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World Changing Ideas: Putting this material on roofs can help clean up smoggy air

With air quality hovering around dangerous levels in much of the world, the manufacturing company 3M has developed a way for the roofs of buildings to play a role in reducing pollution.

BY EILLIE ANZILOTTI Fast Company | NOVEMBER 29, 2018

For the past several weeks, the air quality in California has made headlines. Raging wildfires in the northern and southern parts of the state created clouds of ash and dangerously high toxicity levels in the atmosphere. The fires created a state of emergency, but in many parts of the country, that poor air quality is a daily issue, not one created by natural disasters. Over the summer, southern California violated federal smog standards for 87 days in a row. Around 41% of people in the U.S. live with regular exposure to poor air quality.

Cleaning up the air will require reducing dependency on fossil fuels and the pollution they create. While industries like manufacturing and transportation work on these wide-scale changes, 3M has developed something of a stopgap: roofing granules that suck smog from the atmosphere.

“Roofing granules have been a part of our business since the 1930s,” says Gayle Schueller, 3M’s chief sustainability officer. “This is not a new business to be in, and it’s not a new material for us.” Traditionally, granules are used in construction to coat rooftops and provide an extra layer of protection from UV rays, which helps buildings remain cool and less dependent on air conditioning. They also make roofs more fire resistant. Around 10 years ago, 3M developed “cool roofing” granules that reflect sunlight and help buildings comply with roofing standards like the 2014 Los Angeles ordinance mandating new residential projects be built with additional rooftop insulation to keep them cool.

Instead of reflecting the sun, though, 3M’s new smog-reducing granules use it. The photocatalytic coating on these granules, designed for asphalt roofing, is activated by the sun’s UV rays. That generates radicals that bind with the chemical compounds in smoggy air, and transform them into water-soluble ions that eventually wash away.

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While 3M conducted its own internal testing of the granules, they also sent samples for external validation to Lawrence Berkeley National Lab, which evaluated how effectively the granules absorbed different gases and pollutants. They found that a average-sized roof coated in granules removes around as much pollution from the air as three trees could.

One company that sources from 3M, Malarkey Roofing, has pledged to incorporate the smog-reducing granules into all of their shingles. So far, Malarkey shingles have pulled the equivalent amount of smog from the air as 100,000 trees.

“When we innovate, we start with an understanding of where there is a problem, and we identified the issue of smog in cities,” Schueller says. Around 10% of 3M’s 90,000 person staff are scientists, she adds, and they collaborated on both developing the photocatalytic coating, and testing its environmental impacts.

The runoff from the ions, they found, does not contribute significantly to water quality issues—the impact is minimal, Schueller says, and the smog would’ve infiltrated the water from the air anyway if it hadn’t first been absorbed by the roofing granules.

This dynamic underscores the need for these granules to be seen as a temporary fix, not a solution to air quality issues. The smog-absorbing granules pull pollution out of the air—which is certainly helpful for people breathing in that air—but they don’t ultimately remove it from the ecosystem. Truly cleaning up the air and the environment in cities will require addressing the root causes of that pollution. Until that happens, innovations like these granules can help ease conditions for people in the short term. 🍀

