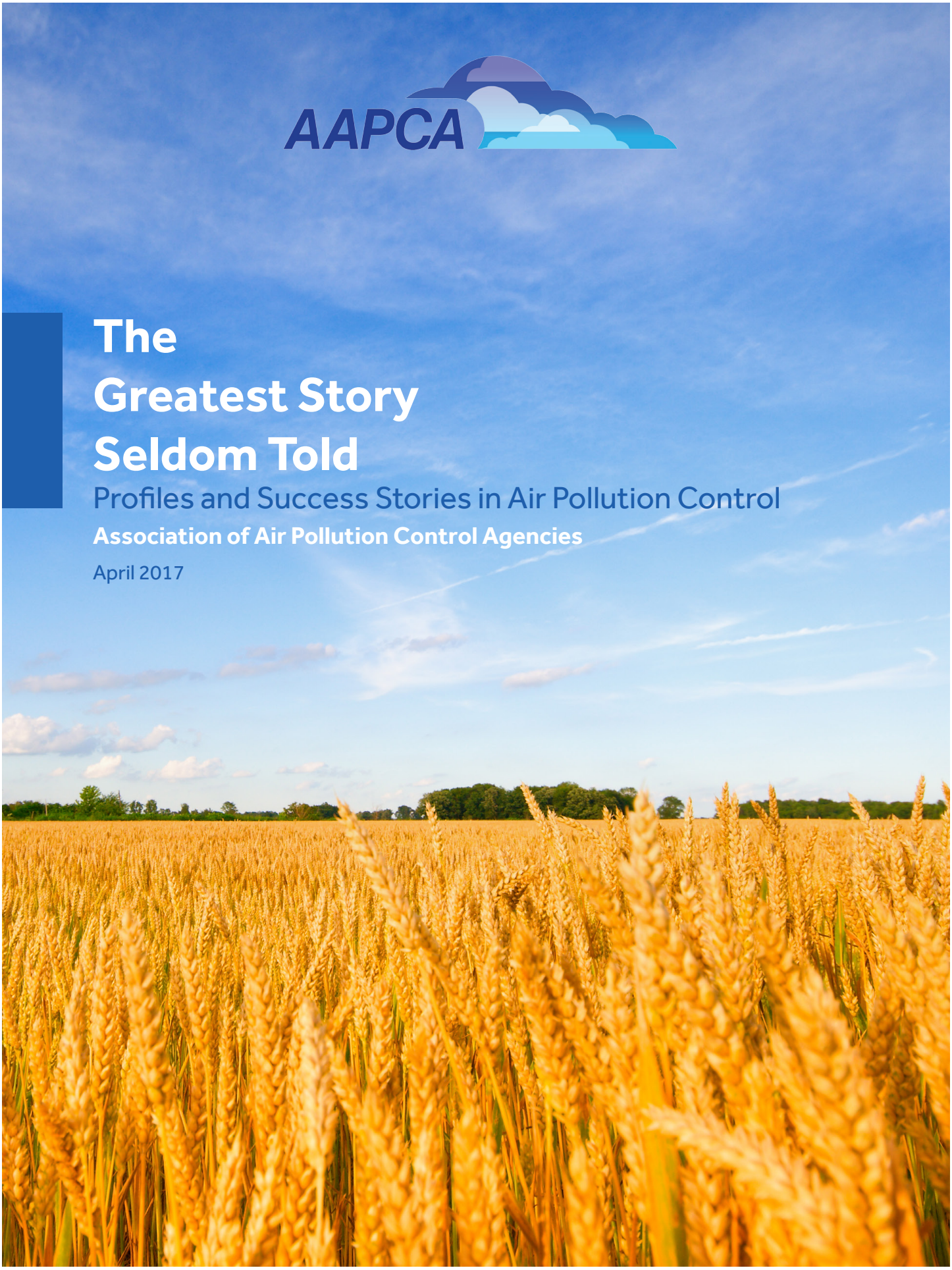


The Greatest Story Seldom Told

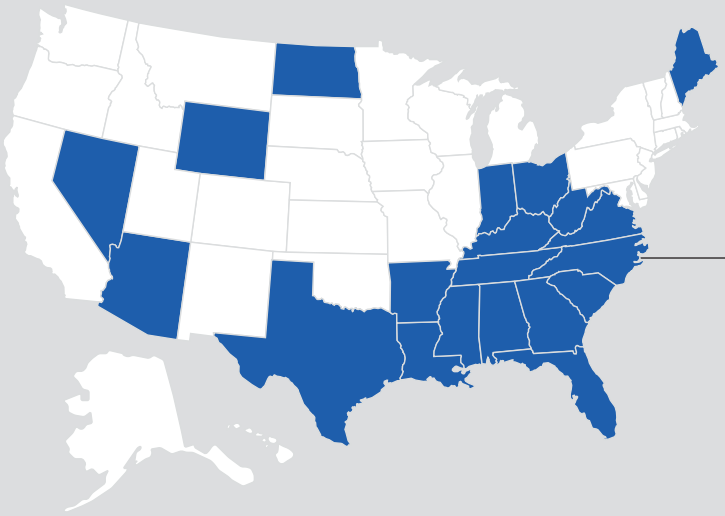
Profiles and Success Stories in Air Pollution Control

Association of Air Pollution Control Agencies

April 2017

The Association of Air Pollution Control Agencies (AAPCA) is a consensus-driven organization focused on assisting state and local air quality agencies and personnel with implementation and technical issues associated with the federal Clean Air Act. AAPCA members work collaboratively on behalf of states and the communities they protect to act as a conduit for and provide feedback to federal regulators on air quality rules that have significant impacts across the entire nation. AAPCA represents more than 40 state and local air agencies, and senior officials from 20 state environmental agencies currently sit on the AAPCA Board of Directors. AAPCA is housed in Lexington, Kentucky as an affiliated association of the Council of State Governments (CSG). More information about AAPCA may be found by visiting **http://www.cleanairact.org.**

State Environmental Agencies Currently Represented on the AAPCA Board of Directors



Alabama
Arizona
Arkansas
Florida
Georgia
Indiana
Kentucky
Louisiana
Maine
Mississippi
Nevada
North Carolina
North Dakota
Ohio
South Carolina
Tennessee
Texas
Virginia
West Virginia
Wyoming

Footprint of AAPCA State Members

State members of the AAPCA Board of Directors have primary responsibility for air quality for a significant portion of the country, as reflected in the following statistics:

- An estimated 141 million Americans, nearly 45 percent of the **total U.S. population**;
- An **average population growth** from 2000 to 2016 of above 17.5 percent, compared to national population growth of approximately 15 percent;
- 40 percent of **U.S. Gross Domestic Product**;
- More than 45 percent of **U.S. Total Manufacturing Output** and over five million manufacturing jobs;
- 60 percent of **total energy production** in the United States, including:
  - 55 percent of total **net electricity generation**;
  - 77 percent of **coal production**;
  - 65 percent of **crude oil production**; and,
  - 57 percent of natural **gas production;**
- More than 60 percent of **U.S. operable petroleum refining capacity**;
- More than 47 percent of **Highway Vehicle-Miles Traveled**;
- Seven of the top ten states for **number of establishments related to automotive production**, and more than 45 percent of direct U.S. automotive manufacturing jobs; and,
- A majority of these states have **adult asthma prevalence rates** below the national average, including six of the ten lowest state rates in the country.

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Foreword

Dear Readers,

How many of us remember a time when cities in the United States were more famous for their smog than their tourist attractions? When clear blue skies were rare and special events? Air quality has improved dramatically since those days of yesteryear, and ambient air monitoring data continues to reveal the downward trend of air pollutants. It is, perhaps, the greatest story seldom told, and one that is certainly worth telling.

As the current president for the Association of Air Pollution Control Agencies, I am fortunate to work closely with the many dedicated environmental professionals who lead our members' state and local air quality control agencies. Our Association provides numerous opportunities to share ideas, debate technical considerations, and find solutions to improve our air quality. Through efficient air quality management practices, AAPCA Member States lead the way in reductions of nitrogen oxides, sulfur dioxide, ozone, and particulate matter, while maintaining robust and growing economies.

In this report, you will find information that details the remarkable air quality improvements in AAPCA Member States and the entire United States over the last several decades. To illustrate:

- As of 2015, combined emissions of the six criteria air pollutants for which there are national ambient air quality standards were down 71 percent since 1970.
- From 2005 to 2015, reported toxic air releases were down 56 percent, or more than 851 million pounds, and AAPCA Member States accounted for nearly two-thirds of the total reduction.
- In 2016, states performed full compliance evaluations for more than 14,500 facilities, 80 times the number conducted by U.S. EPA – and from 2010 to 2014, AAPCA Member States performed full compliance evaluations at nearly 47 percent of facilities annually, well ahead of the national average.
- According to U.S. EPA, AAPCA Member States in 2016 were more efficient in permitting, with only a 15 percent backlog for renewing Title V permits among states with more than 100 Title V sources.
- From 2000 to 2015, emissions of nitrogen oxide in AAPCA Member States fell more rapidly than the national average.
- Between 1990 and 2014, AAPCA Member States reduced sulfur dioxide emissions in the power sector by more than 8 million tons.
- From 2000 to 2014, per capita energy-related carbon dioxide emissions were down 18.1 percent on average nationally, with AAPCA Member States averaging a 19.3 percent reduction.

These improvements benefit us all. To achieve these air quality improvements and emissions reductions, significant capital investment in emissions controls were required at coal-fired power plants and other stationary sources.

Although there is more work to continue, please take a moment to read of our achievements in improving air quality, human health, and the environment. It is a story certainly worth telling, and perhaps "The Greatest Story Seldom Told."

Sean Alteri
Director, Kentucky Division for Air Quality
President, AAPCA

Introduction: Storytelling, Public Perception, and Air Quality in the United States

Through the Clean Air Act's framework of cooperative federalism, hard-working state and local air agencies have been responsible for tremendous progress in virtually every measure of air quality. This report attempts to catalogue these trends through publicly available data from agencies like the U.S. Environmental Protection Agency (EPA) and includes key metrics from concentrations of criteria pollutants like ground-level ozone and particulate matter and air releases of toxic chemicals to compliance/enforcement activity and operating permit renewals.

Where apples-to-apples data exist, the report also highlights critical areas where the 20 states who serve on the AAPCA Board of Directors have provided leadership. These states, which have primary responsibility for air quality in parts of the country growing in population and economic activity, have frequently outperformed the national average in a variety of these measures. Similarly, the United States has exceeded international progress in air quality.

Recent public opinion suggests that these trends, despite being supported by active public participation and market forces, have gone under the radar for most Americans. With media more likely to report bad news combined with often apocalyptic framing by advocates and limited understanding of technical air quality information, it is no wonder that the public is often confused about air quality in their city, county, state, and nation. Below are a few key disconnects in public perception which present opportunities for expert air agencies:

- In recent years, Americans are more likely to view the environment as getting worse and express that they worry a great deal about air pollution and the environment in general. However, approximately equal numbers of those polled rate the overall quality of the environment as good or excellent as poor or only fair.
- Despite tremendous strides in all measures of air quality since 2000, trends in national and international surveys show that there has been little movement in American public perception about air quality.
- While surveys of national environmental trends show a significant portion of Americans expressing dissatisfaction and personal concern about air pollution, surveys that ask about air quality in respondents' local area show high levels of satisfaction, with most states above 85 percent.
- Majorities of Americans routinely support the U.S. government doing more in terms of protecting the environment and more strongly enforcing environmental laws, yet questions about the intensity of these policy preferences often show other priorities as more important or pressing.
- Americans express mixed messages about which level of government should have the most say in air quality regulation, as well as about which institutions they trust on environmental matters.

State and local air agencies are uniquely situated to help bridge these gaps because of their experience in the community, proximity to the affected public, qualified personnel, and ability to interpret up-to-date air quality information. In a world of social media as well as the advancement of so-called "Big Data" and highly localized measurement technologies including low-cost personal air sensors,[1] it is more important than ever for state and local air agencies to develop proactive, credible avenues to communicate with the public about air quality.

Beyond data measuring "micrograms per cubic meter" or "parts per billion," air agencies need to be poised to highlight case studies, community involvement, and localized benefits. A 2004 study examining localized patterns of air quality perception in Texas, published in *Risk Analysis*, found that public views are not driven by actual air quality conditions but that "other factors such as sense of place, neighborhood setting, source of pollution, and socioeconomic characteristics appear to shape perceptions." The researchers suggest that "[p]olicymakers thus cannot rely on scientific data alone to drive a public decision-making process, but also must consider location-based factors, the specific make-up of the population, and the venues through which this population receives information on environmental conditions."[2]

Contained below is additional information on these five major disconnects between air quality trends and public attitudes. All surveys and polls should be taken with a grain of salt, as public perceptions about the environment are often shaped by the latest political and media developments. Unless otherwise noted, the information below comes from Gallup's annual Environment survey, most recently conducted March 1-5, 2017. These surveys represent an indispensable resource for evaluating national environmental trends, with several common questions being asked of Americans for 15 years or more.[3]

Getting Better All the Time?

In March 2017, 47 percent of Americans asked by Gallup said they personally worry a great deal about air pollution and 31 percent worry "a fair amount." As illustrated in the accompanying chart, this is the largest figure worrying a great deal about air pollution since 2001. 47 percent also said they personally worry a great deal about the quality of the environment in general.

Date	Great deal	Fair Amount	Only a little	Not at all	No opinion
2017 Mar 1-5	47	31	15	7	--
2016 Mar 2-6	43	31	19	7	--
2015 Mar 5-8	38	33	19	10	*
2014 Mar 6-9	46	27	21	7	-
2013 Mar 7-10	40	30	20	9	-
2012 Mar 8-11	36	35	22	7	*
2011 Mar 3-6	36	36	20	8	*
2010 Mar 4-7	38	32	22	8	*
2009 Mar 5-8	45	31	18	6	*
2008 Mar 6-9	43	35	17	6	-
2007 Mar 11-14	46	33	15	5	*
2006 Mar 13-16	44	34	15	7	*
2004 Mar 8-11	39	30	23	8	*
2003 Mar 3-5	42	32	20	6	*
2002 Mar 4-7	45	33	18	4	*
2001 Mar 5-7	48	34	14	4	*
2000 Apr 3-9	59	29	9	3	*
1999 Apr 13-14	52	35	10	3	*
1999 Mar 12-14	47	33	16	4	*
1997 Oct 27-28	42	34	18	5	1
1991 Apr 11-14	59	28	10	4	*
1990 Apr 5-8	58	29	9	4	*
1989 May 4-7	63	24	8	4	*

Question: how much do you personally worry about air pollution?
Asterisk* indicates less than 0.5 percent

Similarly, 58 percent said in March 2017 that the quality of the environment in the country as a whole is getting worse. Since 2001, this belief that things are getting worse has never dropped below 48 percent and the number of Americans who say the environment is getting better has never exceeded 42 percent. While Americans are more likely to express the view that the environment is getting worse and they personally worry about air pollution and the environment, since 2001, roughly the same number of those polled have characterized the overall quality of the environment today as "Good" (ranging from 34 percent to 43 percent) or "Only fair" (from 40 to 49 percent), with smaller portions judging it "Excellent" (4 to 7 percent) or "Poor" (6 to 16 percent).

Never the Twain Shall Meet?

Between the early 2000s and today, in which one-third and one-half of those polled by Gallup consistently said they worried a great deal about air pollution, aggregate emissions from six common pollutants fell by more than 60 percent,[4] air releases of toxic chemicals dropped more than half,[5] and the carbon intensity of the economy went down by more than 25 percent.[6]

Similar inconsistencies show up in world opinion surveys. The United States and the Americas as a region rank in the middle of the pack for satisfaction with air quality where respondents live, with satisfaction rates globally at 78 percent according to Gallup surveys in 2012.[7] In 2015, average annual population-weighted fine particulate matter in the United States was less than one-fifth the global mean (8 micrograms per cubic meter compared to 44 globally). The U.S. ranks behind countries like Bangladesh and Nepal in air quality satisfaction despite average fine particulate matter levels roughly 90 percent lower than these countries.[8] Between 2006 and 2013, the U.S. experienced the largest drop in carbon dioxide emissions in the world, roughly 500 million tons over that period.[9]

Like Politics, All Air is Local

In 2017, Americans were divided on the question of satisfaction regarding the quality of the environment in the nation with 13 percent answering "very satisfied," 39 percent "somewhat satisfied," 28 percent "somewhat dissatisfied," 16 percent "very dissatisfied," and 4 percent with no opinion.

However, a Gallup 50-state poll conducted between June and December 2013 found that "the majority of residents of every state are satisfied with the air quality where they live." Median satisfaction for AAPCA Member States was nearly 90 percent, and greater than 85 percent of those polled across more than 40 states said they are satisfied with the quality of air in the city or area where they live.[10] A June 2015 poll conducted for the National Association of Manufacturers found 67 percent of respondents would rate the air quality in their local area as excellent (21 percent) or good (46 percent).[11]

Policy Preferences & Intensity

In 2017, 59 percent of those polled by Gallup said the U.S. government is doing too little in terms of protecting the environment (the highest number since 2000). 69 percent were also generally in favor of "more strongly enforcing federal environmental regulations" in this year's survey. Despite these sentiments, Americans rarely identify the environment or pollution as the most important problem facing the country, and national[12] as well as individual state[13] surveys have shown Americans identifying other non-air environmental problems as a higher priority.

Mixed Messages about Messengers

Americans have expressed divergent opinions regarding which governmental and non-governmental institutions they trust on environmental issues. A June 2015 survey conducted for the National Association of Manufacturers asked "Who do you think should have more of a say when it comes to air quality regulations in your local area?" 46 percent of respondents said their local elected officials, 29 percent said their state elected officials, and 18 percent said the federal government.[14]

In 2000 and 2005, Gallup asked participants about the degree to which they trust various institutions to "protect the quality of our nation's environment" – a great deal, a moderate amount, a slight amount, or not at all. While this represents a smaller set of older responses, the answers suggest an opportunity for state and local agencies to

establish (or re-establish) their credibility as brokers of high quality information. A majority of respondents said they trusted the following institutions a great deal or moderate amount: federal environmental agencies like the EPA; state environmental agencies; national environmental organizations; local environmental agencies; and, local government agencies. However, the intensity of this trust varied by institutions. Below are the percentages of respondents saying they trusted the institutions a great deal:

Institution	Percent trust "a great deal" (2005 Mar 7-10 results)	Percent trust "a great deal" (2000 Apr 3-9 results)
Federal environmental agencies like the EPA	22 percent	27 percent
State environmental agencies	16 percent	21 percent
National environmental organizations	25 percent	34 percent
Local environmental organizations	26 percent	28 percent
Local government agencies	11 percent	12 percent

This information on air pollution and public perception suggests an opening for expert state and local air agencies. *The Greatest Story Seldom Told: Profiles and Success Stories in Air Pollution Control* may be able to help complement these agency stories. The mission is not accomplished, and, with stable, adequate resources and a collaborative effort to prioritize environmental concerns, these agencies are poised to continue this remarkable progress.

[1] AAPCA, ***Preparing for Personal Air Sensors: Definition, Opportunities, and Data Limitations***, 2016
[2] Samuel D. Brody, B. Mitchell Peck, and Wesley E. Highfield, "**Examining Localized Patterns of Air Quality Perception in Texas: A Spatial and Statistical Analysis**," *Risk Analysis*, Vol. 24, No. 6, 2004.
[3] Gallup, "**Environment**," 2017.
[4] U.S EPA, "***2015 Toxic Release Inventory Analysis***," January 2017.
[5] U.S. EPA, "**2015 Toxic Release Inventory National Analysis: Executive Summary**," January 2017.
[6] U.S. Energy Information Administration (EIA), ***Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014***, January 17, 2017.
[7] Gallup, "**Nearly Four in Five Satisfied With Quality of Air Worldwide**," November 22, 2013; see also: Gallup, "**More Than 1 Billion Worldwide Critical of Air Quality**," April 22, 2010.
[8] Health Effects Institute and the Institute for Health Metrics and Evaluation, ***State of Global Air/2017***.
[9] U.S. Department of Energy, "**Watch Our CO_2 Drop**," January 2016 (Data from IEA).
[10] Gallup, "**Satisfaction With Air Quality, by State**," June 5, 2014; See also: Gallup, "**North Dakota: Legendary Among States**," August 25, 2014.
[11] National Association of Manufacturers, "**VOTERS POLLED ON AIR QUALITY**," June 2015.
[12] Gallup, "**Most Important Problem**," 2017; See also: Gallup, "**In US, Water Pollution Worries Highest Since 2001**," March 31, 2017.
[13] **http://www.ppic.org/content/pubs/survey/S_715MBS.pdf**.
[14] National Association of Manufacturers, "**VOTERS POLLED ON AIR QUALITY**." June 2015.

