



# Understanding the Impact of a **Lower Fine Particulate Matter National Ambient Air Quality Standard**

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A look at the potential impact of the proposed new, lower PM<sub>2.5</sub> standard on state and local air agencies.

In early January, the U.S. Environmental Protection Agency (EPA) announced a proposal to revise the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM).<sup>1</sup> The proposal, which was open for public comment through March 28, 2023, was the culmination of supplemental scientific and policy assessments developed following EPA's June 2021 announcement that the agency would reconsider its December 2020 decision to retain the existing PM NAAQS.<sup>2</sup> A final rule—expected in August 2023—could tighten the current annual standard. State and local air agencies will play a critical role in determining if an area is attaining, or meeting, the NAAQS. In coordination with EPA, agencies will also develop and update state implementation plans (SIPs) to ensure the NAAQS are met and maintained within and across state lines.

### Background: NAAQS Program and PM Standards Review

The NAAQS program, created under the U.S. Clean Air Act (CAA) Amendments of 1970, determines the health-based (or primary) and public welfare (or secondary) ambient air quality levels for six “criteria” pollutants, including coarse (PM<sub>10</sub>) and fine (PM<sub>2.5</sub>) particulate matter (42 U.S.C. §7409(b)). CAA Section 109(d) sets forth that EPA, in coordination with the independent Clean Air Scientific Advisory Committee (CASAC), shall review each criteria pollutant NAAQS at five-year intervals, however the actual timeline has varied.

Periodic reviews of the PM NAAQS have resulted in the standard evolving over time as scientific understanding of exposure levels and health effects has increased.<sup>3</sup> The original particulate standard of Total Suspended Particulates (TSP) was established in 1971, then changed to PM less than 10-micron (PM<sub>10</sub>) in 1987. Following the 1997 review, EPA established a standard for PM less than 2.5-micron (PM<sub>2.5</sub>) and set the primary NAAQS of 15.0 micrograms per cubic meter (µg/m<sup>3</sup>) as an annual mean, averaged over three years. In 2012, EPA tightened the PM<sub>2.5</sub> NAAQS to 12.0 µg/m<sup>3</sup>, which was retained in 2020 after CASAC review. In mid-2021, the agency announced the reconsideration and supplemental review of the determination to retain the existing 2012 PM NAAQS.

EPA's current proposal to revise the PM NAAQS is informed by the CASAC evaluations of updated science and policy assessments totaling more than 1,000 pages and a 467-page Regulatory Impact Analysis (RIA).<sup>4</sup> The January 2023 proposal lowers the primary PM<sub>2.5</sub> annual standard from 12.0 µg/m<sup>3</sup> to within the range of 9.0–10.0 µg/m<sup>3</sup> while retaining the current primary daily NAAQS for PM<sub>2.5</sub> and PM<sub>10</sub>, as well as the secondary PM NAAQS. The proposal sought further comment on alternative annual standard levels down to 8.0 µg/m<sup>3</sup> and up to 11.0 µg/m<sup>3</sup> and various ranges for the daily and secondary NAAQS. The agency is now reviewing comments received ahead of a final rule anticipated later this year.

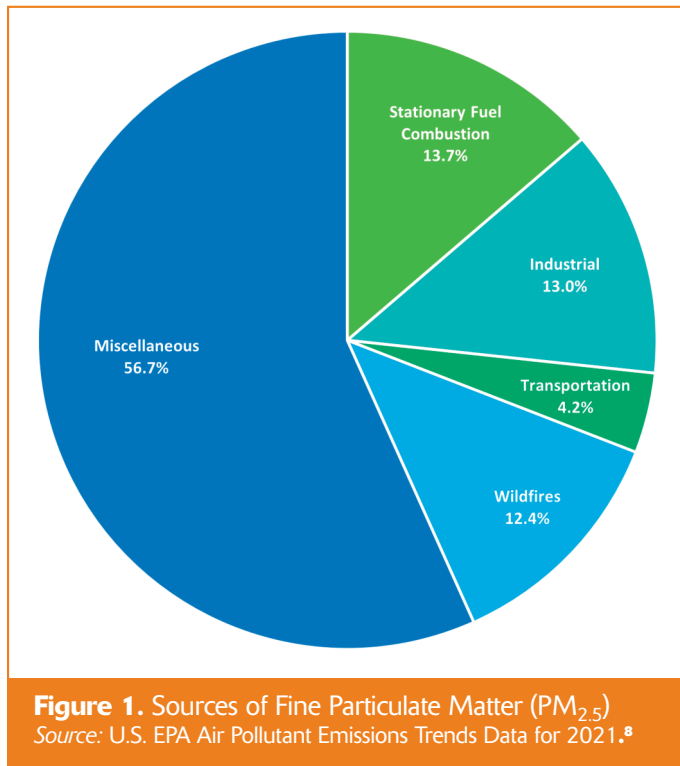
### Historical Trends, Sources, and Projected Impacts

