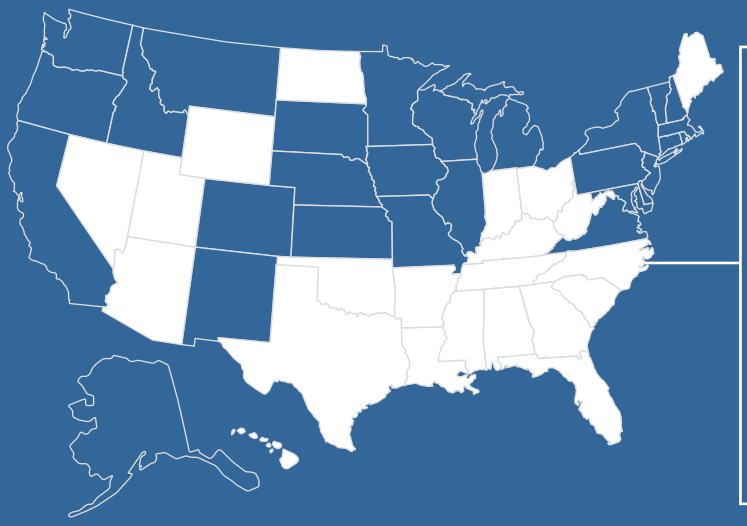
AAPCA
THE ASSOCIATION OF AIR POLLUTION CONTROL AGENCIES

State Air Trends & Successes: *The StATS Report*

2019 EDITION

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 45 state and local air agencies, and senior officials from 22 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
Hawaii
Indiana
Kentucky
Louisiana
Maine
Mississippi
Nevada
North Carolina
North Dakota
Ohio
Oklahoma
South Carolina
Tennessee
Texas
Utah
West Virginia
Wyoming

Footprint of AAPCA State Members

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

- An estimated 144 million Americans, nearly 45 percent of the **total U.S. population**;
- An **average population growth** from 2000 – 2018 of approximately 23 percent, compared to national population growth of 16 percent;
- Nearly 40 percent of **U.S. Gross Domestic Product**;
- Approximately 45 percent of **U.S. Total Manufacturing Output** and 5.6 million manufacturing jobs;
- 63 percent of **total energy production** in the United States, including:
  - 56 percent of **total net electricity generation**;
  - 47 percent of **wind generation**;
  - 77 percent of **coal production**;
  - 75 percent of **crude oil production**;
  - 66 percent of **natural gas production**;
- More than 66 percent of **U.S. operable petroleum refining capacity**; and,
- An estimated 45 percent of **Highway Vehicle-Miles Traveled**.

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FOREWORD

Dear Readers,

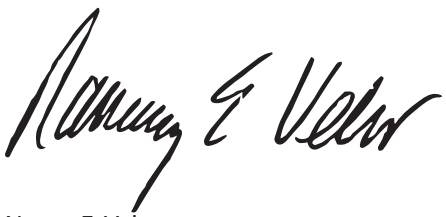
As the nation celebrates this 49th Earth Day and the importance of the natural environment, it is also a time to reflect on the tremendous environmental progress that has been made in the United States. Americans today enjoy cleaner water and air than they did 50 years ago, and trends show the environment will continue to benefit from the protections provided by state, local, and federal planning. Perhaps there is no greater evidence of this progress than the nation's air quality, where state and local agencies, including the membership of the Association of Air Pollution Control Agencies (AAPCA), have dedicated significant time and resources to their missions.

AAPCA is a consensus-driven organization of 47 state and local air agencies focused on assisting members with implementation of technical issues associated with the federal Clean Air Act. AAPCA's Board of Directors is comprised of senior officials from 22 geographically diverse Member States' environmental protection agencies. This diversity strengthens our members' ability to learn new perspectives that help foster the development of creative and innovative methods to addressing air quality. Consensus principles encourage and promote each of our members' abilities to focus on common, core issues faced with implementing the Clean Air Act, and communicating and working with federal co-regulator partners to address those issues. This approach provides AAPCA's members important information as they develop sensible and localized strategies to address air pollution issues in their states and localities.

As AAPCA's current president, I am excited to present our annual publication, newly titled in 2019 as State Air Trends & Successes: The StATS Report. State and local air quality agencies are responsible for making complex planning decisions affecting air quality in their communities. In detailing air quality progress and the role of air agencies, The StATS Report highlights the importance of understanding unique social and economic factors in forming strategies that best address air pollution issues while accommodating economic and population growth. That progress is evident in a variety of air quality measures and indicators, including:

- From 1970 to 2017, a 73 percent reduction in the combined emissions of the six criteria air pollutants for which there are national ambient air quality standards.
- From 1990 to 2016, electricity sector emissions of nitrogen oxide were reduced more than 80 percent and electricity sector sulfur dioxide emissions were reduced 91 percent.
- Nearly two-thirds of the national reduction in reported toxic chemical air releases from 2007 to 2017 were achieved by AAPCA Member States.
- AAPCA Member States reduced the aggregate emissions of the six criteria air pollutants by 54 percent, while experiencing a 263 percent increase in Gross Domestic Product, a 58 percent increase in vehicle miles traveled, and a 44 percent increase in population.
- In the electricity sector, AAPCA Member States accounted for more than 60 percent of nitrogen oxide emissions reductions in the United States from 1990 to 2016.

These statistics, and the other metrics catalogued in this report, convey the remarkable improvements in air quality that have been made. As Air Directors, we acknowledge that our work is not done. We will continue to engage with our federal partners and other stakeholders to continue this progress.



Nancy E. Vehr

Air Quality Administrator, Wyoming Department of Environmental Quality

President, AAPCA

INTRODUCTION: THE STORY OF AIR QUALITY STATISTICS IN THE UNITED STATES

Next year, the United States will celebrate a major environmental milestone: 50 years since the establishment of the Clean Air Act amendments of 1970. This milestone will be laudable not simply due to the passage of five decades, but because of the remarkable improvements in air quality that have been achieved over that time. From ambient pollution concentrations to air toxics releases, there has been definable progress in virtually every measure of air quality. Even more notable is that this progress has come alongside exponential growth in the nation's population and economy – a narrative that previous editions of this report have described as "the greatest story seldom told."

Using publicly available data from agencies like the U.S. Environmental Protection Agency (EPA), this report by the Association of Air Pollution Control Agencies (AAPCA) catalogues air quality metrics and trends that demonstrate this progress. These positive trends are reflected in criteria air pollutant concentrations, compliance and enforcement statistics, and in visibility data from national parks, to name a few. Where applicable to provide context, this report also tracks the trend lines of economic and social growth indicators.

STATE AND LOCAL AIR AGENCIES: EXPERTS ON THE GROUND

Recognizing the vital, complex work done at the state and local level is key to understanding how the United States has made tremendous strides in improving air quality. Under the federal Clean Air Act, state and local air agencies are responsible for developing and implementing plans to meet air quality standards. In concert with detailed technical analyses, state agency planning and decision-making that responds to unique social and economic factors can better develop sensible, localized strategies that best address air pollution issues.

This is the first year that AAPCA is releasing this publication as *State Air Trends & Successes: The StATS Report*, an evolution that seeks to establish the annual nature of the report, underscore the technical work and data that inform the document, and affirm the role of cooperative federalism defined in the Clean Air Act. The report also includes information on local agencies that are members of AAPCA, which serve a critical role in ensuring healthy air for their communities.

MEASURABLE SUCCESS IN THREE PARTS

As with **previous editions** of this publication, *The StATS Report* details air quality progress in multiple sections: trends and leadership in AAPCA Member States; the international context of America's air quality; and, several long-term national trends in air pollution control. While each of these chapters provide slightly different starting points for analyzing air quality improvement in the United States, the overarching narrative of significantly cleaner air remains the same throughout.

The first section, "Air Quality Success in AAPCA Member States," highlights the 22 states that serve on the AAPCA Board of Directors. AAPCA Member States have substantially improved air quality in their jurisdictions while experiencing above-average growth and economic activity. In many areas, these states have outperformed national metrics and provided leadership on air quality issues.

The report's second section, "American Leadership in Air Quality," aims to provide some international context for air quality in the United States. The U.S. is the world's largest economy and ranks third in terms of population, and yet has been able to dramatically reduce emissions and concentrations of air pollutants.

The third and final section of this report, "Air Quality Trends in the United States," details the key trends and metrics of air pollution control in the U.S., all of which demonstrate measurable and substantial improvement.

COMMUNICATING AIR QUALITY SUCCESS

The remarkable progress in U.S. air quality over the past 50 years seems to be mismatched with public perception. Though not a definitive accounting of public opinion, Gallup's annual "**Environment**" poll provides the following data since 2001:

- Respondents that "personally worry about the quality of the environment" a "Great deal" or "Fair amount" historically hovering near 70 percent;
- Similarly, around 70 percent of those polled personally worry about "Air pollution" a "Great deal" or "Fair amount";
- Between 40 and 50 percent of respondents have indicated that the "overall quality of the environment in this country" is "Only fair," with seldom more than 40 percent responding "Good"; and,
- The percentage of those polled stated that the "environment in the country as a whole" is "Getting worse" has been consistently higher over that period than those responding that it is "Getting better."

The StATS Report aims to help fill the above gaps between public perception regarding air quality and the definable progress that has been achieved as well as be a complement to the tremendous work done at the state and local levels. Improvement is ongoing, and state and local air agencies will continue to be at the forefront of critical planning processes that establish environmental priorities based on technical expertise, community engagement, and localized information. With stable, adequate resources, state and local air agencies can continue to perform the vital role provided by the Clean Air Act's framework of cooperative federalism.

TYPES OF AIR QUALITY DATA AND METRICS

Ambient air quality can be measured in a variety of ways, but an important set of indicators are the air pollutants that are regulated under the federal Clean Air Act. The Clean Air Act directs the U.S. Environmental Protection Agency (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 differ in 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 is 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 [SIPs] for non-attainment areas, perform modeling for permit review analysis, and 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. Primary sources that inform this report include:

- Criteria air pollutant concentration data that 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 are 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 (NEI). The NEI 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 are computed and published annually by U.S. EPA and defined 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 wilderness areas, and greenhouse gases. For hazardous air pollutants, the Toxic Release Inventory (TRI) provides a consistent trend over time.[9] Information on visibility progress can be found in U.S. EPA's annual Air Quality Trends Report.[10] Greenhouse gas data are 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) annual report Energy-Related Carbon Dioxide Emissions at the State Level.[12]

