



What Kinds of Cool Roof Products Are on the Market?

The roofing market provides products for two distinct segments: low-sloped roofs and steep-sloped roofs. Low-sloped roofs are found on most commercial and industrial buildings, as well as warehouses and

some residences. Steep-sloped roofs are found on most single-family homes. Cool roof options for low-sloped roofs include cool roof coatings and cool single-ply membranes. Cool roof options for steep-sloped applications include reflective tiles and metal roofs.



Cool roofs save building owners money on energy bills.

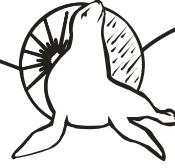
Cool Roof Coatings

Cool roof coatings are white liquids – the consistency of thick paint – applied over an existing roof structure. Coatings are designed only for use on low-sloped roofs. They can be applied over a traditional roof to achieve energy savings, an extended life span, and protection from weathering and ultraviolet (UV) radiation. The new surface can last 10 to 20 years, depending on coating quality and the thickness at which it is applied.

Cool roof coatings go on with a power sprayer or roller. Home and building owners should ensure that the underlying roof substrate is sound before a coating is applied, as these products are not intended to plug leaks or otherwise improve the structure of a roof.

Most cool roof coatings can be described as one of the following:

- Elastomeric;
- Polyurethane; or
- Acrylic.



Cool roof coatings may be applied with a roller.

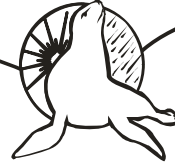
Each has been found to retain solar reflectance over time. The Department of Energy's Lawrence Berkeley National Laboratory found that the reflectance of cool coatings decreases by only about 20% over the product's lifespan, and that most of this decrease occurs in the first year after application.

Cool roof coatings may cost between \$0.75 and \$1.50 per square foot for materials and labor. Installation cost varies, however, depending on the condition of the roof, size of the job, number of roof penetrations or obstacles, and the ease of access to the roof. For accurate cost information on a particular project, a professional roofing contractor should be contacted.

Cool Single-Ply Membranes

Single-ply roofing is the catchall name for roofing materials that come in pre-fabricated sheets and are applied in a single layer to a low-sloped roof. Single-ply roofs are a flexible or semi-flexible roof membrane typically constructed of rubber or plastic materials. Single-ply roofs can be manufactured in a bright-white color for high solar reflectance– or albedo – and increased energy savings.

Single-ply roofs are durable and can cover a number of roof structures. They are typically delivered in rolls, and applied by heat sealing the seams, or with caulk. Some of the newest single-ply roof products are made with self-cleaning and mold-resistant polymers to maintain solar reflectance.



Since the "single-ply" classification includes both light- and dark-colored materials, products that are highly reflective should be selected for heat island reduction and energy savings purposes. Examples of single-ply products include:

- EPDM (ethylene-propylene-diene-terpolymer membrane): a flexible elastomeric single-ply roofing material.
- PVC (polyvinyl chloride): a synthetic thermoplastic polymer prepared from vinyl chloride. It is the most expensive of the three, but is well known for long-term performance.
- TPO (thermoplastic polyolefin): a blend of polymers that may or may not contain desirable additives such as flame-retardants or UV absorbers. It can last 30 years and is largely maintenance free.

Single-ply roofing costs vary considerably from \$1.50 to \$3.00 per square foot, including materials, installation, and reasonable preparation work.

Reflective Tiles

Tiles usually are made of clay or concrete, and the solar reflectance of traditional tiles ranges from 10-30%. Manufacturers have begun to develop cool tiles that contain pigments that reflect in the infrared. Special pigments allow roofing materials to keep their traditional colors, such as brown, green, and terra cotta, while reflecting away up to 70% of the sun's energy. These products enable buyers to forego the perceived tradeoff between energy efficiency and the aesthetic concerns that may arise with a bright-white roof.

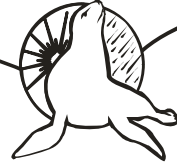
The cost of reflective tiles is around \$3.00 per square foot. They are well-known for durability and long life, and are most often used on new homes or on higher end reroofing projects.

Metal Roofs

Several EPA ENERGY STAR ® labeled metal roof products are available for residential use. These materials have a high albedo to reflect the sun's radiation. Unless treated metal has a low thermal emittance and retains the heat that it does absorb. Manufacturers have recently developed cool metal roofing products that use pigments that reflect infrared radiation, further increasing the solar reflectance of metal roofing, keeping it cooler.

Dark-colored metal roof applications are also available. These options reflect solar radiation and save energy while meeting consumers' aesthetic demands.

Metal roofs generally start at \$2.00 per square foot, and are known to be durable and long lived.



What Is the Size of the Cool Roof Market?

There are few reliable data segmenting the roofing market into highly reflective and traditional roof applications. What is known about the size of the cool roof market comes from roof marketing surveys and opinions that characterize the demand for reflective products.

Industry sources suggest, for instance, that 10% (by dollar value) of the commercial roof market is represented by highly reflective products. Regardless of whether this figure is precise, the existence of large-scale incentive programs for purchasing cool roof products – in combination with data from roof manufacturers and contractors – indicates that market share for commercial applications is growing.

The size of the residential market for cool roofs is also uncertain, though it is known to be smaller than the commercial market. According to a roofing industry survey, the overall estimated roofing sales volume (for all roof products) was approximately \$20 billion in 1997.

How Does the Cost of Cool Roofs Compare with Traditional Roofs?

The up-front price of a roof product depends on the initial cost of the roof materials and the additional cost of installation.

On a unit-area basis, reflective roofs are usually cost-competitive with – and sometimes less expensive than – traditional roofs at the time of purchase. Of course, this depends on the specific types of roofs under consideration, their quality, local availability, and other factors.

When the life-cycle costs of cool and traditional roofs are compared, however, cool roofs are often less expensive. This is because, once installed, electricity demand is reduced and summertime savings on energy bills begin to add up. In fact, experience has shown that, over time, most reflective roofs pay for themselves.

Cool roofs can be installed on both new buildings and older structures due for re-roofing. Because most roofs require regular maintenance, as well as periodic re-roofing or recoating, opportunities to switch to cool materials and improve roof reflectance are regularly presented.

For more information on cool roofs and the cool roof market, visit EPA's [ENERGY STAR® Roof Products](#) Web Site.