Types of Air Quality Data and Metrics

Trends and indicators of air quality can be measured in a variety of ways, but an important group of data to analyze is that of the air pollutants that are regulated under the Clean Air Act (CAA). The Clean Air Act directs the EPA to establish national ambient air quality standards (NAAQS) for air pollutants, the "attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health."[1] NAAQS have been set for six "criteria" pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), ground-level ozone (O_3), fine particulate matter ($PM_{2.5}$), lead (Pb), and nitrogen dioxide (NO_2).[2]

Section 109 of the Clean Air Act requires EPA to establish both primary and secondary NAAQS. Primary NAAQS are "standards the attainment and maintenance of which ... are requisite to protect the public health," while secondary NAAQS "specify a level of air quality the attainment and maintenance of which ... is requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air."[3] U.S. EPA and the Clean Air Scientific Advisory Committee review the adequacy of the NAAQS according to the statute. Individual NAAQS may have a different form (for example, annual fourth-highest daily maximum 8-hour concentration average over three years, for ozone), level (often measured in parts per billion or micrograms per cubic meter), and averaging time (from one hour up to one year).

Nationally, ambient air pollution data from thousands of monitors across the United States are collected by U.S. EPA, state, local, and tribal air pollution control agencies and provided to the Air Quality System. These data are used to "assess air quality, assist in Attainment/Non-Attainment designations, evaluate State Implementation Plans for Non-Attainment Areas, perform modeling for permit review analysis, and other air quality management functions. [Air Quality System] information is also used to prepare reports for Congress as mandated by the Clean Air Act."[4]

U.S. EPA reports on long-term air quality trends by preparing data analyses that show the overall trend lines for pollutant concentrations and emissions. This report relies on a number of sources when looking at air quality and pollutant trends:

- For criteria air pollutant concentrations in ambient air, data are pulled from EPA's analysis of the Air Quality System that looks at long-term trends in air quality;[5]
- Data showing emissions trends of the criteria pollutants is pulled from U.S. EPA's Air Pollutant Emissions Trends Data,[6] which includes "all criteria pollutants National Tier 1" and relies on the National Emissions Inventory. The National Emissions Inventory is "a comprehensive and detailed estimate of air emissions of criteria pollutants, criteria precursors, and hazardous air pollutants from air emissions sources ... released every three years based primarily upon data provided [to the Emissions Inventory System] by State, Local, and Tribal air agencies for sources in their jurisdictions and supplemented by data developed by the US EPA."[7]
- Design values, which U.S. EPA defines as "a statistic that describes the air quality status of a given location relative to the level of the NAAQS ... typically used to designate and classify nonattainment areas, as well as to assess progress towards meeting the NAAQS."[8]

This report also includes data for hazardous air pollutants, visibility progress in national parks, and greenhouse gases. For hazardous air pollutants, the Toxic Release Inventory[9] provides a consistent trend over time that is shown here in conjunctions with air toxics analysis from U.S. EPA's 2014 *Report on the Environment*.[10] Greenhouse gas data is pulled primarily from U.S. EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks*[11] and the U.S. Energy Information Administration's (EIA) report *Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014*.[12]

[1] 42 U.S.C. §7409(b)(1).
[2] A chart of the primary and secondary NAAQS by pollutant can be found **here**.
[3] 42 U.S.C. §7409.
[4] EPA **notes** that the Air Quality System "also contains meteorological data, descriptive information about each monitoring station (including its geographic location and its operator), and data quality assurance/quality control information."
[5] Links to data summary files can be found **here**.
[6] Data can be found **here**. EPA notes: "The latest version of the 1970 - 2016 data shows trends for Tier 1 categories. One of the distinct and natural occurrences in inventory development is the evolution and improvement of emission estimate methods over time. in some cases, an improved estimation method for a source category may be applied 'backwards' to previous year estimates for that same category."
[7] More information on the NEI can be found **here**. Version 1, issued in 2014 (2014v1); Release of Version 2 is anticipated mid-2017. EPA notes that "2014v1 did not account for the impact of meteorology and there will be a noticeable spike in [particulate matter] emissions in 2014."
[8] U.S. EPA, ***Toxic Release Inventory National Analysis 2015***, January 2017.
[9] U.S. EPA, ***EPA's Report on the Environment (ROE)***, 2014.
[10] U.S. EPA, **Air Quality Design Values**.
[11] This report relies on EPA's ***U.S. Greenhouse Gas Inventory Report: 1990-2014***, released in April 2016. In February 2017, EPA released for public comment the ***Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015***.
[12] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014***, January 17, 2017.

AIR QUALITY

Fine Particulate Matter

According to U.S. EPA's online *Green Book*, there were 39 areas designated nonattainment for the 1997 $PM_{2.5}$ annual national ambient air quality standard of 15 micrograms per cubic meter ($\mu g/m^3$).[1] Design values[2] based on monitoring data from U.S. EPA's Air Quality System show that nonattainment and maintenance areas[3] in AAPCA Member States averaged above a 35 percent reduction in fine particulate matter levels since 2004. The average decrease in fine particulate matter concentrations was slightly more than 32 percent in all nonattainment and maintenance areas under the 1997 standard.[4] Below is the percent change between 2004 and 2015 in design values for areas previously designated nonattainment in AAPCA Member States for the 1997 annual NAAQS for fine particulate matter.

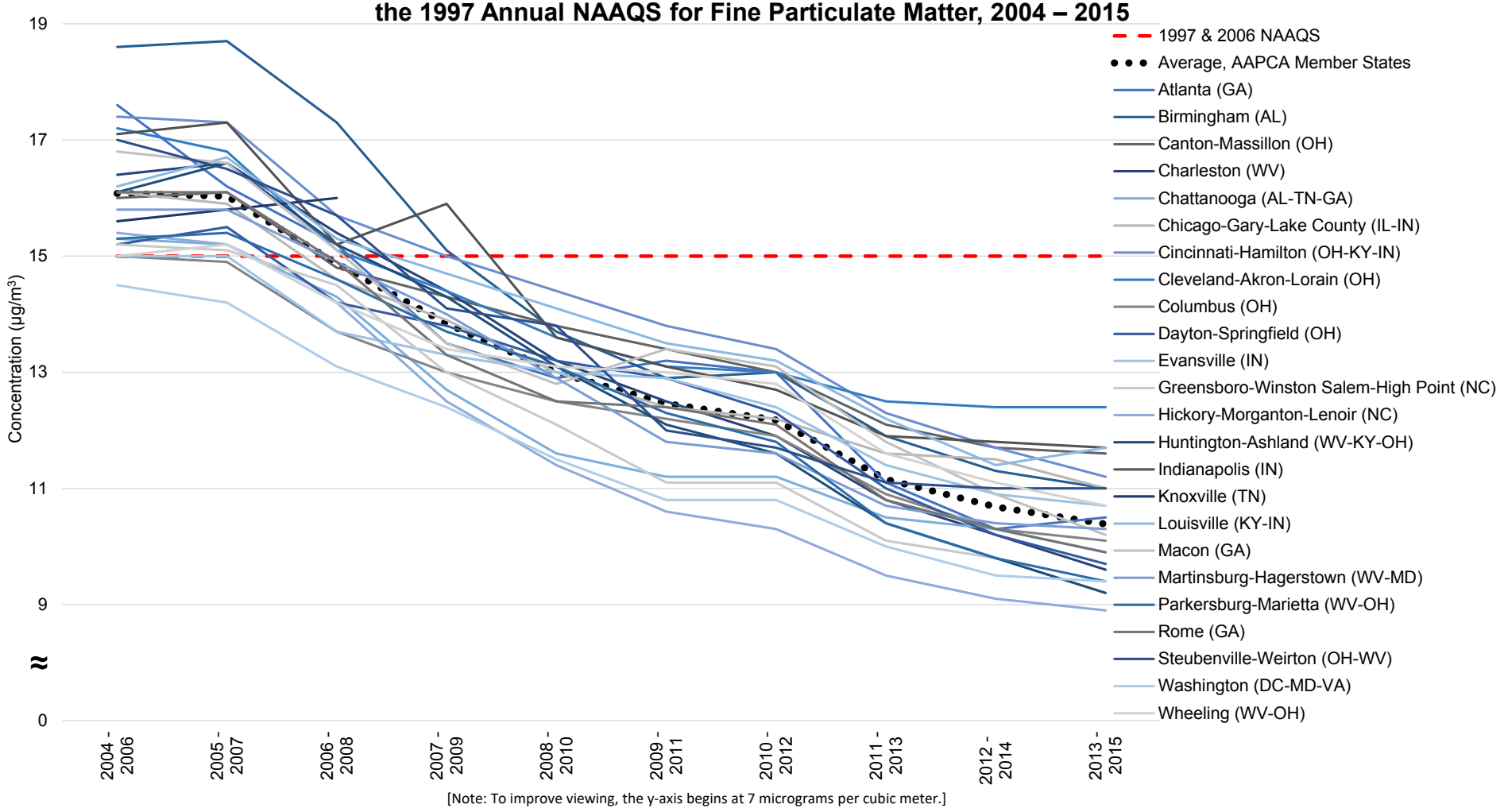
Designated Area	Percent Change
Atlanta (GA)	-40.34%
Birmingham (AL)	-40.86%
Canton-Massillon (OH)	-27.50%
Charleston (WV)	-41.46%
Chattanooga (AL-TN-GA)	-35.29%
Chicago-Gary-Lake County (IL-IN)	-31.68%
Cincinnati-Hamilton (OH-KY-IN)	-35.63%
Cleveland-Akron-Lorain (OH)	-27.91%
Columbus (OH)	-32.67%
Dayton-Springfield (OH)	-36.18%
Evansville (IN)	-28.67%
Greensboro-Winston Salem-High Point (NC)	-39.47%

Designated Area	Percent Change
Hickory-Morganton-Lenoir (NC)	-42.21%
Huntington-Ashland (WV-KY-OH)	-42.86%
Indianapolis (IN)	-31.58%
Knoxville (TN)	-35.90%
Louisville (KY-IN)	-27.78%
Macon (GA)	-39.29%
Martinsburg-Hagerstown (WV-MD)	-34.81%
Parkersburg-Marietta (WV-OH)	-38.56%
Rome (GA)	-38.51%
Steubenville-Weirton (OH-WV)	-35.29%
Washington (DC-MD-VA)	-35.17%
Wheeling (WV-OH)	-28.67%

"It makes sense for state and local air pollution agencies to take the lead in carrying out the Clean Air Act. They are able to develop solutions for pollution problems that require special understanding of local industries, geography, housing, and travel patterns, as well as other factors ... State, local, and tribal governments also monitor air quality, inspect facilities under their jurisdictions and enforce Clean Air Act regulations."

U.S. EPA, "**The Plain English Guide to the Clean Air Act**," April 2007.

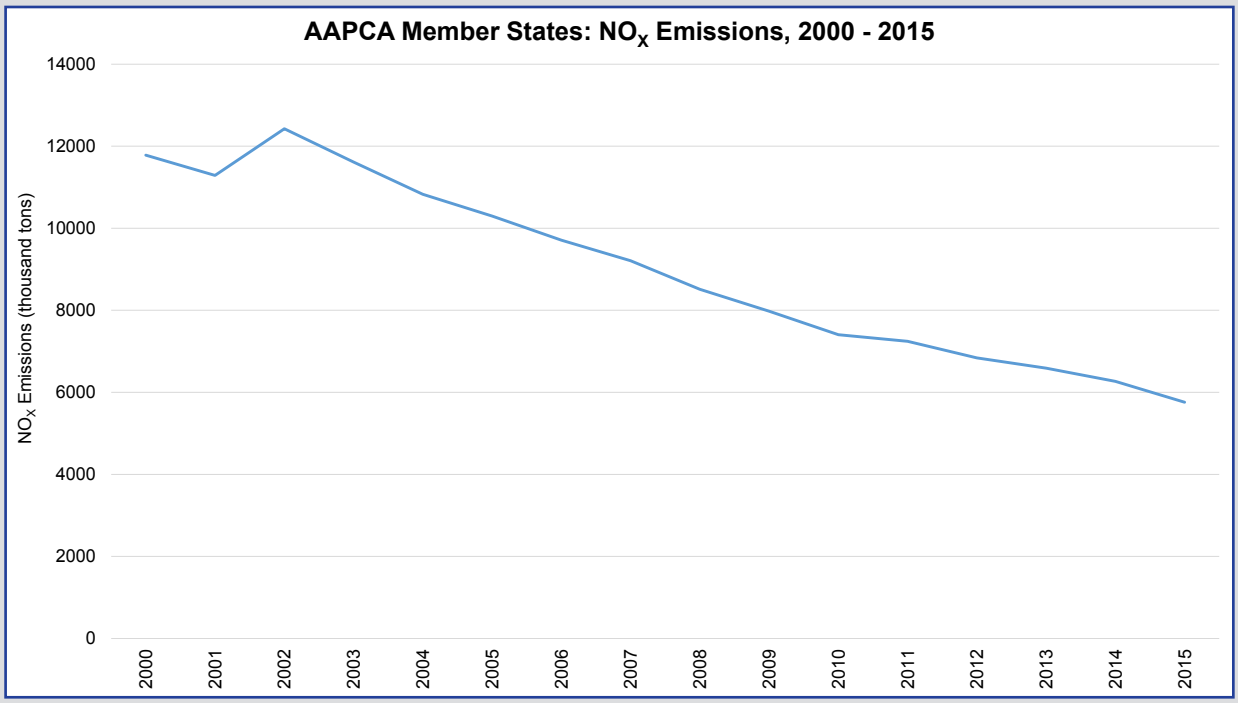
AAPCA Member States: Design Value History for Areas Previously Designated Nonattainment for the 1997 Annual NAAQS for Fine Particulate Matter, 2004 – 2015



[Note: To improve viewing, the y-axis begins at 7 micrograms per cubic meter.]

Ozone

From 2000 through 2014, AAPCA Member States averaged a more than 21 percent reduction in ozone concentrations (based on the maximum fourth-highest eight-hour average concentration measurement), while the national average saw a decrease of approximately 17 percent.[5] Further, emissions of oxides of nitrogen (NO_X), an ozone precursor,[6] were down about 49 percent nationally in 2015 as compared to 2000,[7] with AAPCA Member States reducing NO_X emissions by more than 50 percent over the same period.[8]



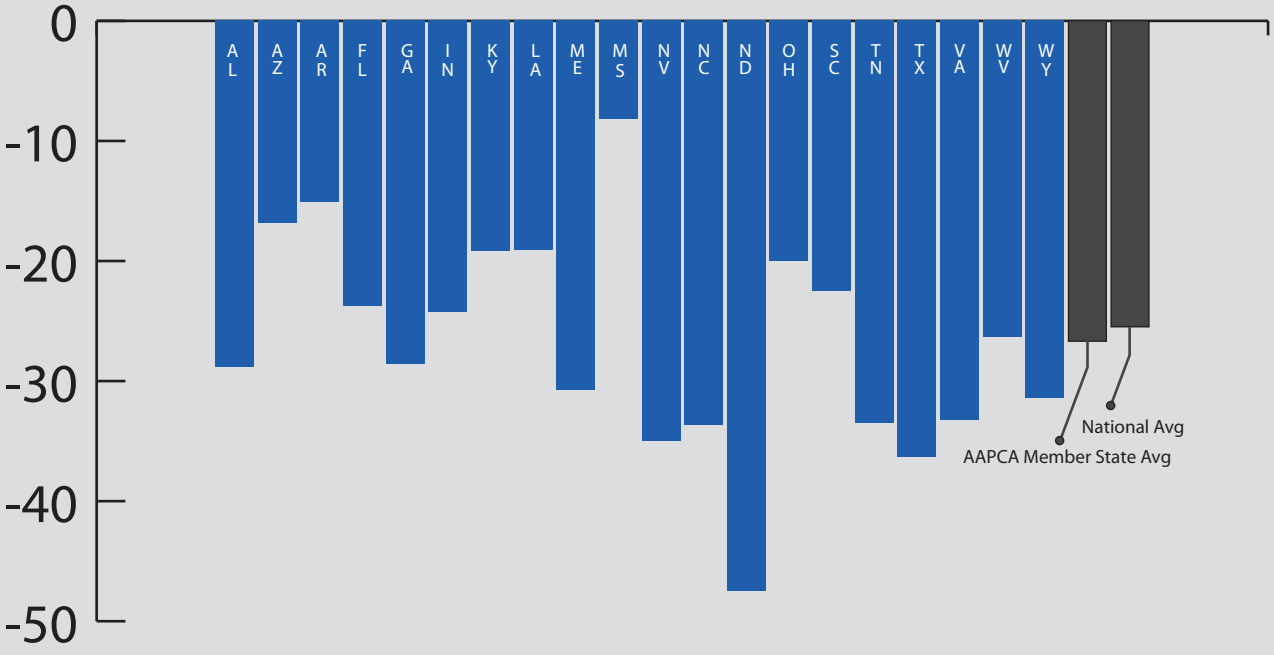
Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: "State Average Annual Emissions Trend."

GREENHOUSE GASES AND ENERGY

From 2000 to 2014, the 20 states that sit on the AAPCA Board of Directors accounted for more than 53 percent of the cumulative national reductions in energy-related carbon dioxide emissions (436.9 million metric tons total), including the following trends:[9]

- An average 19.3 percent reduction in per capita energy-related carbon dioxide emissions, compared to the national average of 18.1 percent, or approximately 5.5 metric tons per person – 36 percent more than the national average of 3.8 metric tons per person;
- An average decrease in energy intensity of 19.7 percent, compared to the national average of 17.5 percent;[10] and,
- Reductions in the carbon intensity of the economy of 26.7 percent on average – the national average was a 25.5 percent reduction.

AAPCA Member States: Carbon Intensity of the Economy 2000 - 2014

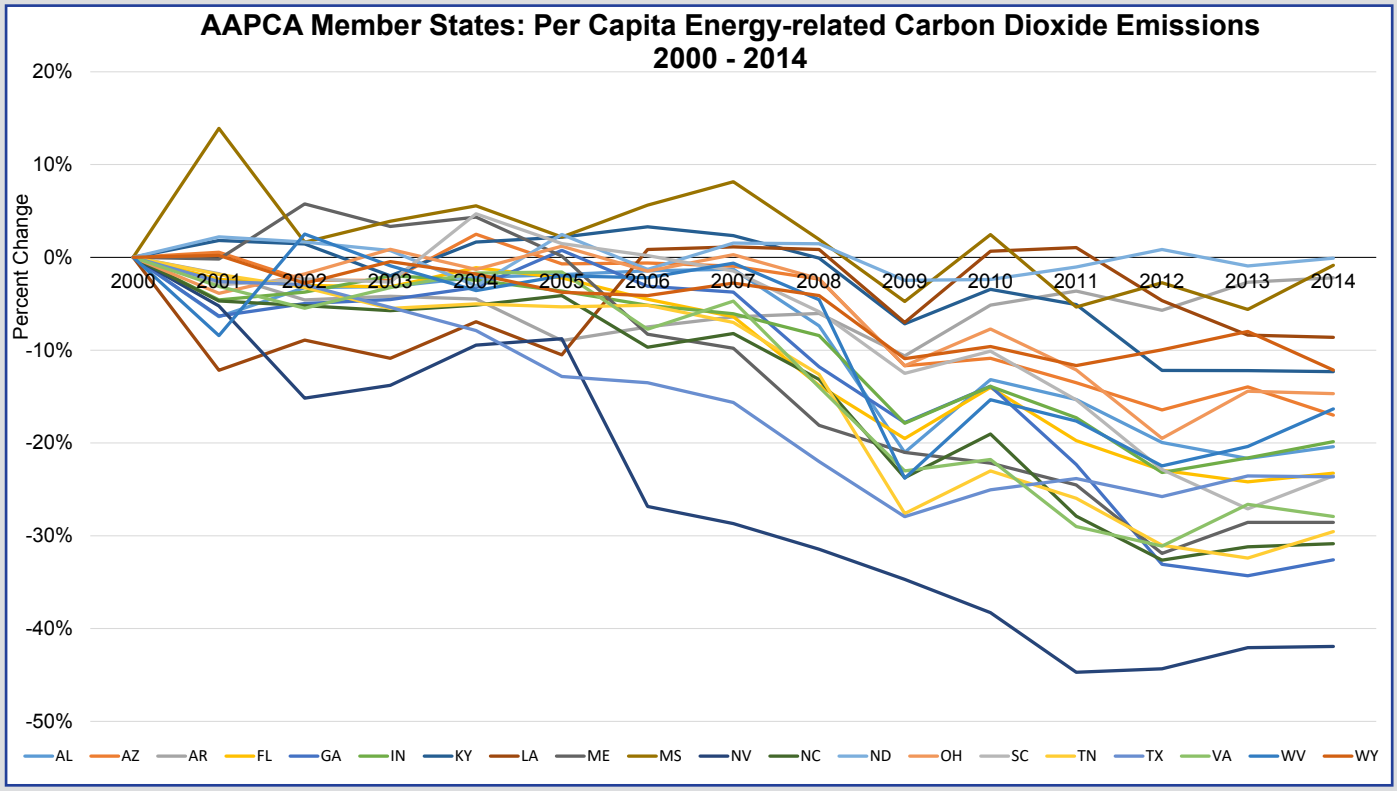


Source: U.S. EIA, ***Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014***, January 17, 2017. Table 8. Carbon intensity of the economy by State (2000-2014).

