

September 2007

Easy being green?

By Mark Ward Sr.

The talk among big-city commercial builders today is about “sustainability” — a 50-cent word to describe the concept of “green building” and “LEED” (Leadership in Energy and Environmental Design), a rating system developed by the U.S. Green Building Council to certify that buildings are eco-friendly. From office towers to resort hotels to mixed-use developments, building owners and tenants worry about “VOCs” (volatile organic compounds emitted by conventional carpets, flooring, adhesives, and paints) and “IAQ” (internal air quality).

But does all this really matter when you’re a rural builder who is constructing a garage, a horse barn, a mini-warehouse, a small-town strip mall, or a church gym? None of these projects likely will ever seek LEED certification. Indoor air quality is less important when the “tenant” is an RV, a bass boat, a horse, or an airplane. And these owners are more worried about how much a new building will cost up-front, rather than its “life-cycle costs” over 30 years.



At the same time, though, the national buzz about green building is starting to trickle down into consumer consciousness, including that of rural building customers. All things being equal, clients would rather save on their energy bills than not. “Green” may not win the job and secure the contract, but it can provide an extra marketing edge which can put you over the top to sell the building.

Seen in that light, metal building systems have some eco-friendly advantages to assist rural building in its green marketing efforts. “Metal contributes to a ‘value-priced green’ project,” advises David McQueen, business development manager for Butler Manufacturing Company, a maker of pre-engineered metal buildings based in Kansas City. “Steel is made with recycled content, and with today’s paint systems you can get a ‘cool’ metal roof that saves on energy costs.”



From where he sits, McQueen sees that “interest in green building is moving in from the coasts and is now showing up in the heartland.” Especially as energy prices continue to rise, he adds, the incentive will increase for rural building customers to factor “green” into their construction plans.

And though huge urban construction projects may seem far away in distance and complexity, they are still having an impact on rural building. As McQueen explains, “green” projects have reached enough critical mass so building products manufacturers must respond to the demand. In turn, he points out, that means “more green building products are becoming available and their cost is coming down.”

As such, says McQueen, savvy rural builders can put together a “green” building package that combines the eco-advantages of metal together with environmentally-sound windows, floors, natural lighting, energy-saving HVAC systems, and other “green” products. “Green construction is good, tight, quality construction,” he states, “and if you don’t do it on your own, the building codes in your area may eventually force you to do it, anyway. But it’s better for you to start now in getting an edge in ‘green’ experience and developing a ‘green’ reputation.”

Gaining such a reputation can pay dividends, McQueen believes, because “in today’s rural building market it’s often the owner who comes looking for a green builder.” Among eco-conscious owners he cites nonprofit organizations, government agencies, parks and recreation departments, kids’ camps, wealthy horse owners who are “into” environmentalism and organic farms and wineries.

These metal buildings offer more than the advantages of high recycled content and cool metal roofing. “With the software programs available today, including from our company,” McQueen says, “you can engineer your projects — sometimes in just 20 or 30 minutes — so that there’s no wasted metal. The software also lets you become a design/builder, which is the best way to control your costs.”

McQueen acknowledges some rural builders may fear putting together a “green” metal building package for their customers may add to the cost and result in lost work. “But the more you practice green building,” he counters, “it gets easier and cheaper to do as you gain more experience.”

Inherently Sustainable Elements

The domestic mini-mills, which today supply most of the materials for metal buildings, “are increasing the amount of recycled content they use,” observes McQueen. And at Memphis-based Varco Pruden (VP) Buildings, marketing manager Jim Peckham agrees, “Metal buildings have many inherently sustainable elements. They use recycled content and metal buildings are also recyclable at the end of their lives.”

Peckham explains there are two methods for steel production. Basic oxygen furnaces (BOFs) use about 30 percent recycled content, while the electric arc process uses about 70 percent. “And together with the recycled content,” he adds, “metal buildings benefit from today’s design approach, which is to meet all the code requirements without wasting any metal.”

In addition to their green properties, Peckham says, metal buildings are marketable for their structural strength and wind resistance, and lower lifetime maintenance costs since metal components are not affected by termites or mold. Metal paint systems available today are long-lasting and metal buildings can now be combined with advanced insulation systems. “More and more building owners,” he advises, “are considering life-cycle costs in making construction decisions.”