The NAAQS program has dramatically improved the nation's air quality through cooperation between EPA, state, local, and tribal agencies, and regulated entities.<sup>5</sup> A 2017 article in the *Annals of the American Thoracic Society* states that “Actions to control emissions from vehicles, factories, electric power plants, and more have reduced emissions of the most prominent pollutants [...] by 73%, even while the U.S. gross domestic product has grown by more than 250%.”<sup>6</sup> EPA's June 2022 report, *Our Nation's Air: Status and Trends Through 2021*,<sup>7</sup> finds that the national annual average for ambient PM<sub>2.5</sub> was reduced from 13.5 µg/m<sup>3</sup> in 2000 to 8.5 µg/m<sup>3</sup> in 2021. U.S. gross domestic product more than doubled over that same period, underscoring that environmental protection and economic development are not mutually exclusive.

EPA tracks the criteria pollutant emissions of major sources, which can contribute to direct (primary) emissions or secondary formation of particles in the atmosphere. Importantly, most concentrations of PM<sub>2.5</sub> in the atmosphere form from precursor emissions of sulfur oxides (SOx), nitrogen oxides (NOx), volatile organic compounds (VOCs), and ammonia (NH<sub>3</sub>). Figure 1 presents the sources of primary PM<sub>2.5</sub> emissions per the agency's Air Pollutant Emissions Trends Data for 2021.<sup>8</sup>

EPA's RIA for the PM<sub>2.5</sub> NAAQS reconsideration found substantial benefits to public health, the environment, economic growth, and social welfare. For example, reducing the annual PM<sub>2.5</sub> standard to 10.0 µg/m<sup>3</sup> while maintaining the 24-hr PM<sub>2.5</sub> standard at 35 µg/m<sup>3</sup> is estimated, in 2032, to avoid as many as 1,700 deaths and 110,000 lost workdays and reduce hospital visits for a range of health conditions. EPA estimates the economic value of these avoided morbidities and premature deaths to be between US\$7.6 billion and US\$17 billion.<sup>9</sup>

Revising the PM<sub>2.5</sub> NAAQS to within the proposed ranges could bring more than 100 counties (out of about 3,100 counties) in the country into nonattainment. In a preliminary analysis,<sup>10</sup> EPA found that monitoring data from 2019 to 2021 indicated that at least 50 counties would not meet an annual standard of 10.0 µg/m<sup>3</sup>; the number of impacted counties would more than double under a 9.0 µg/m<sup>3</sup> PM<sub>2.5</sub> NAAQS scenario, with an additional 62 counties—112 in total—out of attainment. Several counties may be designated nonattainment for PM<sub>2.5</sub> for the first time. Under current air pollution control efforts, EPA's analysis further projects that 51 counties would not meet the most stringent standard proposed of 9.0 µg/m<sup>3</sup> by 2032. State and local agencies with areas designated nonattainment must develop air quality attainment plans for their jurisdictions, which could be subject to additional emission reduction requirements through permitting restrictions to, under certain situations, withholding federal highway funding if attainment dates are not met.<sup>11</sup>



### State Considerations When Implementing a New NAAQS

Determining attainment status is dictated by the CAA and takes several years. After a new NAAQS is promulgated, delegated programs at state, local, and tribal agencies are required to implement measures to meet the standards. EPA provides the following timeline<sup>12</sup> for designations and implementation:

- **Within 2 years after a final NAAQS:** For areas with available information, EPA must “designate” areas as meeting (attainment areas) or not meeting (nonattainment areas) the final NAAQS considering the most recent air quality monitoring data and input from states and tribes. All PM<sub>2.5</sub> nonattainment areas are initially designated as “Moderate.”
- **Within 3 years after a final NAAQS:** CAA Section 110 requires all states to submit [“infrastructure” SIP] revisions to show they have the basic air quality management program components in place to implement the final NAAQS.
- **Within 18 months after the effective date of designations:** Nonattainment area PM<sub>2.5</sub> [SIPs] are due.
- **End of the 6th calendar year after the effective date of designations:** “Moderate” area attainment date.