Cost of Energy

In 2015, the average retail price for electricity in AAPCA Member States was 9.28 cents per kilowatt-hour (cents/kWh), nearly 1.7 cents/kWh less than the national average of 10.91 cents/kWh – more than 16 percent cheaper. Motor gasoline prices in AAPCA Member States are also below the national average.

Sources: U.S. EIA, "**State Electricity Profiles**," January 17, 2017.
U.S. EIA, "**Motor Gasoline Price and Expenditure Estimates, Ranked by State**," 2014.



Source: U.S. EIA, ***Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014***, January 17, 2017.

Recent AAPCA Best Practice Winners

Each year, AAPCA awards **Best Practices** that identify ground breaking technology, innovative approaches, and exemplary operations in the field of air pollution control, with particular focus on activities that are directly transferable to the operation of an air pollution control agency. Below are recent recipients:

2016:

- **Air Protection Branch 101 Training**, Georgia Environmental Protection Division, Air Protection Branch

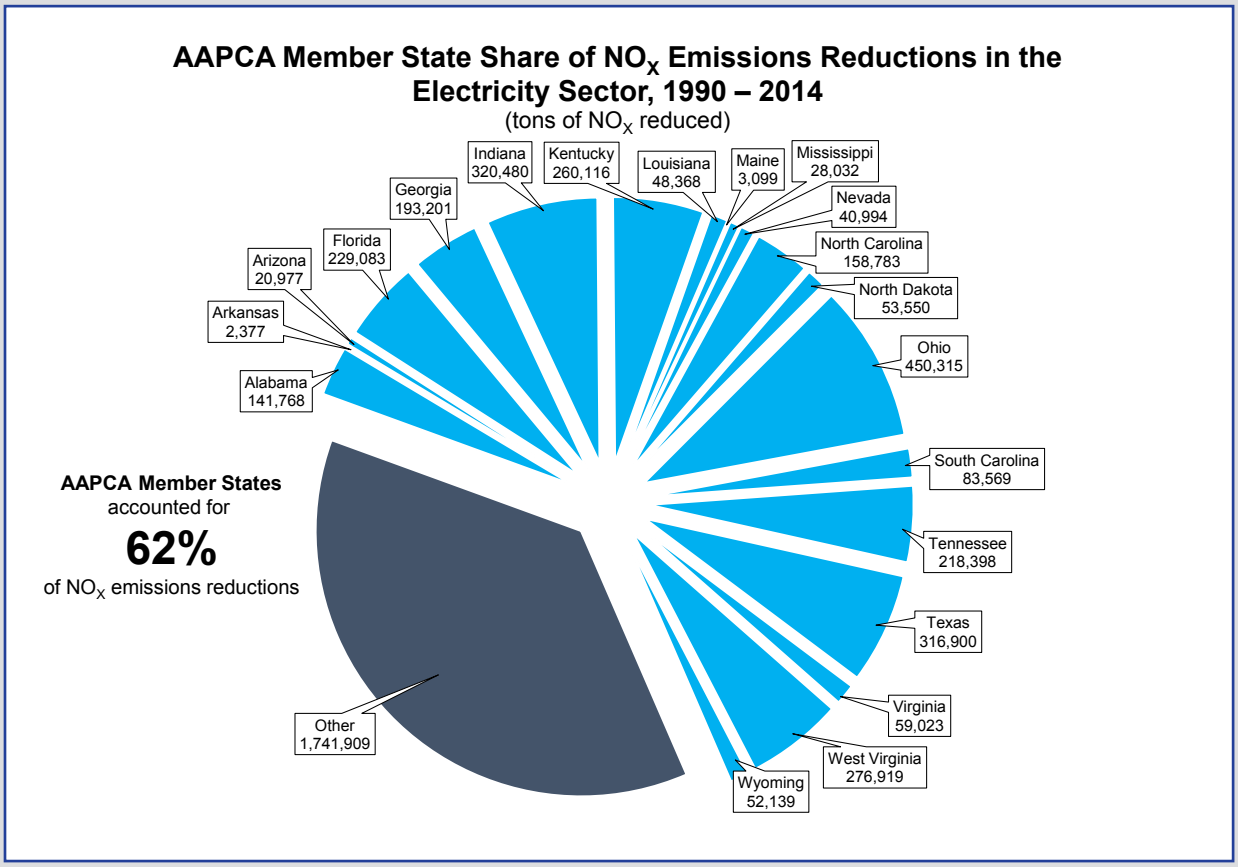
2015:

- **AirCom: Florida Division of Air Resource Management's New Compliance and Enforcement Database and Field Inspection Tool,** Florida Department of Environmental Protection
- **FAIR: Florida Air Inspector Reference**, Florida Department of Environmental Protection
- **Promoting Energy Efficiency at Commercial and Industrial Facilities in North Carolina**, North Carolina Division of Air Quality

ELECTRICITY SECTOR EMISSIONS REDUCTIONS

Oxides of Nitrogen

Between 1990 and 2014, AAPCA Member States accounted for 62 percent of the NO_x emissions reductions in the electricity sector, lowering NO_x emissions from 3,880,019 tons in 1990 to 968,179 tons in 2014.[11]

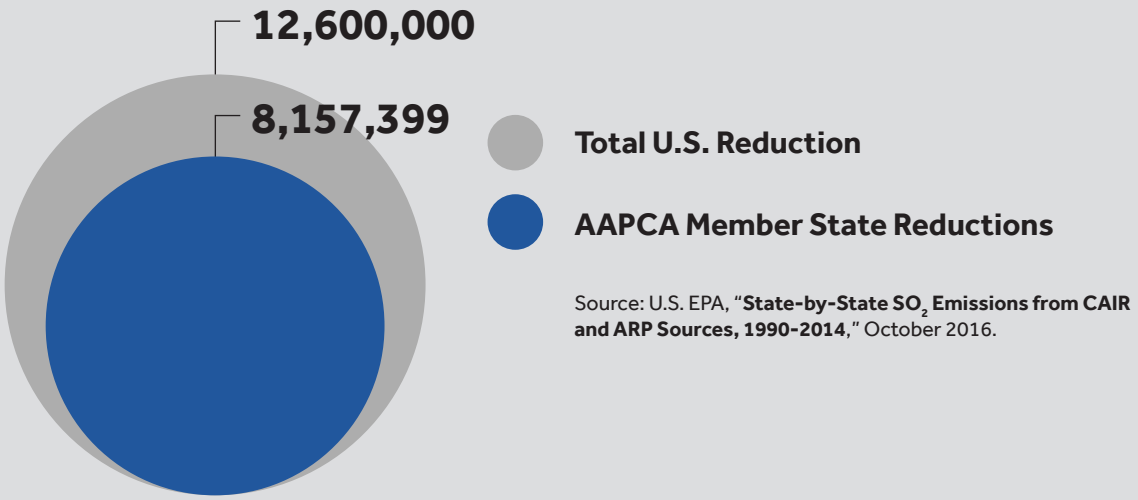


Source: U.S. EPA, "**State-by-State Annual NO_x Emissions from CAIR and ARP Sources, 1990-2014,**" October 2016.

Sulfur Dioxide

United States SO_2 emissions in the electricity sector decreased from 15.73 million tons in 1990 to 2.62 million tons in 2014, a 12.6-million-ton reduction total. AAPCA Member State reductions equaled nearly 65 percent of the total U.S. reduction over that period, bringing emissions down from roughly 10 million tons in 1990 to just over 2 million tons in 2014.[12]

AAPCA Member States: Share of SO_2 Emissions Reductions in the Electricity Sector, 1990 – 2014



Source: U.S. EPA, "**State-by-State SO_2 Emissions from CAIR and ARP Sources, 1990-2014**," October 2016.

Capital Investment for Emissions Controls at Coal-Fired Power Plants

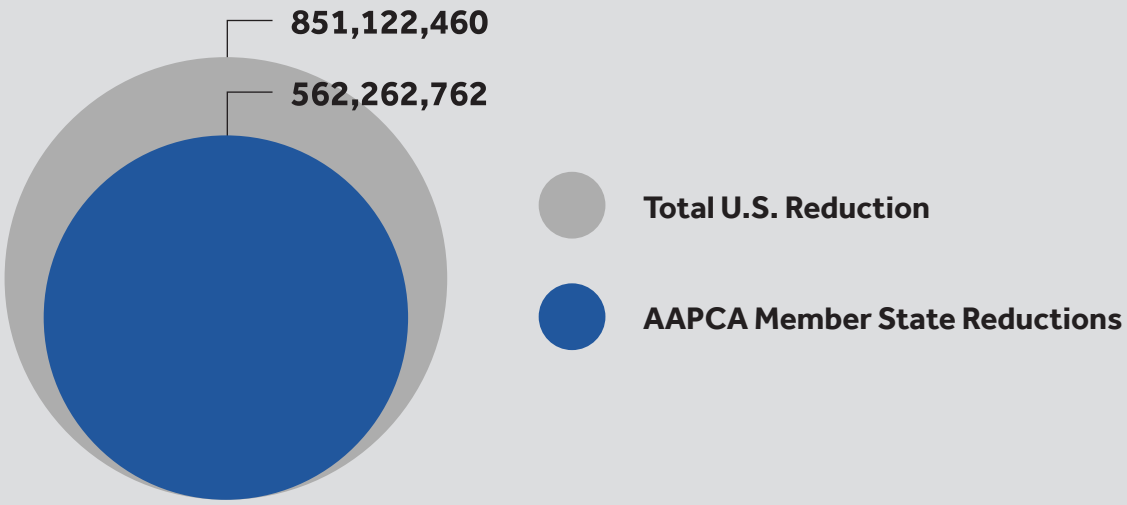
A 2016 report projects that, between 1996 and 2020, coal-fired power plants in AAPCA Member States will invest more than $83 billion in emissions control systems – approximately two-thirds of total national investments. Plants in Indiana, Ohio, Kentucky, West Virginia, and Pennsylvania are estimated to invest more than $8 billion in each state over that period. These figures include "capital investments made for selective catalytic and non-catalytic reductions (SCR/SNCR) to reduce NO_x emissions, wet scrubber, dry scrubber and dry sorbent injection (DSI) equipment to reduce SO_2 emissions, fabric filter and electrostatic precipitators (hot-side/cold-side) to reduce emissions of particulate matter, as well as activated carbon injection (ACI) to reduce emissions of mercury and other hazardous air pollutants." Not included in these figures are costs for fuel switching or plant closures.

Source: Energy Ventures Analysis, Inc., ***Capital Investments in Emission Control Retrofits in the U.S. Coal-fired Generating Fleet through the Years – 2016 Update***, January 26, 2016 [Data from: EIA 767/860 form, EVA estimates, industry data].

TOXIC AIR RELEASES

U.S. EPA's *2015 Toxic Release Inventory National Analysis* revealed a 56 percent decrease in reported toxic air releases[13] compared to the 2005 level, from 1,520,015,772 pounds in 2005 to 668,893,312 pounds in 2015.[14] Of the more than 851-million-pound reduction that was documented, AAPCA Member States accounted for 562,262,762 pounds, or nearly two-thirds of the national total.[15]

AAPCA Member States: Share of Total Reduction of Toxic Air Releases Reported to the Toxic Release Inventory, 2005 – 2015



Source: U.S. EPA, "**Where You Live in the 2015 Toxic Release Inventory National Analysis**," January 2017.

Visibility Progress: Then and Now in the Great Smoky Mountains

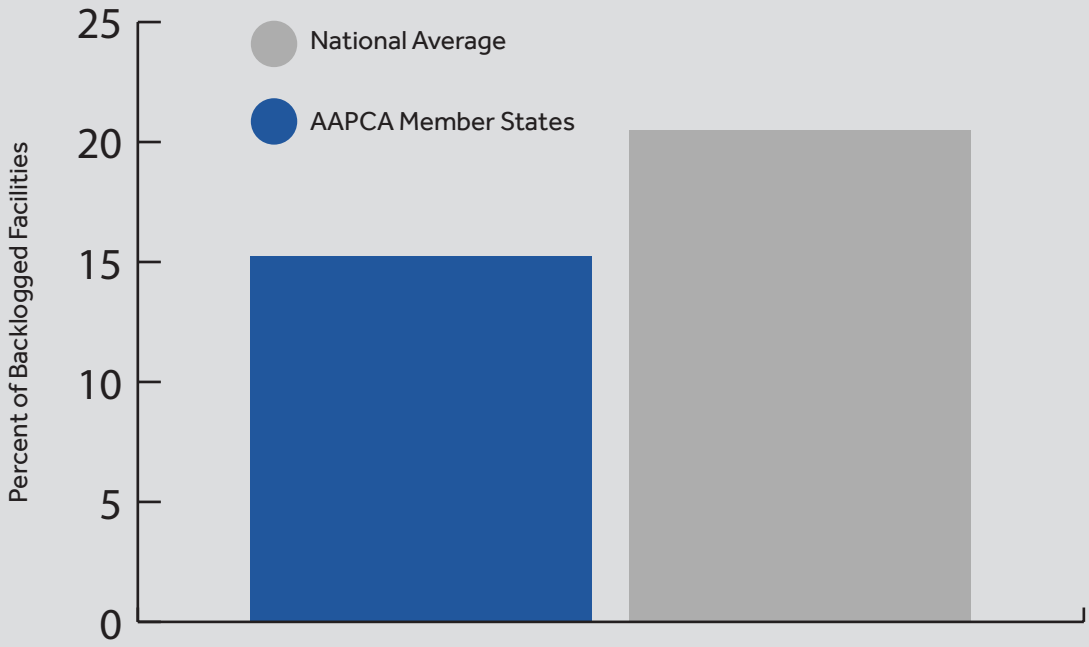
In July 2016, the North Carolina Department of Environmental Quality (NC DEQ) highlighted changes in visibility for the Smoky Mountains National Park between 1998 and 2015. NC DEQ explained that "average visibility on the clearest days increased from 54 miles in 1996 to 89 miles in 2014. On the haziest days, the visibility increased from 10 miles to 33 miles,"noting that this progress is a "direct result of state and federal measures to reduce air pollution. Air quality monitoring shows that levels of key pollutants have dropped dramatically over this time period."

Source: North Carolina Department of Environmental Quality, "**Cleaner air benefits tourism as well as health and the environment**," July 25, 2016.

PERMITTING EFFICIENCY

As outlined by U.S. EPA, "Title V of the Clean Air Act requires major sources of air pollutants, and certain other sources, to obtain and operate in compliance with an operating permit," also known as a Title V air permit. In 2016, for states with more than 100 Title V sources, the backlog for renewing those permits was 20.5 percent. For AAPCA Member States, the backlog was only 15 percent.[16]

Title V Renewal Backlog for Permitting Authorities with Greater than 100 Title V Sources

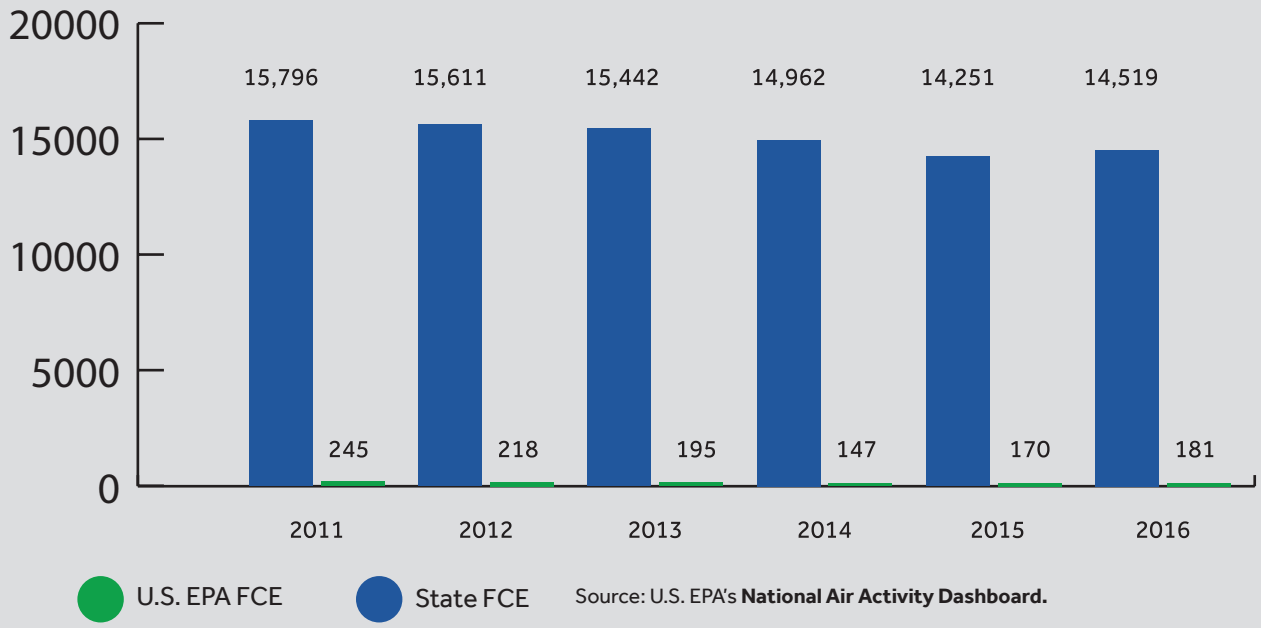


Source: Indiana Department of Environmental Management, "**Indiana Department of Environmental Management leads nation in Title V air permit response time**," March 16, 2016.

COMPLIANCE AND ENFORCEMENT ACTIVITY

According to U.S. EPA's Enforcement and Compliance History Online (ECHO), states conducted full compliance evaluations related to the Clean Air Act for more than 14,500 facilities in 2016, more than 80 times as many that were conducted by EPA.[17] For the more than 4,000 facilities subjected to formal or informal enforcement actions in 2016, more than 90 percent were carried out by states – 18 times the number carried out by U.S. EPA.[18]

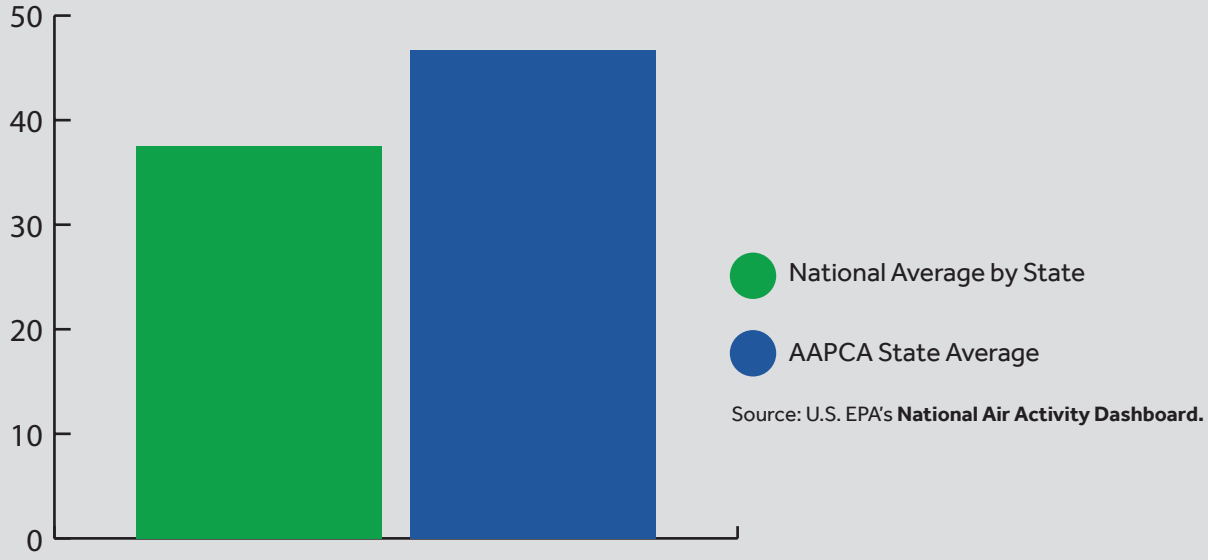
Number of Facilities with a Full Compliance Evaluation (FCE), 2011 - 2016



Source: U.S. EPA's **National Air Activity Dashboard.**

Further, AAPCA Member States performed full compliance evaluations at nearly 47 percent of facilities annually from 2010 to 2014, whereas the national average for states was approximately 37.5 percent of facilities.[19]

Percentage of Facilities with a Full Compliance Evaluation (FCE), 2010 - 2014



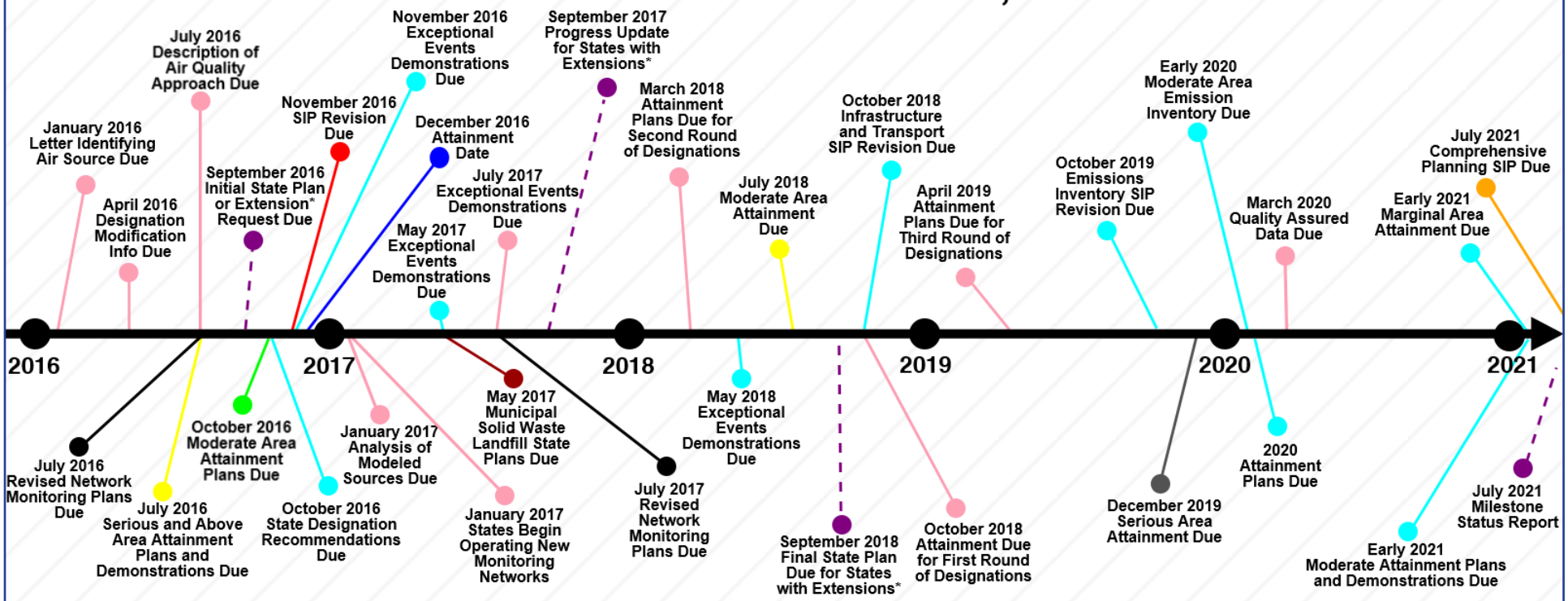
Source: U.S. EPA's **National Air Activity Dashboard.**

DEMANDS ON STATE AND LOCAL AIR AGENCIES

This progress comes in the context of increasing demands on state and local air agency personnel. AAPCA has recently published **several resources** highlighting these deadlines.

