## 4 in 10

'Four in 10 Americans live in counties with unhealthy air pollution levels.'

*State of the Air* Report
American Lung Association, 2021

# The Industry's First Smog-Reducing Shingle

**All Malarkey Shingles Include 3M™ Smog-Reducing Granules, *Time* Magazine's Top 50 Inventions of 2018.**
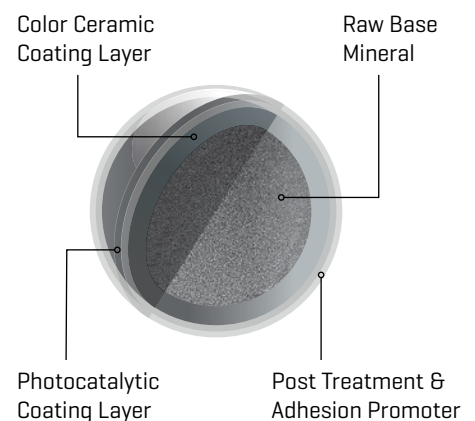Air quality is a concern for us all, which is why we created the industry's first smog-reducing shingle, using 3M™ Smog-Reducing Granules.
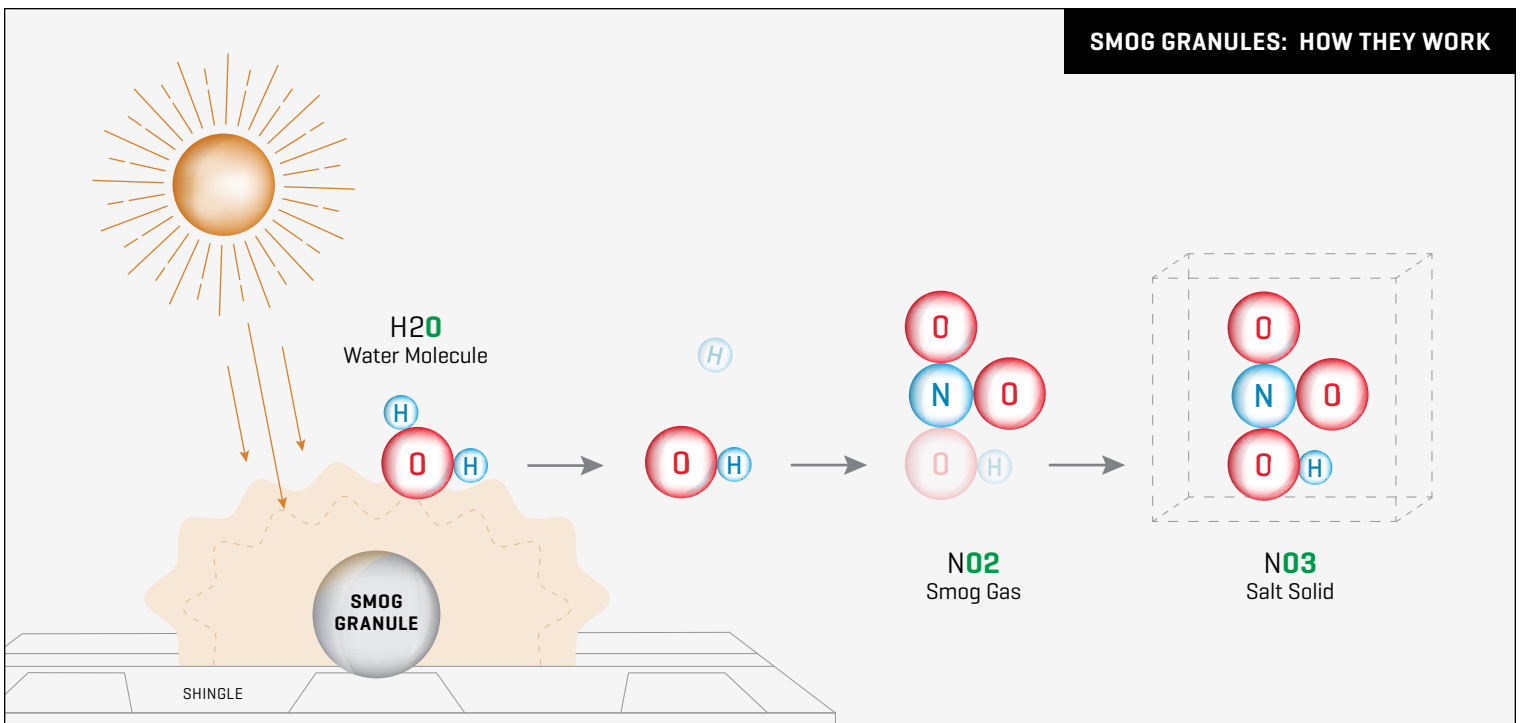
Designed with a photocatalytic coating, and blending inconspicuously into the shingle's color, these innovative granules harness sunlight to actively clean the air of emission pollutants.

**56% of homeowners want all building materials eco-friendly.**
3M Study, 2021

Improving Our Climate
**3M™ Smog-Reducing Granules**

Color Ceramic
Coating Layer

Raw Base
Mineral

Photocatalytic
Coating Layer

Post Treatment &
Adhesion Promoter

A MEMBER OF
HOLCIM

**Malarkey**
Roofing Products®

H2$\mathbf{O}$
Water Molecule

SMOG
GRANULE

SHINGLE

N$\mathbf{O}$2
Smog Gas

N$\mathbf{O}$3
Salt Solid

## $\mathbf{O}$H molecule attaches to N$\mathbf{O}$2 (smog gas), which changes it to N$\mathbf{O}$3 (salt solid).

Sunlight activates the smog-reducing granule with enough energy to break apart water molecules in the air, like from humidity ($H_2O$ breaks into OH and H). The newly formed OH molecule seeks to attach itself to smog molecules ($NO_2$) that come close to the roof.

When the OH molecule attaches to the $NO_2$ smog molecule, it chemically transforms $NO_2$ (smog gas) into $NO_3$ (a salt solid) which drops to the roof and rinses away with rainwater as plant food.

# What is Smog?

Smog is a form of air pollution resulting from the interaction of UV sunlight with chemicals in the atmosphere like nitrogen oxides ($NO_x$) that get into the air primarily from the burning of fuel (ex. vehicle emissions).

As gas, smog is easily inhaled, making it extremely hazardous to humans and animals, and can lead to severe health risks including lung tissue damage, bronchial infections, and heart problems.

**WHAT THE EXPERTS SAY**

"Along with planting more trees, we view smog-reducing technology, embedded into mainstream roofing materials, as a great step forward in addressing air pollution."
– Jonathan Parfrey, Executive Director - Climate Resolve

"The best, 'greenest', most innovative product period. Not even a close 2nd out there."
– Greg Carlson, Carlson Projects - Nebraska

**WHAT DO TREES HAVE TO DO WITH IT?**
Trees are nature's filters. Not only do they clean particulates out of the air by trapping them on leaves and bark, they also absorb pollutant gases like nitrogen oxides ($NO_x$) through leaf stomata. Stomata are small windows on green leaves that let carbon dioxide and other gaseous pollutants in and oxygen out.

Like trees, Malarkey shingles with 3M™ Smog-Reducing Granules help fight air pollution by converting smog gases into water soluble ions that settle on the roof and wash away with rainwater.

**EACH ROOF HAS THE SMOG-FIGHTING POTENTIAL OF ~2 TREES*.**

*Assumes average-sized roof of 30 squares. Source: Lawrence Berkeley National Laboratory and 3M.

**Malarkey Roofing Products®**