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A Belfast manufacturer rehabs a former BNAS building to test high-efficiency technology

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PHOTO/TIM GREENWAY

Bob Maynes of Mathews Brothers stands near the company's next generation of energy efficient windows installed in a demonstration project at Brunswick Landing

When the U.S. Department of Energy first reached out to Belfast-based window maker Mathews Brothers about participating in a program aimed at producing the next generation of high-efficiency windows, the company's answer was a polite "thanks, but no thanks."

While the opportunity was enticing to one of the nation's oldest window manufacturers — Mathews Brothers has been producing windows in the state since 1854 — the company, along with others in the industry, expressed some reservations, according to Bob Maynes, director of marketing and international sales at Mathews Brothers.

"In the initial go-round with the DOE, we opted not to participate because it was not a fully thought-out program," says Maynes. "Our sense was that they didn't really have a full understanding of the impact on manufacturing as far as cost versus benefit; they didn't really understand us and we didn't really understand them."

The second iteration of the program addressed this gap and won over the window manufacturer.

"When they had the second go-round, we saw that they were on the right path and decided to get involved. It was refined and more reasonable," says Maynes.

The company is participating in the rehabilitation of a former veterinary clinic at the old Brunswick Naval Air Station into a model of energy efficiency. It's being done under the auspices of the Midcoast Regional Redevelopment Authority, which is charged with making the former base, now called Brunswick Landing, a hub for renewable energy and efficiency technology.

"This is one of the legs of our redevelopment stool," says Tom Brubaker, public works and utilities manager with MRRA. "Our strategy is to develop a renewable energy center for the clean technology sector and do it in a sustainable, smart way."

A collaborative effort among Mathews Brothers, the DOE, MRRA, Dow Corning, insulation manufacturer Dryvit and Cambridge-based Fraunhofer Center for Sustainable Energy Systems, the rehab of the former clinic is designed to test the efficiency of a new vacuum-insulated wall paneling system. Mathews Brothers was tapped to participate in the project, earning a $25,000 grant from the DOE's

Building America Program to install its R5-rated windows at the clinic as part of a year-long test of energy efficiency.

The co-branding with established companies like Dow Corning, Dryvit and Mathews Brothers appeals to Brubaker. "It's been a great experience for MRRA to be able to partner with these companies. We're hoping it will translate into business for them as well as us," he says.

The DOE's R-5 Windows Volume Purchase Program was conceived to reduce cost to buyers while providing business to manufacturers and creating a market for high-efficiency windows. R5 refers to an efficiency rating for building materials; typical windows in today's homes average between an R2 and R3 rating.

Nearly 40% of energy consumption in the United States goes toward heating and cooling buildings, but 14% finds a way to slip out of a building's envelope — its windows and walls — taking with it $133 billion a year in energy costs, according to the DOE.

"The stated goal of the DOE is to make all homes net zero energy consumptive by the year 2020, so they are setting up these milestones along the way. For 2012, it was the R5 window," says Maynes.

Maynes says the company was not content to rely on existing technology to achieve the rigorous efficiency goals of the R5 program. "A lot of others are using existing technology and window frames and modifying them to meet thermal values," he says.

Enter Quanex Building Products, a longtime supplier of window framing to Mathews Brothers, which was aggressively pursuing the R5. Quanex was eager to team up with Mathews Brothers to churn out a product that met the new DOE standards.

"While the rest of the world was using blown-in foam insulation and double layers of krypton gas, theirs was to use traditional glazing and argon gas to be able to meet the thermal values," Maynes says.

Producing an efficient R5 window means balancing a number of factors, according to Maynes. An ideal window would keep heat in while letting light in. But the two attributes can often be at odds when striving for maximum efficiency.

A low rate of heat loss, measured as a U-value, means better insulation and resistance to heat flow, but it can often come at the cost of transparency. "At the same time, you want to have a high solar heat gain in the winter, so if you're focused strictly on the U-value, you sacrifice that heat gain to achieve the holy grail of a [low] U-value," says Maynes.

