FOUNDATION FOR CLEAN AIR PROGRESS

GET THE FACTS

Turning the Corner

For nearly three decades, clean air has been one of our nation's top environmental priorities. According to the U.S. Environmental Protection Agency (EPA), between 1970 and 1990 alone the nation spent nearly one-half trillion dollars cleaning up the air.

These investments have paid off. Today, 28 years after the landmark Clean Air Act Amendments of 1970 and eight years after the ambitious 1990 amendments to that legislation, air quality in virtually all the nation's urban areas has improved dramatically. We are well on our way to achieving the nation's clean air goals.

Not So Good Old Days

Although comprehensive air quality data aren't available before the early 1970s when regular air quality monitoring began, what is known suggests that the "good old days" did not always include clean air. According to EPA emission estimates, sulfur dioxide emissions were higher in 1920 when Woodrow Wilson was president. Carbon monoxide emissions were higher in 1945, the year Truman succeeded Roosevelt as president. And smog-forming hydrocarbon emissions were higher in 1955 when Eisenhower was president. Indeed, some historical evidence suggests that, decades earlier, air pollution was dangerously worse than what we experience now:

- In the 1940s, air in industrial centers like Pittsburgh, Buffalo, Birmingham and St. Louis became so thick with smoke at times, that, at mid-day, streetlights were turned on and automobile drivers had to use their headlights.
- In 1948, a fog laden with sulfur dioxide and suspended particulates, the products of a local steel mill, a zinc smelter and a sulfuric acid plant, stagnated over the town of Donora, Pennsylvania, for five days. The disaster killed 20 people and left nearly half the town's 14,000 residents ill.
- In the 1950s, smog levels in Southern California were worse than they are today in Mexico City, where current U.S. standards for smog are violated every day of the year.
- In 1953, high concentrations of pollutants in the air over New York City killed an estimated 300 people and injured thousands.

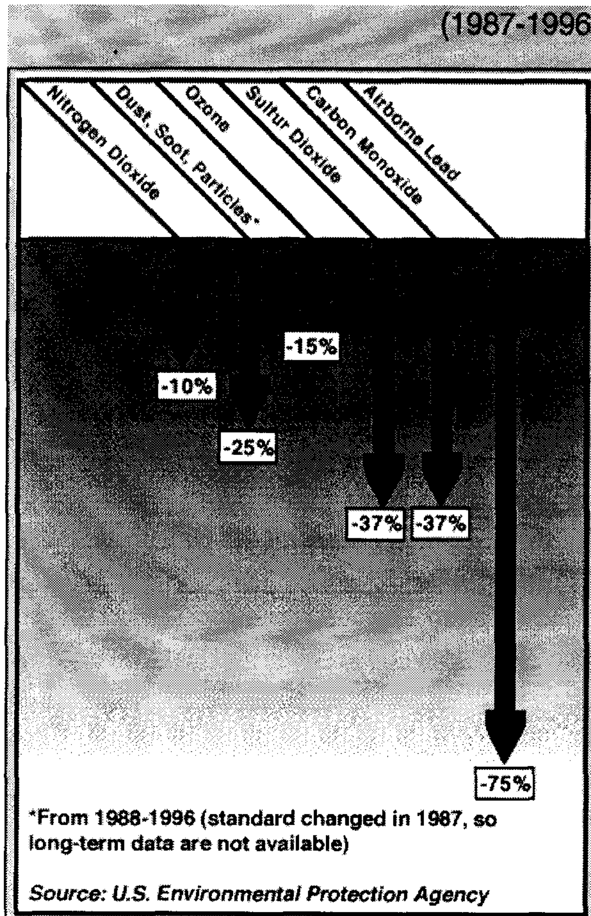
Record on Air Quality Improvement

Today, air quality is so greatly improved that few Americans could imagine life under the conditions described above. Since 1970, emissions of all major pollutants have declined substantially, with the single exception of nitrogen oxides. (And nitrogen dioxide pollution levels meet federal standards everywhere, despite the increase in emissions.)

