Cool roofs help lower indoor air temperatures by reflecting sunlight and decreasing heat absorption. Cool roofs can save energy as well as beautify your home.

**THE EMERGENCE OF COOL ROOFS**

Cool roofing is not a new concept. In the mid-1980s, researchers at DOE national laboratories in Tennessee and California were measuring the energy-saving benefits of what were called “solar radiation control coatings” on test roofs. Since then, great strides in new technologies have made cool roofs much more effective.

**Benefits of Cool Roofs**

The immediate and long-term benefits of roofs that stay cool in the sun have made cool roofing one of the fastest-growing sectors of the building industry. Studies exploring the energy efficiency, cost-effectiveness, and sustainability of cool roofs show that in warm or hot climates, substituting a cool roof for a conventional roof can:

- Reduce the annual air conditioning energy use of a single-story building by up to 15%.
- Cool interior spaces in buildings that do not have air conditioning, making occupants more comfortable.
- Reduce carbon emissions by lowering the need for fossil fuel-generated electricity to run air conditioners.
- Potentially help slow climate change by cooling the atmosphere.

If you are installing a new roof or remodeling an existing building, there are a range of cool roof options to fit your needs and save money.

**DID YOU KNOW?**

- Solar reflective roofs, solar reflective pavements, and vegetation could lower urban air temperatures, saving additional energy and improving air quality.
- Cool roofing reduces peak demand for electricity, helping to lower costs and avoid power outages.
- Cool roof products dominate the commercial roofing marketplace in warm and hot climates.
- Cool products are generally economical on low-slope roofs for commercial or industrial buildings.
- Cool options are available for most traditional roofing materials.
- White roofs are coolest, but cool colors are a popular alternative for roofs that can be seen by neighbors.
- ENERGY STAR® lists about 3,000 approved cool-roofing materials.
How Cool Roofs Work

Traditional dark-colored roofing materials absorb sunlight, making them warm in the sun and transferring that heating to the interior space of a home, and thus increasing the need for air conditioning. A white or special “cool color” roof reflects up to 90% of the sunlight that hits it, which keeps that roof cooler in the sun. Because a cool roof transmits less heat into the building it reduces the need for air conditioning by lowering interior building temperatures.

The “coolness” of a roof is determined by a combination of two properties:

- **Solar reflectance** — the amount of sunlight that is reflected, expressed as a fraction.
- **Thermal emittance** — the efficiency with which a surface cools itself by letting go of the heat it has absorbed from sunlight.

Both properties are measured on a scale of 0 to 1 — the higher the values, the cooler the roof.

Cool Roofs Today Save Energy and Money

Today both white and “cool color” products are available for low-slope and steep-slope roofs. “Cool” choices now exist for most traditional roofing materials—in fact, they don’t look different from traditional shingles; they just have more reflective materials included. Cool roofing should be considered whenever construction, an energy retrofit, or a roof replacement is being planned. It is rarely economical to replace a mechanically sound roof just to increase its solar reflectance. Check roofcalc.com to see if a cool roof would be cost-effective for you.

How to Select and Buy Cool Roofing Materials

The energy and cost savings that can be achieved by using cool roofing technologies depend on many factors, such as climate and building characteristics.

Three aspects of cool roofing technologies also affect their cost-effectiveness:

- Shingles lose some of their ability to reflect sunlight and let go of the sun’s heat over time. For this reason, energy savings should be based on long-term values of solar reflectance and thermal emittance.
- The incremental initial cost of the cool roof (if any).
- The incremental cost of keeping a cool roof clean and reflective (if any).

FURTHER READING

Cool Roof Rating Council Products Directory
coolroofs.org

DOE Building Energy Software Tools Directory
energy.gov/eere/buildings/listings/software-tools

Energy 101: Cool Roofs
energy.gov/articles/energy-101-cool-roofs

Energy Saver: Cool Roofs
energy.gov/energysaver/cool-roofs

ENERGY STAR Cool Roofing Materials
energystar.gov/products/roof_products

Cool Roofs Calculator
roofcalc.com

Financial Incentives
Tax credits, incentives, and rebates may be available in your area. Please visit energystar.gov/about/federal_tax_credits for more information.