia launched a pilot in Canberra in late 1996. Here in NZ we followed up on this and added our climate-specific twists. In our pre-determined three climate zones we plan to offer a whole window rating scheme that incorporates the solar and thermal performance of any glazing system, rated by winter performance, summer performance, and interior furnishing's fading resistance (from the WINDOW4 DWT). In addition, we'll be providing information on condensation resistance because over 90% of our market is non-thermally broken aluminum.

We start with a whole house, hour by hour, average climatic year numerical simulation, and compare the base case 4mm clear glass aluminum frame windowed house, with various other glazing options and framing options.

We selected 21 generic window systems, representing our best judgement about windows that are currently available in New Zealand—or conceivably will be in the marketplace within the next five years.

While this exercise provides a degree of "future-proofing", we expect that, at five-year intervals, these 21 generic systems will be reexamined and possibly modified to account for technology advances and market use. Also, at the five-year points, we'll be adjusting our best and worst performers in each category as the population of windows improve in energy performance.

So in New Zealand we use a full year's climate data in a numerical simulation of actual energy use for an average house in a specific climate zone. The NFRC, in contract, relies on the results from the Window 4 program which gives the Solar Heat Gain Coefficient (SHGC) and U value, from which it infers which window is best for what climate. The NFRC "annual energy performance" criteria would have been similar to the New Zealand approach, but were recently rejected by NFRC. We are doing it, but then we have fewer people and a few less state governments to keep happy. Otherwise we have pillaged the best of the

NFRC and other rating schemes.

Promotion in NZ is through the glazing and aluminum framing industry. We have been working with them from the start (this is less true in Australia) and they are calling some of the non-technical shots. We're hoping to have the technical development of our rating system largely complete by March 2000, or even earlier.

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Alberta Sustainable Home, Continued from page 2

type high solar heat gain coefficient film from Southwall Technologies and glass from PPG.

In the Greenhouse, a window carrying an extremely high energy rating (ER= +17.8 W/sq. meters) was placed on the south elevation behind the translucent evacuated glass-tube solar hot water collector to show maximum light penetration into a window, through and around a solar collector.

Although no scientific monitoring has been done thus far, we have a number of early impressions and observations to share. First, a commercial version of our prototype window seems achievable, especially if better spacer bars and better insulating gas are used.

SunPipes, installed over interior stairway and bathroom sink, did bring in daylight but could be improved with a seasonal adjustment to maximize winter-time sun, and design to minimize condensation (which now collects in the diffuser and is evaporated on warm days). Interior windows, of reused single glass, help interior spaces share the sunshine brought in by the

SunPipes.

Condensation was not a problem on the high insulation windows. On the lower insulation windows (south facing), we recommend a condensation retention gutter that collects run-off moisture for later evaporation or clean-up. Heat shrink storm window kits improved serious condensation problems.

In sum, we felt privileged to work with a unique team of industry leaders who were prepared to acknowledge the limitations and opportunities of their particular products. We were also very thrilled to have the professional assistance of so many, to get "performance targets" into the field without prolonged theoretical or academic gymnastics. The best tests are always in the field with real people, completed buildings, and actual climates.

Jorg Ostrowski, M. Arch (MIT), B. Arch (Toronto) has been working in the sustainable building field since 1976 and focuses on environmental design, ecological planning and sustainability. His email is jdo@ucalgary.ca; phone is (403) 239-1882

Market Transformation Moves Both Ways, Affecting Efficiency in Manufactured Housing

BY MICHAEL LUBLINER

It was not long ago that the Pacific Northwest could point to one of the Nation's premier success stories in market transformation. Buoyed with financial support from the region's utilities and Bonneville Power Administration, the acclaimed Manufactured Housing Acquisition Program (MAP), which ran from 1992 to 1995, dramatically increased the total number of energy efficient electrically heated homes in the region. At one point, the penetration level was close to 100%. When MAP ended, the region responded with the Super Good Cents/Natural Choice (SGC/NC) program, a voluntary, market-drive approach to affordable, energy efficient manufactured housing.

