Center for American Progress

Soot Pollution 101

What You Need to Know and How You Can Help Prevent It

Jackie Weidman and Susannah Marshall August 10, 2012

Earlier this summer the Environmental Protection Agency proposed updated clean-air standards that will prevent tens of thousands of premature deaths. The proposal comes in response to legal action calling upon the EPA to update final regulations for particle pollution. This rule is in line with the Clean Air Act's requirements to protect public health and improve air quality.

Particle pollution, commonly referred to as "soot," is one of the deadliest forms of air pollution. This 101 details why it is essential that the EPA adopts the strictest rules possible to protect Americans from the dangers of breathing these particles.

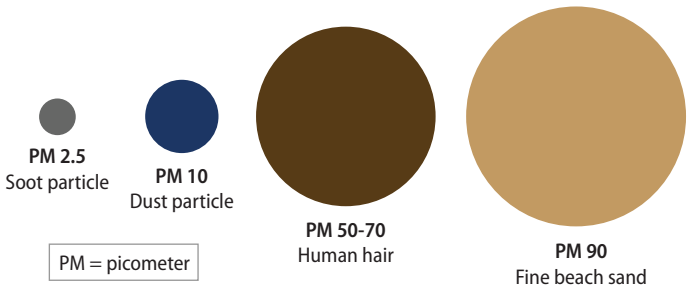
What is soot?

Soot is the common term for a type of particle pollution called PM 2.5—particulate matter that is 2.5 micrometers in diameter or smaller. Such fine particles are even smaller than dust and mold particles, or approximately 1/30 of the size of a human hair.

It is comprised of a variety of pollutants, including chemicals, acids, metals, soils, and dust, which are suspended in the air after emission. Soot can come in solid, liquid, or gaseous ("aerosols") states.

FIGURE 1

How big is particle pollution?



Source: U.S. Environmental Protection Agency

How is soot produced?

Soot is a byproduct of burning fossil fuels, particularly coal. It is emitted by a variety of sources, including burning coal for electricity or industrial fuel, manufacturing, oil refining, and motor vehicles.

Soot is released into the air as either extremely small particles or liquid droplets. Some solid particles are emitted directly into the air while others are formed when gases form particles as they are carried thousands of miles from pollution sources.

Why is soot a problem for public health?

Soot poses tremendous harms to public health, particularly because of its size. Particulate matter is so small that it can easily enter your lungs and bloodstream, potentially causing damage in a number of ways.

The Environmental Protection Agency describes the process of soot harming the human body:

> *Microscopic particles can penetrate deep into the lungs and have been linked to a wide range of serious health effects, including premature death, heart attacks, and strokes, as well as acute bronchitis and aggravated asthma among children.*

The American Lung Association adds that breathing particle pollution can potentially cause "cancer and developmental and reproductive harm."

Nearly 6 million people in the United States live in an area with unhealthy year-round levels of particle pollution. The most vulnerable members of the population are children, the elderly, low-income communities, and people with pre-existing heart and lung diseases. Healthy adults, however, can also suffer from its adverse effects.

Why is soot an environmental problem?

Soot causes several environmental problems, such as haze and the acidification of lakes and rivers.

Haze is formed when sunlight interacts with small particles in the atmosphere. Soot is the primary cause of haze, which severely decreases visibility in U.S. cities and national parks. As a result the EPA estimates that visibility in national parks and other scenic areas in the eastern United States has been reduced from a 90-mile distance to just 15–25 miles.

Fine particle pollution negatively impacts the natural beauty of such national treasures by robbing us of color, distance, and hue, and negatively harms the health of visitors and residents. Haze can also hurt tourism by discouraging visits, which causes economic damage.

Particle pollution is also correlated to acid rain. The same compounds from soot that react in the air to form haze—sulfur dioxides and nitrogen oxides—can mix with atmo-

spheric moisture to acidify precipitation. Carried by the wind or in the water, this acidified pollution degrades water quality by making lakes and rivers more acidic, depleting the nutrients in the soil and damaging sensitive farm crops, and changing the nutrient balance in river basins, along coastlines, and in forests.

