Air Quality Forecast Capability

The United States needs a national air quality forecasting (AQF) capability.

Air quality has improved significantly in recent decades following passage of the Clean Air Act in 1970. However, there are still many areas of the country where the public is exposed to unhealthy levels of air pollutants and sensitive ecosystems are damaged by air pollution. The cost of poor air quality to the U.S. from air pollution-related illness alone has been estimated at $150 billion per year. Forecasting impending poor air quality can provide early notice and warning to individuals and communities to help them limit exposure and reduce asthma attacks, eye, nose, and throat irritation, other respiratory and cardiovascular problems, and even save lives. For each 1 percent reduction in adverse health impacts that AQF could provide, over $1 billion would be saved every year. In order to help the nation realize these benefits, Congress has directed NOAA to provide national AQF guidance.
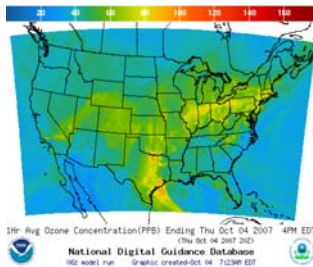
NOAA and EPA have established a national AQF partnership.

http://www.weather.gov/aq

NOAA and EPA have entered into a partnership to make full use of their respective capabilities and authorities in developing a national AQF capability. The goal of this partnership is to provide ozone, particulate matter, and other pollutant forecasts with enough accuracy and advance notice for people to take actions that prevent or limit harmful effects from poor air quality.

EPA, responsible for collecting and updating a national inventory of emissions, provides these data to NOAA for use in the AQF capability. Through its relationships with state and local air quality agencies, EPA's AIRNow Program also collects air quality monitoring data and sends them to NOAA. NOAA incorporates these emissions data and NOAA weather observations into operational AQF model predicted concentration fields. State and local agencies use this guidance to issue air quality forecasts and Air Quality Index predictions in their jurisdictions. EPA nationally distributes information from state and local air quality forecast agencies. The private sector uses and disseminates state and local forecast information to the public as well.

The NOAA/EPA partnership provides more sophisticated tools and advances the power of air quality forecasting.
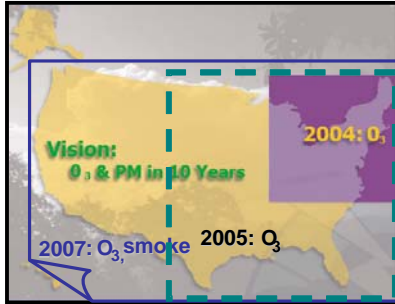

EPA's AIRNow network of ozone monitors

Over the past decade, more state and local agencies have begun to make air quality forecasts for their communities. Today, about 300 cities nationwide are issuing air quality alerts, but without the benefit of the kind of high-powered national forecasting technology and guidance that supports local weather forecasts. For localities that have been forecasting air quality, the new NOAA forecasting guidance will improve forecasters' ability to predict the onset, severity, and duration of poor air quality. For communities in most of the country, this has been the first time that air quality predictions have been made available.
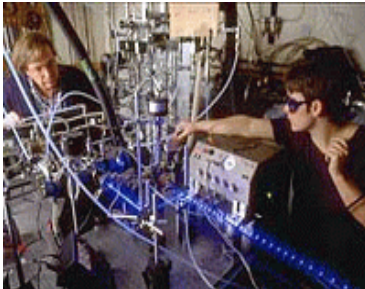
The national AQF capability will expand over the next decade.

The initial deployment of NOAA's operational AQF guidance, in September 2004, provided one-day predictions of 1-hour and 8-hour average concentrations of ground-level ozone in the northeastern United States. Subsequent deployments in August 2005, and September 2007, expanded the domain westward to include the central and eastern United States, and then all lower 48 states. Ozone forecasts for the entire nation will be implemented within the next few years, followed by particulate matter forecasts. Within the decade, additional pollutants will be added and forecast intervals will be extended to two days or more.

NOAA atmospheric research supports advances in AQF.

NOAA scientists are conducting research crucial for improving our ability to predict and monitor changes in air quality, including air pollutant transport, air pollutant transformation processes, atmospheric deposition, particulate matter characterization, and tropospheric ozone reaction and transport processes. These data and analyses will help establish the basis for building next generation air quality forecasts to improve the National Air Quality Forecasting capability.

NOAA scientists conduct experiments to study the reactions and properties of atmospheric gases/particles that are important in air quality.

Ozone and particulate matter cause a range of adverse health effects.

Ground-level ozone (O_3) is a product of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of heat and sunlight. Motor vehicle exhaust, industrial emissions, gasoline vapors, and chemical solvents are among the major sources of NO_x and VOCs responsible for harmful buildup of ground-level ozone. Even at low concentrations, ozone can trigger a variety of health problems such as lung irritation and inflammation, asthma attacks, wheezing, coughing, and increased susceptibility to respiratory illnesses.

Particulate matter (PM), or airborne particles, include dust, soot, sea-salt and smoke. Some particles are directly emitted into the air by, for example, cars, trucks, buses factories, construction sites, and wood burning. Other particles are formed in the air when gases from burning fuels react under sunlight and with water vapor. Such gases, from incomplete combustion in motor vehicles, at power plants and in other industrial processes, contribute indirectly to particulate pollution. PM can cause chronic bronchitis, asthma attacks, decreased lung function, coughing, painful breathing, heart problems, as well as serious environmental impacts such as acidification of lakes and streams and nutrient depletion in soils and water bodies.

NOAA Mission

The Commerce Department's National Oceanic and Atmospheric Administration (NOAA) is dedicated to enhancing national safety, economic security, and environmental stewardship through analysis, prediction and research of weather, water and climate-related events.

EPA Mission

The Environmental Protection Agency's (EPA's) mission is to protect human health and to safeguard the natural environment—air, water, and land—upon which life depends. For 30 years, EPA has been working for a cleaner, healthier environment for the American people.

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