Although MAP was clearly a success, by 1996, the winds of deregulation were changing the landscape. Most utilities eliminated their efficiency incentives in anticipation of a competitive marketplace and Bonneville Power reduced its significant funding of the MAP program. This resulted in a startling drop to 67% of new homes meeting SCG/NC standards.

In late 1997 and 1998, production of SGC continued to plummet. At one point, less than 50% of total electrically heated manufactured homes produced in and destined for siting in the Northwest met the standards.

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gage and land acquisition divisions as well as an environmental consulting division.

Funding for the project is provided in part by the U.S. Department of Energy's Building America program, as administered by the National Renewable Energy Laboratory. CARB is one of the four Building America partners and is headed by Steven Winters Associates, a building system consulting firm with offices in Norwalk, CT and Washington, DC.

In attempting to slow down the precipitous decline in market share, the Northwest Energy Efficiency Alliance (or Northwest Alliance), provided support for a regional marketing campaign, with retailer training and certification, television ads and promotional materials, and salesforce recognition. The goal of the Northwest Alliance is to bring the SGC/NC penetration rates up to at least 20% over the baseline penetration of 50%. Further, the NW Alliance aims to make the certification and quality assurance parts of the program self-supporting.

Among major changes in 1997, the program required that manufacturers

use windows with NFRC tested U-values. While the overall SGC/NC "fleet average" energy use was unchanged or reduced as a result of the new specification, there were changes among types of windows available in the market. It had the effect of increasing the use of Low-E coating and reducing the use of Argon gas filled windows.

MAP truly demonstrated the technical feasibility of building manufactured homes more efficiently than the old federal standards. As a result, in 1994, required energy efficiency levels were increased. These standards are currently up again for public comment (box below).

MESSAGE TO HUD: TIME TO RAISE THE FEDERAL STANDARD

BY MICHAEL LUBLINER

At a recent National Manufactured Homes Association (NMHA) meeting it was noted that the incremental cost of a Low-E coating with good solar control is comparable to savings provided by "right sizing" of air conditioners, making Low-E a no cost conservation measure when a sealed double pane window unit is considered the base case.

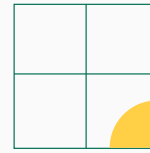
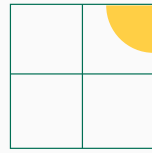
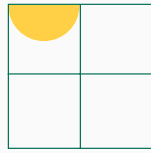
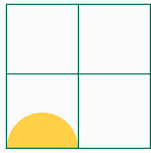
Yet, many manufacturers use a single pane window with an interior storm window. In that case, it is more costly and/or difficult to add Low-E as a no cost trade-off than a double pane sealed unit.

Interior storms are a concern because they are easily removed. In addition, we have questions about their long term performance.

The SGC/NC program does not allow the single pane window w/interior storm, but the U.S. Department of Housing and Urban Development (HUD's) energy standards do allow it. HUD also refers to an AMMA

1503 test instead of NFRC. It's ironic that while two federal agencies (DOE & EPA) seem to support NFRC, HUD does not reference it in the manufactured housing standards. Since HUD is looking at the standard now, this is a good time to comment.

There are still some manufacturers around the country that use a single paned aluminum window and interior storm in their manufactured homes, making the cost to go to an Energy Star window considerably higher. In the Northwest, because of MAP and Super Good Cents, vinyl frames have become common in most middle to upper-end manufactured homes. Most SGE homes also use low-E vinyl windows with a warm edge spacer. Low-E has dropped in price since it was first introduced. The recent shift to insulated spacers has also improved the Low-E window U-value to below 0.35 (the Energy Star standard), at no added cost. It is time we ask HUD to adjust their window energy efficiency standard for manufactured housing so that it supports, not undermines, successful voluntary programs like Energy Star and SGC/NC.



Collaborative NEWS

1998—A Banner Year for EWC

During the last year, the Efficient Windows Collaborative has made great progress toward achieving our goals! As 1999 begins, we'd like to thank you for your support and participation during 1998 - what a year it has been!

