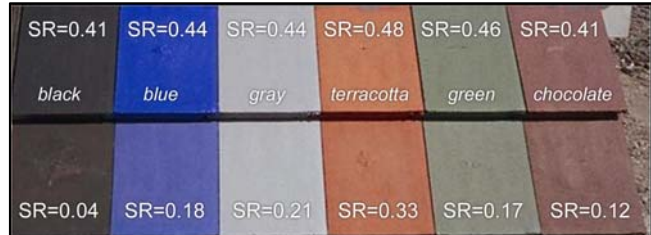


Cool Roofs Will Revolutionize the Building Industry

Adoption of infrared-reflective paints is one of the major advances in roofing in our century.

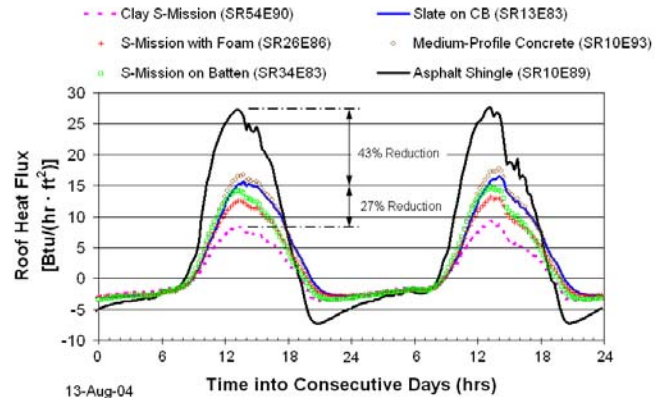
ORNL's Building Envelopes Program has conducted research for many roofing consortiums and their affiliates to help them develop cool roof products. Based on the knowledge gained through our studies and results of field tests, we concluded that cool roofs must not only be reflective and highly emissive — cool roofs must use all cost-effective strategies to minimize the energy use of buildings. Twenty percent of electrical energy use in houses is attributable to heat transfer through the roof. With the cool roofs now beginning to reach the market, we can significantly reduce residential energy consumption.



Cool Tile IR Coating™ applied to concrete tile (top row) boosts solar reflectance (SR) compared to standard coatings (bottom row) with the same appearance. Courtesy Joe Reilly, American Rooftile Coatings

The Department of Defense (DoD) developed novel cool color pigments to produce paints that are dark in color but highly reflective in the near-infrared portion of the solar spectrum. First used in paints for military camouflage to match the near-infrared reflectance of background foliage, these pigments were later applied by DOE to the manufacture roofing materials that reflect more sunlight than conventional roofing products, which lowers roof surface temperature and in turn reduces the building's cooling-energy requirement.

During our studies of the many prototype roofing materials produced by our industry partners, we serendipitously discovered the second major advance in roofs for our century: We found that elevating the roof cover from the roof deck to induce above-sheathing ventilation is as important as increasing solar reflectance and may be the stronger player in reducing heat gain into the attic. The two combined can reduce heat gain through the roof by 50% compared to nailed asphalt shingle roofs.



The effect of solar reflectance and above-sheathing ventilation for dark clay and concrete tile roofs as compared to a direct nailed shingle roof.

ORNL is collaborating with the U.S. Army and several industry partners to showcase cool roofs that mitigate heat gain by high reflectance and new ventilation schemes through a study at Fort Irwin in Southern California. All costs for actual roof construction are borne by roofing manufacturers and the base housing budgets.



Privatized housing at Fort Irwin

Deployment of cool, ventilated roofs could result in about a 10% reduction of building cooling-energy use with no heating season penalty. Through its Residential Community Initiatives Program (RCI), the Army is building 70,000 new privatized military family homes. This technology could be implemented in all of those homes and on shingled buildings when re-roofing is required. The payback period is expected to be less than five years.

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