To meet these timelines, air agencies will need tools, guidance, and appropriate flexibility to accommodate unique social, geographic, and economic factors. With each successive, tighter PM<sub>2.5</sub> NAAQS, achieving the standard becomes more difficult, particularly as the NAAQS potentially approach

background concentrations while the majority of stationary sources have control measures to reduce PM<sub>2.5</sub> emissions. States have stressed as paramount the need for a timely implementation rule, known as a “SIP Requirements Rule,” that addresses plan requirements for nonattainment areas under a newly promulgated NAAQS. To illustrate, the 2015 Ozone NAAQS SIP Requirements Rule was finalized in November 2018, well into the implementation timeline and state planning efforts. A timely rule and guidance will be particularly important for areas that have not previously been in nonattainment.

Additionally, the PM<sub>2.5</sub> NAAQS reconsideration has proposed changes to the Air Quality Index (AQI) and new monitoring requirements, including “a revision to the PM<sub>2.5</sub> network design to account for at-risk populations.”<sup>13</sup> Operating an ambient air monitoring program involves network planning, monitor siting, shelter maintenance, instrument certification, and data handling, including quality assurance/quality control, recordkeeping, and reporting. EPA will need to coordinate directly with state and local air agencies, which serve as primary monitoring entities under the CAA.

Agencies have concerns about ambient PM data comparability between monitors using federal reference methods (FRM) and federal equivalent methods (FEM) for continuous monitoring, which have been shown to measure higher concentrations than collocated FRMs and may bias design values used for attainment designations.<sup>14</sup> Resource or other constraints will also need to be taken into consideration.

While air agencies are responsible for developing strategies to meet and maintain the NAAQS, events such as wildfires and transatlantic Saharan dust can severely impact air quality and are clearly outside of regulatory control. EPA states in a fact sheet on the proposed PM NAAQS revisions that “Wildland fires—including both wildfires and prescribed fires—account for 44% of the nation’s primary emissions of fine particulate matter (PM<sub>2.5</sub>).”<sup>15</sup> The “exceptional events” provision established in Section 319 of the CAA allows data from events affecting air quality and “not reasonably controllable or preventable” or “caused by human activity that is unlikely to recur at a particular location or a natural event” to be set aside for regulatory purposes (42 U.S.C §7619). A lower PM NAAQS could substantially increase the number of regulatorily significant events and, therefore, EPA may need to update guidance, regulations, review processes, and other mechanisms for agencies to reasonably develop exceptional event demonstrations.

EPA’s implementation of the Inflation Reduction Act (IRA) may also play an impactful role in meeting the PM NAAQS. Appropriately crafted and timed provisions on monitoring and consideration of overburdened communities (among others) can assist state and local agencies in planning,

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permitting, enforcement, and other regulatory efforts. The agency's IRA funding directed at reducing diesel emissions from heavy-duty vehicles, including school buses and at ports, could improve PM emissions and air quality in some areas. Close coordination with state and local governments that have technical experts on the ground will help maximize air quality benefits as agencies seek to develop SIPs for meeting the PM NAAQS and other CAA programs.

In announcing the PM NAAQS reconsideration, Administrator Michael Regan noted that "EPA is committed to ensuring this review, and other upcoming NAAQS reviews, reflect the

latest science and public health data." His comments align with Strategy 1 of the *FY 2022 – 2026 EPA Strategic Plan*, "Ensure Scientific Integrity and Science-Based Decision Making."<sup>16</sup> As the agency promulgates a new PM NAAQS, committing to Strategy 4 of the plan ("Strengthen Tribal, State, and Local Partnerships and Enhance Engagement") can drive successful implementation. Under the CAA, states, tribes, and local governments are co-regulators with EPA and central to meeting the NAAQS. This collaboration has resulted in cleaner and healthier air across the nation—and established a proven framework for achieving public health goals. **em**

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