While some building owners are committed to green building strategies up-front, Peckham finds contractors “can also let their customers know about the advantages of green building, as well as the tax incentives available in many areas.”

At Whirlwind Building Components, a Houston-based manufacturer of pre-engineered metal buildings and roofing systems, marketing manager Carrie Miller reports, “Buildings are responsible for almost two-thirds of U.S. electricity consumption and one-third of total primary energy usage. The simplest way to reduce that figure is by installing Energy Star-approved ‘cool’ roofs.”

Miller explains a surface which perfectly reflects back, rather than absorbs, all sunlight would have a 1.0 solar reflectance rating. For example, she says, a red or brown tile roof is rated between 0.10 and 0.35. By comparison, then, such a tile roof can be less reflective than colored paint (0.15 to 0.35) and brick or stone veneer (0.20 to 0.40) on a building sidewall, or grass (0.25 to 0.30), trees (0.15 to 0.18), concrete sidewalks (0.10 to 0.35), and asphalt paving (0.05 to 0.20).

According to Whirlwind, reflective roofing can save up to 40 percent in cooling energy. Miller cites a well-known and widely publicized 2004 study in which a Georgia school district built two identical schools, but equipped one with a standard roof and the other with a cool metal roof. In a year's time the first school spent \$67,251 on electrical bills and the second spent \$58,447, for 13 percent difference that total \$8,804 in yearly savings.

Painting Becomes Cool

More information about cool metal roofing is available from the Cool Roof Rating Council (www.coolroofs.org), and the Metal Roofing Alliance (www.metalroofing.com) and general resource guides to green building products are online at GreenBuilder.com and BuildingGreen.com. But understanding cool roofs begins with an understanding of metal roofing paint systems.

Polyvinylidene fluoride (PVDF) resins — best known by their trade names Kynar 500 and Hylar 5000 — were commercially introduced in the 1960s, explains David Story, who is cool color solutions specialist at BASF Industrial Coatings Solutions Group in Southfield, Mich. When combined with complex inorganic color pigments (CICPs) that resist breakdown, the paints offer superior fade- and chalk-resistance. “But over the past decade,” he adds, “the industry has been asked to come up with coatings that reflect back more solar radiation so dark metal roofs stay cooler and reduce air-conditioning loads.”

Story says the issue of cool roofing gained traction in the mid 1990s when California began to experience rolling blackouts of its electrical power grid. In response, BASF seven years ago introduced its first cool metal roofing paint. “Since then, the federal government’s Energy Star has set the bar at 25 percent reflectivity,” he reports. “But as cool roofs have been catching on, the bar continues to be raised.”

In January 2006, Story relates, the United States Green Building Council and its LEED rating program set a “Solar Reflectivity Index” that equates to a reflectivity of about 30 percent for steep-sloped roofs and 70 percent for low-sloped or flat roofs. Moreover, in January 2008 the state of California will apply its “Title 24” energy-saving rules to steep-sloped residential roofing.

“There is a recommendation that metal roofs on homes should have a reflectance of 40 percent, while asphalt shingles would only require a 25 percent rating,” notes Story. “We agree that raising the standard is good for the environment, but we think the rules should be equitable for everyone.”

The problem with a higher standard for metal roofs, Story explains, “is that at 40 percent reflectivity we could offer only a handful of light colors — maybe beige, light tan, white, and pearlescent copper and silver.” Since homeowners overwhelmingly favor darker roof colors, that would put metal at a distinct disadvantage compared to asphalt. “But the shingles get their reflectivity from granules,” he points out, “and those granules flake off over time. Metal roofs hold their reflectivity, but I’m not sure that asphalt does.”

Given consumers will almost invariably choose darker colors for their roofs, BASF believes cool-color technology should be encouraged rather than subjected to mandates that might be counterproductive. Without “cool” pigments, Story says, the reflectance of residential roofs would hover around only 10 percent.

As an example of using a carrot rather than a stick, Story cites the approach taken by two California utilities, Pacific Gas & Electric and Southern California Edison. Customers who install steep-sloped roofs with a reflectance of 25 to 39 percent (and an emittance of 75 percent) can receive a rebate of 10 cents per square foot of roofing area. A reflectance of 40 percent or more earns a 20-cent rebate. To receive the rebate, roofing products must be certified by the Cool Roof Rating Council.