March 2017

State Clean Air Act Deadlines, 2016 - 2021



- Regional Haze
- Clean Power Plan*
- Monitoring Network
- Startup, Shutdown & Malfunction State Implementation Plan (SIP) Call
- 2008 Lead National Ambient Air Quality Standards (NAAQS)
- 2010 Sulfur Dioxide NAAQS
- 2006 Fine Particulate Matter NAAQS
- 2012 Fine Particulate Matter NAAQS
- State Plans Under 111(d)
- 2015 Ozone NAAQS
- 2008 Ozone NAAQS

* On February 9, 2016, the U.S.Supreme Court stayed implementation of the Clean Power Plan. According to U.S. EPA: "EPA firmly believes the Clean Power Plan will be upheld when the merits are considered because the rule rests on strong scientific and legal foundations. For the states that choose to continue to work to cut carbon pollution from power plants and seek the agency's guidance and assistance, EPA will continue to provide tools and support. "

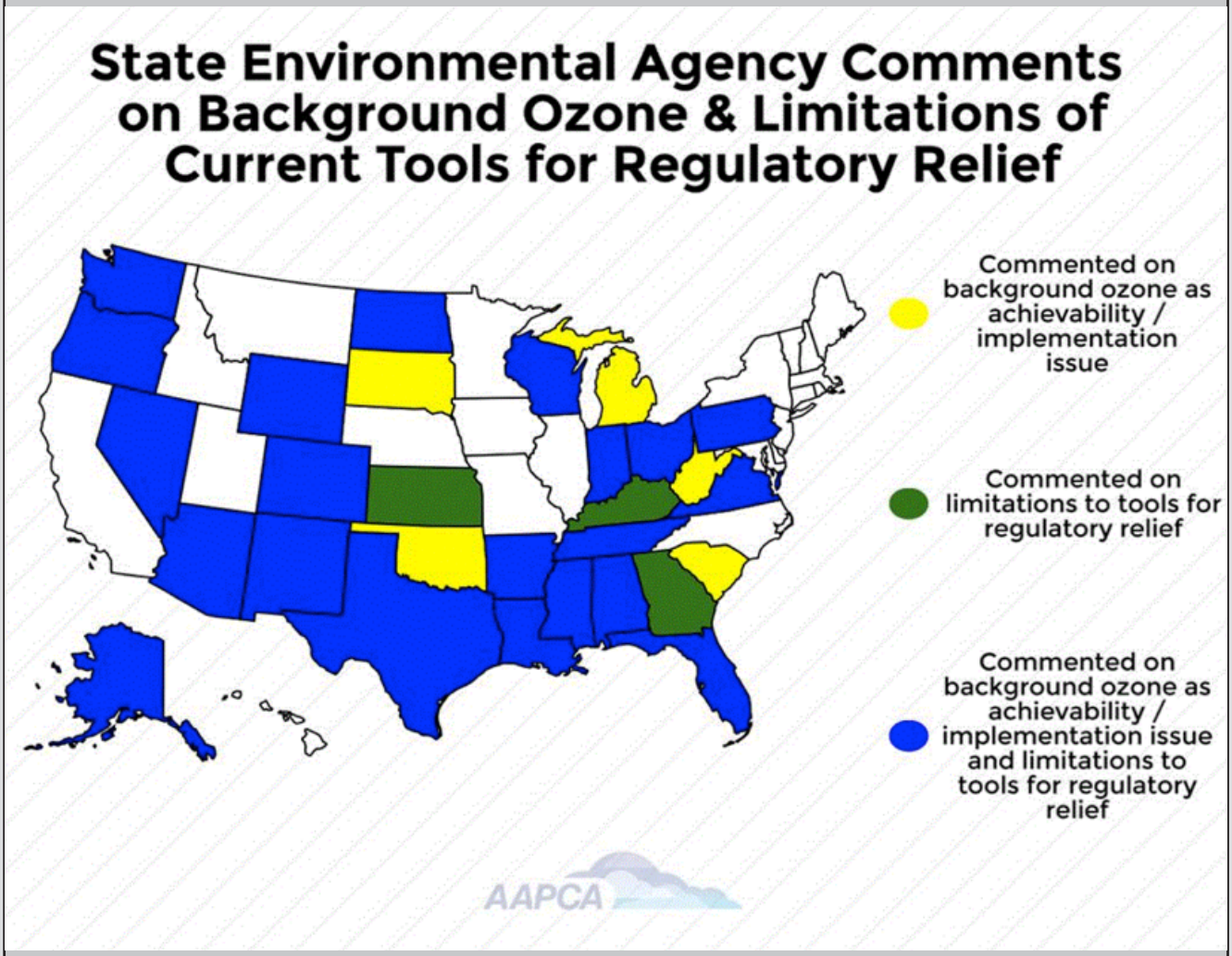
The Association of Air Pollution Control Agencies (AAPCA) is a national, consensus-driven non-profit organization focused on assisting state and local air quality agencies and personnel with implementation and technical issues associated with the federal Clean Air Act. You can find more information about AAPCA at: http://www.cleanairact.org

State Perspectives on Timely Implementation Tools and Background Pollution

Ahead of U.S. EPA's 2015 revision to the NAAQS for ground-level ozone, AAPCA surveyed all written state environmental agency comment on the proposal and released two reports on state perspectives regarding background ozone and timely implementation tools under a more stringent standard.

AAPCA found that a strong majority of commenting states called on EPA to provide timely implementation tools under a revised standard in order to avoid truncated implementation schedules and wasted air agency resources, with many agencies suggesting that EPA propose the accompanying implementation rule when updating the NAAQS.

A majority of state agency comments also raised concerns about the role of background ozone, including both naturally occurring and internationally transported contribution, as an achievability or implementation challenge. State agency comments and a more focused survey of AAPCA Member States revealed critical limitations for the potential tools for regulatory relief.



Sources: AAPCA, ***State Environmental Agency Perspectives on Timely NAAQS Implementation***, September 2015
AAPCA, ***State Environmental Agency Perspectives on Background Ozone & Regulatory Relief***, June 2015.

Section Notes

[1] U.S. EPA's ***Green Book*** contains a history of areas designated nonattainment or maintenance under the NAAQS. EPA's listing of areas designated nonattainment or maintenance for the 1997 annual $PM_{2.5}$ NAAQS can be found at: **https://www3.epa.gov/airquality/greenbook/qbtc.html**. In 2012, the NAAQS for $PM_{2.5}$ was lowered to 12 µg/m3, based on an annual arithmetic mean averaged over three years (the 2006 review maintained the 1997 standard).

[2] U.S. EPA defines design values as "a statistic that describes the air quality status of a given location relative to the level of the NAAQS ... typically used to designate and classify nonattainment areas, as well as to assess progress towards meeting the NAAQS."

[3] **Section 175A(a) of the Clean Air Act** states that "redesignation of a nonattainment area for any air pollutant as an area which has attained the national primary ambient air quality standard for that air pollutant shall also submit a revision of the applicable State implementation plan to provide for the maintenance of the national primary ambient air quality standard for such air pollutant in the area concerned for at least 10 years after the redesignation. The plan shall contain such additional measures, if any, as may be necessary to ensure such maintenance."

[4] **https://www.epa.gov/air-trends/air-quality-design-values#report**. Data file: "$PM_{2.5}$ Design Values, 2015." Data for this chart is based on overlapping three-year averages beginning with 2004 – 2006 and ending with 2013 – 2015.

[5] Data from U.S. EPA's **Air Quality System**.

[6] U.S. EPA **explains** that "Ozone is not directly emitted, but is formed when oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) react in the presence of sunlight. PM can be emitted, or it can be formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds and other gases react in the atmosphere."

[7] **https://www.epa.gov/air-trends/air-quality-national-summary#Emissions Trends**.

[8] **https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data**. Data file: "State Average Annual Emissions Trend."

[9] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014***, January 17, 2017.

[10] As measured by thousand British thermal units (Btu) per chained 2009 dollar of GDP.

[11] U.S. EPA, "**State-by-State Annual NO_x Emissions from CAIR and ARP Sources, 1990-2014**," October 2016.

[12] U.S. EPA, "**State-by-State SO_2 Emissions from CAIR and ARP Sources, 1990-2014**," October 2016.

[13] U.S. EPA regulates 187 hazardous air pollutants. A full list of hazardous air pollutants can be found in Section 112 of the **Clean Air Act**.

[14] U.S. EPA, ***2015 Toxic Release Inventory National Analysis***, January 2017.

[15] Links to State Toxic Release Inventory Data Sheets are available at: **https://www.epa.gov/trinationalanalysis/where-you-live-2015-tri-national-analysis**

[16] Indiana Department of Environmental Management, "**Indiana Department of Environmental Management leads nation in Title V air permit response time**," March 16, 2016.

[17] Data from U.S. EPA's **National Air Activity Dashboard**, part of **ECHO**.

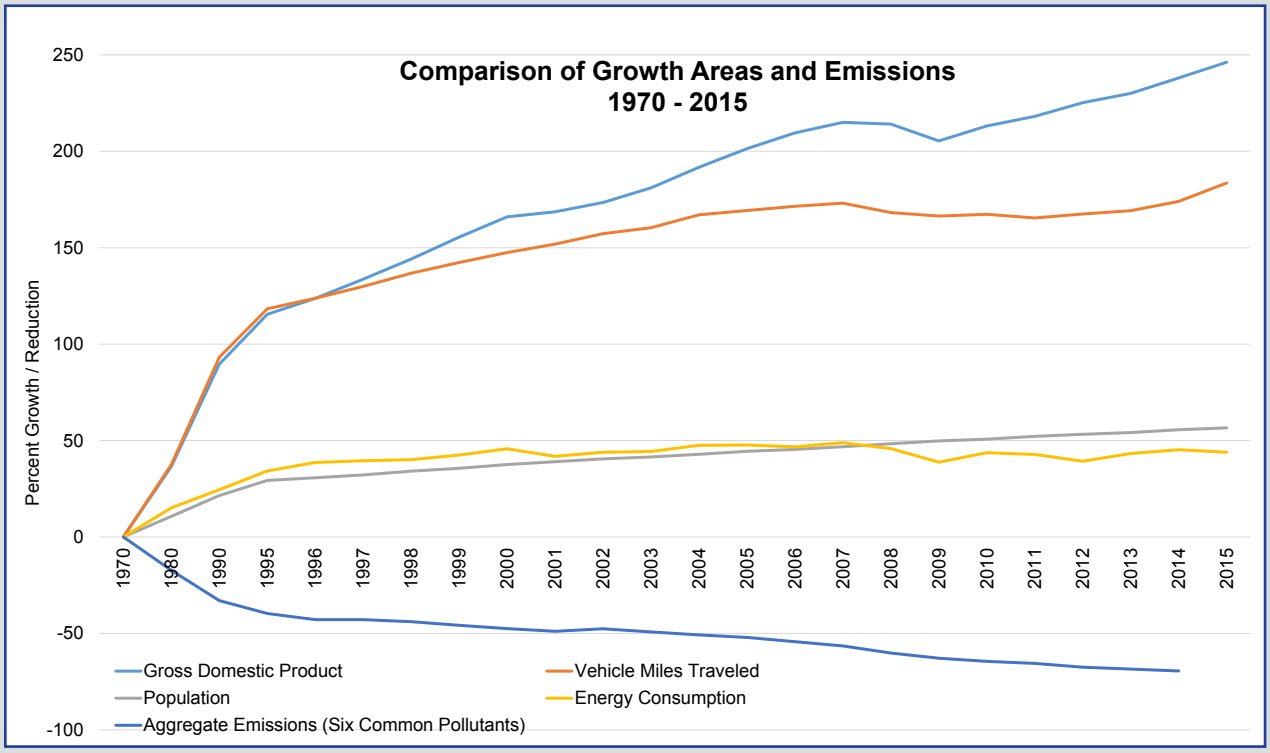
[18] U.S. EPA's **National Air Activity Dashboard**, part of **ECHO**.

[19] Data from U.S. EPA's **Analyze Trends: State Air Dashboard**, part of **ECHO**. EPA Note: "Due to the **transition between CAA national data management systems**, the Performance View of the Air Dashboard has not been updated since January 31, 2015."

AMERICA'S FOOTPRINT

In 2016, EPA published an interactive website entitled *Our Nation's Air: Status and Trends Through 2015*. EPA compares emissions trends of the criteria air pollutants since 1970 to the trend lines of several economic and social indicators, including Gross Domestic Product (GDP), population, vehicles miles traveled, and energy consumption.[1]

EPA states that "By 2015, the combined emissions of the six common pollutants ... dropped by 71 percent since 1970," while the United States experienced a 250-percent increase in GDP, a nearly 200-percent increase in vehicle miles traveled, and steady increases in energy consumption and population.[2]

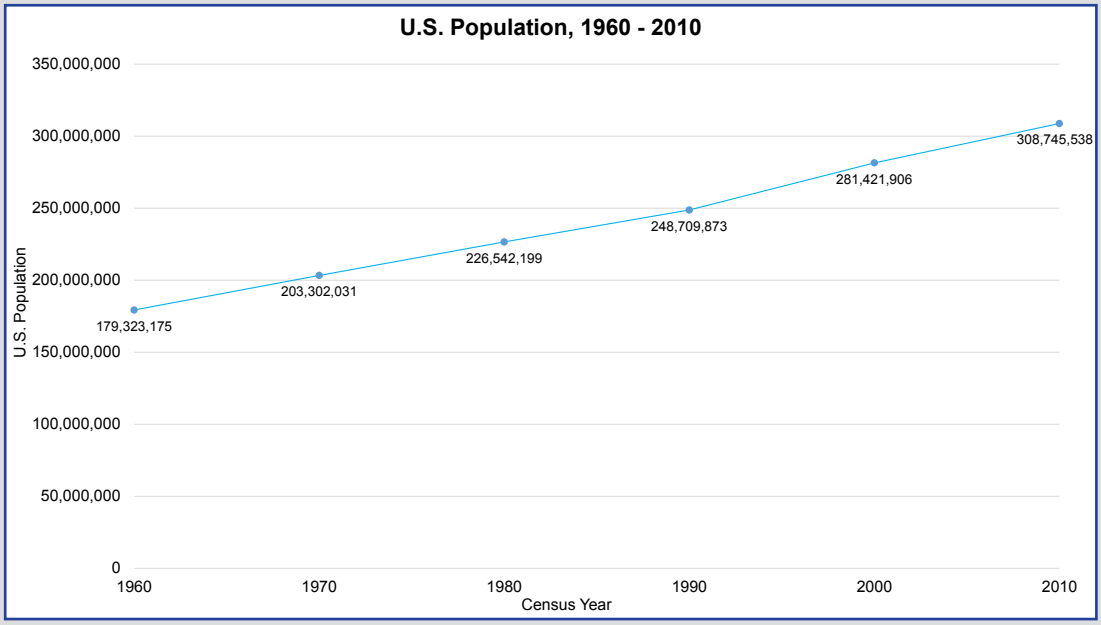


Source: U.S. EPA, ***Our Nation's Air: Status and Trends Through 2015***, Fall 2016.
Data: **https://gispub.epa.gov/air/trendsreport/2016/** (section: Economic Growth with Cleaner Air)

"The United States primarily has done an excellent job, moving from being a very dirty place in the 1950s to quite a clean place today." – Dr. Carlos Dora, World Health Organization (The New York Times, "**Europe Trails U.S. in Cutting Air Pollution, W.H.O. Says**," May 12, 2016)

Population

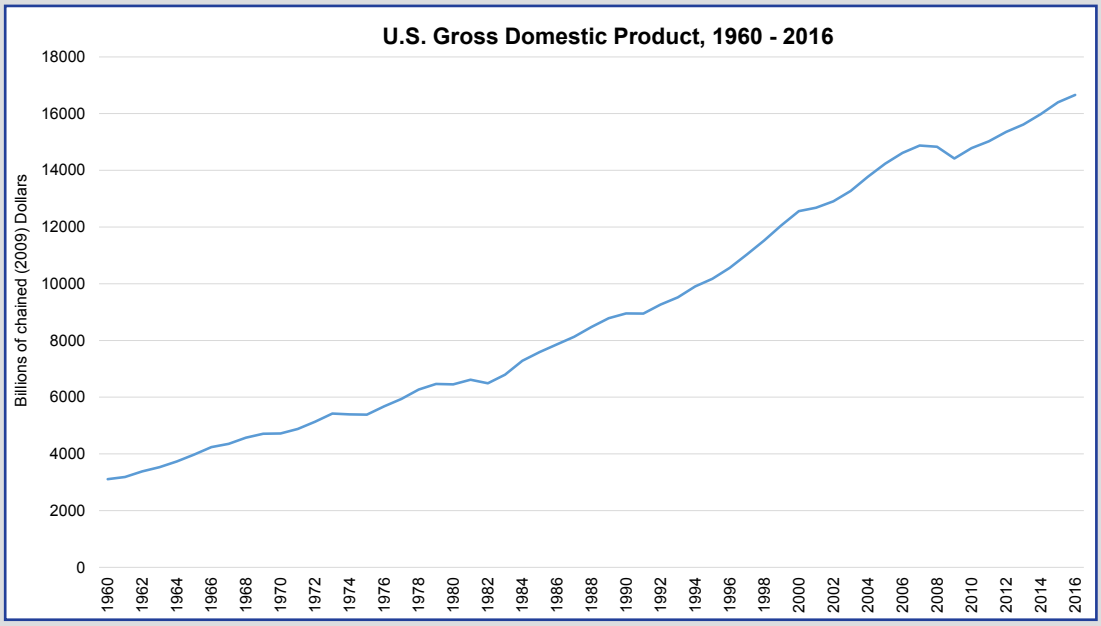
The United States ranks third in total population, behind only China and India, and ahead of Indonesia and Brazil.[3] Since 1960, the U.S. has experienced a 72 percent growth in population, including a 27.3-millon-person increase in the years ranging from 2000 to 2010.[4]



Source: U.S. Census Bureau, data available at: **https://www.census.gov/history/www/through_the_decades/**.