A look at the ten-year period 1987-1996 tells of the most recent successes[1]: Lead emissions plummeted 50 percent; carbon monoxide emissions fell 18 percent; volatile organic compound emissions (VOCs) declined 18 percent; sulfur dioxide emissions dropped 14 percent; and nitrogen oxide emissions increased 3 percent. Particulate emissions decreased 12 percent from 1988 to 1996. (Because of a change in the particulate standard in 1987, a longer-term comparison is not possible.)

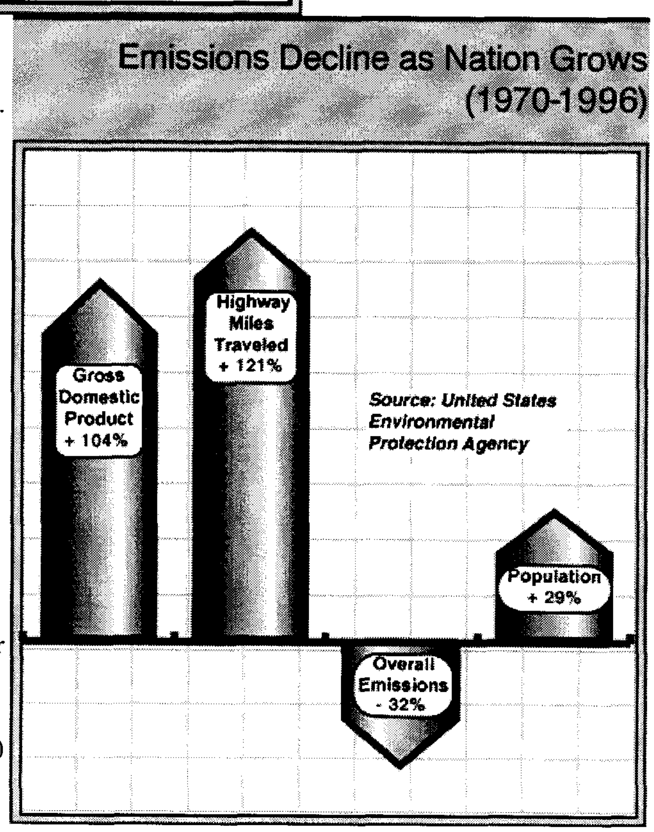
Air Pollution Declines Across the Board

In turn, the decline in emissions has reduced airborne



has reduced airborne concentrations of the six major or "criteria" pollutants[2]. For example, between 1987 and 1996, air pollution measured at government monitoring sites decreased across the board: carbon monoxide by 37 percent; lead by 75 percent; nitrogen dioxide by 10 percent; ozone smog by 15 percent; and sulfur dioxide by 37 percent. Particulates decreased 25 percent from 1988 to 1996.

Another measure of progress is the increasing number of cities solving their ozone smog problems. Ozone smog is the nationÕs most stubborn remaining air pollutant. Over the past seven years, the number of ozone "nonattainment" areas has declined from just under 100 to 57, and some of the remaining "nonattainment" areas have recorded good air quality recently, which may entitle them to be redesignated as "attainment" areas.[3]



Importantly, EPA notes that these improvements in air quality were achieved during a time of significant growth. Since the Clean Air Act of 1970 was enacted, the U.S. gross domestic product has nearly doubled (an increase of 104 percent) and Americans are driving more than twice as many miles (an increase of 121 percent) than in 1970. Yet, the air continues to get cleaner.

Reasons for Progress

To what do we owe this dramatic progress in air quality? Much can be attributed to changes in industrial processes and technological innovations spurred on by the Clean Air Act. Among other advances, industrial operations burn more cleanly; gasoline and other products have been reformulated to reduce emissions; and homes and industry use energy more efficiently. In fact, the energy required to produce one dollar of goods and services in the United States dropped by nearly one-third from 1973 to 1993. Each of these improvements has contributed directly to progress toward our national clean air goals.

But no single source of improvements has been as remarkable over the last 25 years as the changes in the automobile and its fuel. Today's cars go twice as far on a gallon of gasoline, saving 275 gallons per car every year. And new cars, powered by new cleaner-burning gasolines, emit 98 percent fewer hydrocarbons (VOCs), 96 percent less carbon monoxide and 90 percent less nitrogen oxide than their counterparts before 1968.