Over the last year, the EWC has debuted and upgraded our web site. John Carmody and Kerry Haglund have pulled yeoman's duty to get the site in tip-top shape, including revised color and black & white versions of all national and regional FACT SHEETS. With the help of LBNL and the University of Minnesota, the EWC web site has become "the source" for unbiased, technically accurate information about energy efficient fenestration. We hope you will share your comments with us about www.efficientwindows.org to continually improve its content in 1999.

We especially want to hear from you about ways to improve the sections for builders, utilities, government, and manufacturers. If you have ideas about the messages, information products, or other web site links that are of interest to those groups, please let us know! In 1998, our efforts to promote efficient windows, door, and skylights, included:

- Distributing over 60,000 fact sheets across the country in electronic and hard copy.
- Providing over 7,000 Residential Windows books.
- Conducting 10 training seminars about energy efficiency for manufacturers, home energy raters, consumers, builders, and remodelers.
- Partnering with members, trade associations, utilities to make headway on the Florida Windows Initiative.
- Coordinating with other regional efforts like the California Windows Initiative and Northeast Energy Efficiency Partnership.

The Collaborative has also provided opportunities for members to participate in outreach efforts. We hope you have found our services useful and will accelerate your participation in the program as we begin the New Year. 1998 was a banner year for the EWC and next year promises to be even better.

MAJOR GOALS IN 1999 FOR THE EWC INCLUDE:

1. Revise the EWC web site to incorporate a database of manufacturers who participate in the NFRC labeling process and sell ENERGY STAR Windows in specific states and cities.
2. Revise the Residential Windows Book to include more information about cooling climates based on existing and new materials.
3. Coordinate and train EWC consultants to complete 10 manufacturer sales force training seminars; complete 5 state code official training seminars for fenestration/glazing issues; complete 5 builder training sessions.
4. Set up the infrastructure and support for EWC regional initiatives in Texas, Nevada, and Arizona.
5. Revise EWC regional and national fact sheets to incorporate more differentiated products in the energy analysis - (e.g.) spectrally selective tinted products and laminated glass.

Please share your 1999 goals for the Collaborative by e-mailing award@ase.org or calling 202-530-2245.

Willmar's Insulating Glass Guide Helps Consumers

Willmar Windows, headquartered in Winnipeg, Manitoba, has issued a guide outlining basic information about glazing and giving specific performance ratings for a range of insulating glass options currently offered by the company.

Written in straightforward prose, with

helpful and colorful illustrations, the 16-page pamphlet is oriented to specifiers, builders and homeowners considering a new construction or renovation project. A fold-out Glazing Selection Chart addresses Willmar Windows performance in areas such as:

- Visible light transmitted.
- UV blocked
- U-value for total unit
- R-value at center of glass
- Solar heat gain,
- Glass reflectance, and
- Cost relative to clear doublepane.

In addition, the chart shows a cross section of glazing material, showing the various films, gases and glass that comprise each type.

For consumers whose eyes get glazed over by too much technical jargon, Willmar's guide includes a Glazing Glossary as a ready reference for common window and heat loss vocabulary, as well as for more esoteric terms such as sputtered versus pyrolytic coating.



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:

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SPOTLIGHT *On Collaborative Members*

AIR-CHEK LOOKING TO CERTIFY 100 PERCENT OF PRODUCTS IN 1999

How does New Jersey's first vinyl replacement window manufacturer stay competitive after 30 years in the business? By innovation and service, if you follow the lead of Air-Chek Manufacturing, Inc. in Clifton, NJ. Serving the NJ/NY metropolitan area, Air-Chek has sold and installed more than 1.5 million windows. The company was the first in the state to have a window rated by NFRC and was also the first NJ window manufacturer to become a partner in the Energy Star program.

Air-Chek started manufacturing vinyl windows for home improvement contractors. About seven years ago, the company opened Window Depot so that homeowners could obtain factory-direct savings. Air-Chek has its own installation crews and also sells to the do-it-yourself crowd. In the early 90's, the company started to make its own welded windows and has purchased larger welders as consumer demand grew.