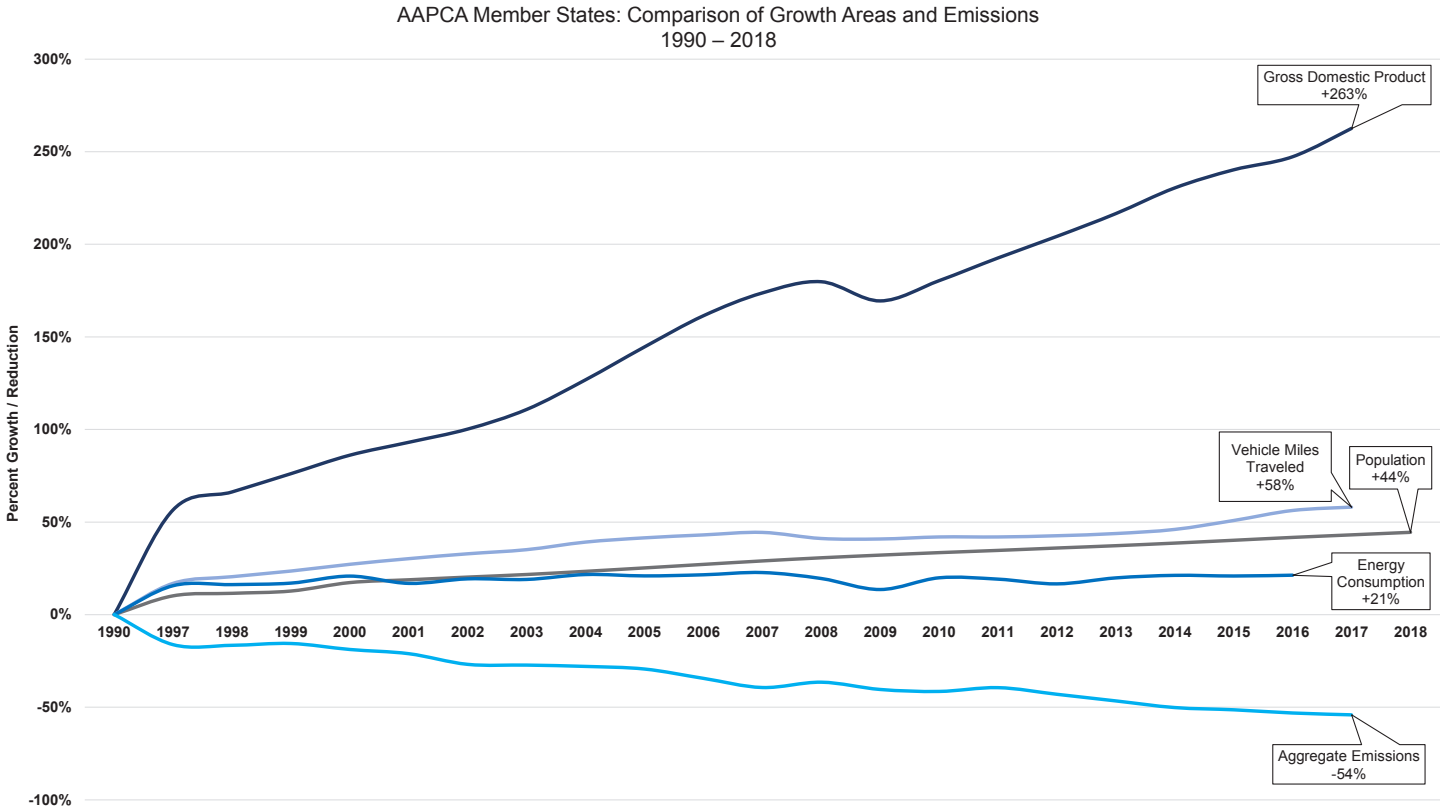
[1] 42 U.S.C. §7409(b)(1).
[2] A chart of the primary and secondary NAAQS by pollutant can be found **here**.
[3] 42 U.S.C. §7409.
[4] U.S. EPA, **Air Quality System**. EPA notes that the AQS "also contains meteorological data, descriptive information about each monitoring station (including its geographic 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 – 2017 data show the trends for Tier 1 categories which distinguish pollutant emission contributions among major source types … As inventory methods are improved over time, for some emission sources and improved estimation method may be applied 'backwards' to previous year trend estimates."
[7] More information on the NEI can be found **here**. Version 2 released February 2018.
[8] U.S. EPA, **Air Quality Design Values**.
[9] U.S. EPA, ***2017 Toxic Release Inventory National Analysis***, January 2018.
[10] U.S. EPA, **National Air Quality: Status and Trends of Key Air Pollutants**. Last Updated July 31, 2018.
[11] U.S. EPA, ***Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2017***, April 2019.
[12] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2005 – 2016***, February 27, 2019.

AIR QUALITY SUCCESSES IN AAPCA MEMBER STATES

AAPCA MEMBER STATES: GROWTH INDICATORS AND EMISSIONS REDUCTIONS

From 1990 through 2017, AAPCA Member States were responsible for a 54-percent reduction in the combined emissions of the six criteria air pollutants for which there are national ambient air quality standards (NAAQS).[1] While overseeing these emissions reductions, AAPCA Member States experienced the following growth in economic and social indicators since 1990:

- Through 2017, a 263-percent increase in Gross Domestic Product (GDP), including accounting for nearly 40 percent of total U.S. GDP in 2017[2];
- A 58-percent increase in vehicle miles traveled through 2017[3];
- A 44-percent increase in population, representing nearly 45 percent of the total U.S. population in 2017[4]; and,
- A 21-percent increase in energy consumption from 1990 to 2016, while producing more than 60 percent of total U.S. energy in 2016.[5]



Sources: Bureau of Economic Analysis, data **available here**; U.S. Office of Highway Policy Information, data **available here**; U.S. Census Bureau, data available **here**; U.S. EIA, **State Energy Data System (SEDS): 1960-2016**; U.S. EPA, **Air Pollutant Emissions Trends**. Data file: "State Average Annual Emissions Trend."

"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."

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

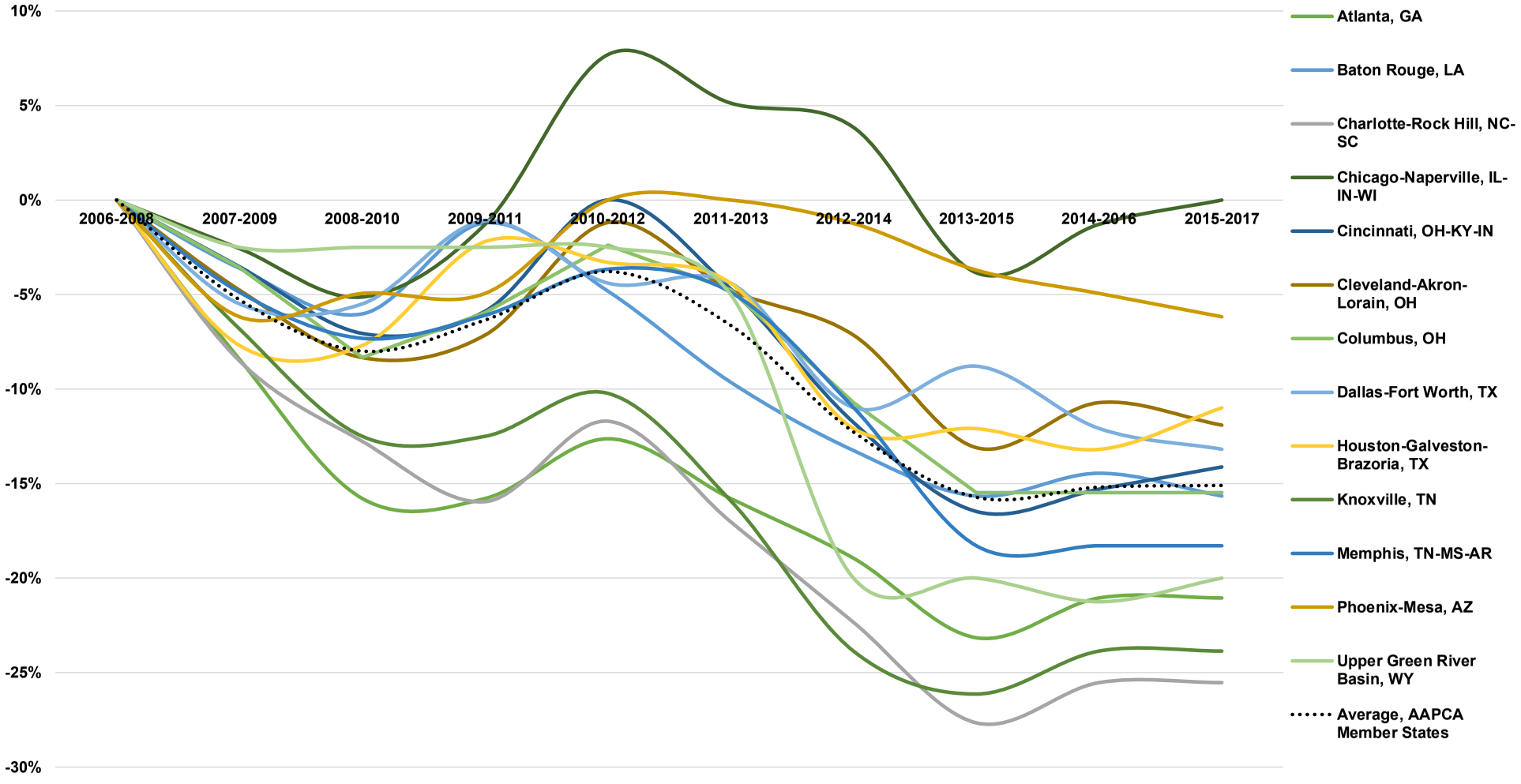
According to U.S. EPA's online *Green Book*, there were 46 areas in the United States designated nonattainment or maintenance for the 2008 8-hour ozone national ambient air quality standard (NAAQS) of 0.075 parts per million (ppm).[6]

Design values based on monitoring data from U.S. EPA's Air Quality System show that the 13 designated areas located within AAPCA Member States averaged a nearly 15-percent reduction in ambient concentrations of ozone from 2006 to 2017.[7] The table below shows percent reductions in design values for areas previously designated nonattainment in AAPCA Member States over this period.

Designated Area	Percent Reduction in Ozone Concentrations
Atlanta, GA	-21.05%
Baton Rouge, LA	-15.66%
Charlotte-Rock Hill, NC-SC	-25.53%
Chicago-Naperville, IL-IN-WI	0.00%
Cincinnati, OH-KY-IN	-14.12%
Cleveland-Akron-Lorain, OH	-11.90%
Columbus, OH	-15.48%
Dallas-Fort Worth, TX	-13.19%
Houston-Galveston-Brazoria, TX	-10.99%
Knoxville, TN	-23.86%
Memphis, TN-MS-AR	-18.29%
Phoenix-Mesa, AZ	-6.17%
Upper Green River Basin, WY	-20.00%

Source: U.S. EPA, **Air Quality Design Values**. Data file: "Ozone design values, 2017."

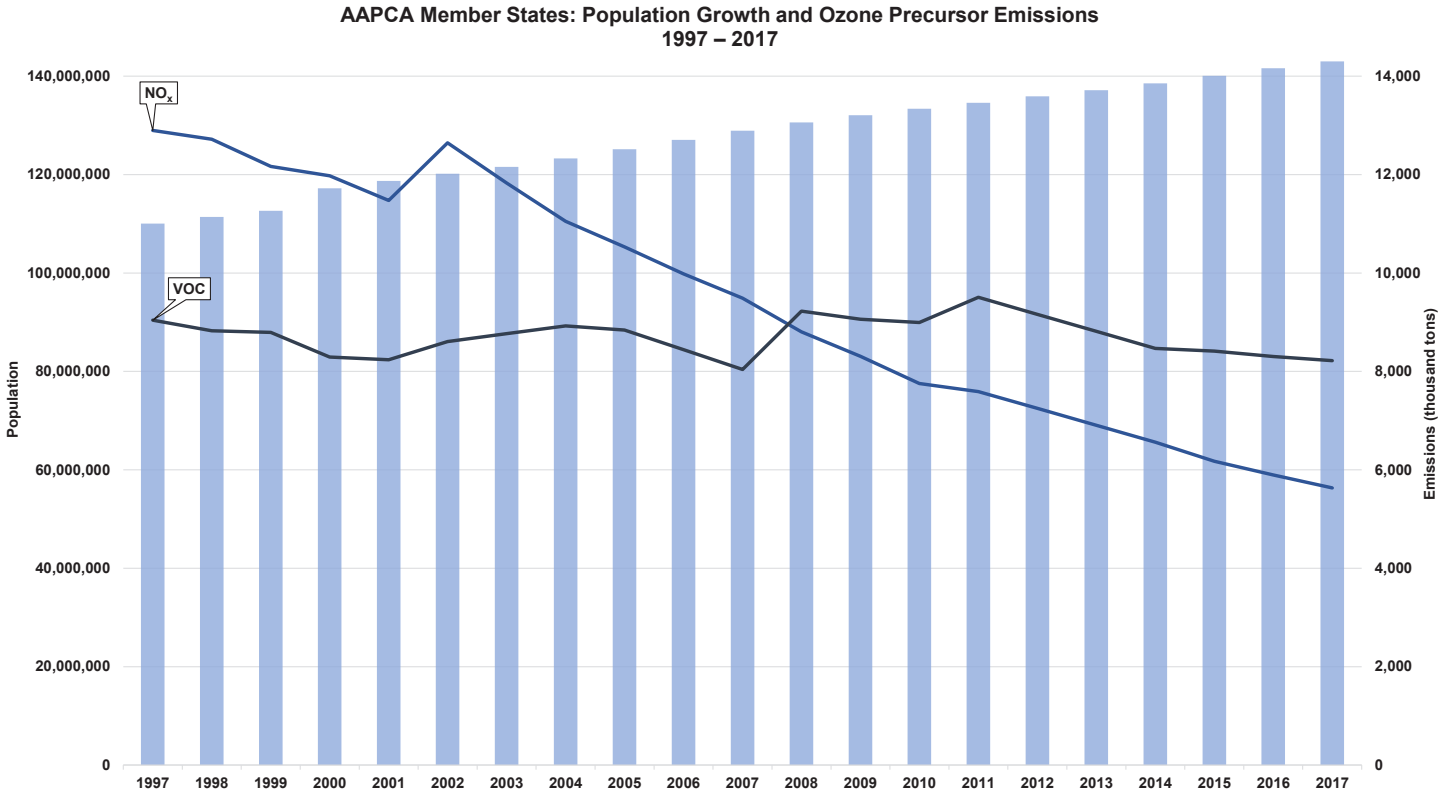
AAPCA Member States: Areas Previously Designated Nonattainment for the 2008 Annual NAAQS for Ozone
Percent Change in Design Value History
2006 – 2017



Source: U.S. EPA, **Air Quality Design Values**. Data file: "Ozone design values, 2017."

