

MEMBRANE ROOFING

Energy-Efficient Roofing

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Light Not Always Right



Dressed for the Weather

A black EPDM roof—as seen here on the Baltimore Aquarium—can help lower heating costs, which can be three to five times higher than cooling costs in central and northern climates.

Geographic Considerations

In colder climates, cool roofing may offer cooling energy savings in the summer months, but requires an increase in energy use during the winter months, resulting in a net energy cost. Energy Star's website cautions that the energy benefits of a cool roof are highly dependent on building design, insulation levels, climatic conditions, building location and building envelope efficiency. Energy Star suggests using the Dept. of Energy's Roof Savings Calculator (www.roofcalc.com). This calculator demonstrates that the heating penalty associated with cool roofs increases as the building location moves from Miami to Boston.

Reflective roofs are exactly that: reflective. They are designed to reflect sunlight and heat back into the atmosphere. However, deflected sunlight and heat energy does not just travel back into the atmosphere; it travels into adjacent buildings' windows and walls and warms adjacent rooftop equipment and parapets. Sunlight deflected into the atmosphere may even change cloud cover, according to a recent study by Arizona State University¹ and it may actually increase global temperatures, according to a study

Sunlight deflected into the atmosphere may even change cloud cover and increase global temperatures, according to recent studies.

by Stanford University. Cool roofs, chosen by LEED to mitigate heat islands, may actually raise the temperature of a city, decrease cloud cover and precipitation, and ultimately increase global temperatures.

Since the energy benefits of cool roofs are highly dependent upon geography, often resulting in a net energy cost in colder climates, it is important to consider the LEED cool roof credit in warmer climates.

Final Thoughts

It is important to focus on the credits that benefit both the environment and the building. Using a dark colored roof in northern climates will still aid in the Optimize Energy Performance credit when using the whole building energy simulation, and follows the recommendations of the prescriptive compliance path of the same credit. Using less energy translates to lower carbon emissions from the power plants that supply that energy—a win-win for the building owner and the environment. □

¹"Urban Adaptation Can Roll Back Warming of Emerging Megapolitan Regions," Matei Georgescu, Philip E. Morefield, et al, Proceedings of the National Academy of Sciences, Feb. 2014
²"Effects of Urban Surfaces and White Roofs on Global and Regional Climate," Mark Z. Jacobson and John E. Ten Hoeve, Journal of Climate, Sept. 2011

Those familiar with the early versions of the U.S. Green Building Council's LEED Green Building Rating System will recall the "Bike Rack" Issue. In several iterations of LEED, a designer could add a simple bicycle rack outside a building to gain one point under the Sustainable Sites Category. It didn't matter if any of the building's occupants rode a bicycle, or if there were bicycle lanes in the area; it was a credit that many came to see as a simple point to achieve.

For years, many designers used the bicycle rack example as evidence that the rating system was flawed and broken, and that sustainability standards should take into account the building's location and its occupants. Since LEED version 2009, a shower must be installed along with the bike rack, taking away the easy point. Today, building owners install bicycle racks when they actually provide a benefit to building occupants, not just in order to gain a LEED point.

However, LEED (v4 now) still offers credits that are not "one-size-fits-all" and have not been modified. One example is the credit for using a reflective roof. The cool roof is the

"new bike rack": a cheap and easy credit used to increase a building's final LEED score, regardless of whether a cool roof provides actual benefits to building owners or occupants.

Determining Efficiency

Awarded under the Sustainable Sites Category, the LEED point for installing a reflective roof suggests that these roofs aid in heat island mitigation regardless of any other factors (location, microclimate, adjacent buildings, etc.). However, the use of cool roofs in some areas of the U.S. comes with unintended consequences.

Cool roofs were initially introduced to the market as an "energy-saving" strategy for warm climates (California and Florida) in the late 1990s. Yet, cold-climate cities like Philadelphia and New York have recently adopted cool roof mandates, and the Energy Star label has been applied to various white roofing materials. This creates the perception that white membrane equals energy efficiency, regardless of where it is used.