“Florida Power & Light has also started a rebate program for cool roofs,” Story adds. “So the idea is

catching on.” And through the end of 2007, homeowners who install cool roofs are eligible for tax credits of up to \$500 under the federal Energy Policy Act of 2005.

Mark Slawikowski, the building products group leader for BASF Industrial Coatings, confirms that “for us, our focus is on cool colors.” He says BASF has acquired several pigment companies whose products can strengthen BASF cool-roof offerings. “We can get a bigger piece of the residential pie for metal roofing,” he counsels, “if we look beyond the initial cost and sell the benefits of long-lasting durability and energy savings.”

At Philadelphia-based Arkema Inc., a manufacturer of Kynar 500 resins, business manager Chip Bisignaro predicts, “Cool-roof technology hasn’t yet run its course and continues to improve. I think that, within a three- to five-year time frame, this technology will really start to make an impact influencing homeowner’s roofing decisions.”

As Bisignaro sees it, metal roofs with PVDF-based paints are already marketable for their long-term performance in color retention and resistance to weathering. “We have stuff on our test fence in Florida that’s been there since the late 1960s and still looks good,” he observes. And now, he suggests, PVDF resins may become even more important “because these resins protect the cool-color properties of the paint pigments.”

Another new wrinkle, Bisignaro reports, is Arkema’s 2006 introduction of a water-based Kynar 500 paint. Such a system, he explains, allows the product to be used in metal roof restoration projects on existing buildings.

“Though the technology is mature, there are always innovations,” affirms marketing manager Mary Ann Johnson of Valspar, a Minneapolis-based manufacturer of paint coatings for metal substrates. Like other manufacturers, Valspar is “responding to the trend toward cool roofing,” she continues.

Johnson agrees metal roofs, though they cost more than asphalt, can be marketed for their durability — and, with cool-roof technology, their ability to save money on homeowners’ energy bills. “We have exposure tests for PVDF paints going back to the 1960s, and the panels still look good,” she reports, “and now with cool colors you can reduce energy consumption and get some tax credits.”

Though PVDF-based paints are the most expensive coil coatings on the market, Johnson points out, “The coating itself is only a nominal part of the overall cost of the roofing system, much less the entire house.” Other factors, such as the fluctuating cost of metal or the labor cost of the installation itself, have much more impact on the cost of a new roof. Given a PVDF coating is a nominal “extra” that offers significantly longer fade- and chalk-resistance, “you can use it as selling point,” she suggests.

In addition to PVDF-based paints, metal roofers can choose two other types of coatings for the coil. Polyesters occupy the low end of the market and, though hard and scratch-resistant, are prone to chalking when exposed to ultraviolet radiation. Silicon modified polyesters (SMPs) are regarded as a middle ground between cheaper polyesters and more expensive PVDFs. Many observers acknowledge that PVDFs offer greater chalk- and fade-resistance, but provide a softer surface that is more prone than SMPs to scratching.

At Akzo Nobel Coatings of Columbus, Ohio, technical manager David Cocuzzi observes, “As for what’s driving paint innovations, the most common need is cool roofing. People want darker-colored roofs that reflect heat like lighter-colored roofs.” The move toward cool roofing, he believes, was sparked about seven years by the federal government’s Energy Star program. “Pigment manufacturers began to see cool roofing as a marketing opportunity,” he relates, “and have used a lot of ingenuity to bring us where we are.”

One of those pigment manufacturers is the Shepherd Color Company. Based in Cincinnati, the

company makes high-performance complex inorganic color pigments. “The fundamental technology for CICPs has been around since the 1960s,” reports sales and marketing manager Chris Manning, “but today they fit right into the desire to save energy by optimizing infrared reflectivity.”

While coatings technology is mature, Manning adds, “Small innovations can make a big difference, because pigments control the color and they control the coating’s resistance to fading, chemicals, and infrared exposure. Then the polymer controls the coating’s chalk-resistance and its flexibility, hardness and, to some extent, its gloss. There have been several key developments in paints for metal roofing over the last five years which have had a real impact in increasing infrared reflectivity.”

Metal roofs are not, however, the only portion of metal building systems in which “green” innovations are being made today. For example, American Building Company of Eufala, Ala., recently introduced a SmarTrax system in which advanced paint systems are employed on its buildings’ sidewall panels as well as the roofs.

“Sustainability is affecting the building industry in a colossal way,” affirms ABC president Harold Franze, “and it’s important for companies like ours to provide builders with the green products and information they need.”