AIR QUALITY | OZONE PRECURSOR EMISSIONS

The population in AAPCA Member States has grown by an average of nearly 30 percent over the last two decades, from 110,060,580 people in 1997 to 142,997,543 in 2017,[8] while precursors for ground level ozone have been reduced.[9] During this period of population growth, emissions of NO_x reduced more than 55 percent, from nearly 13 million tons in 1997 to less than 6 million tons in 2017. Similarly, VOC emissions in AAPCA Member States dropped from above 9 million tons to around 8 million tons, a reduction of nearly 10 percent over the same period.[10]



Sources: U.S. Census Bureau: Data **available here**; U.S EPA, Air Pollutant Emissions Trends. Data file: "**State Average Annual Emissions Trend**."

In 2017, the average retail price for electricity in AAPCA Member States was 10.07 cents per kilowatt-hour (cents/kWh), about 0.40 cents/kWh less than the national average of 10.48 cents/kWh – nearly 4 percent more affordable.

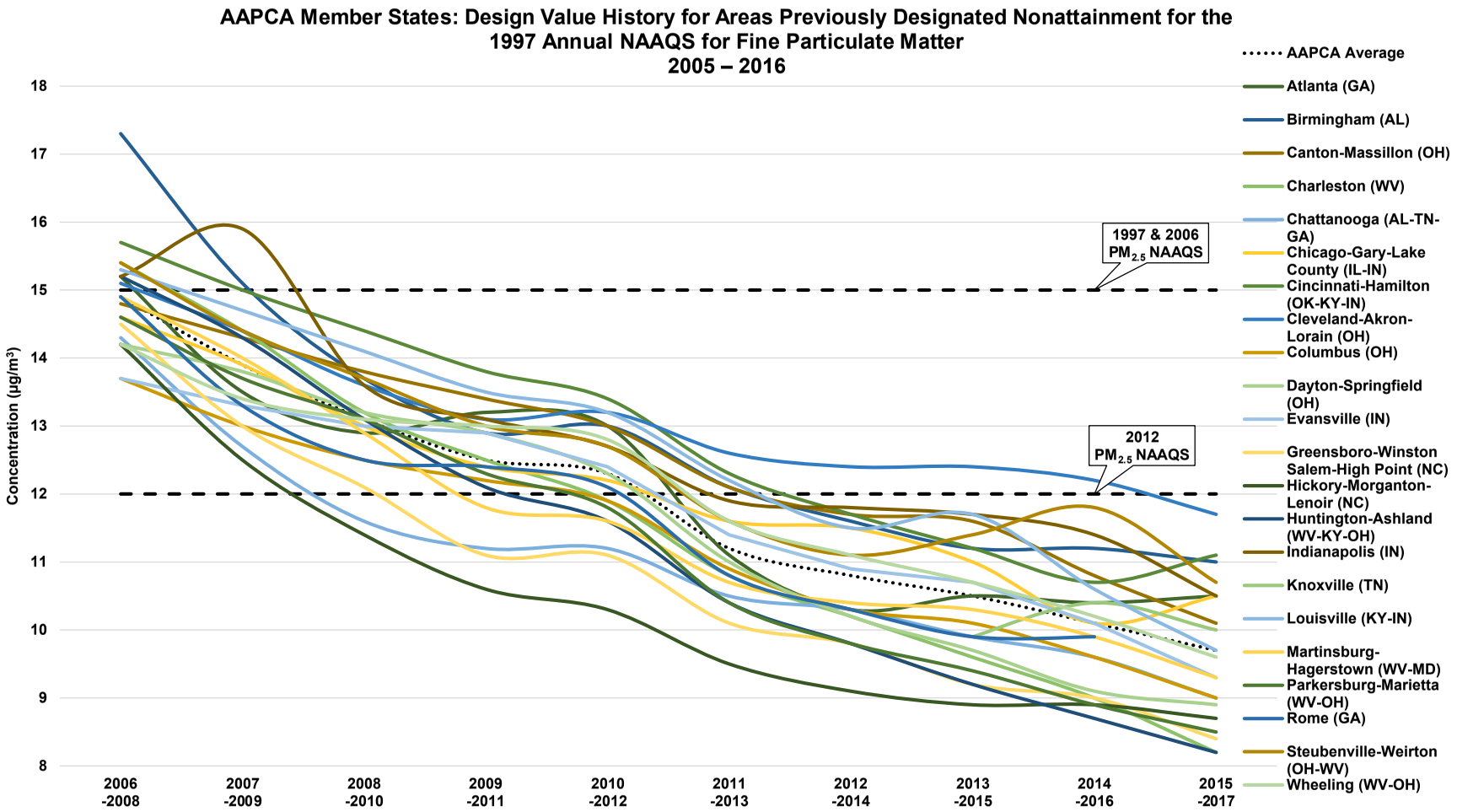
Source: U.S. EIA, "**State Electricity Profiles**," January 8, 2019

AIR QUALITY | FINE PARTICULATE MATTER

U.S. EPA's *Green Book* indicates that there were 39 locations in the United States designated non-attainment for the 1997 fine particulate matter ($PM_{2.5}$) NAAQS of 15 micrograms per cubic meter (µg/m3), as measured by the three-year average annual mean concentration.[11] Of the designated nonattainment areas, 22 were partially or completely located within AAPCA Member States. The table below shows the percent reduction in design values for these locations from 2006 to 2016, with an average reduction of 35 percent.[12]

Designated Area	Percent reduction in $PM_{2.5}$ Concentrations
Atlanta (GA)	-30.92%
Birmingham (AL)	-36.42%
Canton-Massillon (OH)	-31.76%
Charleston (WV)	-46.75%
Chattanooga (AL-TN-GA)	-37.06%
Chicago-Gary-Lake County (IL-IN)	-28.08%
Cincinnati-Hamilton (OK-KY-IN)	-29.30%
Cleveland-Akron-Lorain (OH)	-22.52%
Columbus (OH)	-34.31%
Dayton-Springfield (OH)	-37.32%
Evansville (IN)	-32.12%
Greensboro-Winston Salem-High Point (NC)	-42.07%
Hickory-Morganton-Lenoir (NC)	-38.73%
Huntington-Ashland (WV-KY-OH)	-46.05%
Indianapolis (IN)	-30.92%
Knoxville (TN)	-37.50%
Louisville (KY-IN)	-36.60%
Martinsburg-Hagerstown (WV-MD)	-37.58%
Parkersburg-Marietta (WV-OH)	-41.78%
Rome (GA)	-33.56%
Steubenville-Weirton (OH-WV)	-30.52%
Wheeling (WV-OH)	-32.39%

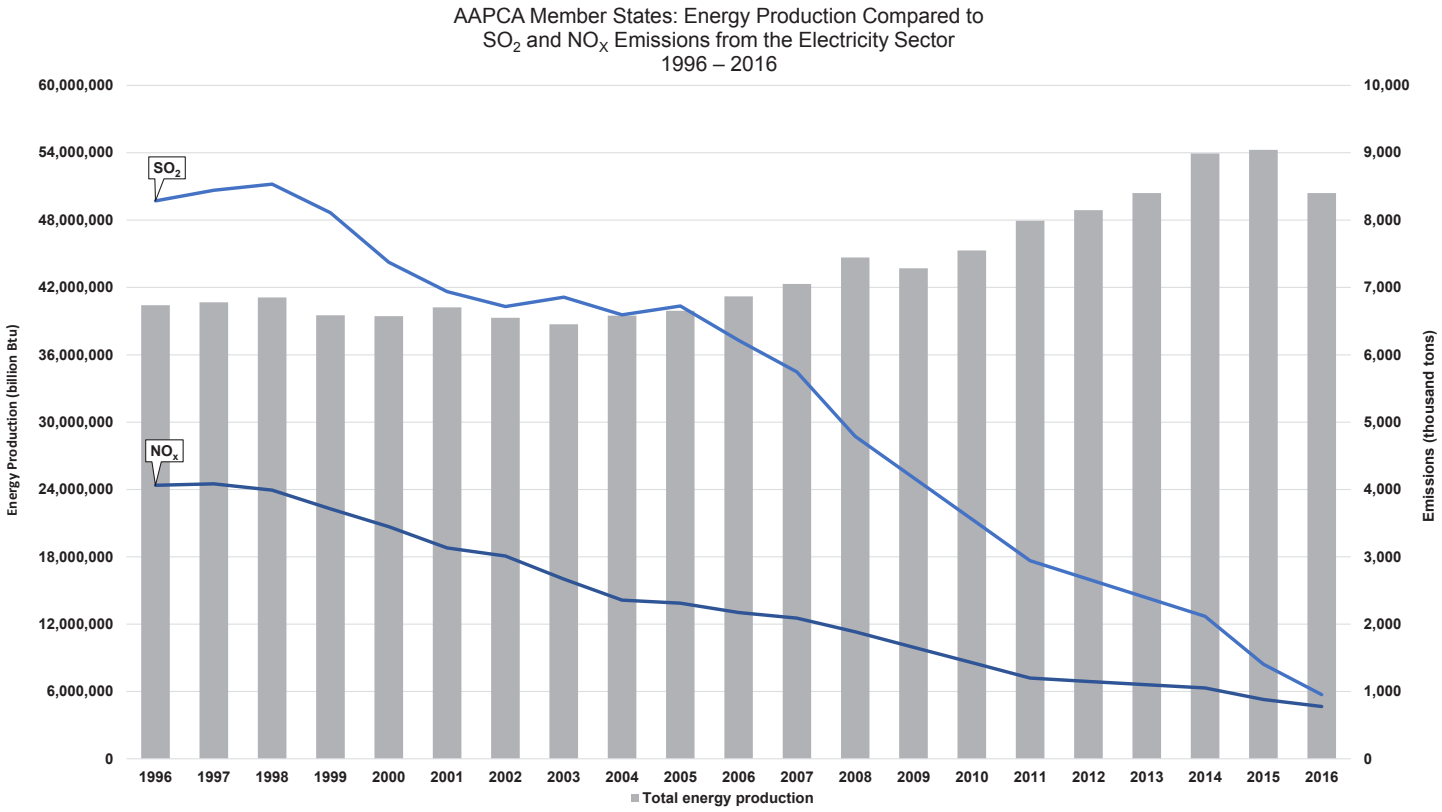
Source: U.S. EPA, **Air Quality Design Values**. Data file: "$PM_{2.5}$ Design Values, 2017."



Source: U.S. EPA, **Air Quality Design Values**. Data file: "$PM_{2.5}$ Design Values, 2017."

ELECTRICITY SECTOR EMISSIONS REDUCTIONS

From 1996 to 2016, energy production in AAPCA Member States increased by nearly 25 percent,[13] while emissions of sulfur dioxide (SO_2) and oxides of nitrogen (NO_X) were reduced significantly. Specifically, SO_2 emissions from the electricity sector in AAPCA Member States decreased 88 percent, from 8,286,000 tons in 1996 to 953,000 tons in 2016, while NO_X emissions from the electricity sector went from 4,061,000 tons in 1996 to 777,000 tons in 2016, a reduction of 80 percent.[14]



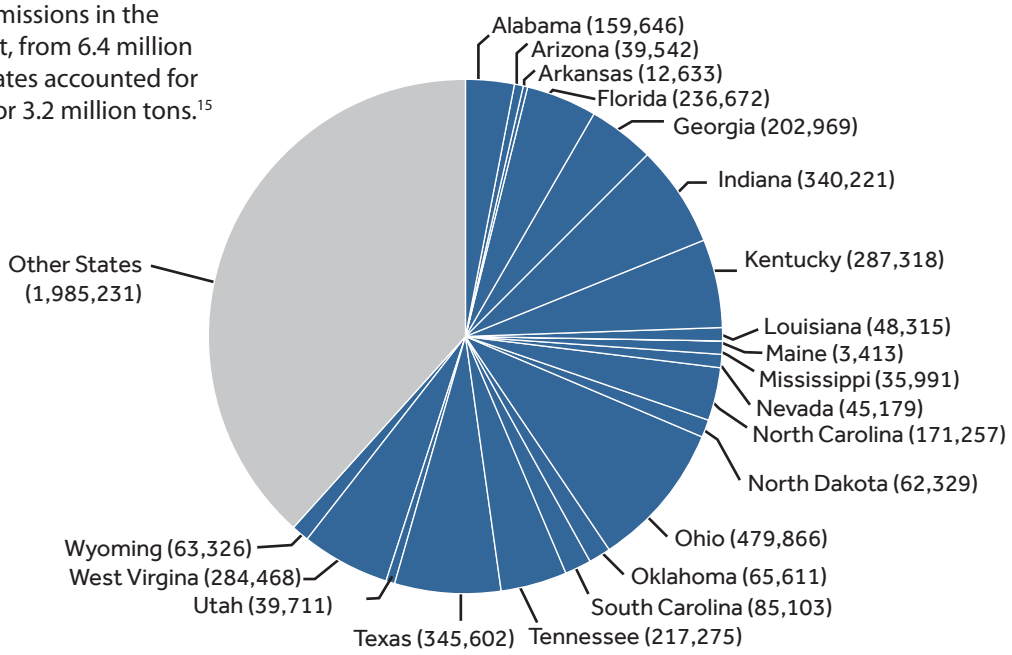
Sources: U.S. EIA, **State Energy Data System (SEDS): 1960-2016**; U.S. EPA, Air Pollutant Emissions Trends. Data file: "**State Average Annual Emissions Trend**."

