



Why Cool Roofs Are Way Cool

A cool roof reflects and emits the sun's energy as light back to the sky instead of allowing it to enter the building below as heat. In many climate zones, a cool roof can substantially reduce the cooling load of the building, providing several direct benefits to the building owner and occupants:

- increased occupant comfort, especially during hot summer months
- reduced air conditioning use, resulting in energy savings typically of 10-30%¹, and
- decreased roof maintenance costs due to longer roof life.

In addition to these well known benefits to the building owner, cool roofs benefit the environment and public health in far more ways. As recognition of these benefits has become more widespread, cool roof requirements are appearing in building energy codes and green building programs across the nation.

Climate Change Mitigation

Cool roofs directly reduce green house gas emissions by conserving electricity for air conditioning therefore emitting less CO₂ from power plants. Cool roofs also cool the world independently of avoided carbon emissions, simply by reflecting the sun's energy as light back to the atmosphere, thereby mitigating global warming. A Lawrence Berkeley National Laboratory study found that world-wide reflective roofing will produce a global cooling effect equivalent to offsetting 24 gigatons of CO₂ over the lifetime of the roofs. This equates to \$600 billion in savings from CO₂ emissions reduction.²

Urban Heat Island Mitigation

Cities can be 2° to 8°F warmer than surrounding areas due to dark materials, including roofs, which absorb the sun's light energy as heat during the day and release it at night as heat.³ This phenomenon removes the opportunity for air to cool down at night and results in higher temperatures being maintained longer. By immediately reflecting solar radiation back into the atmosphere and reemitting some portion of it as infrared light, cool roofs result in cooler air temperatures for the surrounding urban environment during hot summer months.

Reduced Smog

Cool roofs, through mitigation of the urban heat island effect and reduction of ambient air temperatures, in turn improve air quality. Smog is created by photochemical reactions of air pollutants and these reactions increase at higher temperatures. Therefore, by reducing the air temperature, cool roofs decrease the rate of smog formation.

Public Health Benefits

Lower ambient air temperatures and the subsequent improved air quality also result in a reduction in heat-related and smog-related health issues, including heat stroke and asthma.

Peak Energy Savings and Grid Stability

Because cool roofs reduce air-conditioning use during the day's hottest periods, the associated energy savings occur when the demand for electricity is at its peak. Therefore, use of cool roofs reduces the stress on the energy grid during hot summer months and helps avoid shortages that can cause blackouts or brownouts. In addition, for building owners that pay for their energy based on the time of use, they save energy when it is at its most expensive – and hence, save more money!

Secondary Energy Benefits

Cool roofs directly reduce the air conditioning use for buildings by reducing heat gain in the building below, but they also indirectly reduce air conditioning use in urban areas by helping lower ambient air temperatures. Therefore, with cooler daytime temperatures, buildings and vehicles use less air conditioning and save additional energy. In turn, this results in a reduction in the CO₂ emissions from electricity generating power plants.

The Cool Roof Rating Council (CRRC) is a non-profit membership organization. Formed in 1998, the CRRC maintains a credible, third-party rating system to measure and label the radiative properties of roofing materials. Please visit us at www.coolroofs.org.

¹ Energystar.gov

¹ Akbari, H. (2008). Global Cooling: Increasing Solar Reflectance of Urban Areas to Offset CO₂. In press, *Climate Change*.

³ Energystar.gov