Gross Domestic Product

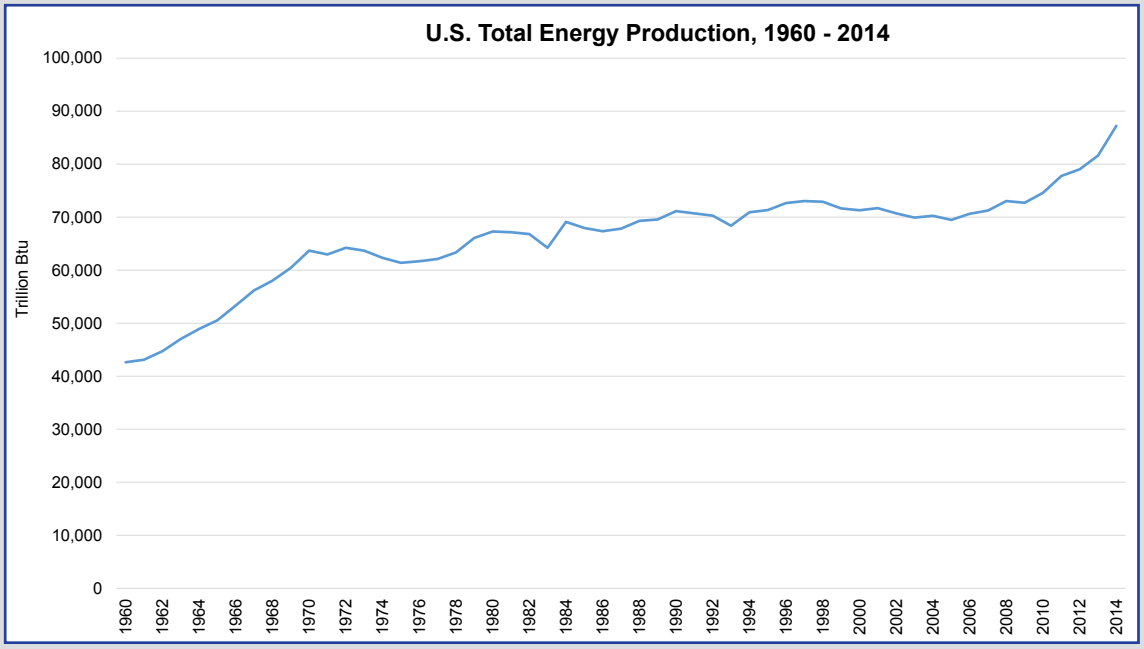
U.S. GDP in 2015 represented nearly a quarter of the gross world product[5] and has risen relatively steadily, growing from $1.076 trillion in 1970 to $18.037 trillion in 2015.[6] As of 2016, U.S. GDP had grown nearly 436 percent since 1960.[7]



Source: U.S. Bureau of Economic Analysis, data available **here**.

Energy Production

The United States is a significant energy producer, second only to China in total energy production, according to the International Energy Agency (IEA).[8] Energy production in the U.S. has increased approximately 105 percent since 1960.[9] Further, from 2004 to 2014, the U.S. became 28 percent more energy self-sufficient – up to 91 percent, the highest percentage of energy self-sufficiency the nation has obtained.[10]

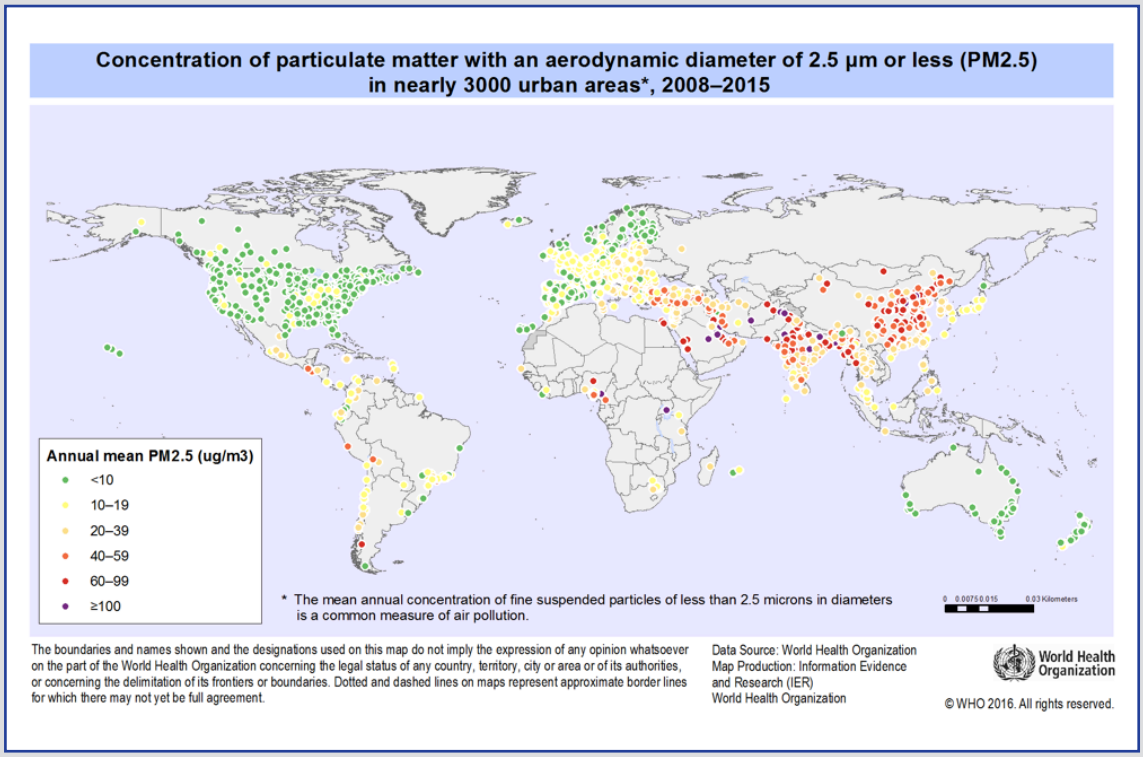


Source: U.S. EIA, **State Energy Data System (SEDS): 1960-2014**, June 29, 2016.

AIR QUALITY

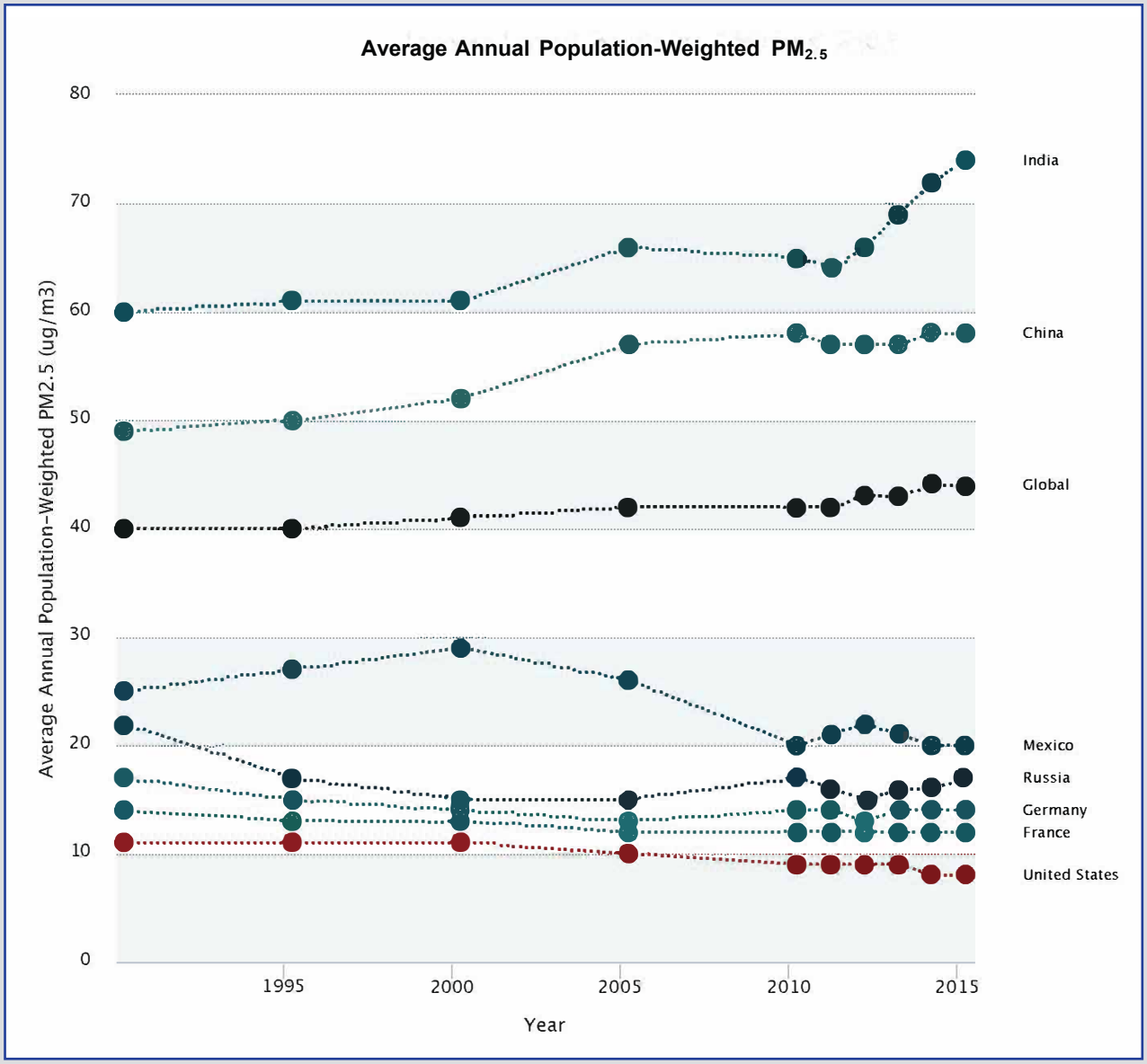
Fine Particulate Matter

In 2016, the World Health Organization mapped the concentration of fine particulate matter in nearly 3,000 cities, based on measurements taken from 2008 to 2015.[11] The map demonstrates that the majority of the United States has lower fine particulate matter levels than most of the rest of the world.



Source: World Health Organization, "**Concentration of particulate matter with an aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$) in nearly 3000 urban areas, 2008-2015**," 2016.

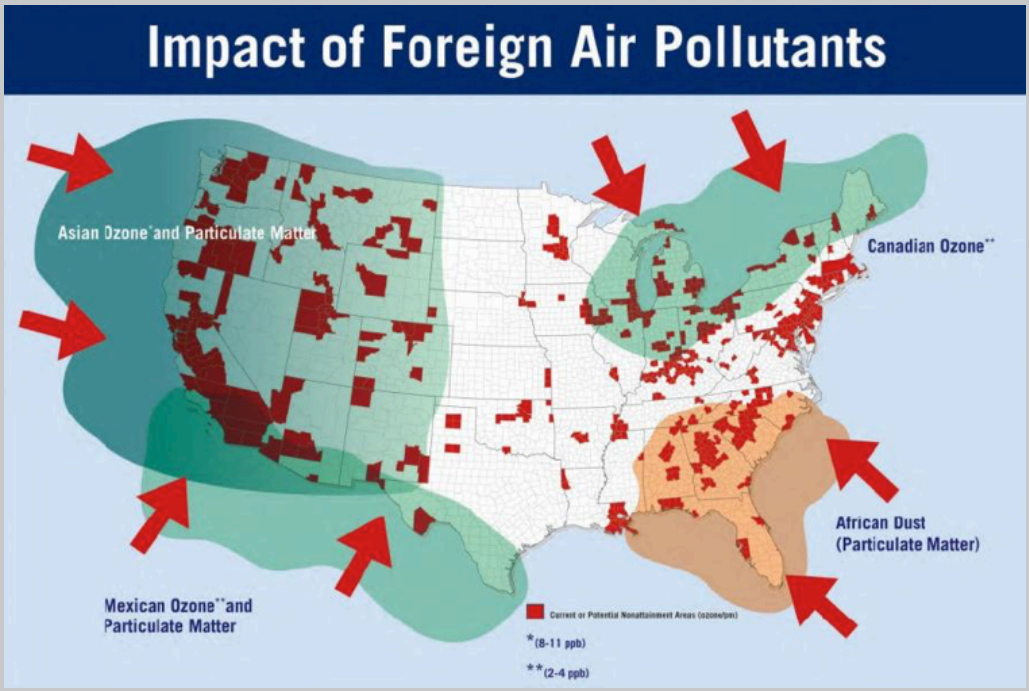
In 2017, the Health Effects Institute and the Institute for Health Metrics and Evaluation released the report *State of Global Air/2017*. Data accompanying the report shows annual average population-weighted fine particulate matter and demonstrates U.S. leadership with annual metrics below the World Health Organization Interim Targets and Guideline Values.[12]



According to the report's glossary: "Instead of calculating average air pollution levels where all areas receive equal weight, as is typically done, population-weighted averages give weight to the areas in proportion to their population, so that greater weight is given to exposures in areas where the most people live."

Source: Health Effects Institute and the Institute for Health Metrics and Evaluation, ***State of Global Air/2017***.

Small World: The Influence of Foreign Emissions on U.S. Ozone Levels



Source: **U.S. Chamber of Commerce**, January 2015.

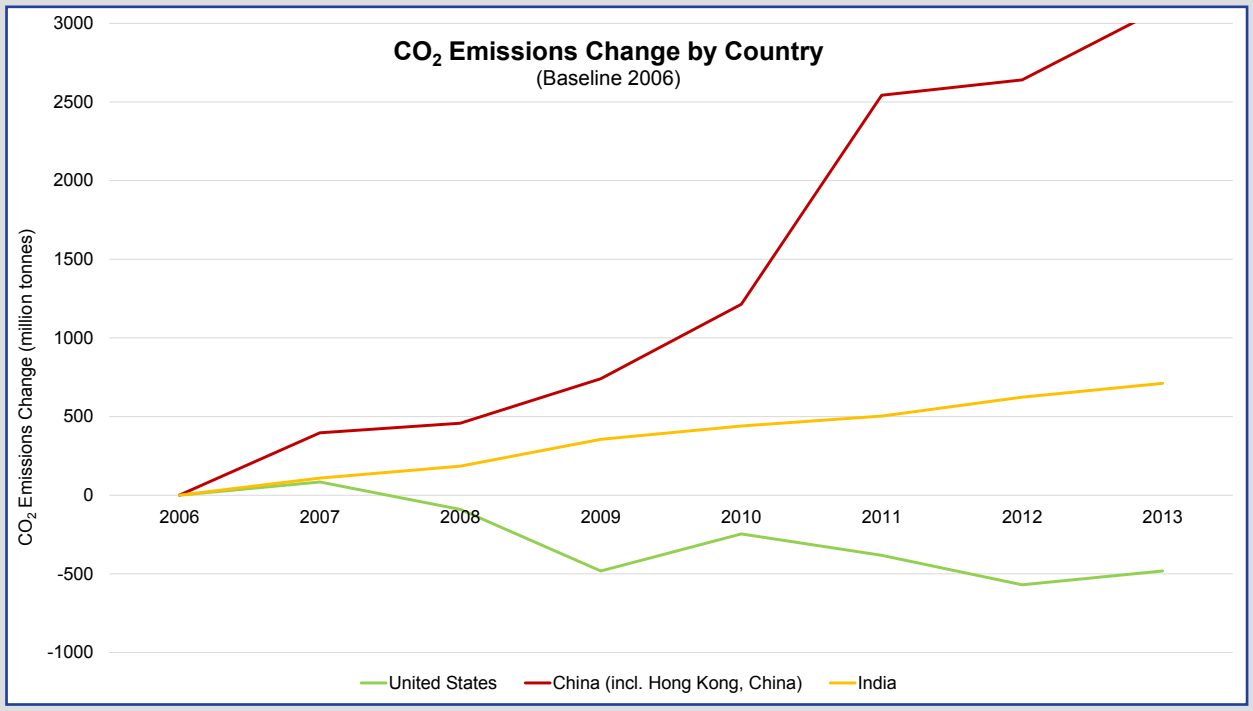
A growing body of scientific literature, including from government researchers at NASA, EPA, and other agencies, suggests significant contributions to U.S. air pollution concentrations from foreign sources. For example:

- In the journal *Atmospheric Chemistry and Physics*, a study published in March 2017 concluded that "Asian NO_x emissions have tripled since 1990, contributing as much as 65% to modeled springtime background [ozone] increases (0.3–0.5 ppb yr−1) over the [Western United States], outpacing [ozone] decreases attained via 50% [United States] NO_x emission controls."
  Lin, M. (Princeton University, National Oceanic and Atmospheric Administration [NOAA]), Horowitz, L. W. (NOAA), Payton, R. (U.S. EPA Region 8), Fiore, A. M. (Columbia University), & Tonnesen, G. (U.S. EPA Region 8): **US surface ozone trends and extremes from 1980 to 2014: quantifying the roles of rising Asian emissions, domestic controls, wildfires, and climate**, *Atmos. Chem. Phys., 17, 2943-2970, doi:10.5194/acp-17-2943-2017, 2017.*

- Authors of a 2015 study published in *Nature Geoscience* found that "The [ozone] decrease over the western US associated with both local and Asian NO_x emissions changes is 0.04 [Dobson units] yr-1 (Table 1), but the contribution of emissions and [ozone] transport from China to tropospheric [ozone] over the western [United States] has grown by 0.03 [Dobson units] yr-1 over 2005-2010 (Fig. 3a). The import from China has thus neutralized ~43% of the 0.07 (=0.03+0.04) [Dobson units] yr-1 [ozone] decrease that would have occurred largely in response to air pollution controls in the western [United States], had Chinese emissions been constant."
  Verstraeten, W. (Wageningen University), Neu, J. (NASA Jet Propulsion Laboratory, California Institute of Technology), Williams, J. (Royal Netherlands Meteorological Institute), Bowman K. (NASA Jet Propulsion Laboratory, California Institute of Technology), Worden, J. (NASA Jet Propulsion Laboratory, California Institute of Technology), & Boersma, K. (Wageningen University): **Rapid increases in tropospheric ozone production and export from China**, *Nature Geoscience 8, 690–695, doi:10.1038/ngeo2493, 2015.*

Carbon Dioxide Emissions

Based upon International Energy Agency data, the chart below highlights CO_2 emissions from China, India, and the United States between 2006 and 2013. In terms of per capita CO_2 emissions, the United States reduced emissions by 2.57 tons per person, whereas China increased emissions by 2.11 tons per person and India by 0.48 tons/person. The U.S. has had the largest drop in carbon dioxide emissions in the world over that period.[13]



Source: U.S. Department of Energy, "**Watch Our CO_2 Drop**," January 2016 (Data from IEA).

Section Notes

[1] U.S. EPA, ***Our Nation's Air: Status and Trends Through 2015***, Fall 2016.
[2] U.S. EPA, ***Our Nation's Air: Status and Trends Through 2015***, Fall 2016.
[3] U.S. Census Bureau, **U.S. and World Population Clock**, February 27, 2017.
[4] U.S. Census Bureau, data available at: **https://www.census.gov/history/www/through_the_decades/**.
[5] **http://data.worldbank.org/indicator/NY.GDP.MKTP.CD**.
[6] U.S. Bureau of Economic Analysis, "**Gross Domestic Product, 1970 – 2015**," Updated December 22, 2016.
[7] U.S. Bureau of Economic Analysis, data available at: **https://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&904=1960&903=6&906=a&905=1000&910=x&911=0**.
[8] **http://energyatlas.iea.org/#!/tellmap/-297203538/0**.
[9] U.S. EIA, **State Energy Data System (SEDS): 1960-2014**, June 29, 2016.
[10] International Energy Agency, **IEA Energy Atlas**, 2016.
[11] World Health Organization, "**Concentration of particulate matter with an aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$) in nearly 3000 urban areas, 2008-2015**," 2016.
[12] Health Effects Institute and the Institute for Health Metrics and Evaluation, ***State of Global Air/2017***.
[13] U.S. Department of Energy, "**Watch Our CO_2 Drop**," January 2016 (Data from IEA).