ELECTRICITY SECTOR EMISSIONS REDUCTIONS | NITROGEN OXIDES

From 1990 to 2016, electricity sector NO_x emissions in the United States were reduced over 80 percent, from 6.4 million tons to 1.2 million tons. AAPCA Member States accounted for more than 60 percent of these reductions, or 3.2 million tons.[15]

AAPCA Member States: Share of NO_x Emissions Reductions in the Electricity Sector, 1990-2016
(tons of NO_x reduced)

Source: U.S. EPA, "**Annual NO_x Emissions from CSAPR and ARP Sources, 1990 – 2016**," May 2018.

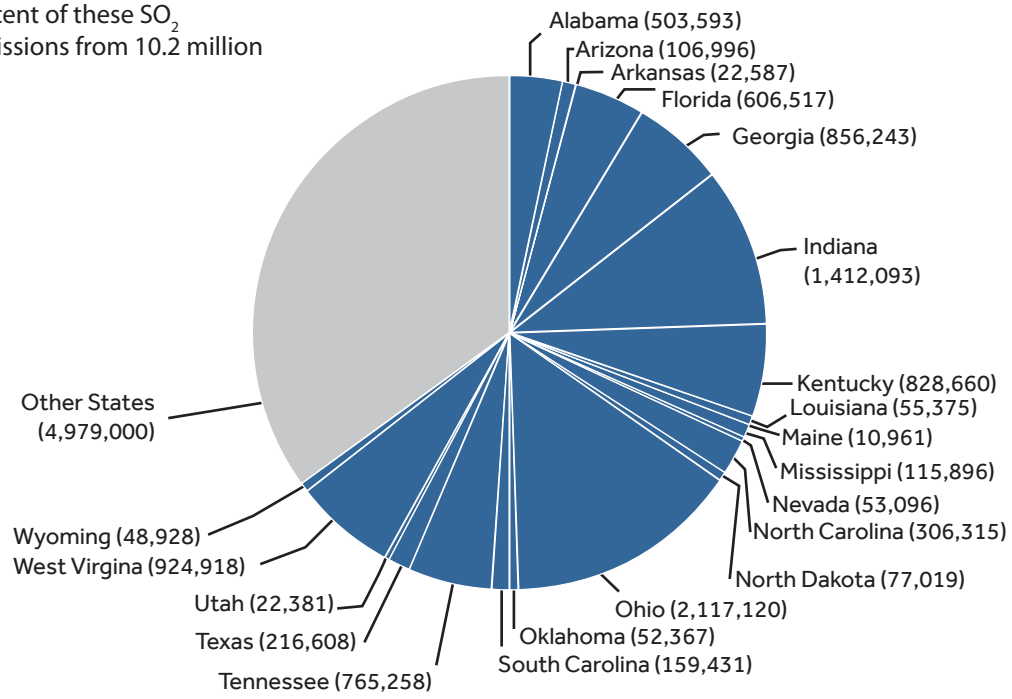


ELECTRICITY SECTOR EMISSIONS REDUCTIONS | SULFUR DIOXIDE

Nationally, SO_2 emissions from the electricity sector went from 15.7 million tons in 1990 to 1.5 million tons in 2016, a 91-percent reduction. Between 1990 and 2016, AAPCA Member States accounted for more than 65 percent of these SO_2 emissions reductions, lowering SO_2 emissions from 10.2 million tons in 1990 to 944,000 tons in 2016.[16]

AAPCA Member States: Share of SO_2 Emissions Reductions in the Electricity Sector, 1990-2016
(tons of SO_2 reduced)

Source: U.S. EPA, "**State-by-State SO_2 Emissions from CAIR and ARP Sources, 1990-2016**," May 2018.



REGIONAL HAZE: VISIBILITY PROGRESS IN WICHITA MOUNTAINS WILDERNESS AREA

Located in southwest Oklahoma, the Wichita Mountains Wilderness Area is a popular destination for outdoor activities and wildlife viewing. As a Class 1 Area, the Wichita Mountains Wilderness Area has benefitted from the collaborative effort of state, local, and federal stakeholders through the Regional Haze Program. With in-state reductions in SO2 of more than 45,000 tons and NOX of more than 50,000 tons between 2002 and 2011, visibility at the Wichita Mountains improved by 20 percent on the worst visibility days. Visitors now enjoy views with 13.89 more miles of visual range on the worst visibility days.

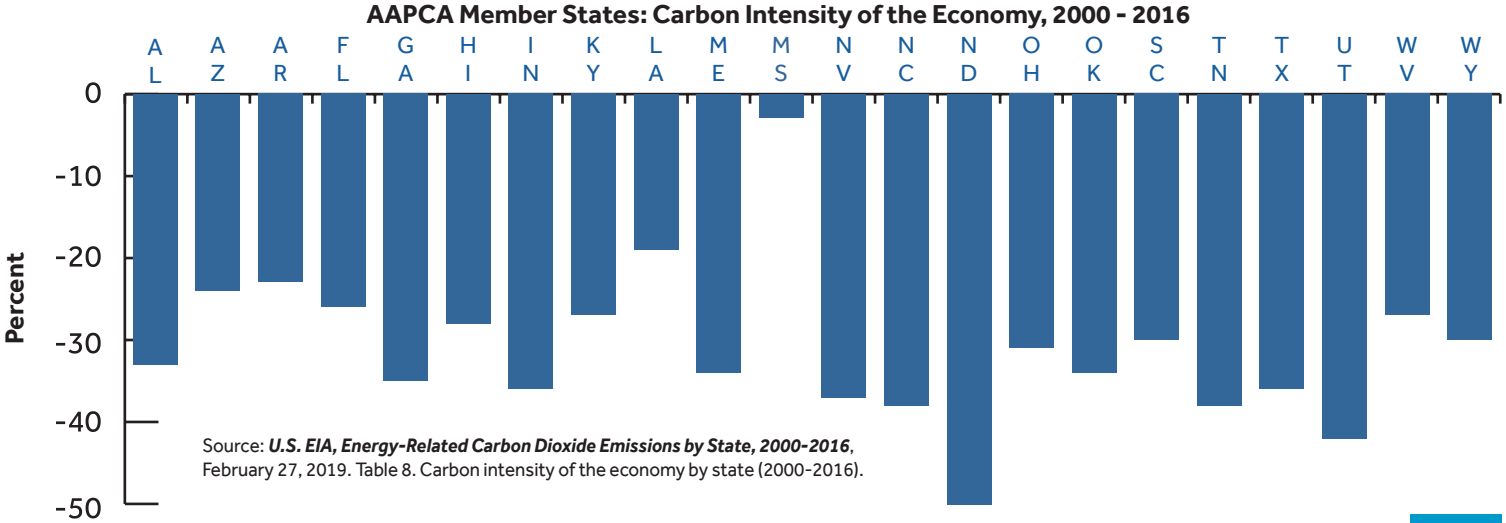
Photo credit: Kent Stafford, Oklahoma Department of Environmental Quality

GREENHOUSE GASES AND ENERGY

From 2000 to 2016, the 22 states that comprise the AAPCA Board of Directors reduced energy-related carbon dioxide emissions by 307 million metric tons, accounting for more than 38 percent of cumulative national reductions. AAPCA Member States also represented the following trends:[17]

- An average reduction in carbon intensity of the economy of more than 30 percent;
- An average decrease in energy intensity of 11.6 percent, or 1.48 thousand British thermal units (Btu) per dollar of GDP, compared to the national average reduction of 0.89 thousand Btu per dollar of GDP; and,
- On average, above a 12.5-percent reduction in per capita energy-related carbon dioxide emissions, or approximately 15 metric tons per person.

AAPCA Member States: Carbon Intensity of the Economy, 2000 - 2016



Source: ***U.S. EIA, Energy-Related Carbon Dioxide Emissions by State, 2000-2016***, February 27, 2019. Table 8. Carbon intensity of the economy by state (2000-2016).

AAPCA BEST PRACTICES IN AIR POLLUTION CONTROL

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 recipients of AAPCA Best Practices since 2015:

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

2016

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

2017

- **National Ambient Air Quality Standards (NAAQS) Exceedance Reports** – Georgia Environmental Protection Division, Air Protection Branch
- **Pollutants of Concern Table Implementation** – Kentucky Division for Air Quality
- **Standardization of an Engineer's Notebook for Title V Permitting** – Wyoming Department of Environmental Quality, Air Quality Division

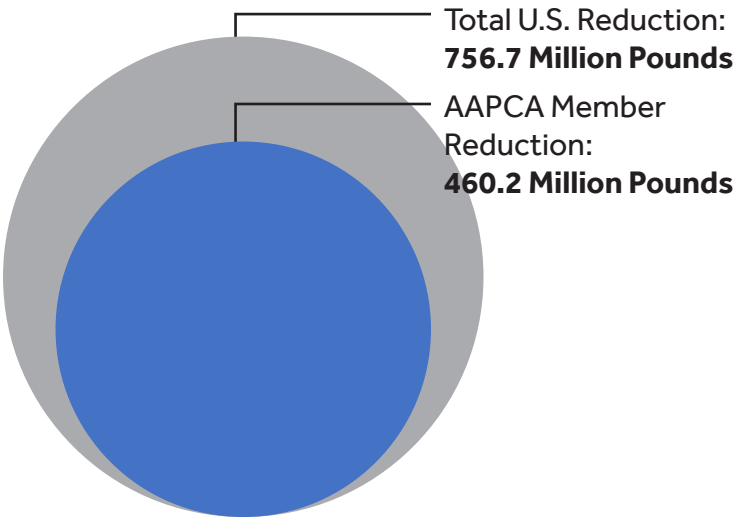
2018

- **Georgia State Implementation Plan Processing Procedures** – Georgia Environmental Protection Division, Air Protection Branch
- **Toxicity Factors Database** – Texas Commission on Environmental Quality
- **Inventory, Monitoring, Permitting, and Compliance Tracking (IMPACT) Web-based Data System** – Wyoming Department of Environmental Quality, Air Quality Division

TOXIC AIR RELEASES

According to U.S. EPA's 2017 *Toxic Release Inventory (TRI) National Analysis*, data from 2017 showed a 57 percent decrease in reported toxic air releases compared to a decade prior, from just over 1.3 billion pounds in 2007 to less than 580 million pounds in 2017.[18] Of the more than 750-million-pound reduction, AAPCA member states accounted for more than 460 million pounds, over 60 percent of the national total. [19]

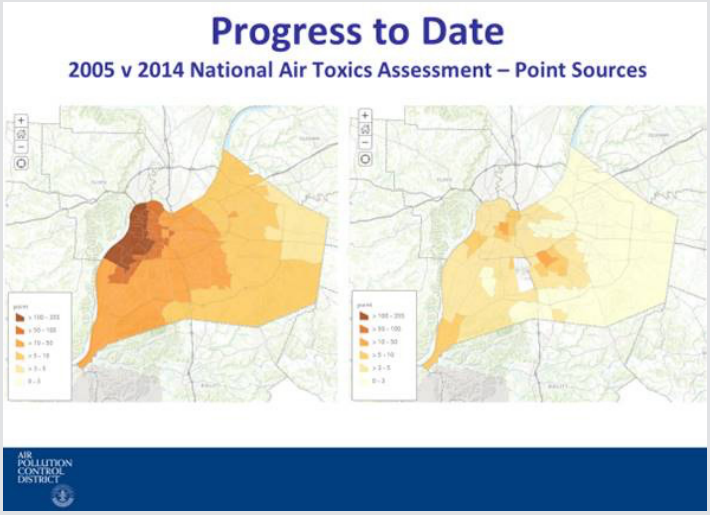
AAPCA Member States: Share of Total Reduction of Toxic Air Releases Reported to the Toxic Release Inventory
2007 — 2017



