

Keep Your Cool

Dale Sventeck

Cool roofing is becoming a key component of restaurant sustainability

For years, restaurant owners and managers have implemented a variety of high-tech energy-management improvements, re-imagining everything from building automation, systems interoperability, and lighting and office equipment to security systems and, the biggest electricity consumer of all, air conditioning.

As important and attractive as these high-tech solutions are, low-tech cool-roofing systems can be a key building component for restaurant owners and managers who want to bring sustainability into their operations.

Basics of Sustainability

In a building, sustainability involves using natural resources efficiently to avoid or minimize impacts to its occupants and the environment. This can be done throughout the building's lifecycle, from design and construction to maintenance, rehabilitation and eventual demolition.

For many, "sustainability" translates to "energy savings." Indeed, that's an important benefit of cool roofing. Cool-roof systems have steadily increased their share of the commercial roofing market in recent years.

A study conducted a few years ago by the EPA estimated that \$40 billion is spent annually to air condition commercial buildings. That's one-sixth of all electricity consumed in the United States. High roof reflectivity can help keep commercial buildings cooler and reduce their energy consumption by as much as 40 percent.

The Cool-Roofing Movement

Commercial roofs made from black or dark materials absorb heat and transfer it into the building. On a hot day, the surface of a black roof can be 70 degrees hotter than the air temperature, compared with only 20 degrees hotter for a lighter roof. If a building has rooftop HVAC units, which is common for restaurants, they will have to work a lot harder—using more electricity—to cool the superheated air hovering on a dark roof.

In northern climates, the energy savings provided by a reflective roof in the summer will be offset by the heat loss in the winter; that is, a building with a white roof will not "warm up" as much from the sun during winter months as it would with a black roof. However, several factors will minimize the potential wintertime heat gain from a dark roof:

- Hot air rises, so any wintertime heat transferred to the interior of a building from the rooftop will remain at the top, adding minimal warmth to the building or occupants.

- Throughout North America, there are fewer wintertime hours of sunlight available to warm a building and affect energy costs. In fact, in some areas, there is a more than six-hour difference between summer and winter daylight hours. Plus, the angle of the sun is less direct, which also minimizes warming potential.
- In many parts of the United States, roofs are covered with snow for much of the winter, in effect turning them white and eliminating any potential heat gain from a black roof.
- Winter skies are typically cloudier than summer skies, which reduces the amount of sunlight that hits the rooftop even more. Sunnier summer days provide more direct sunlight on the rooftop, enabling a cool roof system to help reduce building energy consumption.
- The energy required to air condition a building in the summer can be considerably more than the energy to heat it in the winter, making the potential for summer energy cost savings much greater with a highly reflective white roof than winter savings with a heat-absorbing black roof.

Protecting Your Investments

Building sustainability goes beyond energy savings and includes such areas as asset preservation and productivity. Roofing systems can contribute here as well:

- Insulation can be more effective: Studies have shown that extremely high temperatures lower the effective R-value of the most widely used types of insulation. Cooler roof materials reduce the amount of heat that penetrates the surface, helping preserve the effectiveness of underlying insulation materials.
- Roof substrate deterioration can be reduced: Ultraviolet and infrared radiation and moisture penetration accelerate roof substrate deterioration. A cool-roofing system will reflect this radiation and help protect and preserve the substrate.
- Lower indoor temperatures mean higher worker efficiency: Studies of worker performance in settings with machine operation and high physical activity reveal that productivity drops 10 percent at 84 degrees Fahrenheit and as much as 38 percent at 95 degrees Fahrenheit. In non-conditioned facilities, reflective roofing can moderate workspace temperatures because less heat is transferred to the interior space. This improves working conditions, increasing employee productivity.

Additional Benefits

As mentioned, sustainability also considers factors that deliver broader environmental benefits that are not as tangible as dollars saved, but are valuable nonetheless. For example, cool roofs help mitigate the urban heat island (UHI) effect, which is the tendency for cities to be several degrees warmer than surrounding rural areas.

UHIs promote the formation of smog and greenhouse gases and contribute to human health problems, including heat stroke and asthma. Smog is created by photochemical reactions of air pollutants, which increase at higher temperatures. Therefore, by reducing the air temperature, cool roofs can decrease the rate of smog formation.

In addition, because cool roofs reduce air-conditioning use during the hottest parts of the day, the associated energy savings occur when the demand for electricity is at its peak. Therefore, cool roofs reduce stress on the energy grid during hot summer months and help avoid shortages that can cause blackouts or brownouts. For building owners who pay a variable energy rate based on the time of day, cool roofs can pay off even more, allowing them to save more money and energy during times of peak demand.

Flat commercial rooftops are increasingly being turned into usable space with the goal of making buildings more environmentally friendly. Solar and vegetative roofing systems are becoming more common, and these applications require a dependable, watertight roofing system beneath them.

In the world of solar power, grid parity (when an alternative energy source can generate power at a cost that's comparable to the price of purchasing it from the electricity grid) has made solar electricity economically competitive in some locations. In those parts of the country, commercial building owners who have a desire to be "green" can now do so cost-effectively with rooftop solar.

Meanwhile, as rooftop gardens become increasingly popular, a growing number of building owners are seeking vegetative roofing systems that can support various forms of vegetation on a rooftop. Besides aesthetic enhancements, the vegetation offers other benefits. In urban areas that experience significant water runoff during rainstorms, vegetative roof systems help reduce runoff that stresses the capacities of storm sewer systems. Vegetation also helps insulate and keep the roof surface cool, reducing building cooling requirements and mitigating UHI effects.

Of course, the primary reason to install a new roof is to ensure that your restaurant is watertight and safe and comfortable for your workers and patrons. Fortunately, there are a multitude of roofing systems that can provide restaurants with proven protection against the elements, as well as deliver a variety of sustainable benefits

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