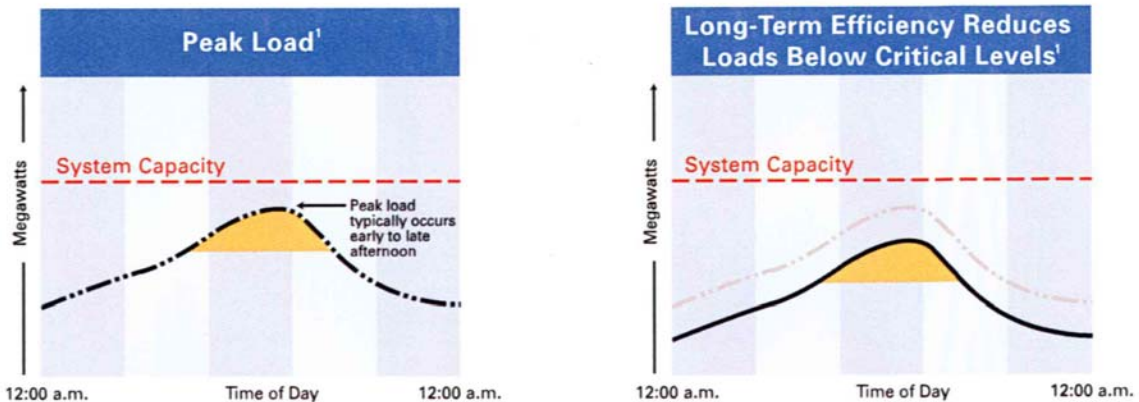




## Understanding Cool Roofs

Many factors affect the indoor temperature of a building and ultimately our comfort as building occupants. Environmental factors such as sunshine, clouds, humidity and wind speed all impact the building envelope causing a temperature change. The first line of defense for a building is the material selection and placement in the building envelope.

Highly infrared emissive and solar reflective roofing surfaces can help save money in air-conditioning costs because less heat is transferred into the building. Increased insulation can also mitigate this heat transfer. This translates into less cooling to keep people comfortable. This is especially true on hot afternoons in peak energy periods, such as 3 p.m. in the middle of July on a 90°F day. Lower peak usage helps to reduce the chance of rolling power outages, which means businesses stay up and running.



<sup>1</sup> Produced for the U.S. Department of Energy by the National Renewable Energy Laboratory, a DOE national laboratory, DOE/GO-102002-1613, September, 2001.

## The Role of Reflectivity and Emissivity in Cool Roofs

In order to help better understand the concept of cool roofs, we need to understand reflectivity and emissivity.

### Reflectivity

Solar reflectivity (or reflectance) is the fraction of the solar energy that is reflected by the surface (i.e., roofing membrane) back to the sky. White membranes have the highest solar reflectivity, while black have the lowest.

### Emissivity

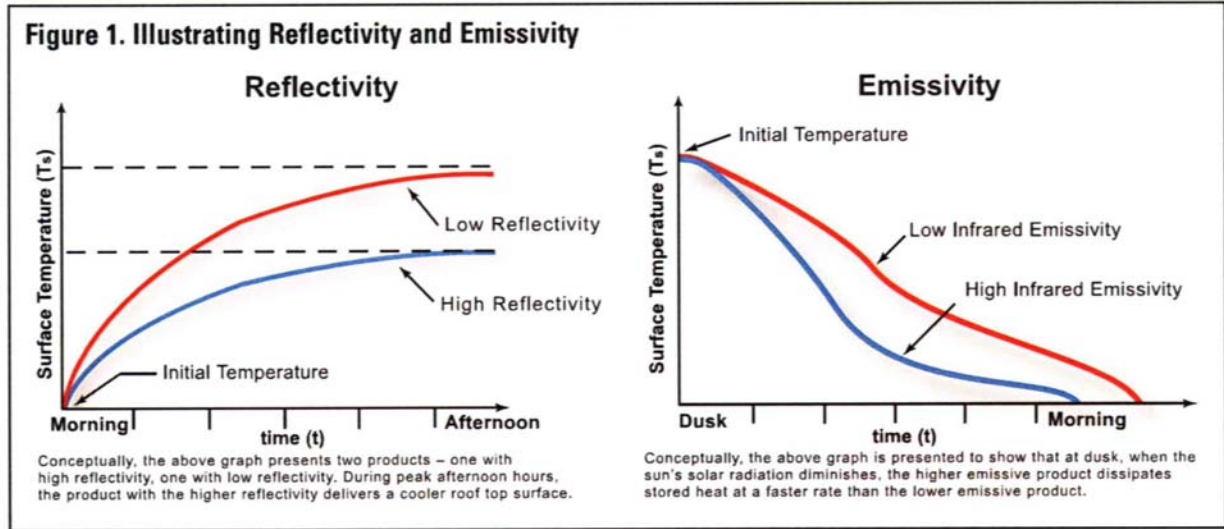
Infrared emissivity (or emittance) is a measure of the ability of a surface to shed some of its heat (in the form of infrared radiation) away from the surface (i.e., roofing membrane). High infrared emissivity helps keep surfaces cool. Metallic surfaces have a low infrared emissivity.

# Energy Seal Coatings

Acrylic Coatings for Roof and Wall Applications



Conceptually, Figure 1 below demonstrates how the sun's solar radiation affects a product's reflective and emissive properties.



Energy efficient material selection will impact indoor environmental comfort, which results in lower energy consumption and reduced demand during peak periods.

Figure 2 compares properties from three types of roofing products:

- White (cool) roof
- Aluminum-coated roof
- Dark roof

Highly reflective and highly emissive products, such as the white membrane, combined with the proper amount of roof insulation, offers a system that significantly reduces heat gain into the building.

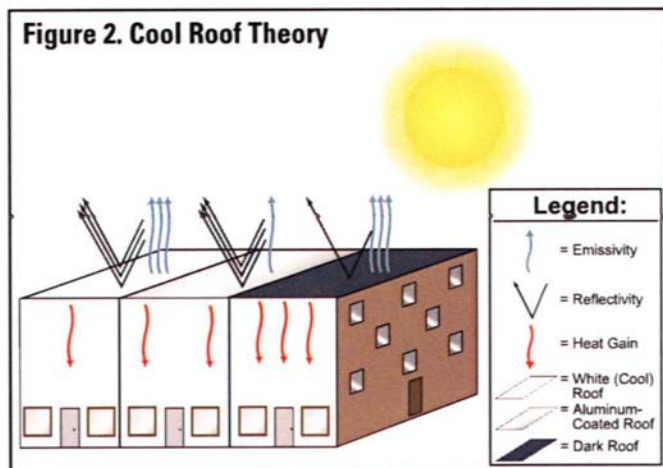


Figure 2 above is presented in a simplified form to illustrate the theory of cool roofs. There are many complex and related variables that must be considered when selecting the correct roofing product for the application.