Three years ago, company president John Mordenti read in trade journals about the Model Energy Code. Air-Chek found ways to make its top-of-the-line Ultra Double-hung window more energy efficient, by using INEX thermoresin spacers, AFG Comfort E2 glass, and inert gases. After gearing up for these efficiency options, Air-Chek sent its window off to ETC labs for testing, and then joined the NFRC, using Windows and Doors Manufacturers Association as its independent certification agency. "We've been selling



this window for two years now," reported Bill Schul, Plant Engineer.

"We became an Energy Star partner in 1998. We had wanted to become a member of the Efficient Windows Collaborative once we had an NFRC certified product, but we didn't have enough products certified. We just completed testing of all our products through a program with Vinyl Building Products in Oakland, NJ and hope to have all our products NFRC certified by February 1999," he noted.

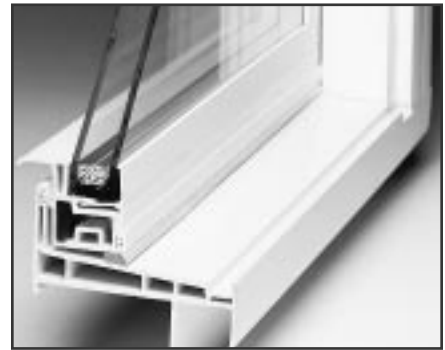
Service is a strong part of the Air-Chek story. Sales personnel are non-commissioned professionals, licensed by the state of New Jersey. The company has its own window installers and provides a 25 year warranty which is transferable. Prices are published and available to all with no hidden charges.

The company promotes energy efficiency in its literature and on its Web Site (www.airchek-windowdepot.com). Prospective buyers checking out the web site are advised to "ask to see the (NFRC) label."

In the last analysis, educating the customers is good for business. "Since introducing our first NFRC certified window, we have found that more of the public is expressing an interest in energy efficient windows. One of our sales pitches has been to beware of the window salesman who give you a U-value for center of glass only," said Schul.

VINYL BUILDING PRODUCTS AIMS TO GIVE CUSTOMERS A MARKETING EDGE

In the 1970s, extruded vinyl windows were introduced in the United States. Impressed with their successful track record in Europe, Nick Cangialosi, a window fabricator, retooled many of his operations to fabricate vinyl frame windows. In 1977, seeing the need for a reliable quality supplier of vinyl extrusions, Nick decided to combine his window and door manufacturing and marketing experience with this new vinyl technology and opened his own vinyl extrusion company, Vinyl Building Products, Inc. in Oakland, New Jersey.



Today, Vinyl Building Products, Inc. (VBP) is one of North America's leading vinyl extruders in the industry, with over 70 licensed manufacturers of rigid vinyl windows and doors coast to coast.

Vinyl Building Products' Vinyline® represents a "full-house" of products including: Single & Double Hung, Casement, French Casement, Slider, Awnings, Bays / Bows, Basement Window, Garden Window, Picture Units, Specialty Shapes, Circle Tops, Swing Doors, Sliding Patio Doors, and French Doors.

In early 1997, the company saw an opportunity to provide value-added service to its growing customer base. Working with ETC, in Rochester, NY, VBP developed a program to help its fabricators certify their products with NFRC. ETC, one of the country's premier labs for window performance simulation and physical testing, looked at all VBP products and created a database of certified reports for all products. "When a fabricator comes on line with a need for NFRC certification, we can handle it very quickly by customizing reports to the fabricator's particular need," said Sergio Rucci, a vice president at ETC.

The program represents a cost-sharing partnership between VBP and its customers. Fourteen companies have already taken advantage of the offering, with 29 products.

For those companies, a quick means of NFRC certification paid off in market advantage when Massachusetts, as of Jan. 1, 1999, required that all residential windows sold in the state must conform to NFRC labeling requirements. The state put specific requirements on replacement windows, stating that they had to carry a minimum value of U-.44.

For further information on VBP, check out their web page: www.vinyline.com or call Sharon Lane at (800) 468-4695, ext. 14