One study of California cars showed that the half of the fleet that pollutes the least is responsible for less than 10 percent of the hydrocarbon emissions. In contrast, other research shows that 10 percent of the cars on the road (mostly older or poorly maintained vehicles) account for 50 percent of auto emissions. According to four researchers writing in *Science* magazine in 1993, "The key to the vehicle emissions problem is the inordinately large contribution to emissions from a relatively small fraction of the fleet ... If maintenance of the entire current fleet ...were possible, then the major portion of the vehicle emissions problem would be solved."

In fact, reduced emissions from cars and other highway vehicles deserve the lionÕs share of credit for overall emission reductions. According to EPA, highway vehicle emissions of all types (carbon monoxide, lead, VOCs, sulfur dioxide, particulates and nitrogen oxides) declined about 25 percent between 1987 and 1996 while total emissions from all sources (factories, plants, small businesses, boats, backyard grills, lawn equipment, on- and off-road vehicles, etc.) decreased only about 17 percent. If highway vehicle emissions are excluded from total emission calculations, emissions would have decreased only about 12 percent.

Looking Ahead

In 1997, EPA issued new, more stringent standards for ozone and particulate matter. These new standards set the hurdle for clean air compliance much higher and require much more to be done reducing emissions over many more years into the future. Although the new standards mean we now have further to go, they should not overshadow the real progress that has already been made improving air quality for all Americans.

Footnotes

[1] This is the most recent period for which EPA data are available.

[2] Appendix A provides a more detailed discussion of criteria pollutants.

[3] "Attainment" and "nonattainment" refer to compliance or momcompliance with a federal air quality standard. Appendix B presents a further explanation.

APPENDIX A: The Six Criteria Pollutants

Following is a brief description of each of the six pollutants for which National Ambient Air Quality Standards (NAAQS) have been set by the U.S. EPA, including major health and environmental impacts and the most common sources of emissions.

Carbon Monoxide

Carbon monoxide is a colorless, odorless and poisonous gas. A byproduct of incomplete combustion of carbon-based fuels, carbon monoxide is produced by automobiles, buses, trucks, small engines, (e.g., outboard motors, lawnmowers), wood-burning stoves, incinerators and some industrial processes.

When breathed, carbon monoxide enters the bloodstream and can impede the body's ability to deliver oxygen to vital tissues. Exposure to elevated levels of carbon monoxide can lead to dizziness, headaches, fatigue, visual impairment and reductions in work capacity, manual dexterity and learning ability. Persons with cardiovascular disease are most susceptible to carbon monoxide-induced health problems. However, some healthy individuals have shown decreased maximum exercise performance when exposed to carbon monoxide.

Lead

Lead is a heavy metal that can accumulate in the human body. It exhibits a high degree of chronic toxicity, especially in children. Lead can adversely affect mental development and performance, kidney function, liver function, and blood chemistry. Exposure to lead typically occurs through ingestion or inhalation. Sources of ambient lead are combustion of fuels with lead additives, coal combustion, smelting operations, carbattery plants or incinerators that burn waste containing lead or lead compounds. The introduction of unleaded gasoline in 1975 has significantly reduced ambient lead levels.

Nitrogen Dioxide

Nitrogen dioxide is a light brown gas that is present in all urban atmospheres. It can irritate lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. It also is a critical compound in the chemistry of ozone formation and acid precipitation. In addition, high concentrations of nitrogen dioxide may damage vegetation; atmospheric deposition of nitrogen dioxide can lead to destructive algae blooms in aquatic ecosystems. Common sources of nitrogen dioxide include the combustion of fuels by utilities, industrial boilers, and car and truck engines.

Ozone

Ozone is a colorless gas that is the major constituent in smog found in or downwind of urban areas. Ozone, a strong oxidant, damages human lung tissue, reduces lung function and sensitizes the lungs to other irritants. It can also damage vegetation.

Ozone is the product of chemical reactions that occur in the atmosphere on hot days (usually temperatures over 90 degrees Fahrenheit) in the presence of sunlight. The chemical reactants that produce ozone under these conditions are nitrogen oxides (nitric oxide and nitrogen dioxide, together referred to as NOx) and volatile organic compounds (VOCs). Sources of VOCs include gasoline, paints, inks, cleaning solutions, waxes, polishes, aerosol sprays and many other products that evaporate readily. As a result of atmospheric processes that can transport NOx andVOCs downwind, ozone formation can occur in areas removed from the sources of the emissions.

