A White Roof Isn't Always the Right Roof

By: Robert Reale | May 15, 2009 | 03:25 PM (PDT)

A "winter penalty" may erode the value of a reflective roof's albedo effect in the reduction of greenhouse gas emissions.

Even partisans of using reflective roofs note that a 'winter penalty' in cooler climes may mean their albedo benefits could pale compared to heating requirements.

Recently I have come across numerous articles promoting cool roofs, and although I work for a company that does indeed manufacture cool, white TPO (for thermoplastic olefin) roofs as well as dark-colored materials, I would like to offer some statistics and information that will inform your readers of the benefits of other roof systems.

By having information on the different roof choices, building owners can choose the roof that is best for their location and climate, and that best solution isn't always white.

The Cool Roof Rating Council admits to a "winter penalty" when cool roofs are installed in northern climates. An article in the April edition of Maintenance Solutions magazine that was penned by the CRRC states, "Heating costs may increase slightly for buildings located in cooler regions." CRRC's justification for increasing heating costs and greenhouse gasses was that days (sunlight hours) are longer in the summer than they are in the winter, thus more energy is consumed to cool a building than to heat it.

The article failed to mention spring and autumn. However, information gathered from the U.S. Department of Energy clearly demonstrates that heating is a much more significant factor in energy usage than cooling. For instance, Grand Rapids, Mich., has 7,153 heating degree days versus 508 cooling degree days per year, which means heating equipment runs approximately 14.3 hours for every one hour that cooling equipment runs.

Furthermore, the 2008 Buildings Energy Data Book, published by the U.S. Department of Energy, concluded that space heating accounts for 29 percent of all commercial buildings' energy end-use intensities, while space cooling only accounts for 6 percent. These numbers, combined with the increased heating consumption in northern locales, clearly depict that there is no acceptable justification for increased heating costs in cooler climates.

To illustrate this point, I've chosen three major U.S. cities and provided analyses of energy and

carbon footprint models, all generated using the DOE's cool-roof calculator, to help lend some clarification and hopefully dispel some growing cool-roof myths.

- Boston, Mass.: 5,841 HDD versus 646 CDD
- Grand Rapids, Mich.: 7,153 HDD versus 508 CDD
- Albuquerque, N.M.: 4,361 HDD versus 1,211 CDD

Due to the overwhelming amount of heating degree days and positive winter heat gain in these locations, in all instances, energy consumption and carbon emissions are fewer with a dark roof surface than with a reflective surface. This is true even as far south as Albuquerque. It is also important to note that increased insulation dramatically reduces energy consumption in every model.

Reflective, cool roofs are environmentally responsible when properly insulated and installed in warmer climates. Roofing, like most industries, has many solutions to accommodate many sets of circumstances. The media must be responsible when looking for ways to conserve energy and stop global warming. It can be difficult to navigate, especially when the same agency that provides an Energy Star rating for reflective roofing materials also provides a tool that demonstrates this product to be less energy efficient in approximately half of the country.

Many roofing manufacturers, most of which only offer reflective materials, are promoting reflectivity as energy efficient, regardless of climate zone. My company, Carlisle, supports the reflective roofing requirements of the American Society of Heating, Refrigerating and Air-Conditioning Engineers climate zones 1-3, as they are clearly the more energy-efficient roofing materials for predominantly cooled spaces.