

The Cool Roofing Trend

It is hard to believe that it has been seven years since the turn of the century. Much has changed in our world and sadly, much has stayed the same. Continuing violence in the Middle East has not only proven how fragile our global political balance is, it has demonstrated how tenuous our energy supply has become in North America. A series of unfortunate weather events on the Gulf Coast have added to concerns about our nation's ability to source its own fossil fuel. Rolling blackouts in California and a major blackout on the East Coast have further demonstrated the volatile nature of our power structure. The resulting skyrocketing of fuel costs for homes, vehicles and industry is likely to be the primary catalyst for emerging trends in the roofing industry in the next decade.

Background

Just as the energy crisis of the 70's propelled the roofing industry towards innovative modified bitumen roofing alternatives, today's energy crisis is already precipitating a new generation of roofing technologies. Roofing manufacturers, power companies, governmental bodies and environmentalist organizations are collaborating on novel and innovative ways to conserve energy.

Vegetative roofing and photovoltaic technologies remain at the cutting edge of those efforts. However, they are not likely to gain substantive market share in the next decade without governmental intervention in the form of mandates or incentives unless energy costs rise high enough to substantially shorten the return on investment interval for such technologies. In some urban areas this is already happening with vegetative systems, due to their combined benefits of energy saving and sewer-water run-off reduction. In the interim however, the most likely scenario for the next decade is for the roofing industry to see its most significant growth in the area of cool roofing technologies.

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One of the hottest concerns today is Peak Energy Demand

(PED). PED is defined by the United States Environmental Protection Agency (EPA) as "the maximum electricity used to meet the cooling load of a building or buildings in a given area." Although there are a myriad of other energy demands created by a building each and every day that are not related to PED, the phenomenon of rolling blackouts has made PED reduction of critical concern. PED ultimately affects how much energy is required from a specific power grid to satisfy community needs. On a July mid-afternoon in Southern

California with cooling demands at their highest level, it is critical to have enough power to satisfy demand.

National programs such as Energy Star® have been launched in recent years to promote PED reduction. The Energy Star program represents a voluntary partnership between businesses and the federal government to promote energy efficiency and environmental activities. When it was initiated in 1998, the program focused on household devices such as computers and washing machines. Since then it has moved on to encompass building envelope products such as windows and roof-

ing, reintroducing terms such as reflectivity and emissivity to the roofing industry vocabulary.

Next-Generation Reflectivity and Emissivity

The science behind reflective and emissive roof systems is fairly simple. Any traditional roof system is exposed to radiation produced by the sun. This radiation is either absorbed or reflected based mostly on the color of the roof system. Traditional white roofs reflect more sunlight than darker roof systems. But light from the sun comes not only from visible sunlight it also comes in the form of infrared radiation (or heat). The phenomena associated with absorbing or reflecting heat is known as emissivity.

Highly emissive roof systems reflect a large portion of the infrared radiation. As the surface of the roof system heats up, due to absorbed visible and infrared light, the entire roof sys-



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tem heats up. Although the insulation layers in the roof system can help reduce the amount of heat that passes from the roof's surface to the building below, the use of cool, reflective products on the surface helps to further reduce the surface temperature thereby reducing the potential elevation of the building temperature. There is therefore a direct relationship between reducing PED and increasing the reflectivity and emissivity of the surface roofing product.

Regulatory and Other Drivers

Historically, the Energy Star program has required an initial reflectance of 65 percent with a three-year maintained reflectance of 50 percent. In view of continually escalating energy costs, there is an effort underway to increase the reflectivity requirements for Energy Star qualification and to add to the standards requirements for emissivity.

The Cool Roof Rating Council (CRRC) also established in 1998, was organized to "develop accurate and credible methods for evaluating and labeling the solar reflectance and thermal emittance of roofing products and to disseminate the information to all interested parties." One of those interested parties was and continues to be the California Energy Commission (CEC). The CEC is charged with the creation and maintenance of Title 24 in the State of California.

