



Advances in paint and coating technology allow even dark colored homes to enjoy increased solar reflectance for natural cooling in hot summer months.

Image Source: Unsplash user Bernadette Gatsby

Air conditioning can be a significant proportion of a household's energy consumption and cost each year, representing "more than 8% of all the electricity produced in the U.S., at a cost to homeowners of over \$15 billion."¹ Not only can this be a blow to a household budget, it also greatly increases the home's carbon footprint; for the average home, a single air conditioning system releases almost two metric tons of carbon dioxide each year. Although many homeowners have made the switch to high-efficiency air conditioners, some are looking to decrease their energy bills and carbon footprint even further by reducing the need for air conditioning in the first place through measures such as better insulation, moving toward energy-efficient light bulbs, and getting rid of energy-leeching appliances. However, there is one major area of potential energy saving that is often overlooked: solar reflection.

Color and Beyond

Most people have a basic understanding how solar reflection works. You know that if you wear a black t-shirt on a hot summer day you will feel significantly warmer than if you wear a white t-shirt and you likely know this is due to the fact that white reflects more of the sun's rays while black absorbs them, drawing them toward your body. The same principle is true for homes. According to the National Renewable Energy Laboratory:

The primary source of heat buildup (i.e., gain) is sunlight absorbed by your house through the roof, walls, and windows. Dull, dark-colored home exteriors absorb 70% to 90% of the radiant energy from the sun that strikes the home's surfaces. Some of this absorbed energy is then transferred into your home by way of conduction, resulting in heat gain. In contrast, light-colored surfaces effectively reflect most of the heat away from your home.²

The effect of switching from a dark-colored to a light-colored home exterior can be significant. One study on Florida homes found that increasing heat reflectivity through the use of light colors saved homeowners an "an average of 23% of their cooling costs" and widespread implementation of such

measures could incur a nationwide savings of “\$10 billion in energy and equipment costs.”³ But while color itself can be an important part of heat absorption, what ultimately matters is solar reflectance, which, thanks to recent advances in paints and coatings, no longer necessarily correlates with color.

Expanding the Possibilities of Passive Cooling

Many homeowners have a specific vision for [what they want their home to look like](#). As such, while they may know that a light-colored home with a light-colored or reflective metal roof is the best option for maximizing solar reflection, they may be reluctant to take such measures due to aesthetic or practical concerns. The paints and coatings industry recognizes this and has begun to expand the appeal of passive cooling by [developing products that minimize light absorption on even dark surfaces](#).

Today, these products take the form of everything from solar reflective paints with built-in light reflection properties to specialized coatings to minimize light absorption, including 3M Glass Bubbles that use a hollow structure with a low refractive index to maximize solar reflection, titanium dioxide compound integration, and proprietary pigments that “reflect energy in the near and far infrared region of the spectrum even though they absorb strongly in the visible region.”⁴ With an ever-growing number of solar reflective paint and coating options to choose from, these innovative products can be applied to a full range of traditional and modern wall and [roofing materials](#), including wood, metal, [polymers, and concrete](#), and allows homeowners to optimize cooling without compromising appearance.



The solar reflectance values determined by spectrophotometric evaluation can allow both builders to achieve LEED certification in even retrofitted structures.

Image Source: John-Mark Kuznietsov

Measuring Color in Solar Reflective Paint

Evaluating the efficacy of light reflecting products requires the use of advanced spectral technologies to quantify total solar reflection values (TSR). Spectrophotometric instrumentation offers the most accurate and cost-effective way of determining reflectance values of all sample types and can evaluate individual ingredients, complete formulations, and installed products. For manufacturers, detailed TSR analysis is critical to measuring the success of a product, facilitating the tailoring of formulations, and continuously monitoring product efficacy during production. Additionally, employing spectral analysis during product testing allows you to observe the performance of the product over time by measuring TSR in response to environmental stressors and establishing durability of protection. For consumers, both initial and eventual TSR values are vital to ensuring they can make informed choices regarding building materials and have the Solar Reflectance Index (SRI) data needed to for LEED certification.⁵

But spectrophotometers don't only provide you with TSR data; they are also essential to evaluating color. The [range of optical geometries available in modern spectrophotometers](#) allows you to precisely and easily capture color information at any point in your product design or manufacturing process ensure that you can consistently produce the shades needed to meet the needs of consumers. Colorimetric analysis of light reflecting coatings is particularly important to determine what effect, if any, they have on underlying materials and protect against unwanted color shifts.

HunterLab Precision, Accuracy, and Reliability

HunterLab's commitment to innovation and technological excellence has driven us to produce the finest spectrophotometric instruments available for over 60 years. Our comprehensive range of portable, benchtop, and inline instruments give you the flexibility to perform spectral and colorimetric analysis in virtually any environment, whether in the lab, the factory floor, or at a customer site. Together, we can help consumers make more environmentally-friendly choices and, ultimately, improve quality of life. [Contact us](#) to learn more about our lineup of spectrophotometers and let one of our color measurement experts help you find the right instrument for your needs.

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