

Cool Roofs – A Measure of Sustainability

Overview

Cool Roofs, also known as reflective roofs, can be a practical, cost effective way of saving energy and meeting sustainability goals for a building. Cool roofs can help meet requirements outlined under [Executive Order \(EO\) 13693](#), *Planning for Federal Sustainability in the Next Decade*, signed by President Barack Obama and help Federal agencies comply with related policies, regulations and directives.

What they are

A cool roofing system is designed to reflect more sunlight (high reflectance) and release more absorbed heat (high emittance) than a standard roof, resulting in a cooler roof and building. Just as wearing light-colored clothing can help keep you cool on a sunny day. Most standard or dark colored roofs can reach temperatures that exceed 150 degrees Fahrenheit in the summer sun. However, a cool roof under the same conditions can stay more than 50 degrees cooler, conserving energy used for air conditioning.¹ Figure 1 demonstrates how the dark colored roof absorbs more heat radiated from the sun than a light colored roof. This additional reflectance can also help mitigate the heat island effect which is prevalent in dense urban areas. The heat island effect is known to exacerbate poor air quality and further increase energy consumption in cities.

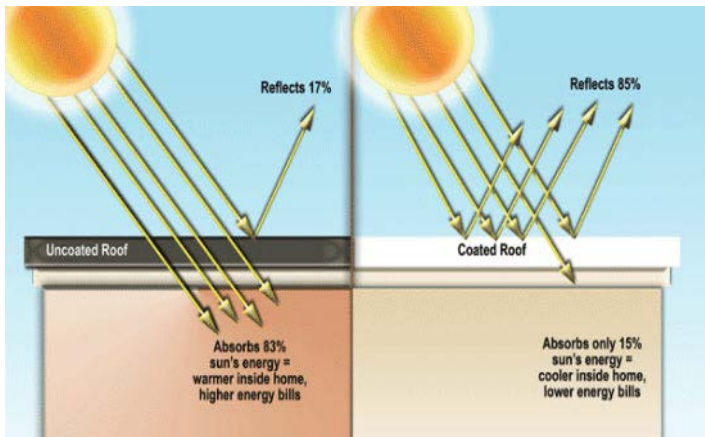


Figure 1. Reflectance of a standard, uncoated roof versus a cool, coated roof. Image courtesy of greenlimbs.com.

How they work

A measure of the performance of a solar roof is the system's solar reflectance index (SRI), which is a material's ability to reflect solar heat. SRI, determined by ASTM E 1980, is based on the emittance and reflective characteristics of a material. A high SRI will provide a more efficient cool roof system than one with a low SRI.

A range of cool roofing systems are available with high SRI surfaces that can be factory or field applied, including single membranes, built-up roofs and modified bitumen sheet membranes. New cool roofs can be

installed during initial building construction or re-roofing. New cool roofs may have little or no impact on the initial cost of a project while providing energy savings during its entire life cycle. Traditional roofs with application of high SRI coatings can also provide some of the same benefits of cool roofs.

Asphalt and composite shingles, tiles, metals and other materials are available with high SRI finishes and coatings for sloped roof applications.

Considerations

The energy saving benefits of cool roofs are the greatest in geographic areas where cooling days exceed heating days. In addition to energy savings there are a number of other issues to weigh when considering a cool roof, including:

- Improved indoor comfort for spaces that are not air conditioned.
- Decreased roof temperature and UV absorption, which may increase the roof's longevity.
- Reduction of HVAC equipment size and wear.
- Credit for green and sustainable building programs.
- Potential Federal, state and local tax credits and deductions.
- Reduced local air temperatures, sometimes referred to as the urban heat island effect.
- Lowered peak electricity demand, which helps prevent power outages.
- Reduced power plant emissions including greenhouse gasses.
- Increased energy use in colder climates due to reduced beneficial wintertime heat gains

In addition to above mentioned considerations, location of the project may dictate installation of cool roofs as many jurisdictions including New York, Philadelphia, Chicago and Los Angeles have enacted laws or building code provisions that require installations of cool roofs.

Conclusion

Installation of cool roof can contribute towards meeting a project's sustainability goals. Additional advantages include environmental benefits, cost savings, occupant comfort, increased roof life and reduced HVAC system size and wear.

Reference:

1. Department of Energy <http://energy.gov/energysaver>

Additional information:

ASTM E1980 Standard Practice for calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
The U.S. Green Building Council: LEED v4