Source: U.S. EPA Toxic Release Inventory Explorer, **2017 TRI Factsheets.**

CASE STUDY: LOUISVILLE'S STAR PROGRAM

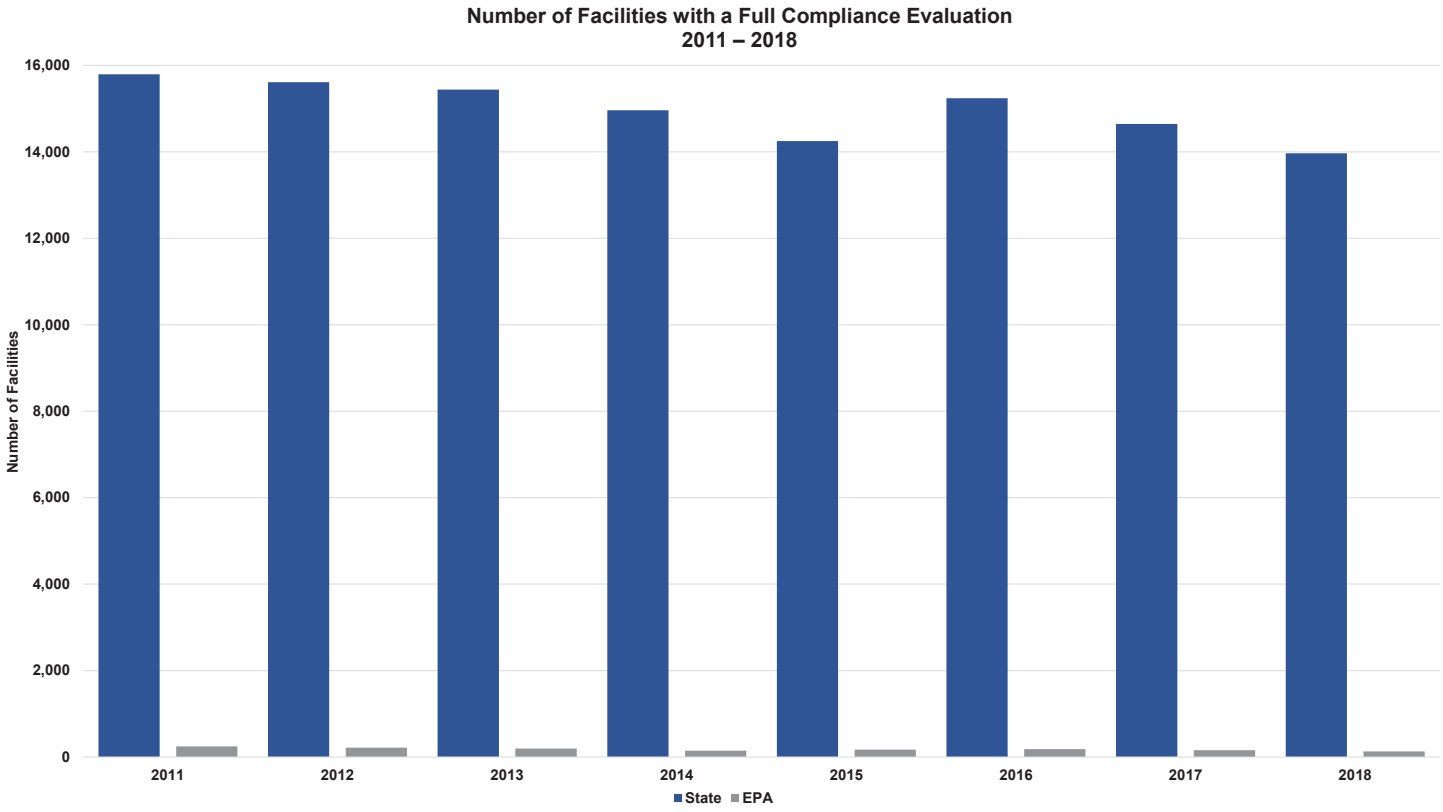
In response to growing concerns about toxic air emissions in West Louisville, the Louisville Metro Air Pollution Control District (APCD) in 2005 developed and implemented the Strategic Toxic Air Reduction (STAR) Program. An air toxics program designed to regulate the reduction of toxic emissions by large industries, STAR was created in response to a monitoring study in the early 2000s that was funded in part by the Kentucky Division for Air Quality and U.S. EPA. The study, conducted by APCD, U.S. EPA, and the University of Louisville, found unsafe levels of 18 toxic chemicals present in and around the Rubbertown industrial complex. Today, STAR is considered one of the most stringent and comprehensive local air toxics regulatory programs in the United States, and has helped Louisville achieve a nearly 70 percent reduction in toxic air releases.



Sources: U.S. EPA's ***2005 National Air Toxics Assessment*** (March 2011) and ***2014 National Air Toxics Assessment*** (August 2018). Note from EPA: "EPA developed NATA as a screening tool for state, local and tribal air agencies. NATA's results help these agencies identify which pollutants, emission sources and places they may wish to study further to better understand any possible risks to public health from air toxics." The 2005 NATA adjusted to show risk from chloroprene and ethylene oxide. More information on NATA can be found **here**.

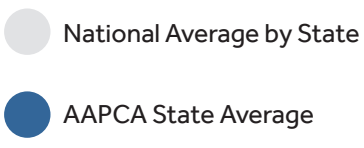
COMPLIANCE AND ENFORCEMENT ACTIVITY

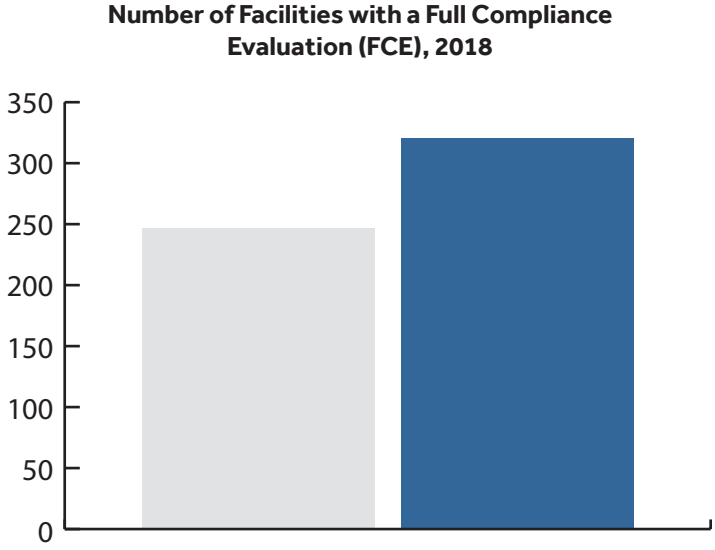
According to U.S. EPA's Enforcement and Compliance History Online (ECHO), states are the leaders in full compliance evaluations related to the Clean Air Act, conducting full compliance evaluations for nearly 14,000 facilities in 2018.[20]



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

Moreover, AAPCA Member States performed full compliance evaluations at an average of 320 facilities per state in 2018, whereas the national average was nearly 250 facilities per state.





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

SECTION NOTES: AIR QUALITY SUCCESSES IN AAPCA MEMBER STATES

[1] U.S. EPA **Air Pollutant Emissions Trends Data**. Data file: State Annual Emissions Trend.
[2] U.S. Bureau of Economic Analysis, data **available here**.
[3] U.S. Office of Highway Policy Information, data **available here**.
[4] U.S. Census Bureau: Population estimates **1990-2000**; **2000-2010**; **2010-2018**.
[5] U.S. EIA, **State Energy Data Systems (SEDS): 1960-2015**.
[6] 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."
[7] U.S. EPA's Greenbook contains a history of areas designated nonattainment or maintenance under the NAAQS. EPA's listing of areas designated nonattainment or maintenance for the 2008 ozone NAAQS can be **found here**.
[8] U.S. Census Bureau: Population estimates **1990-2000**; **2000-2010**; **2010-2018**.
[9] How ground level ozone is formed **https://www3.epa.gov/region1/airquality/oz_prob.html.** According to U.S. EPA, ground level ozone is formed by the "interactions of man-made (and natural) emissions of volatile organic compounds and nitrogen oxides in the presence of heat and sunlight."
[10] U.S. EPA Emissions Inventories, **Air Pollutant Emissions Trends Data**. Data file: State Annual Emissions Trend.
[11] U.S. EPA's listing of areas designated nonattainment or maintenance for the 1997 annual $PM_{2.5}$ NAAQS can be **found here**. 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).
[12] U.S. EPA, **Air Quality Design Values**. Data file: "$PM_{2.5}$ Design Values, 2017." Data for this chart is based on overlapping three-year averages beginning with 2006 – 2007 and ending with 2015 – 2017.
[13] U.S. EIA, **State Energy Data System (SEDS): 1960-2016**.
[14] U.S. EPA **Air Pollutant Emissions Trends Data**. Data file: State Annual Emissions Trend.
[15] U.S. EPA, "**State-by-State NO_x Emissions from CAIR and ARP Sources, 1990-2016,**" May 2018.
[16] U.S. EPA, "**State-by-State SO_2 Emissions from CAIR and ARP Sources, 1990-2016,**" May 2018.
[17] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2000-2016***, February 27, 2019. Data file: Table 1. State energy-related carbon dioxide emissions by year, unadjusted (2005–2016).
[18] U.S. EPA, ***2017 Toxic Release Inventory (TRI) National Analysis***, March 2019.
[19] U.S. EPA Toxic Release Inventory Explorer, **2017 TRI Factsheets**.
[20] Data from **U.S. EPA's National Air Activity Dashboard**, part of **ECHO.**

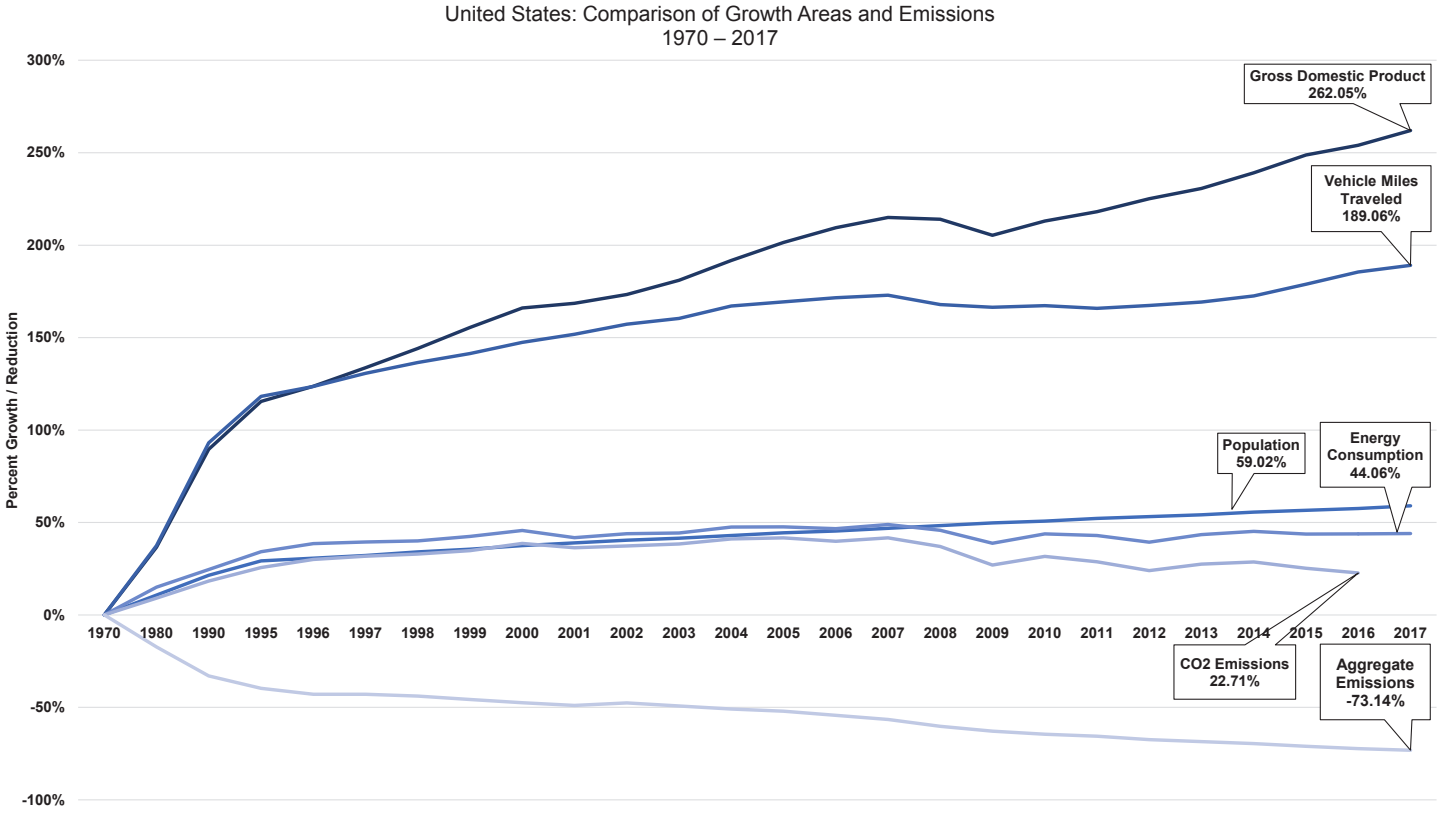
AMERICAN LEADERSHIP IN AIR QUALITY

AMERICA'S FOOTPRINT

U.S. EPA's 2018 report, *Our Nation's Air: Status and Trends Through 2017*, provides a detailed summary of the nation's air quality. In the report, EPA charts the emission trends of criteria air pollutants and carbon dioxide (CO_2) since 1970 as compared to several economic and social growth indicators, including gross domestic product (GDP), population, vehicle miles traveled (VMT), and energy consumption.[1] From 1970 to 2017 the United States experienced the following trends:

- A 262-percent increase in GDP, from $2.9 trillion in 1970 to $19.3 trillion in 2017, ranking first in the world by nearly $7.2 trillion[2];
- The population of the U.S. rose 59 percent, from 203.3 million people in 1970 to 325.7 million in 2017, ranking third in the world in total population, behind only India and China[3];
- Energy consumption in the United States increased 44 percent, from 135 thousand trillion Btu in 1970 to 195 thousand trillion Btu in 2017[4]; and,
- The U.S. saw a 189-percent increase in VMT from 1970 to 2017, from 1.1 trillion miles to 3.2 trillion miles in 2017.[5]

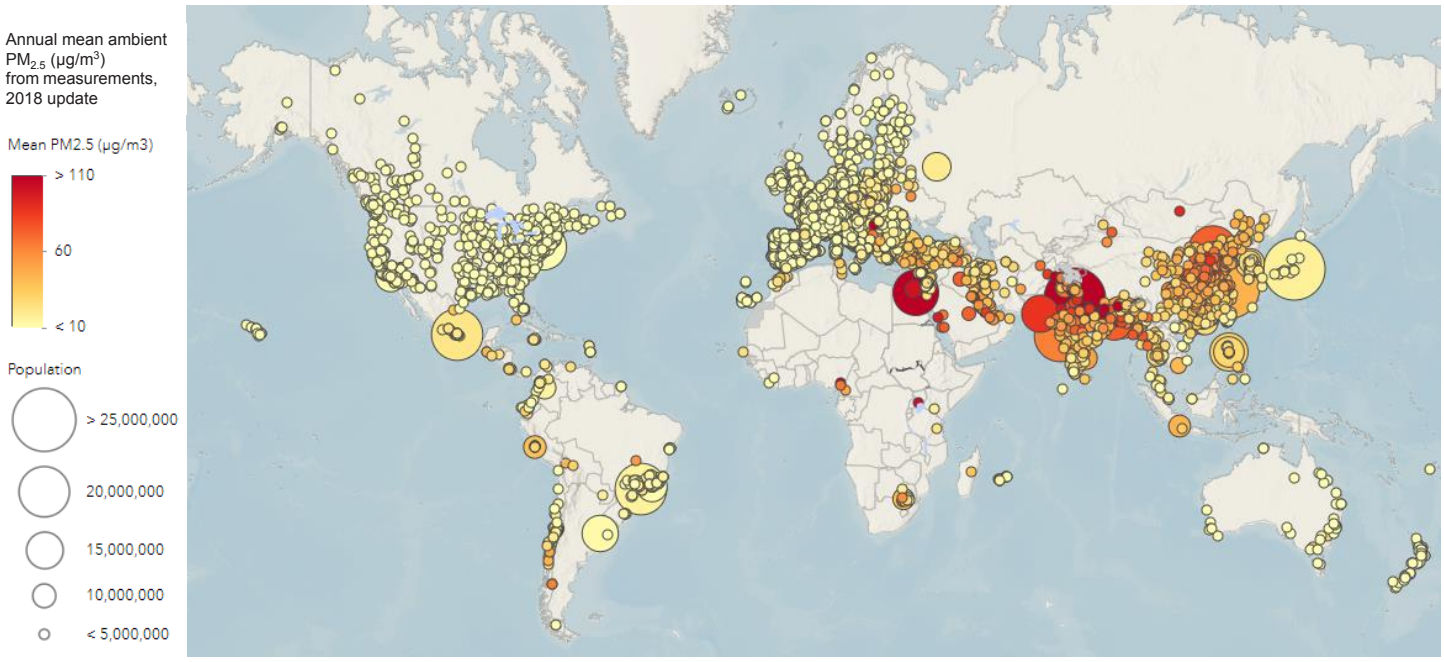
Over the same period, from 1970 to 2017, the United States reduced aggregate emissions of the six criteria air pollutants by 73 percent.[6]



Source: U.S. EPA, ***Our Nation's Air: Status and Trends Through 2017***, July 31, 2018.
Data: **https://gispub.epa.gov/air/trendsreport/2018/** (section: Air Quality Improves as America Grows)

WORLD TRENDS | FINE PARTICULATE MATTER

In 2018, the World Health Organization (WHO) mapped the annual mean ambient fine particulate matter $PM_{2.5}$ concentrations by city population, based on data from 2016 to 2018.[7] The map demonstrates that the majority of the United States has lower fine particulate matter levels than most of the rest of the world.

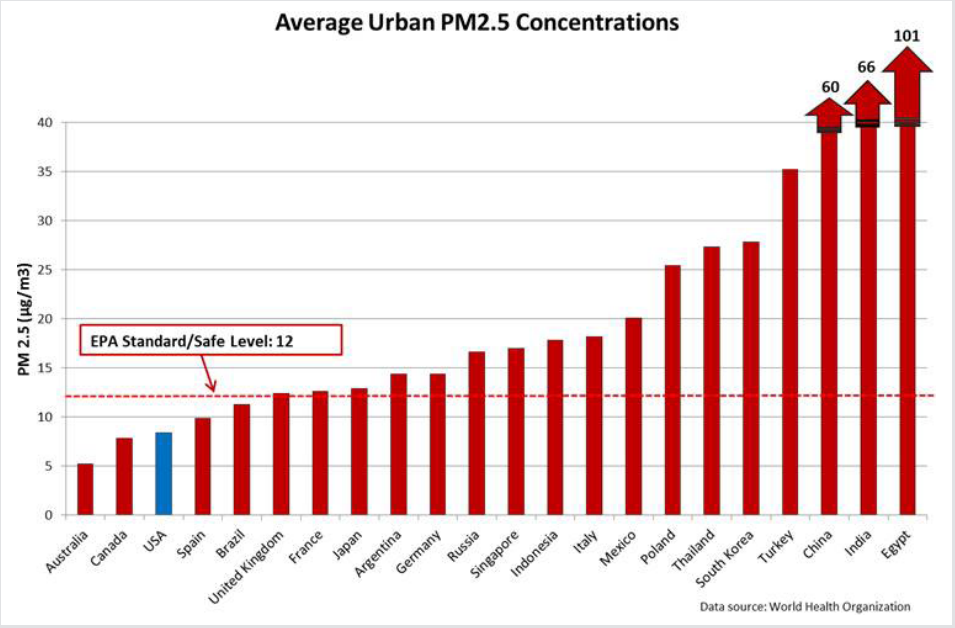


Source: World Health Organization, "**Annual mean ambient $PM_{2.5}$ (µg/m³) - from measurements**," 2018 update.

INTERNATIONAL CONTEXT

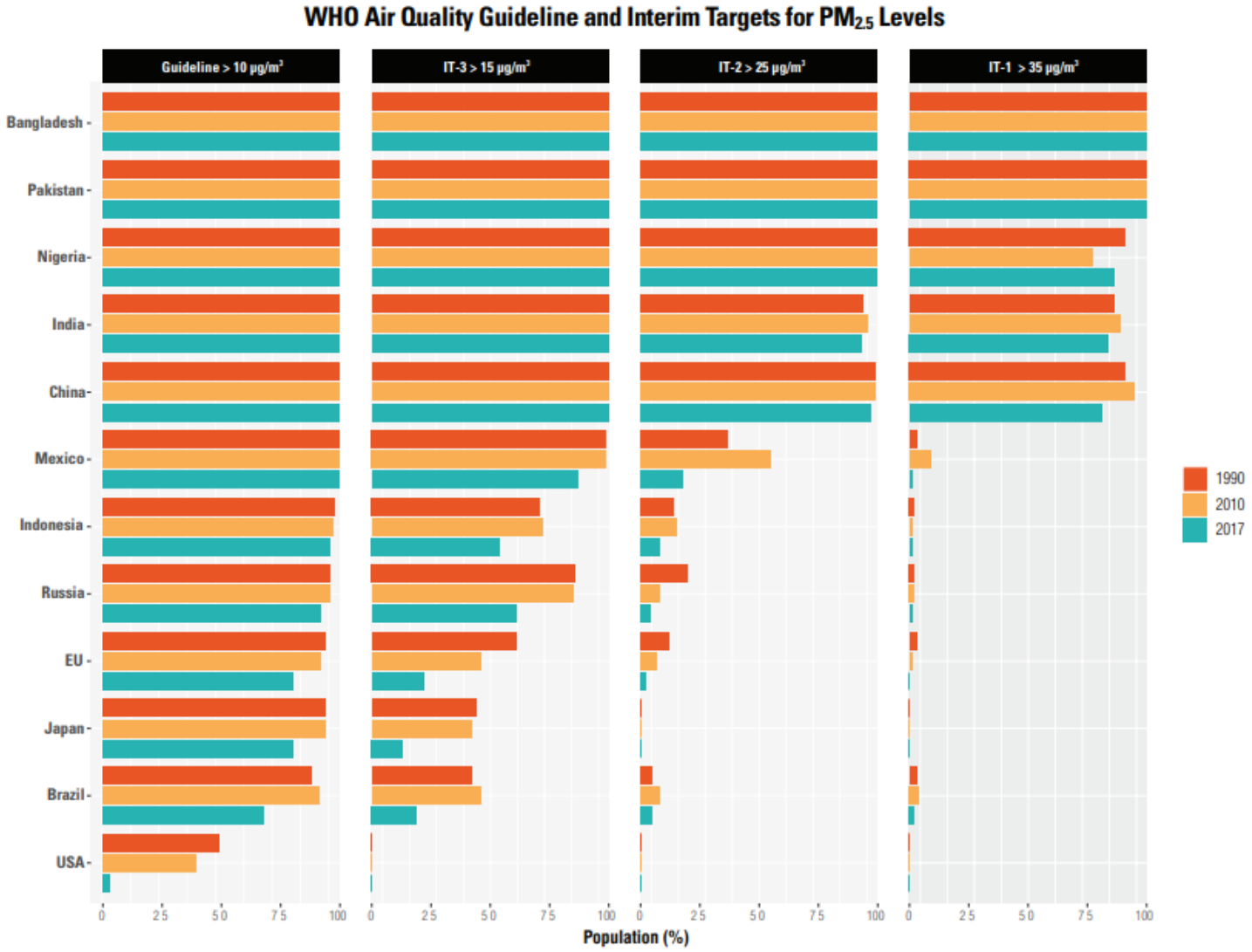
According to data charted from the World Health Organization, Average Urban $PM_{2.5}$ Concentrations in the United States rank among the lowest in the world.

Source: Global Energy Institute, U.S. Chamber of Commerce, "**Visualizing the U.S. Clean Air Success Story**," April 2018. Data from the **World Health Organization**.



In April 2019, the Health Effects Institute and the Institute for Health Metrics and Evaluation released the report *State of Global Air/2019*. The report includes data for 1990, 2010, and 2017 showing the percentage of population living in areas with $PM_{2.5}$ concentrations exceeding the World Health Organization (WHO) Interim Targets and Guideline Values.[8]

Figure 3. Percentage of population living in areas with $PM_{2.5}$ concentrations exceeding the WHO Air Quality Guideline and interim targets in the 11 most populous countries and the European Union in 1990, 2010, and 2017.