Acidification through soot pollution can also stain stone and erode it, slowly discoloring and damaging important national monuments and iconic buildings.

Why is the EPA acting now?

A coalition of states and clean-air organizations sued the EPA for not updating its soot emissions standards within five years, as it is required to do by the Clean Air Act. The U.S. District Court for the District of Columbia told the EPA to issue new standards by June 2012 to protect public health and comply with the Clean Air Act. In accordance with this ruling, the EPA issued the new Air Quality Standards for Particle Pollution.

What does the new rule do?

The current limit is 15 μg/m3 (micrograms per cubic meter of air), which was finalized in 2006. The EPA proposed to reduce the soot limit to between 12 and 13 μg/m3, or a reduction of up to 20 percent. This safeguard would take effect by 2020. It would also additionally set a new standard for visibility in urban areas, which will either be 28 or 30 deciviews.

Existing standards for coarse particle pollution—particles that are between 2.5 and 10 micrometers in diameter—will not change.

Who will be affected by the new rule?

Emission reductions will be required from vehicles, power plants, and stationary diesel engines. The EPA will solicit reports from states to determine whether they meet requirements set forth by the new rule. The EPA will determine which states are in compliance with the rule by the end of 2014. Then, states will have until 2020 to meet the health standards. States may request extensions until 2025 on a case-by-case basis.

The EPA estimates, however, that 99 percent of U.S. counties will be in compliance with the rule without adoption of additional pollution-control measures. This is primarily because of other recent Clean Air Act rules that will also lead to reductions in soot, including the cross-state air pollution rule and the regulations to cut mercury and air toxics.

The approximately 20 counties that will violate the new soot protection standard will have to develop an implementation plan to reduce soot pollution to acceptable levels. State plans must specifically demonstrate how they will meet the standard.

What are the benefits from the soot rule?

Strong soot regulations can achieve tremendous health benefits. Strengthening the standards for soot could result in up to $5.9 billion every year thanks to the reduced costs associated with premature death and disease, according to EPA analysis. In other words every dollar invested in cleaning up soot pollution will yield up to $86 million in health benefits. See the table below for a breakdown of the health benefits from the new rule.

FIGURE 2

Benefits of the soot rule

Annual health effects avoided after implementing soot pollution reductions

Health effect	Maximum number of cases avoided each year
Premature death	35,700
Heart attacks	2,350
Hospital and emergency room visits	23,290
Cases of acute bronchitis	29,800
Cases of aggravated asthma	1.4 million
Restricted activity days (missing work, school)	2.7 million

Source: Donald McCubbin, "Health Benefits of Alternative PM2.5 Standards" (Washington: American Lung Association, Clean Air Task Force, Earthjustice, 2011), available at http://www.earthjustice.org/sites/default/files/Health-Benefits-Alternative-PM2.5-Standards.pdf.

So what happens now?

The EPA will be accepting public comments on the new rules until August 31, 2012. It also conducted two public hearings in July in Philadelphia and Sacramento. At these events most of the speakers urged the EPA to adopt additional protections from soot. This included a number of medical professionals.

To support the EPA's proposed safeguards, you can submit comments here. The rule has to be finalized by December 14, and states will be expected to achieve the new limit by 2020. You can also view a video here on how reducing soot can protect public health.

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Support strong rules to reduce soot pollution today

Example message to send to the EPA:

I urge the EPA to adopt the strongest possible standards to reduce soot (particle) pollution. This dangerous pollutant threatens children, the elderly, as well as people with asthma and other lung and cardiovascular diseases. Stronger soot standards can save up to 35,700 lives and prevent 1.4 million asthma attacks each year. I strongly urge the EPA to clean up soot pollution and protect Americans' health. Thank you.

Click here to submit your comment.