TRENDS IN CRITERIA AIR POLLUTANTS

Concentrations

Nationally, concentrations for the six criteria air pollutants have plummeted over the last several decades. U.S. EPA's 2016 Air Trends Report charts these changes in ambient air since 1980, 1990, and 2000.[1]

	1980 vs 2015	1990 vs 2015	2000 vs 2015
Carbon Monoxide	-84	-77	-60
Lead	-99	-99	-91
Nitrogen Dioxide (annual)	-60	-54	-45
Nitrogen Dioxide (1-hour)	-59	-47	-31
Ozone (8-hour)	-32	-22	-17
PM_{10} (24-hour)	---	-39	-36
$PM_{2.5}$ (annual)	---	---	-37
$PM_{2.5}$ (24-hour)	---	---	-37
Sulfur Dioxide (1-hour)	-84	-81	-69

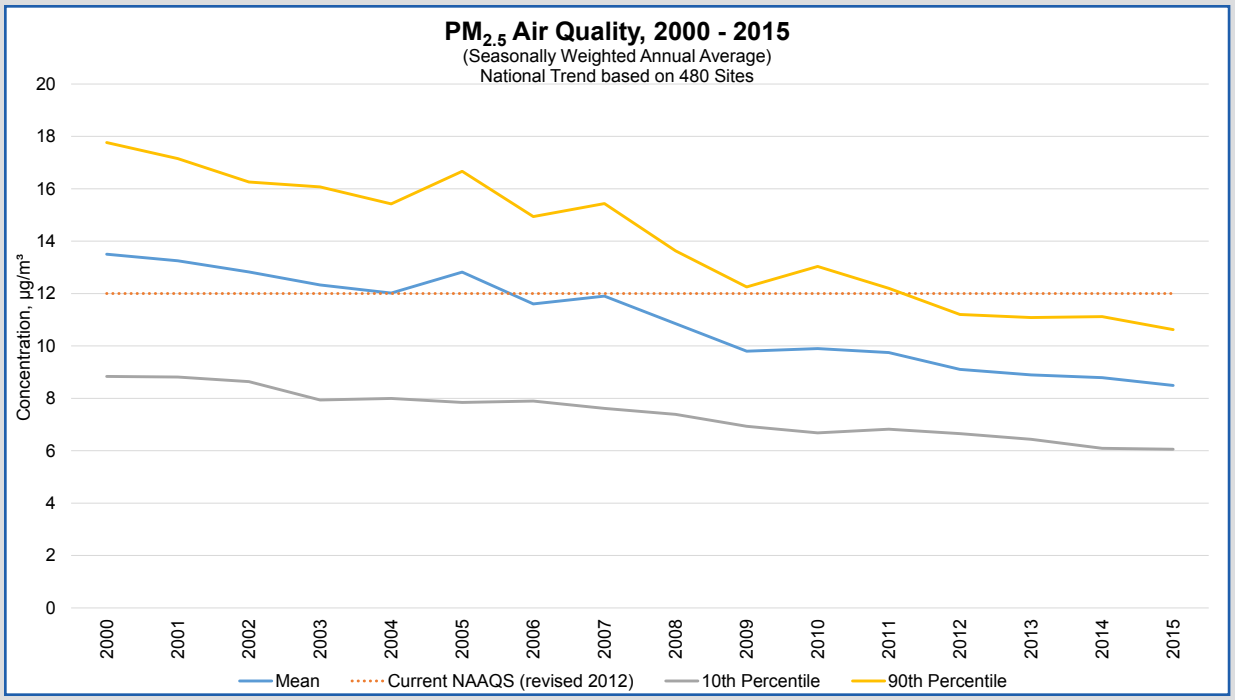
Emissions

Utilizing data from the National Emissions Inventory (NEI), U.S. EPA's 2016 Air Trends Report also provides a breakdown of emissions reductions by criteria air pollutant. Since 1990, emissions for several key pollutants have fallen more than 40 percent. [2]

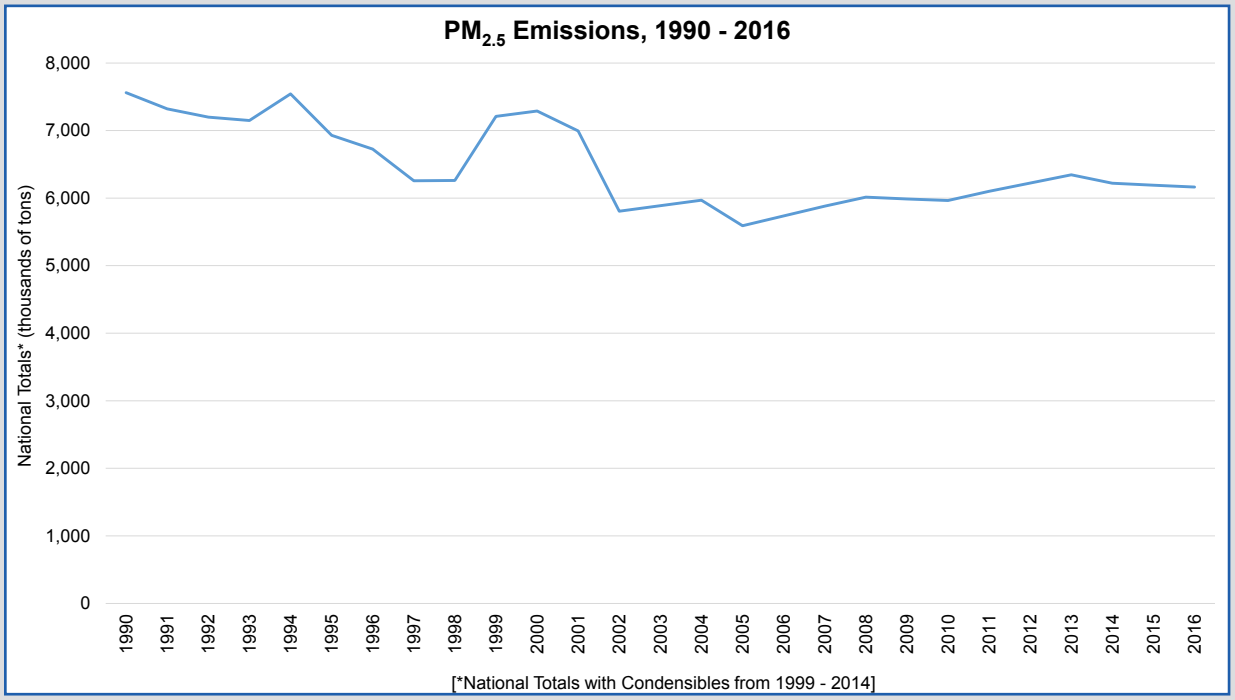
	1980 vs 2015	1990 vs 2015	2000 vs 2015
Carbon Monoxide	-71	-65	-50
Lead	-99	-80	-50
Nitrogen Oxides (NO_x)	-58	-54	-49
Volatile Organic Compounds (VOC)	-54	-41	-19
Direct PM_{10}	-57	-17	-14
Direct $PM_{2.5}$	---	-24	-32
Sulfur Dioxide	-86	-84	-77

The pages that follow illustrate these changes in concentrations and emissions, using the most recent data available. Each concentration chart includes the level of the current NAAQS and mean, as well as the 10^{th} and 90^{th} percentiles over at least 15 years. As noted previously, nitrogen oxides and volatile organic compounds are precursor emissions for ground-level ozone formation.

Fine Particulate Matter



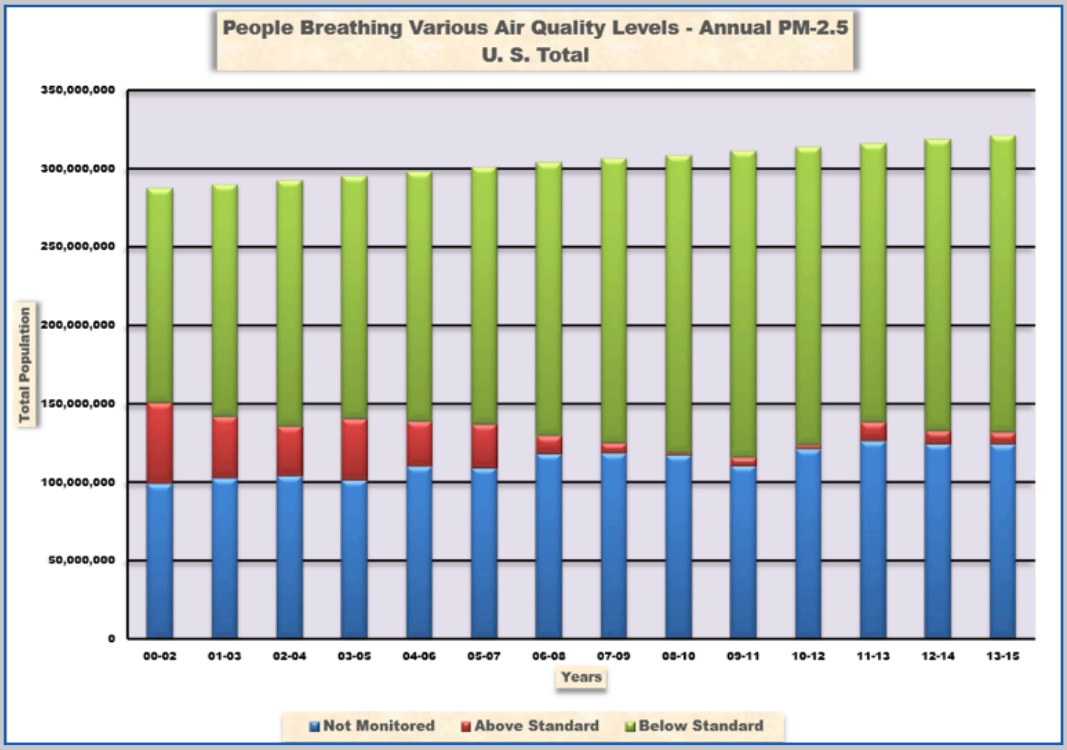
Source: U.S. EPA, **Particulate Matter ($PM_{2.5}$) Trends**.



Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: Average Annual Emissions.

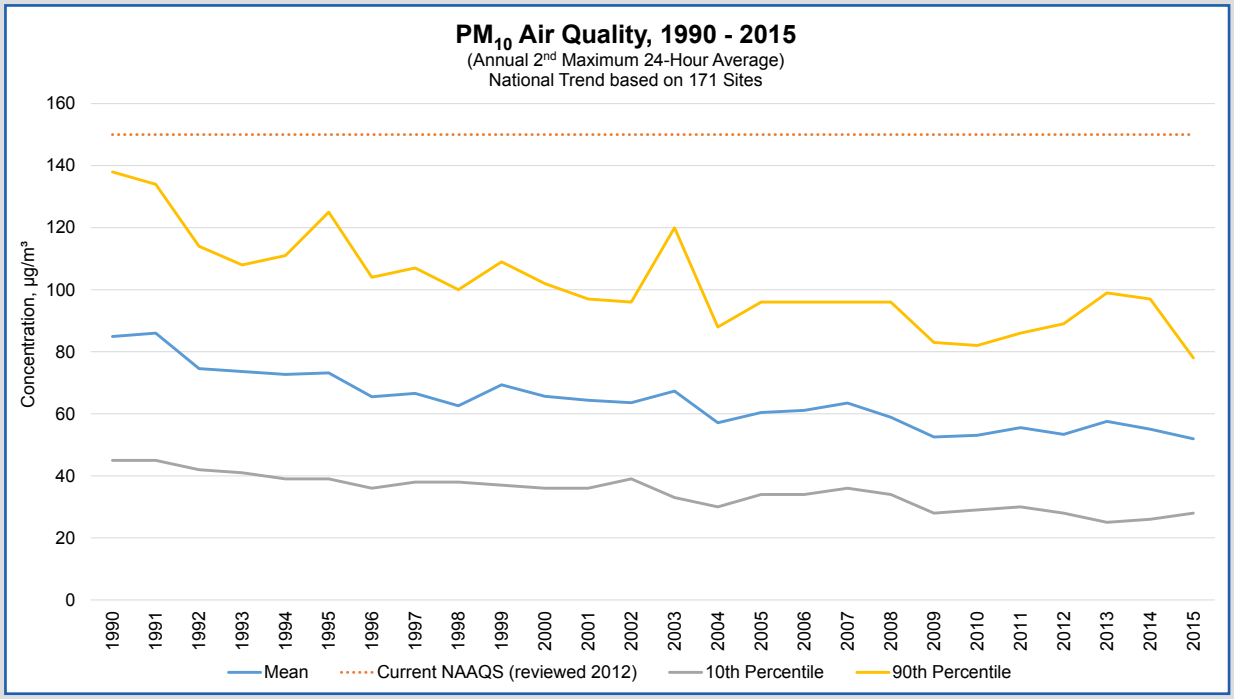
The States' View of the Air

The Indiana Department of Environmental Management (IDEM) recently released the 2017 edition of *The States' View of the Air* report. The report highlights the air quality in counties and cities in the United States. Like a report card, IDEM has graded areas on the state of their air quality under the federal standards for ozone and fine particles. This report shows the percentage of the population breathing fine particulate matter and ozone at levels above or below the standard as well as areas that are not monitored.

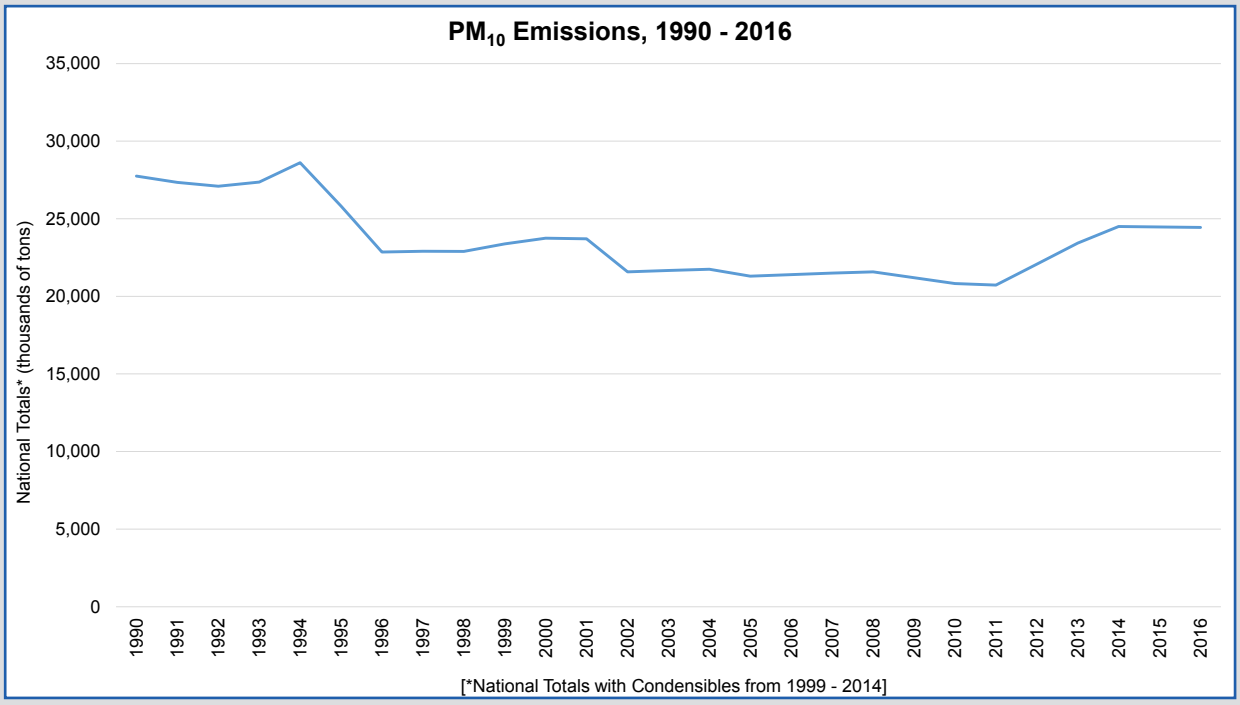


Source: Assistant Commissioner Keith Baugues, IDEM, ***The States' View of the Air***, April 2017.

Coarse Particulate Matter

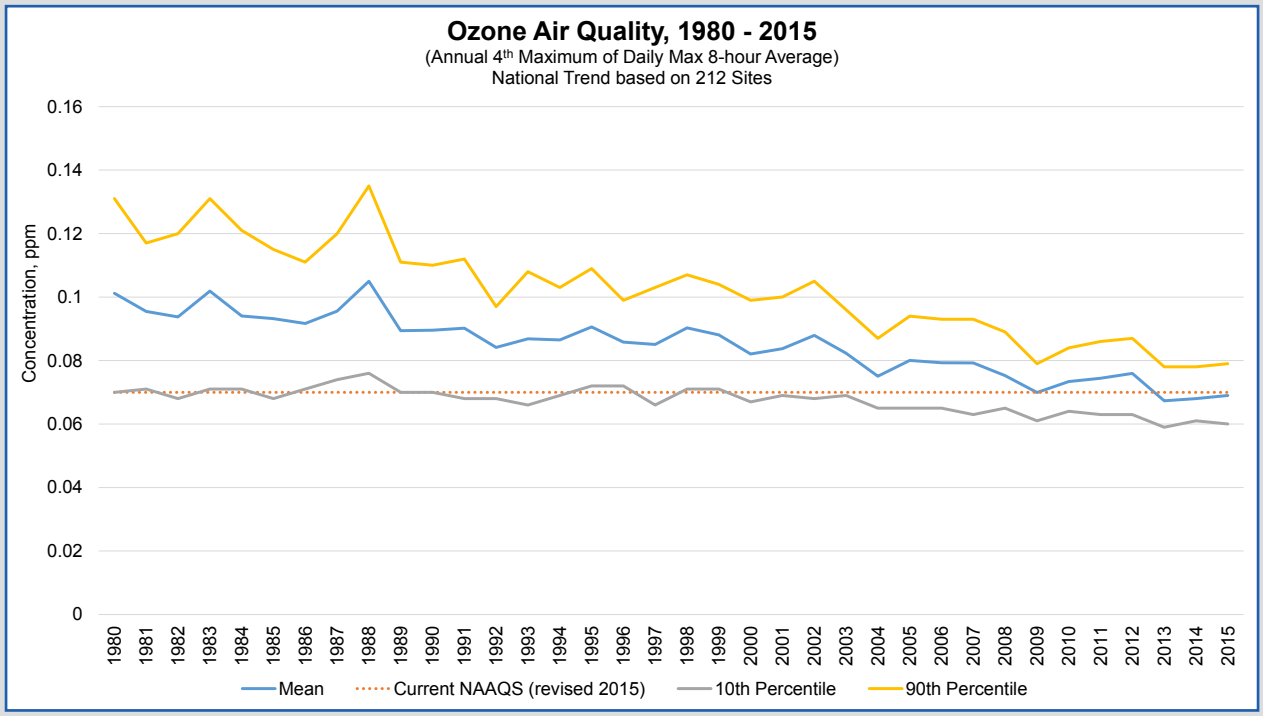


Source: U.S. EPA, **Particulate Matter (PM_{10}) Trends**.



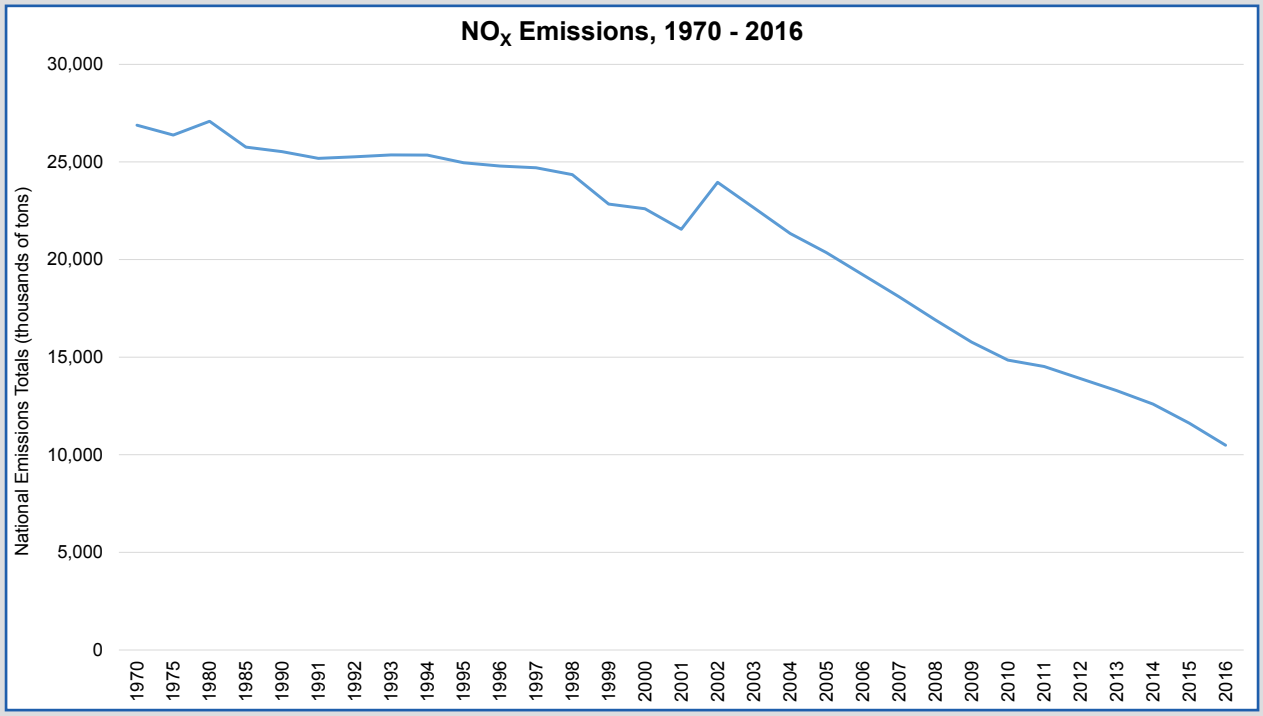
Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: Average Annual Emissions.