Particulate Matter

Particulate matter is a term used to describe dust, soot, smoke and liquid droplets directly emitted into the air, where they are suspended for long periods of time. Particulates can affect breathing and cause respiratory and lung damage. Particulate pollution also can damage paint, soil clothing and reduce visibility. The major sources of particulate matter are industrial processes, smelters, combustion of industrial fuels, fires, natural windblown dust, automobiles, dust from paved andunpaved roads, construction, and agricultural ground-breaking.

Sulfur Dioxide

Sulfur dioxide is a colorless gas that plays an important role in the chemistry of acid precipitation and contributes to impaired visibility. At high concentrations, sulfur dioxide can cause respiratory tract problems, harm vegetation and accelerate corrosion of metals. Major sources of sulfur dioxide are industrial, institutional, utility and apartment house furnaces and boilers, as well as petroleum refineries, smelters, paper mills and chemical plants.

APPENDIX B: Defining Air Quality

Major Pollutants

In 1970, the United States Congress passed the nation's first major clean air legislation, the Clean Air Act. Among other provisions, the act required the newly created U.S. Environmental Protection Agency to establish binding national standards for ambient levels of common and widespread pollutants. In response, the U.S. EPA identified and set National Ambient Air Quality Standards (NAAQS) for six pollutants that affect air quality on an urban or regional scale: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM-10) and sulfur dioxide (SO_2).

The NAAQS establish maximum permissible air concentrations for these six pollutants, known as "criteria pollutants." The existing standards include a primary and secondary ambient air quality standard for each. Primary standards are intended to protect public health, while secondary standards protect public welfare against the adverse effects of air pollution on vegetation, buildings and visibility.

The NAAQS are uniform across the nation. States may opt to impose more stringent standards, but none can choose to set standards less stringent than the federal law requires. In any event, states must adopt EPA-approved state implementation plans which comprise the collection of air quality control measures adopted to achieve the standards and to maintain air quality once they are achieved.

Attainment vs. Nonattainment

Areas said to be in attainment are those in which levels of a criteria pollutant meet the primary NAAQS. When an area does not meet the ambient air quality standard for one of the pollutants, it may be subject to a rule-making process whereby it is designated by the U.S. EPA as a nonattainment area. For some NAAQS, nonattainment areas are further classified based on the severity of the area's problem. Such areas may be required to implement specific pollution-reduction measures according to set timetables for progress toward attainment. It is often the case that an area will be in attainment for some pollutants but not for others.

Determining noncompliance with a standard varies according to pollutant. For ozone, if an area records more than three exceedances of the federal standard on three separate days (at any individual air monitoring site within the area) over a three-year period, it is out of attainment. The designations and the degree of exceedance (e.g., extreme, serious, moderate) are based on the monitor in the area that shows the highest set of readings for that three-year period. Thus, it is possible for an area to be classified out of attainment if only one monitor shows readings above the standard for as few as four hours on separate days over a three-year span.

Once an area has been designated as a nonattainment area, stringent requirements must be met before the area is eligible for redesignation. For ozone, not only must it demonstrate that it has not violated the federal standard more than three times in the most recent three years, it must convince the EPA that the improvement in air quality is the result of "permanent and enforceable reductions in emissions," and not some other factor (e.g., weather conditions). In addition, the area must demonstrate to EPA that its state implementation plan will maintain the NAAQS for 10 years after redesignation.

Hazardous Air Pollutants

In addition to the six criteria pollutants, the U.S. EPA also collects data on emissions of so-called hazardous air pollutants (HAPs). HAPs comprise nearly 200 chemicals identified under the Clean Air Act Amendments of 1990 that "present or may present a threat of adverse human health effects ... or adverse environmental effects." Unlike the effects of criteria pollutants, the effects of HAPs are highly localized. HAPs are not considered "common and widespread" pollutants and are not regulated through ambient air quality standards. Instead, EPA uses its authority to establish standards on a source category basis (for example, power plants or refineries).

Recent years have seen substantial progress reducing these pollutants.

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