"Breakthrough technology" from Quanex allowed Mathews Brothers to strike a balance between insulation and transparency, according to Maynes. "It actually has lower thermal conductivity than even wood, which has always been the least conductive [material]," he says.

The new Quanex technology allowed Mathews Brothers to create a window with a low U-value that also resists condensation. "We don't want a lot of condensation because then you have a great medium for mold to grow," says Maynes.

The partnership with Quantex allowed Mathews Brothers to quickly produce a window that met the R5 standard and, before long, the DOE came knocking.

"Coincidentally, the timing worked out with the DOE refining what they were looking for with Quanex coming out with this new product specifically designed to work with this program. We saw that the anticipated cost of materials would make it a very competitive product in the marketplace," says Maynes.

The DOE recognized that getting consumers to invest in the new technology would not be an easy sell, and that hard data and a physical example of efficiency in action would go a long way in winning over energy-conscious consumers. The department was already involved with Dow Corning and Dryvit in the testing of a new highly efficient vacuum-insulated wall paneling system that is designed to achieve an R-40 rating, as part of the net zero building initiative. What it needed was a demonstration project. The old clinic provided the perfect site.

It was chosen for many factors, including its location in a northern climate and size — at a little over 1,600 square feet, the building is the average size, age and construction of a typical New England home. Windows at the former clinic were originally 6 feet above ground. The retrofit included lowering the height to that of the average single-family home.

"We were curious ourselves and wanted to see how it performs. We have the windows in our own building, but we would like to see some quantitative results. And [Brunswick Landing] is in our backyard, so we had every reason to want to participate," says Maynes.

Over the next year, the building will be monitored for thermal efficiency, air infiltration and moisture performance before being turned back over to the MRRA for future use.

For Mathews Brothers, the joint project is a way to gather performance data, and to position the company to be a leader in the market.

"We didn't get into this to sell this product this year; we got into it to sell this product four years from now," Maynes says.

By embracing the R5 standard, Mathews Brothers has peeked ahead of the curve to ensure its long-term stability, says Maynes. "For 130 years we did only wood, then we switched to PVC in 1991. If we hadn't made that move, we wouldn't be here today. Now we kind of anticipate where the market is going and what are customers are going to want," he says.

In the Northeast, harrowing winter temperatures have largely driven the market, according to Maynes. "There is a good population of New Englanders looking for the best thermal performance they can find," he says.

Competition from a sustainably conscious European market had dominated the public's perception of thermal performance as of late an assumption with which Maynes takes issue. "Some of the best technology does come from Europe, but we believe we can make [products] just as good as anything that comes out of Germany," he says.

While the industry has been lagging — "in the toilet," to use Mayne's words — since 2005, Mathews Brothers is coming off its best first third of a fiscal year since 2005. "We're picking up market share on a weekly basis," although the cutting-edge R5 products can't be directly cited for the rise, says Maynes.

"This [R5] product is still in its first year — its infancy as far as product maturation — but it has gotten us the attention of people we might not have," he says.

"We're not the cheapest guys on the market, but we are making a product that does not cause our customers problems. As word gets out and other companies go out of business, we'll continue to pick up market share," he says.

Speaking of its partner in the project, Maynes says Brunswick Landing appears poised for growth. "They have beaucoup square footage and are more than willing to participate [in economic development projects.] I know the loss of Kestrel put them back on their heels, but they were more than willing to pony up whatever it took," he says, referencing the loss of the aviation company's manufacturing facility.

In redeveloping the former Navy base, MRRA has made a commitment to renewable energy in both the kinds of companies it tries to attract and its own efficiency practices.

"Ultimately, we want to generate our own energy on campus so it is truly self-sustainable. This project is really the first step for us and is consistent with our vision for the campus," says Brubaker.

Brubaker hopes projects like this one will help demonstrate MRRA's commitment to developing a clean energy technology hub at the Brunswick campus that he says could include wind turbine and solar panel manufacturers. "Hopefully it is the first of many," he says.

The building is off the market for the coming year while efficiency testing continues, and while Brubaker says there has not yet been any interest from a company looking to relocate to the former clinic, he says "now that we've made these improvements, we hope this building might become more attractive for reuse."

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