Cool steps help fight global warming

James Temple, San Francisco Chronicle, 2-9-13

When it comes to high-tech possibilities for counteracting climate change, the headlines tend to focus on the seemingly sci-fi stuff: brightening clouds, pumping particles into the stratosphere and launching giant mirrors into space.

But there are down-to-earth versions of the same basic concept, approaches as simple as painting roofs white or using light-colored pavement to cast away more heat from the Earth. A group at Lawrence Berkeley National Laboratories is exploring how big an impact this approach could have on global warming, as well as developing next-generation building materials that could reflect more light.

Compared with more unconventional strategies, the advantages of white roofs and related concepts are that they're proven, cheap and relatively noncontroversial. Indeed, the basic idea has been employed in sweltering parts of the world since at least the time of the pharaohs.

"It's so saleable that people tend to smack their heads and say, 'Why didn't I think of that?'" said Arthur Rosenfeld, distinguished scientist emeritus in the environmental energy technologies division at Lawrence Berkeley, who is working with the lab's Heat Island Group. "There's a huge payoff."

Warming offset

Indeed, if all "eligible" flat urban roofs worldwide were whitened, it could reflect away enough heat to offset the warming effect of 1.2 gigatonnes of carbon dioxide each year, according to research at the Heat Island Group. That's roughly one-thirtieth of annual global emissions.

It could also chip away at total greenhouse gas emissions, since those cooler buildings wouldn't use as much energy for air conditioning.

The total impact is far from the level theoretically promised by things like cloud brightening or spraying sulfur particles into the stratosphere. Done on a large enough scale, using machines under development to whiten clouds along coastlines could offset the warming effect from a doubling of carbon dioxide concentrations in the atmosphere, according to some studies.

But making roofs white can be done today, without the risks and uncertainties associated with more audacious approaches.

Moreover, what's abundantly clear to anyone studying climate change is that there are no silver bullets. Effectively confronting the enormous challenge of global warming will demand a wide range of responses: aggressively expanding clean-energy options, rapidly developing more efficient alternatives, enacting laws that discourage greenhouse gas emissions and quite possibly using "geoengineering" options for sucking greenhouse gases out of the sky or reflecting away heat.

"Almost every potential step we take is a partial solution," said Ronnen Levinson, the staff scientist who leads the Heat Island Group. "White roofs can by no means reverse global warming, but the cooling benefit is substantial and it's something that's easily within reach."

dangerous consequences of rising greenhouse gases levels remain, notably ocean acidification. The CO{-2} dissolved in oceans, lakes and rivers can harm critical components of underwater ecosystems, including coral reefs and plankton.

But curbing heat itself will become increasingly critical, with global average temperatures set to soar this century. Making all flat roofs white would be equivalent to taking half the world's cars off the roads, in terms of the warming effect of CO{-2}{-.}

There are other big advantages to cool roofs, including reducing energy use, smog and illnesses associated with poor air quality. Indeed, these were the original problems that the Heat Island Group, formed in 1979, sought to address. Roofs and pavements constitute about 60 percent of the surface area of cities, so they absorb far more sunlight than rural areas dominated by vegetation.