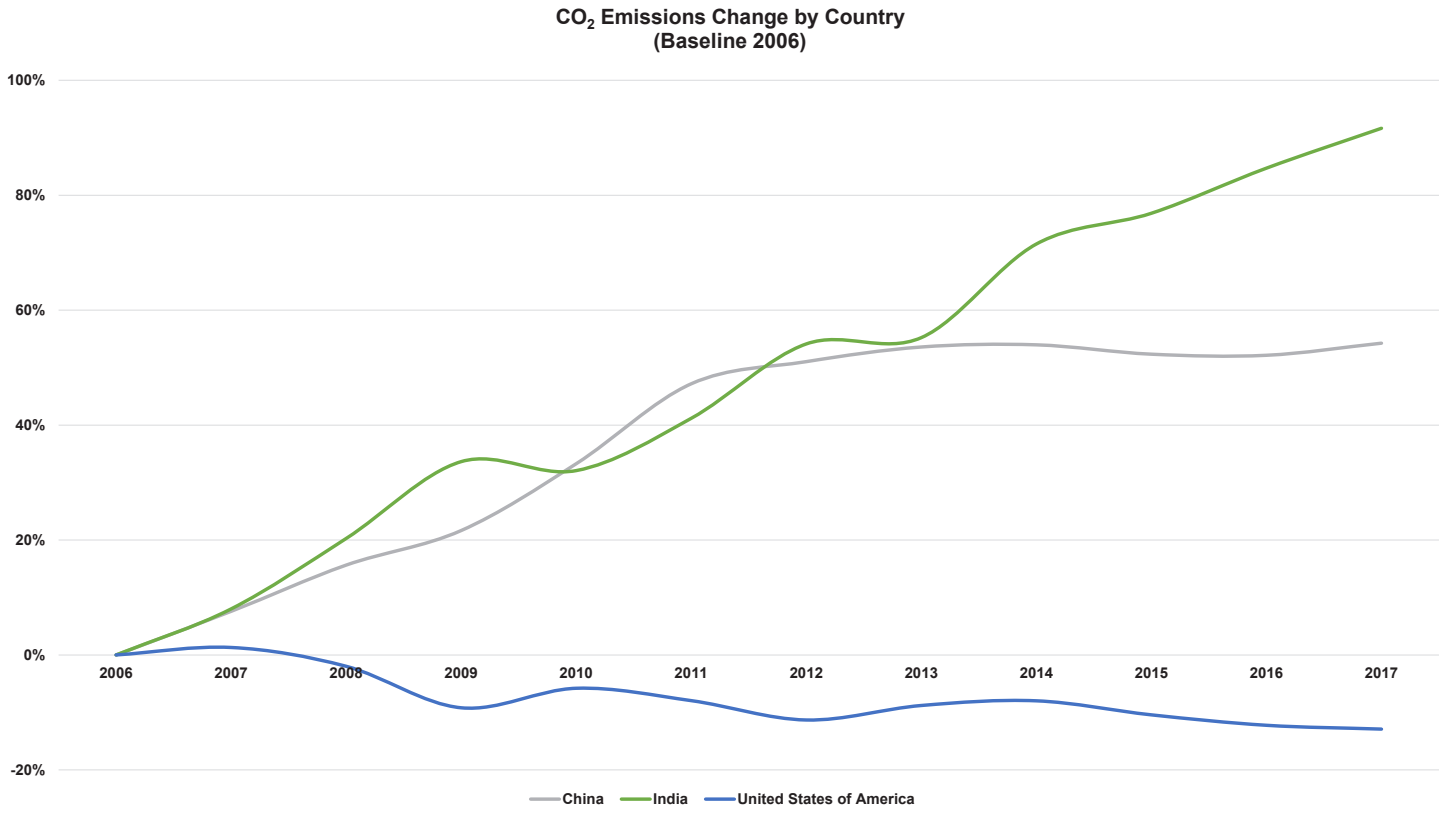


Source: Health Effects Institute and the Institute for Health Metrics and Evaluation, ***State of Global Air/2019.***

"The most striking decrease occurred in the United States, where the proportion of people living in areas exceeding the WHO guideline plummeted from 50% in 1990 to about 40% in 2010 and to just 3% in 2017."

WORLD TRENDS | CARBON DIOXIDE

Based upon data from the Global Carbon Project, the chart below highlights carbon dioxide emissions from the worlds three most populated nations – China, India, and the United States – between 2006 and 2017. During this period the United States reduced emissions by over 780 million metric tons while China increased emissions by 3.46 billion metric tons and India increased emissions by 1.2 billion metric tons.[9]



Sources: Global Carbon Project's **Global Carbon Atlas** (last updated December 5, 2018); U.S. EPA, ***Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2017***, April 2019.

SECTION NOTES: AMERICAN LEADERSHIP IN AIR QUALITY

[1] U.S. EPA, ***Our Nation's Air: Status and Trends Through 2017***, July 31, 2018.
[2] World Bank, **GDP Listings by Country**, February 2019.
[3] U.S. Census Bureau, **Current Population**.
[4] U.S. EIA, **State Energy Data System (SEDS): 1960-2016**.
[5] U.S. Office of Highway Policy Information, data **available here**.
[6] U.S. EPA, ***Our Nation's Air: Status and Trends Through 2017***, July 31, 2018.
[7] World Health Organization, "**Annual mean ambient $PM_{2.5}$ ($\mu g/m^3$) - from measurements**," 2018 update.
[8] Health Effects Institute and the Institute for Health Metrics and Evaluation, ***State of Global Air/2019***, April 2019.
[9] Global Carbon Project, **Global Carbon Atlas.** Last updated December 5, 2018

AIR QUALITY TRENDS IN THE UNITED STATES

CRITERIA AIR POLLUTANT TRENDS | CONCENTRATIONS

Over the course of the past several decades, ambient concentrations of the six criteria air pollutants have declined substantially in the United States. According to EPA's analysis of 2017 monitoring data,[1] there has been at least a 32-percent reduction in the ambient levels of carbon monoxide, lead, nitrogen dioxide, ozone, and sulfur dioxide since 1980, and available monitoring data for fine and coarse particulate matter ($PM_{2.5}$ and PM_{10}) show similar trends. A decade-over-decade comparison demonstrates consistent progress in ambient air quality levels since 1980, 1990, and 2000.[2]

Criteria Pollutant	1980 vs 2017	1990 vs 2017	2000 vs 2017	2010 vs 2017
Carbon Monoxide	-84%	-77%	-61%	-13%
Lead	-99%	-98%	-94%	-80%
Nitrogen Dioxide (annual)	-63%	-56%	-49%	-21%
Nitrogen Dioxide (1-hour)	-60%	-50%	-35%	-14%
Ozone (8-hour)	-32%	-22%	-17%	-5%
PM_{10} (24-hour)	---	-34%	-30%	0%
$PM_{2.5}$ (annual)	---	---	-41%	-18%
$PM_{2.5}$ (24-hour)	---	---	-40%	-10%
Sulfur Dioxide (1-hour)	-90%	-88%	-79%	-66%

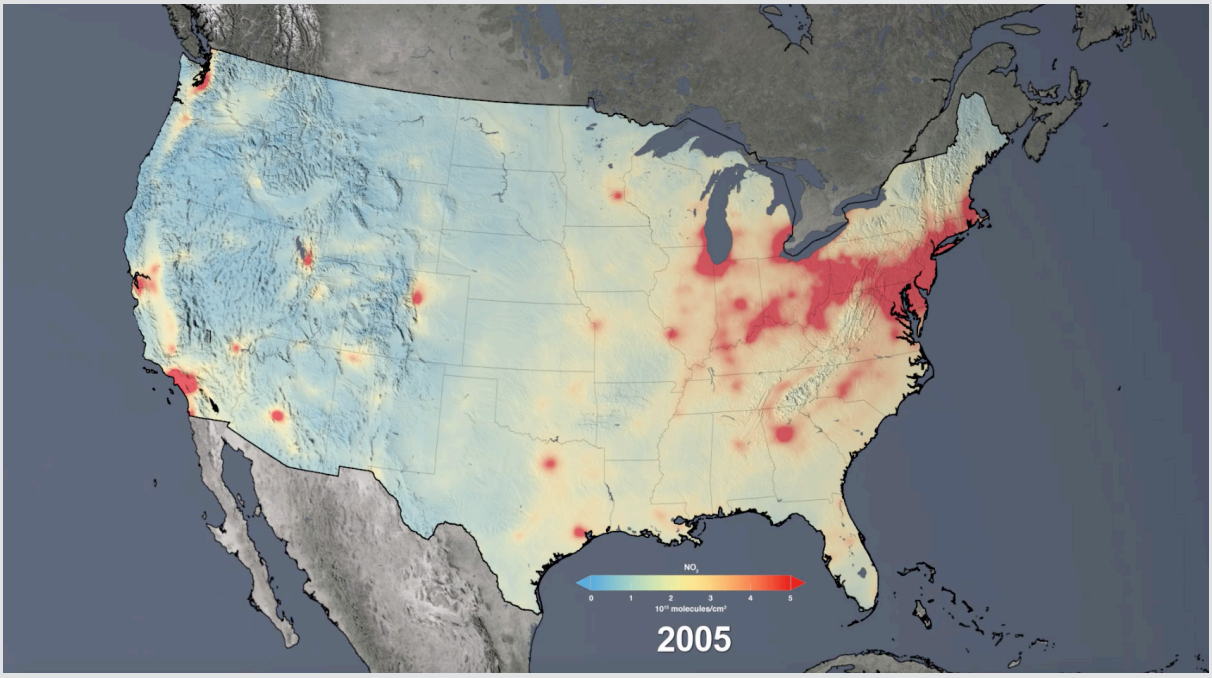
CRITERIA AIR POLLUTANT TRENDS | EMISSIONS

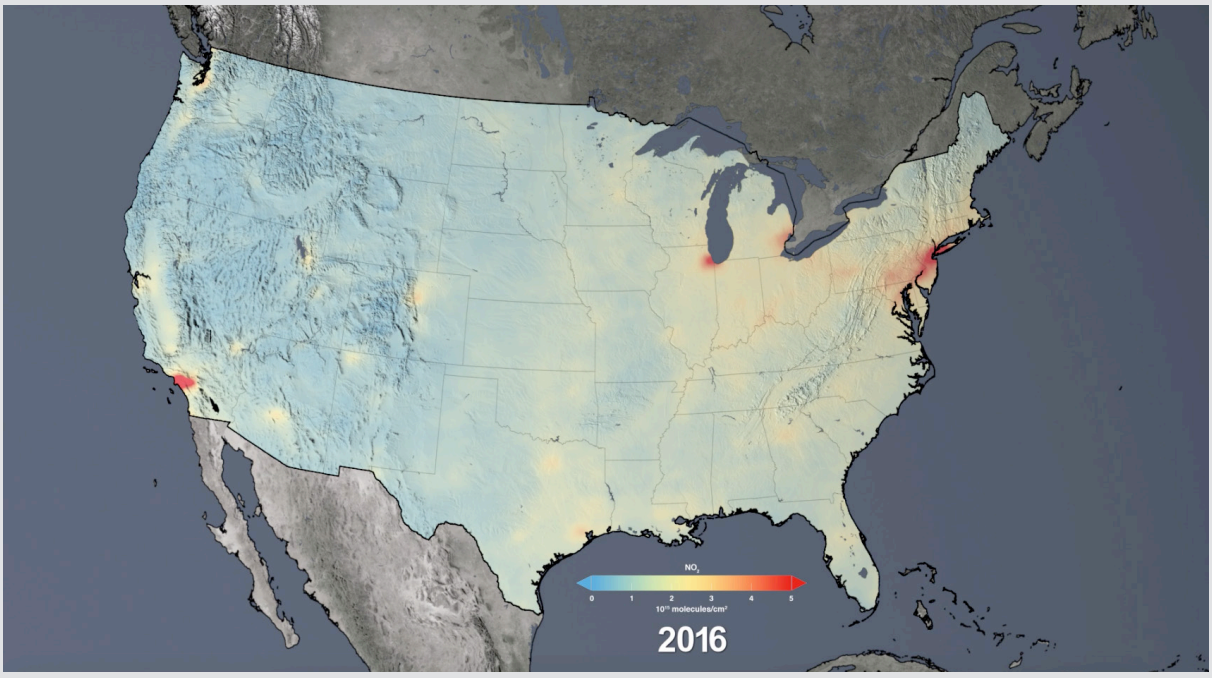
The trends data on emissions published by EPA for 2017 show that, nationally, criteria pollutant emissions and precursors continue to decline. When comparing 1990 to 2017, there has been at least a 29-percent reduction in the emissions of all criteria pollutants or precursors.[3]

Criteria Pollutant	1980 vs 2017	1990 vs 2017	2000 vs 2017	2010 vs 2017
Carbon Monoxide	-72%	-65%	-52%	-19%
Lead	-99%	-80%	-50%	-23%
Nitrogen Oxides (NO_X)	-61%	-58%	-52%	-28%
Volatile Organic Compounds (VOC)	-54%	-40%	-19%	-8%
Direct PM_{10}	-61%	-25%	-22%	-12%
Direct $PM_{2.5}$	---	-29%	-37%	-11%
Sulfur Dioxide	-89%	-88%	-83%	-64%

VIEWS FROM SPACE: NO_2 TRENDS IN THE U.S.

