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Aluminum Now

All That Glitters Is Green

Aluminum Roof Chips Reflect Heat, Reduce Ozone and Energy Bills

Thermal imagery for years has documented the phenomenon known as “urban heat islands” —the tendency for bubbles of hot air to develop over cities as vegetation is replaced by concrete, asphalt, rooftops, and other man-made materials. These elevated temperatures are associated with higher accumulations of ground-level ozone, commonly known as smog, which is known to cause and exacerbate respiratory illnesses.

Moreover, elevated temperatures outside such man-made structures are an indication of excess heat that is retained inside them as well—excess heat that in many cases is mitigated via air-conditioning. In most cases, air-conditioning is powered by electricity generated by the burning of fossil fuel, which itself contributes to ground-level ozone. The issue is of considerable importance: the Environmental Protection Agency estimates that one-sixth of the electricity generated in the United States is used to cool buildings. Clearly, developers and architects should be encouraged to design buildings that help lighten the air-conditioning load.

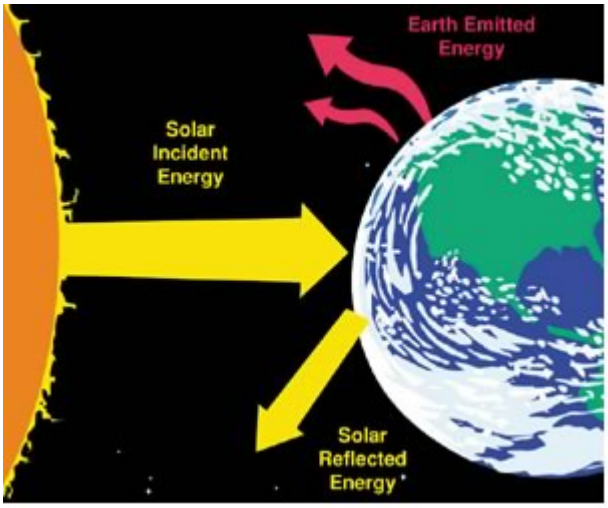
Aluminum to the Rescue

Until the mid-1980s, builders who wished to reduce a standard asphalt roof’s heat-retention had only a couple of options. They could mix gravel into the asphalt and spray it with a reflective pigment, or cover it with a pigmented rubber sheet.

In 1984, Columbus, Ohio-based Transmet Corporation—aided by a grant funded by the Department of Energy's (DOE's) Office of Industrial Technologies—brought to the roofing market its patented aluminum flake product. The one-millimeter-square aluminum chips can be applied by air-spraying them onto freshly applied asphalt with a pneumatic blower, or they can be applied to rolled roofing materials while still at the factory.

According to DOE, applying reflective aluminum flake to dark asphalt roofs is "an inexpensive, lightweight, [and] effective way to reduce the contribution that these types of roofs make to the air-conditioning power load."

Since its introduction 20 years ago, aluminum chips have been used on over 33 million square feet of roofing—chiefly in the U.S., but also in the United Kingdom, Bahrain, and Singapore. DOE estimates that, through 2000, the aluminum chips had cumulatively saved over 650 BTU—with a value of $5.9 million—and reduced carbon dioxide emissions by over 41,000 tons.



Most basic roofs are black asphalt, DOE notes, which absorbs radiant heat from the sun. By using aluminum flake ("chips"), approximately 70 percent of the sun's radiation can be reflected, the agency estimates. Granule-coated asphalt reflects only about 23 percent of the sun's energy.

The length of time required for aluminum chips to pay for themselves—from savings in the cooling load—is only three years, on average in the U.S., according to DOE. If half of the asphalt roofs in the U.S. were to be covered in reflective aluminum chips, DOE estimates the total annual electrical energy savings would reach 50 billion kWh.

As an additional benefit, DOE says, the reflection of ultraviolet radiation by the aluminum chips could virtually double the life expectancy of the asphalt roofs. As petroleum is a major component in asphalt roofing, the increased life expectancy

for such roofs would cut petroleum use significantly—by 19 million barrels per year if half of the asphalt roofs in the U.S. were to incorporate aluminum chips, the agency estimates.

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