Ozone

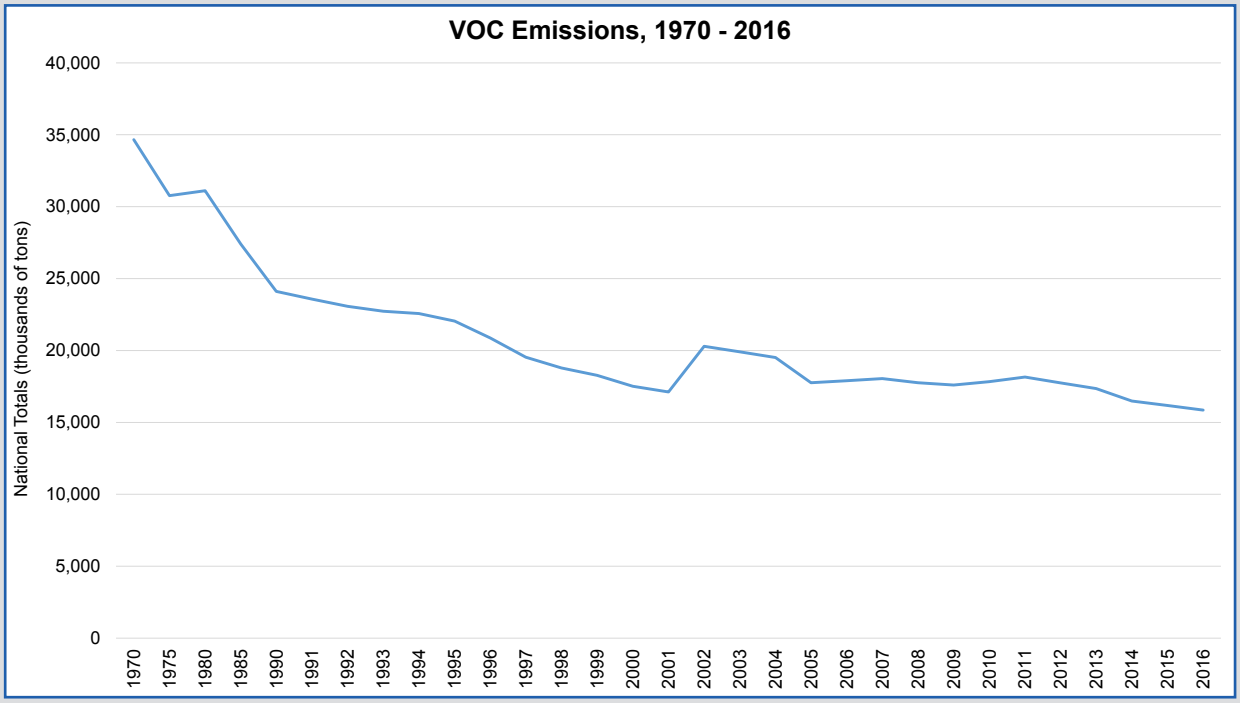


Source: U.S. EPA, **Ozone Trends**.

Ozone Precursor Emissions

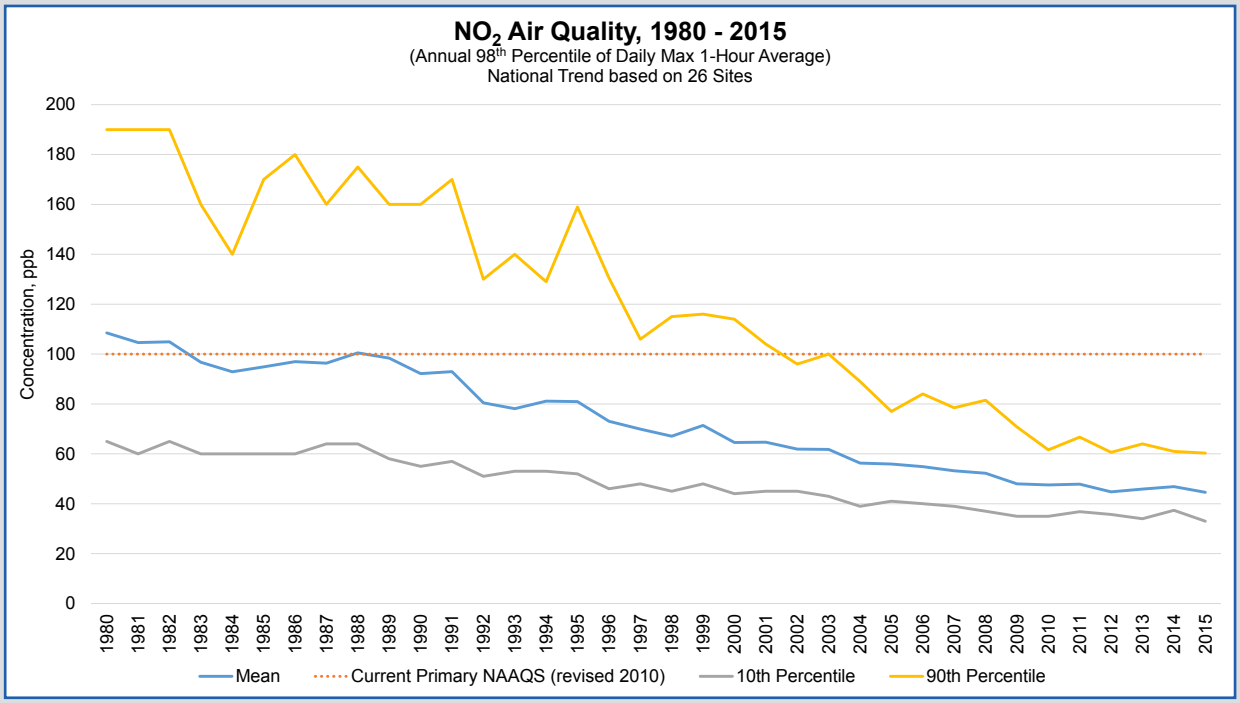


Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: Average Annual Emissions.



Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: Average Annual Emissions.

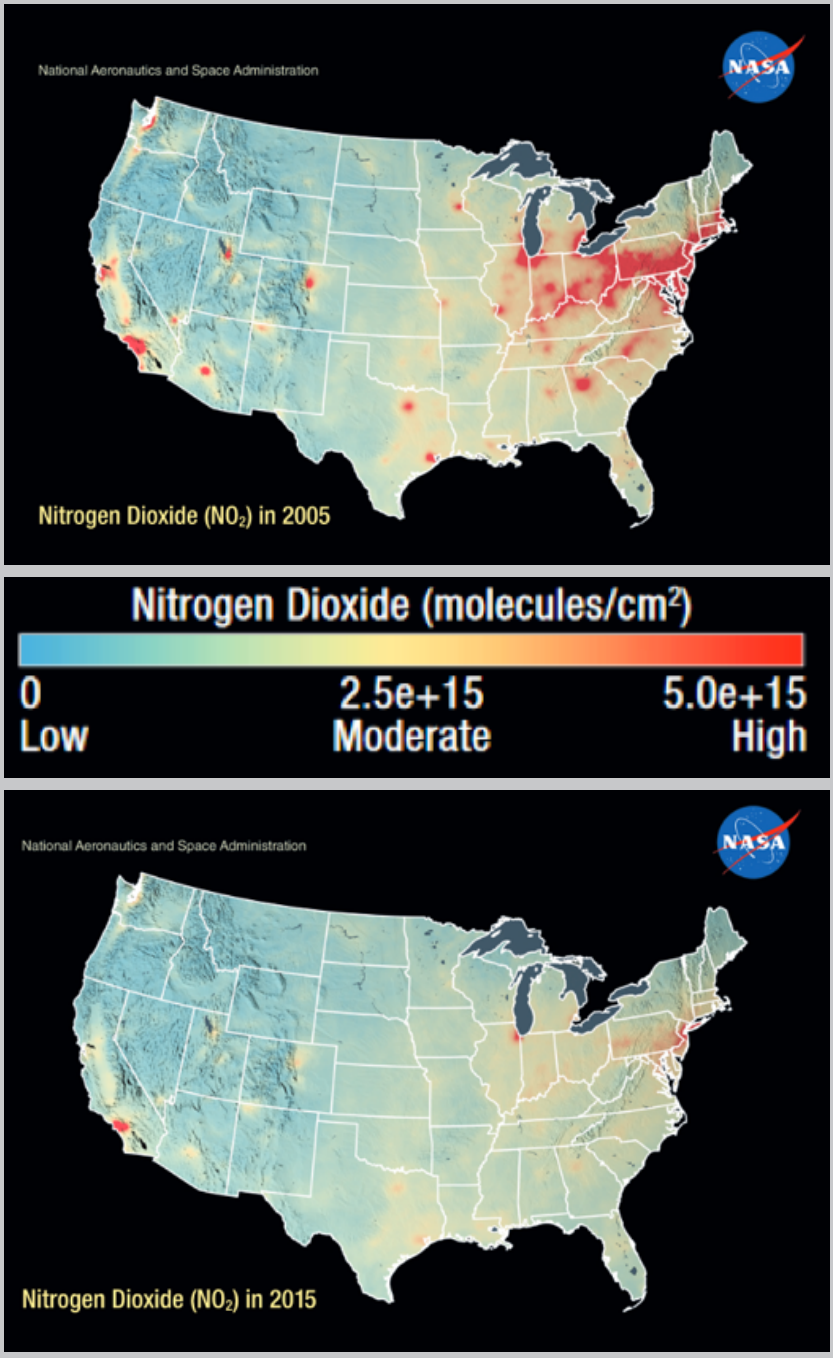
Nitrogen Dioxide



Source: U.S. EPA, **Nitrogen Dioxide Trends.**

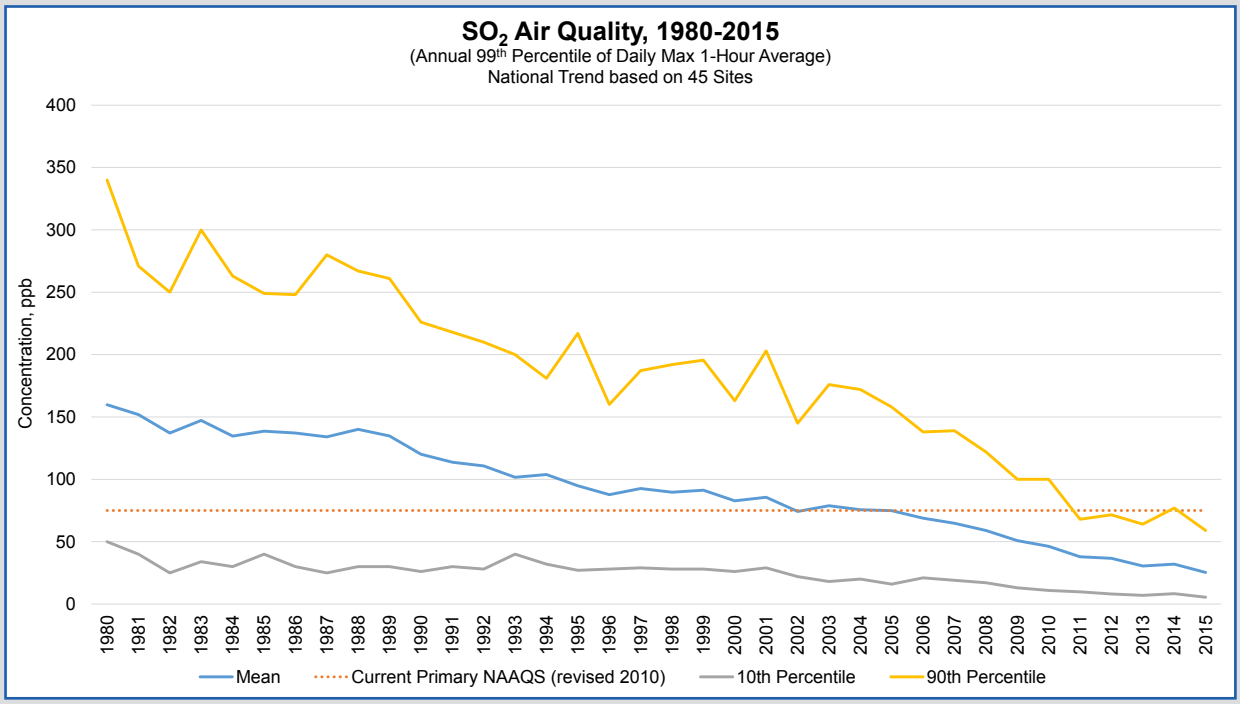
Views from Space: NO_2 Trends in the U.S.

Using the Aura Ozone Monitoring Instrument, the Health and Air Quality Applied Sciences Team (HAQAST) at the National Aeronautics and Space Administration (NASA) mapped the annual mean observations of tropospheric NO_2, showing decreases from 2005 to 2015.

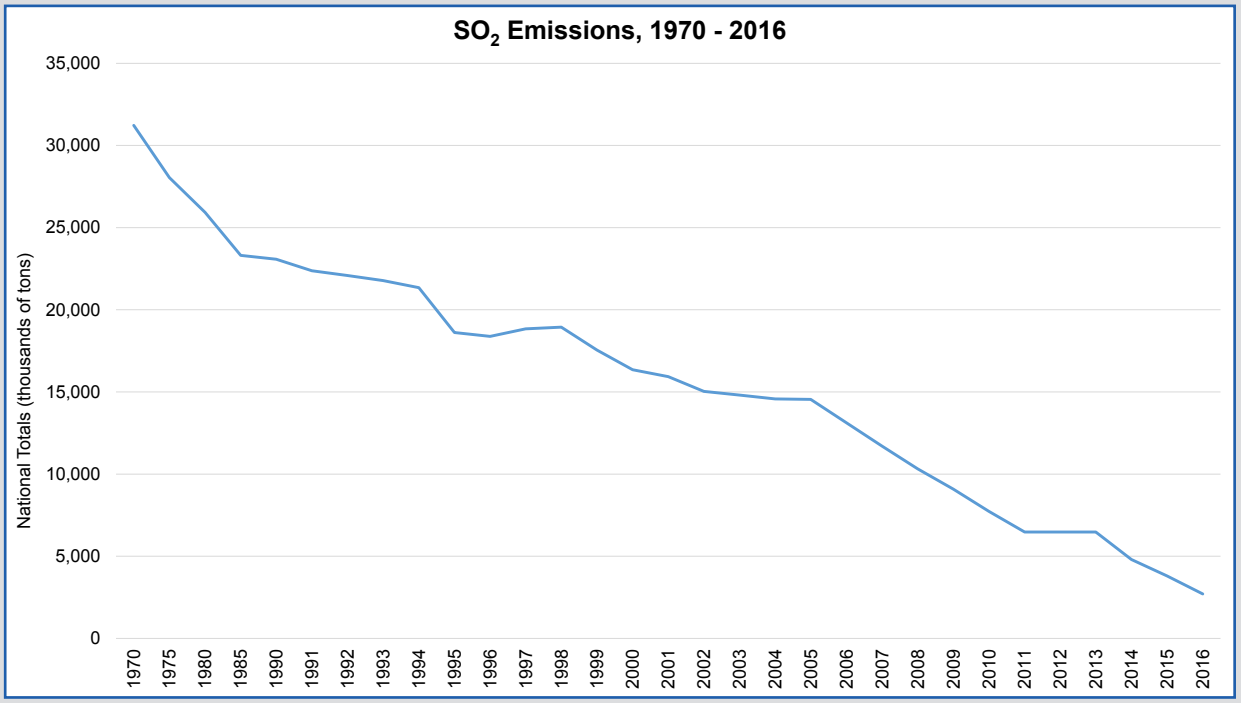


Source: **https://aura.gsfc.nasa.gov/images/outreach/NO2_2005-15_final.pdf**. More information on NASA's HAQAST can be found at: **www.haqast.org**.

Sulfur Dioxide

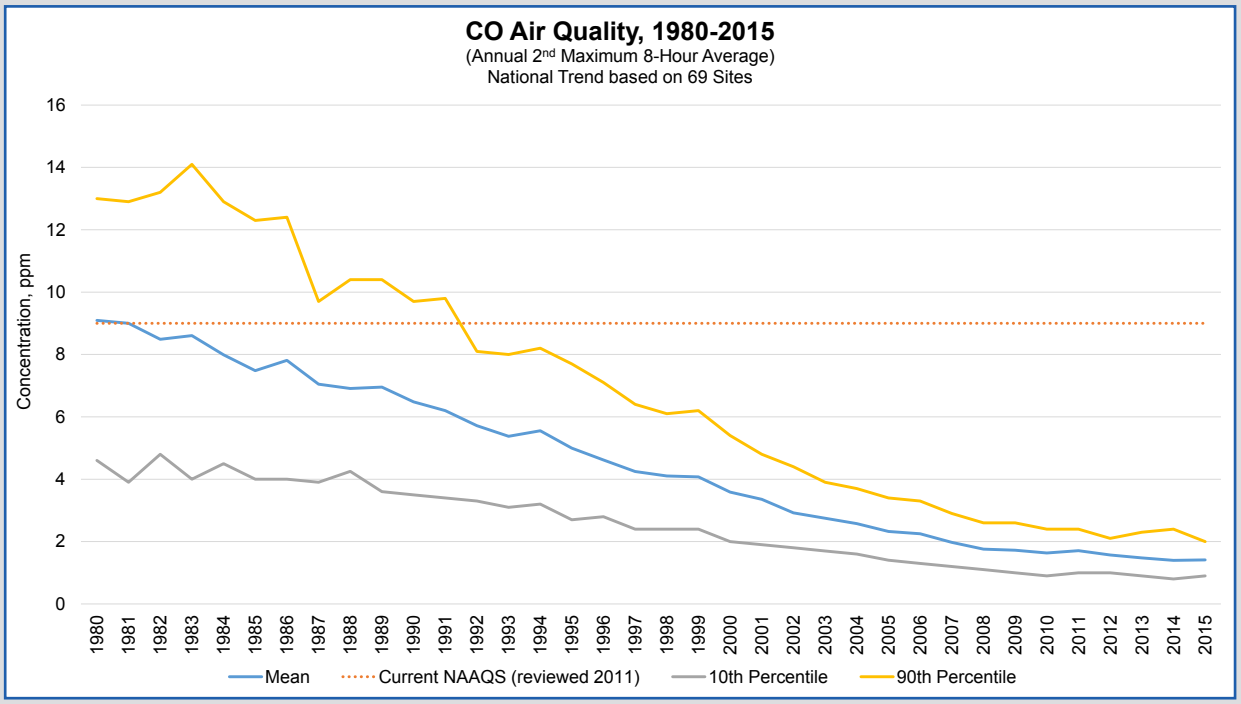


Source: U.S. EPA, **Sulfur Dioxide Trends**.

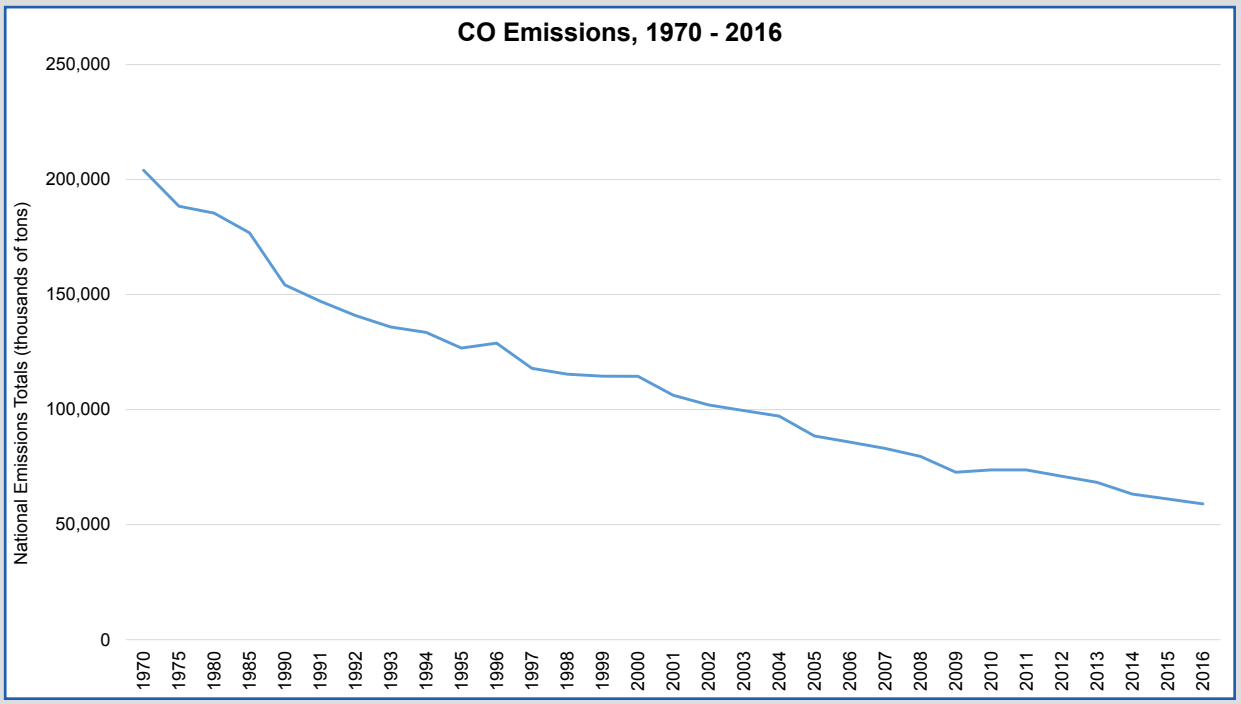


Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: Average Annual Emissions.

