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How white roofs shine bright green

Painting homes a lighter shade does more than save money on A.C.



Eco-vation: If all urban rooftops in temperate and tropical zones were white, like these houses in Bermuda, they could slow global warming by up to 11 years, a new study finds.

Newscom

By Mark Clayton, Staff Writer for The Christian Science Monitor / October 3, 2008

Can you help save the planet by painting your roof white?

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Hashem Akbari thinks so.

Global warming's complexity and momentum have led to a try-everything approach by scientists. In that spirit, Dr. Akbari offers his simple yet profound innovation for slowing that warming way down.

It has long been known that a white roof makes a dwelling cooler. That saves energy and cuts carbon emissions. But until Akbari, a researcher at the Lawrence Berkeley National Laboratory in California, picked up a pencil to do the calculations, few realized the major climate effect that millions of white rooftops could have by reflecting sunlight back into space.

It turns out that a 1,000 square foot area of rooftop painted white has about the same one-time impact on global warming as cutting 10 tons of carbon dioxide emissions, he and his colleagues write in a new study soon to be published in the journal "Climatic Change."

As sunlight pours down into Earth's atmosphere, some of the energy is filtered out or bounces off clouds. About half the energy shines through as visible light and some of that hits the tops of houses. If a roof is white, most sunlight reflects back into space and doesn't heat the earth. But if a roof is a dark color, the sunlight converts to heat rather than bouncing off as light. That thermal energy then radiates off the roof back toward space, where it is trapped by CO₂ in the atmosphere, and then absorbed by this greenhouse gas. As a result, the world's thermometer reads just a little higher than it did before.

If the estimated 360,000 square miles (less than 1 percent of the world's land surface) covered by urban rooftops and pavement were a white or light color, enough sunlight would be reflected back into space to delay climate change by about 11 years, the study shows.

Put another way, boosting how much urban rooftops reflect, called albedo (al-BEE-doh) in scientific terms, would be a one-time carbon-offset equivalent to preventing 44 billion tons of CO2 from entering the atmosphere, Akbari says. It's about the same as taking all the earth's automobiles off the road for 11 years, the study's authors say.

"What we have done are very simple calculations," Akbari says, "but it is novel because, for the first time, we're equating the value of reflective roof surfaces and CO2 reduction. This does not make the problem of global warming go away. But we can buy ourselves some time."

Selling the idea

Geoengineers have had similar ideas: covering the Sahara with enormous sheets of white plastic, for instance, or painting the Black Hills of South Dakota white.

But because white roofs create an additional 20 percent energy savings by cutting cooling costs, some say this built-in financial incentive should propel urban rooftops around the globe to lighten up.

"Now that we know what a great help it is on climate change, we expect more utilities to give incentives for homeowners who go entirely white with their roofing material, not just 'cool' colors [like pastel blues, reds, and greens]" says Arthur Rosenfeld, a member of the five-person California Energy Commission.

To promote energy efficiency, Georgia and Florida already give incentives to owners who install white or light-colored roofs. Going a step further, California has since 2005 mandated that all flat roofs (mostly commercial and industrial) must be white. Some utilities also now offer homeowners an incentive of 20 cents per square foot on a tile roof that may cost \$1.20 a foot.

Still, the cost of going with a "cool roof" usually isn't much more than a typical darker roof. Asphalt shingles with a white or light tint are roughly the same cost as other shades.

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