Title 24 is a somewhat all-consuming regulation that looks at all facets of facility construction. Although the standard was established in 1978, a great deal of revision has occurred over the last several years. Today's standard specifically speaks to "cool roofing" in Section 3.4. For low-slope, non-residential roofing Title 24 calls for a minimum initial reflectance of 0.70 and an initial minimum emittance of 0.75.

Although the State of California has pioneered energy-related governmental mandates, other states including Arizona, Florida, Georgia and Idaho have already followed its lead by including reflective roofing mandates in their building codes. In addition, many urban areas including Chicago, Cincinnati, Los Angeles, San Diego, Sacramento and Austin, Texas now specifically address cool technology in their building codes.

The availability of tax breaks, rebates and incentives for using cool products—in these and other areas—is further contributing to the industry's demand for new cool roofing technologies.

Other national programs have been launched as well. The United States Green Building Council (USGBC) through its Leadership in Energy and Environmental Design (LEED®) program has created a "benchmark for the design, construction and operation of a high performance green building." The LEED program as with the CEC program looks at the entire building and rates many of the materials and designs used in the construction for their "energy efficiency." LEED specifically requires a Solar Reflectance Index (SRI) of 78. SRI is a calculated value that combines the reflectance and the emittance of the surface material.

The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) in ASHRAE Standard 90.1 also discusses the use of cool roofing. This widely acknowledged national standard is recognized and ref-

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erenced by a multitude of building codes. ASHRAE Standard 90.1 cites a reflectance of 0.70 with an emittance of 0.75.

Although many of the standards allow for trade-offs between the use of reflective roofing and the more traditional use of insulation, the industry trend is clearly towards recognizing the energy efficiency of the roofing system itself and designing new systems and technologies to improve that efficiency.

In the decade ahead, we expect that legislation will continue to help drive

Industry trade associations are already actively promoting and monitoring the development of cool roofing alternatives. In 2004, the Asphalt Roofing Manufacturers Association (ARMA) formed a task group to monitor cool roofing issues. A year earlier, the Roof Coating Manufacturers Association (RCMA) formed the White Coating Council to help promote cool roofing solutions. The National Roof Contractor Association (NRCA) has embraced reflectivity and emissivity in its new SpecRight Program. Other industrial



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national trends. As more and more states and localities begin to recognize the potential energy-saving advantages of cool roofs, the demand for innovative new cool roofing technologies will continue to grow. Recent numbers published by the NRCA indicate a growth in market share of many of the product categories that include cool roof products.

Material Considerations

Unlike vegetative or photovoltaic solutions, cool roofing frequently can be achieved cost-effectively within the confines of traditional rooftop applications. Today's reflective technologies can be found in our industry's most popular product categories such as coatings, mineral surfacings, single-ply thermoplastic membranes, metal roofing, modified bitumen membranes and many others. The adaptability of cool roofing technologies is a major reason why they are expected to dominate the sustainable roofing category in the decade ahead.

In addition, roofing material manufacturers are expected to develop original new approaches to achieving reflectivity and emissivity in response to the growing market demand for cool roofing.

trade associations such as the Cool Metal Roofing Coalition (CMRA) and the Reflective Roof Coating Institute (RRCI) have been formed to educate the industry regarding different approaches to cool roofing technology. Clearly, the roofing industry is moving rapidly forward to meet the challenge and the opportunity presented by today's energy concerns.

Ultimately, the growth of the cool roofing category will be determined by the combined influences of energy and material costs, building envelope performance requirements, legislative mandates or incentives and advancements in roofing material technologies. The cool roofing options already available provide great potential for energy savings and conservation. In the decade ahead we will see even more exciting alternatives to increase the sustainability of the total building envelope in response to the volatility of today's energy market. †

Joe Mellott is director of technology for The Garland Company, Inc., a Cleveland, Ohio-based manufacturer of high-performance solutions for the commercial building envelope.

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