Carbon Monoxide

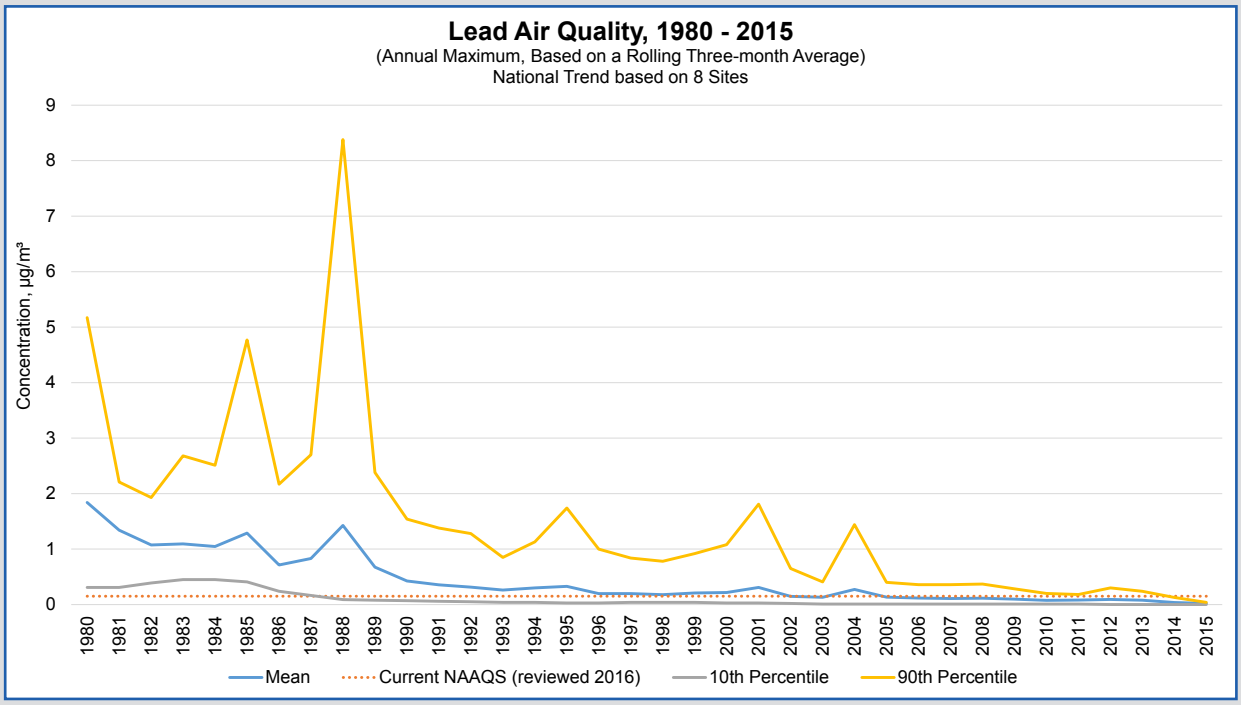


Source: U.S. EPA, **Carbon Monoxide Trends.**



Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: Average Annual Emissions.

Lead

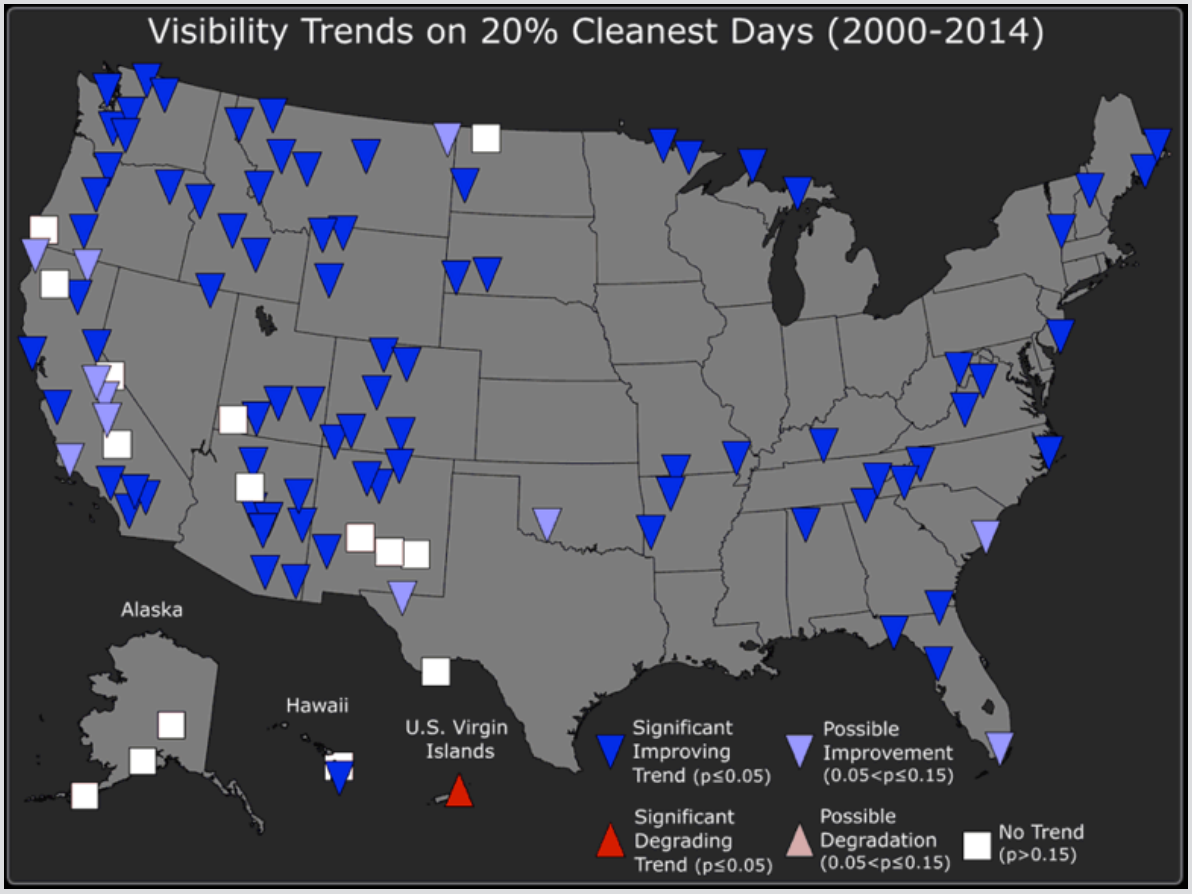


Source: U.S. EPA, **Lead Trends.**

VISIBILITY PROGRESS

Visibility is tracked in 156 national parks and wilderness areas (Class I Areas)[3] in the United States, with progress evaluated based on the 20 percent clearest and 20 percent most impaired days.[4] U.S. EPA's 2016 air trends report maps visibility trends from 2000 through 2014.

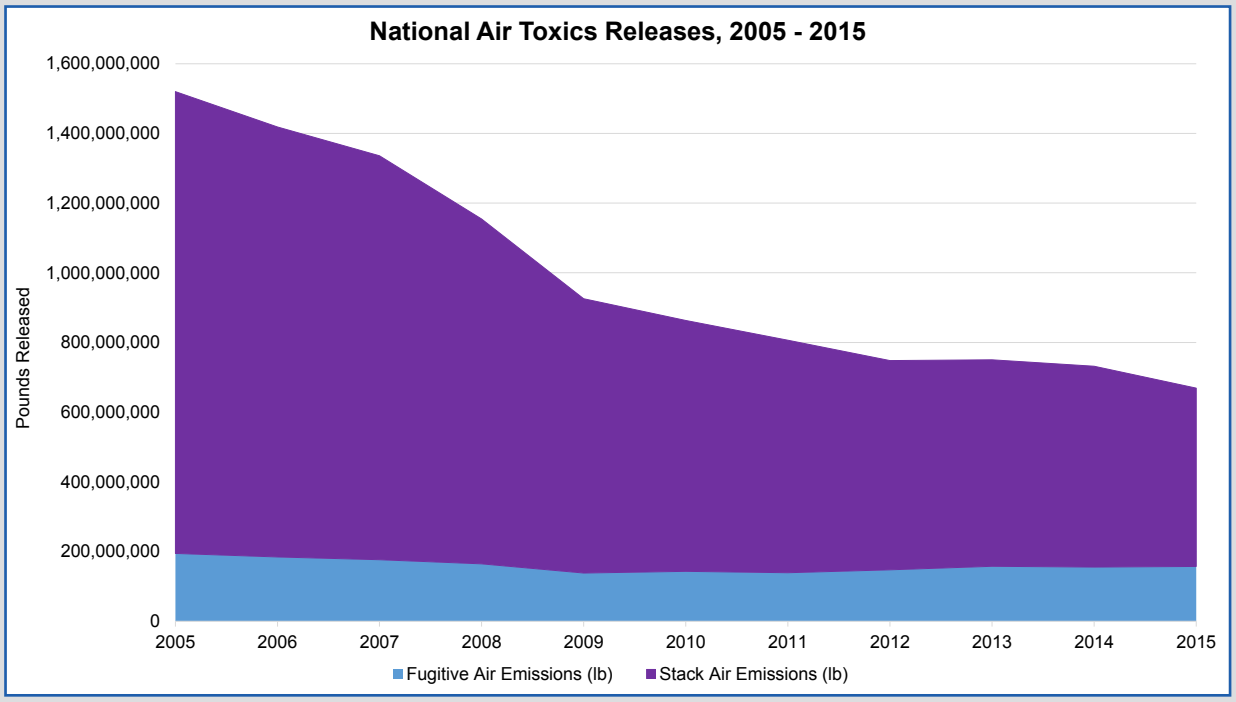
The majority of sites mapped for the 20 percent cleanest days displayed shows a "Significant Improving Trend."[5]



Source: U.S. EPA, ***Our Nation's Air: Status and Trends Through 2015***, Fall 2016. (Section: Visibility Improves in Scenic Areas).

HAZARDOUS AIR POLLUTANT TRENDS

U.S. EPA tracks 187 hazardous air pollutants, or air toxics. The 2015 *Toxic Release Inventory National Analysis* documents a 56 percent reduction in air releases compared to 2005, from 1,520,015,772 pounds in 2005 to 668,893,312 pounds in 2015.[6] The Toxic Release Inventory tracks by point source and fugitive air emissions,[7] which are reported by industry to EPA as required by the Emergency Planning and Community Right-to-Know Act (EPCRA).[8] Nearly 22,000 facilities reported to the Toxic Release Inventory in 2015.



Source: U.S. EPA, ***2015 Toxic Release Inventory National Analysis***, January 2017.

In the 2014 *Report on the Environment*, U.S. EPA provided a summary of ambient concentrations of key air toxics.[9] U.S. EPA's 2011 National-scale Air Toxics Assessment (NATA), released in December 2016, notes that "[n]ationwide, the key pollutants that contribute most to overall cancer risks are formaldehyde, benzene, and acetaldehyde" and that "[m]onitoring data and emissions inventories show overall reductions in air toxics across the country as a result of Clean Air Act programs. Results from the 2011 NATA support this downward trend."[10]

Pollutant	Trend Period	Number of Trend Sites	Percent Change in Average Concentrations over Trend Record
Formaldehyde	2003 - 2013	69	17% decrease
Benzene	2003 - 2013	137	45% decrease
Acetaldehyde	2003 - 2013	67	28% decrease
Carbon tetrachloride	2003 - 2013	111	3% increase
1,3-Butadiene	2003 - 2013	109	53% decrease
Hexavalent chromium (in TSP)	2005 - 2012	14	45% decrease
Arsenic (in PM_{10})	2005 - 2013	23	39% decrease
Tetrachloroethylene	2003 - 2013	117	73% decrease

Recent Headlines from the U.S. Energy Information Administration

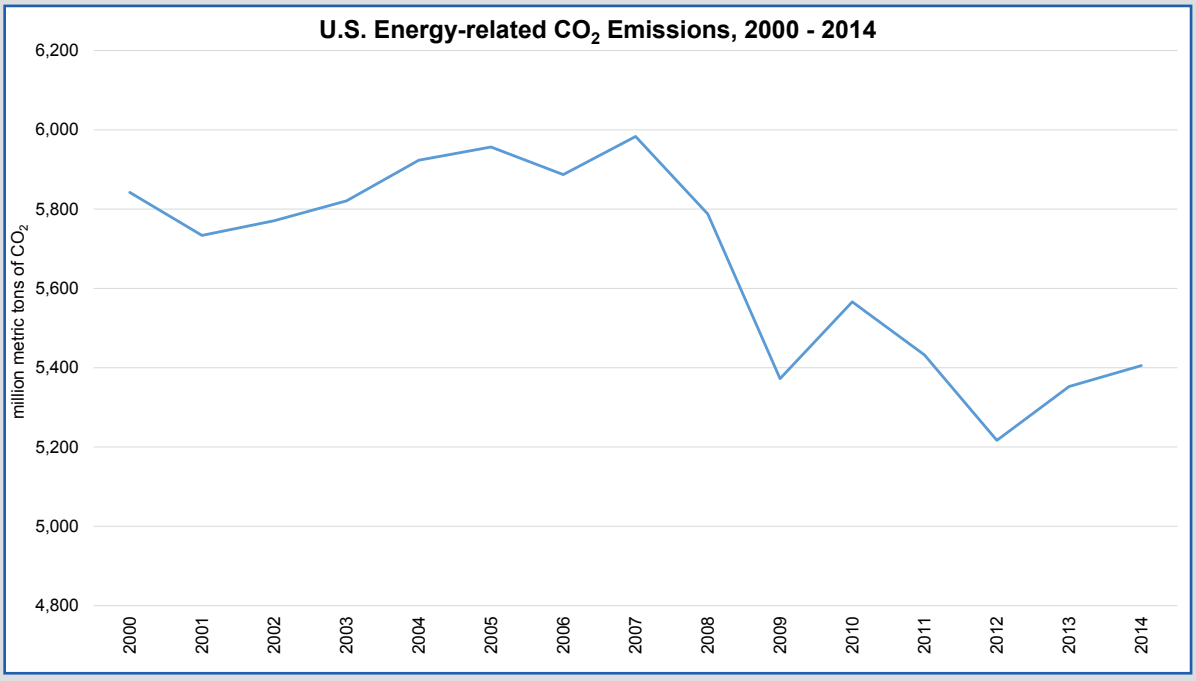
- **U.S. crude oil imports increased in 2016**, April 11, 2017
- **U.S. Energy-related carbon dioxide emissions decreased 2.7% in 2015**, March 16, 2017
- **Sulfur dioxide emissions from U.S. power plants have fallen faster than coal generation**, February 3, 2017
- **Power sector carbon dioxide emissions fall below transportation sector emissions**, January 19, 2017
- **Energy-related CO_2 emissions for first six months of 2016 are lowest since 1991**, October 12, 2016
- **Renewables share of North America electricity mix expected to rise**, August 2, 2016
- **Projected growth in CO_2 emissions driven by countries outside the OECD**, May 16, 2016
- **U.S. energy-related carbon dioxide emissions in 2015 are 12% below their 2005 levels**, May 9, 2016
- **Energy-related carbon dioxide emissions decreased in nearly every state from 2005 to 2013**, November 23, 2015
- **Vehicle standards around the world aim to improve fuel economy and reduce emissions**, October 30, 2015

GREENHOUSE GAS TRENDS

Since 1990, U.S. EPA has reported "total annual U.S. emissions and removals by source, economic sector, and greenhouse gas" via the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*. To compile the report, the Agency relies on "national energy data, data on national agricultural activities, and other national statistics to provide a comprehensive accounting of total greenhouse gas emissions for all man-made sources in the United States."[11]

Data from EPA's 2016 inventory showed that greenhouse gas "emissions in 2014 were 9 percent below 2005 levels," nearly one percent reduction per year on average of over that period.[12] When looking at a breakdown by greenhouse gas in 2014, CO_2 constituted approximately 81 percent of total greenhouse gas emissions; methane was second, representing about 11 percent of greenhouse gas emissions. From 1990 to 2014, methane emissions fell by 5.6 percent.[13]

The electricity sector accounts for about 30 percent of total greenhouse gas emissions.[14] Since the year 2000, energy-related CO_2 emissions have fallen 7.5 percent. U.S. EIA's January 2017 analysis *Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014* reports that per capita energy-related CO_2 emissions are down by more than 18 percent and energy intensity by state is down by nearly 22 percent.[15]



Source: U.S. EIA, ***Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014***, January 17, 2017.

Section Notes

[1] The Air Quality – National Summary portion of EPA's 2016 Air Trends Report can be found at: **https://www.epa.gov/air-trends/air-quality-national-summary**.

[2] **https://www.epa.gov/air-trends/air-quality-national-summary#Emissions Trends**.

[3] A full list of Class I Areas, including the Federal Land Manager, can be found at **https://www.epa.gov/visibility/list-156-mandatory-class-i-federal-areas**.

[4] In addition to EPA, other Federal agencies responsible for addressing visibility are the National Park Service, the U.S. Forest Service, and the U.S. Fish and Wildlife Service.

[5] U.S. EPA, ***Our Nation's Air: Status and Trends Through 2015***, Fall 2016. (Section: Visibility Improves in Scenic Areas).

[6] U.S. EPA, ***2015 Toxic Release Inventory National Analysis***, January 2017.

[7] "Fugitive air emissions are all releases to air that don't occur through a confined air stream, such as equipment leaks, releases from building ventilation systems and evaporative losses from surface impoundments and spills. Point source air emissions, also called stack emissions, are releases to air that occur through confined air streams, such as stacks, ducts or pipes." **https://www.epa.gov/toxics-release-inventory-tri-program/descriptions-tri-data-terms-text-version#Air Releases (On Site)**.

[8] More information about EPCRA can be found at: **https://www.epa.gov/epcra**. EPA also notes that the Pollution Prevention Act "requires facilities to submit information on pollution prevention and other waste management activities of Toxic Release Inventory chemicals."

[9] U.S. EPA, ***Report on the Environment***, 2015. (Section: Ambient Concentrations of Selected Air Toxics).

[10] U.S. EPA, ***2011 NATA: Assessment Results***, 2016.

[11] U.S. EPA, **Greenhouse Gas Emissions**. U.S. EPA also states that the Agency "also collects greenhouse gas emissions data from individual facilities and suppliers of certain fossil fuels and industrial gases through the Greenhouse Gas Reporting Program."

[12] U.S. EPA, ***U.S. Greenhouse Gas Inventory Report: 1990-2014***, April 2016. The ***Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015*** was published online in early 2017. The draft inventory shows an additional 2.2 percent reduction in Greenhouse gas emissions from 2014 to 2015.

[13] U.S. EPA, "**Fast Facts from the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2014**," April 2016.

[14] U.S. EPA, ***U.S. Greenhouse Gas Inventory Report: 1990-2014***, April 2016.

[15] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions at the State Level, 2000-2014***, January 17, 2017.

Other Air Quality Resources

If you are interested in finding out more about air quality in your area, state and local air agencies are an outstanding resource. Below are links to AAPCA Member Agencies:

Alabama Department of Environmental Management
Arizona Department of Environmental Quality
Arkansas Department of Environmental Quality
Florida Department of Environmental Protection
Georgia Environmental Protection Division
Indiana Department of Environmental Management
Kentucky Department for Environmental Protection
Louisiana Department of Environmental Quality
Maine Department of Environmental Protection
Mississippi Department of Environmental Quality
Nevada Division of Environmental Protection
North Carolina Department of Environmental Quality
North Dakota Department of Health
Ohio Environmental Protection Agency
South Carolina Department of Health and Environmental Control
Tennessee Department of Environment & Conservation
Texas Commission on Environmental Quality
Virginia Department of Environmental Quality
West Virginia Department of Environmental Protection
Wyoming Department of Environmental Quality
Canton City Health Department (Ohio)
El Dorado County Air Quality Management District (California)
Forsyth County Office of Environmental Assistance and Protection (North Carolina)
Fort Worth Environmental Management Department (Texas)
Galveston County Health District (Texas)
Huntsville Division of Natural Resources and Environmental Management (Alabama)
City of Indianapolis (Indiana)
Jefferson County Department of Health (Alabama)
Knox County (Tennessee)
Louisville Metro Air Pollution Control District (Kentucky)
Manatee County Environmental Management Department (Florida)
Mecklenburg County (North Carolina)
Mojave Desert Air Quality Management District (California)
Nashville/Davidson Metro Public Health Department (Tennessee)
Omaha Air Quality Control (Nebraska)
San Joaquin Valley Air Pollution Control District (California)
Shelby County Health Department (Tennessee)
Toledo Division of Environmental Services (Ohio)
Ventura County Air Pollution Control District (California)
Western North Carolina Regional Air Quality Agency (North Carolina)
Yolo-Solano Air Quality Management District (California)

Additional Air Quality Resources
Indiana Department of Environmental Management's ***The States' View of the Air***
U.S. EPA's **Air Quality Trends** website
U.S. EPA's Nonattainment Areas for Criteria Pollutants (***Green Book***)
U.S. EPA's **Report on the Environment (ROE)** website
U.S. EPA's **Air Quality Index (AQI)**