Using the Aura Ozone Monitoring Instrument, the Health and Air Quality Applied Science Team (HAQAST) at the National Aeronautics and Space Administration (NASA) mapped the annual mean observations for tropospheric NO_2, showing decreases from 2005 to 2016.

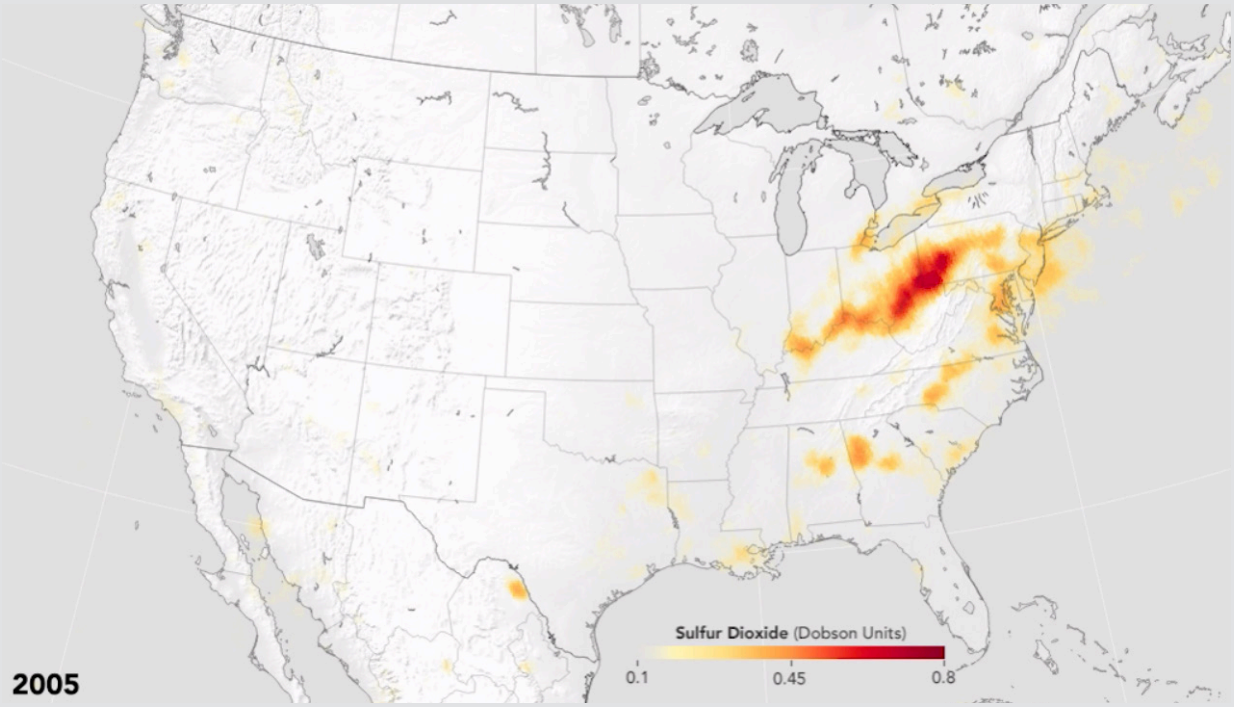


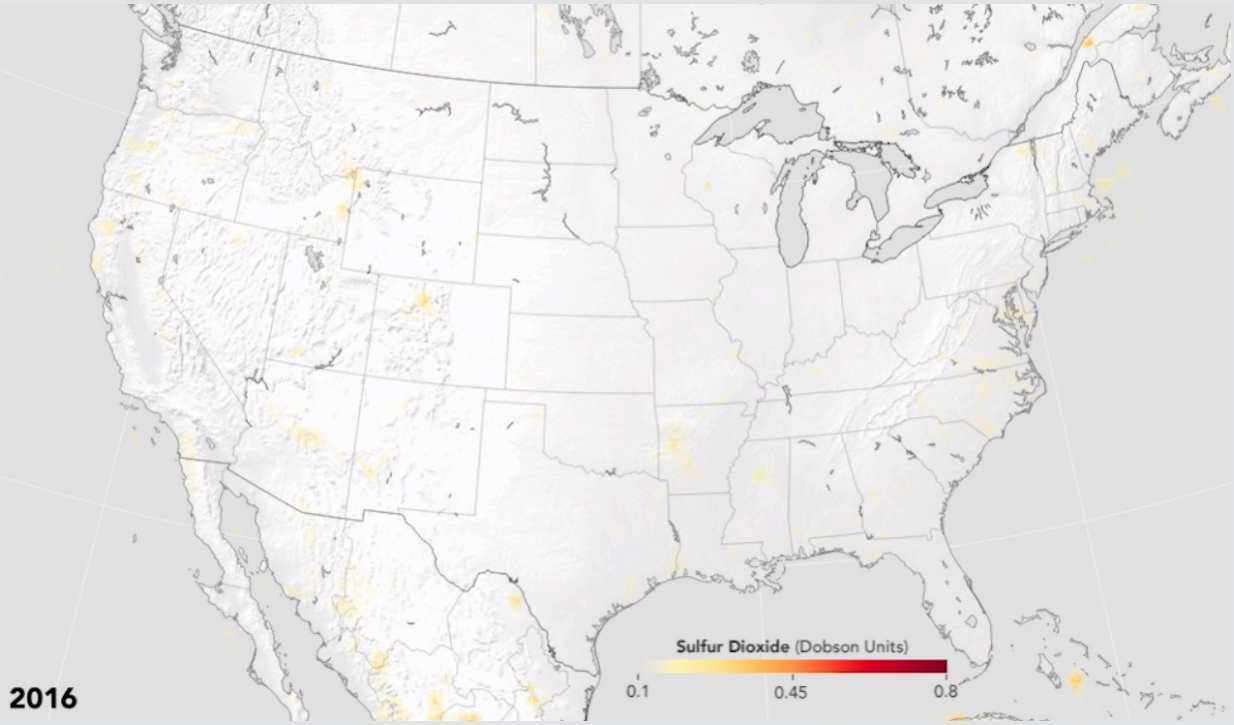


Source: **https://airquality.gsfc.nasa.gov/video/changes-nitrogen-dioxide-usa-2005-2014**. More information on NASA's HAQAST can be found at: **www.haqast.org**.

VIEWS FROM SPACE: SO_2 TRENDS IN THE U.S.

The NASA HAQAST also mapped the annual mean observations for tropospheric SO_2 using the Aura Ozone Monitoring Instrument, showing decreases from 2005 to 2016.



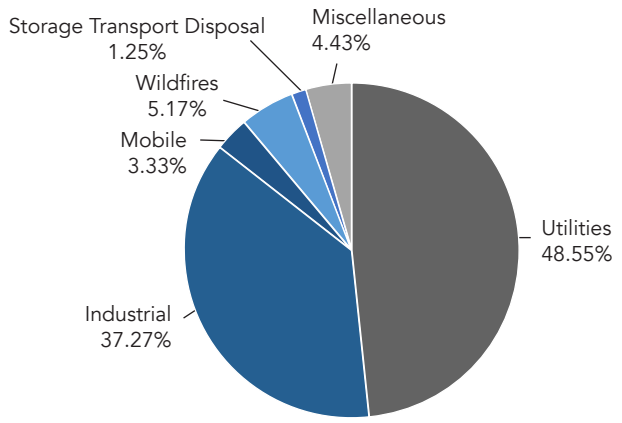


Source: **https://airquality.gsfc.nasa.gov/video/sulfur-dioxide-usa**

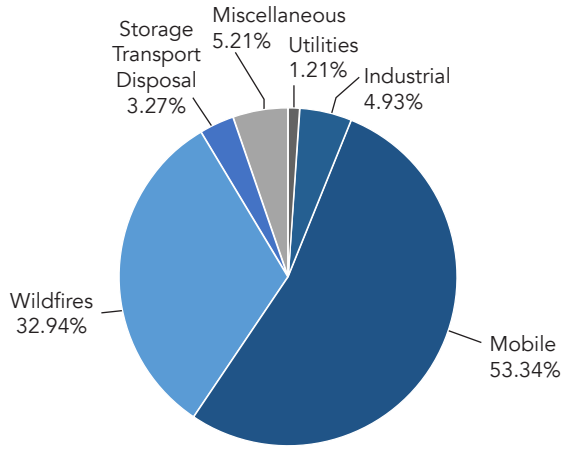
CRITERIA AIR POLLUTANT TRENDS | SOURCES OF EMISSIONS

U.S. EPA tracks emissions from the following source categories: Mobile, Industrial, Storage Transport Disposal, Utilities, Wildfires, and Miscellaneous. Included below are the sources of criteria air pollutant and precursor emissions for the year 2017.[4]

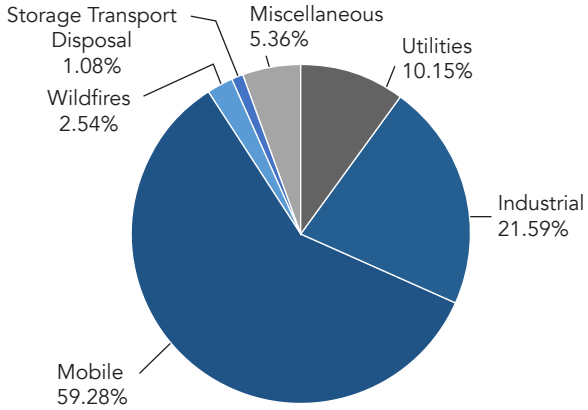
SULFUR DIOXIDE



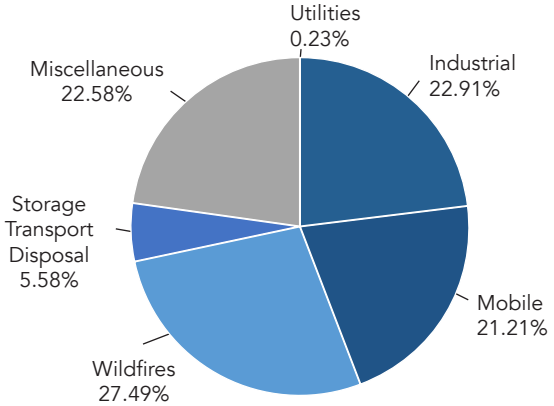
CARBON MONOXIDE



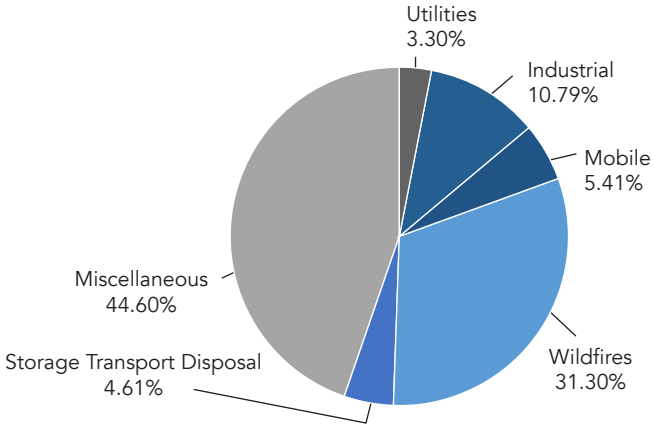
NITROGEN OXIDES



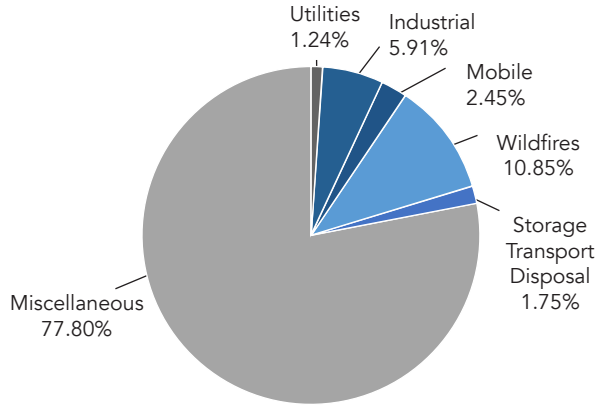
VOLATILE ORGANIC COMPOUNDS



FINE PARTICULATE MATTER

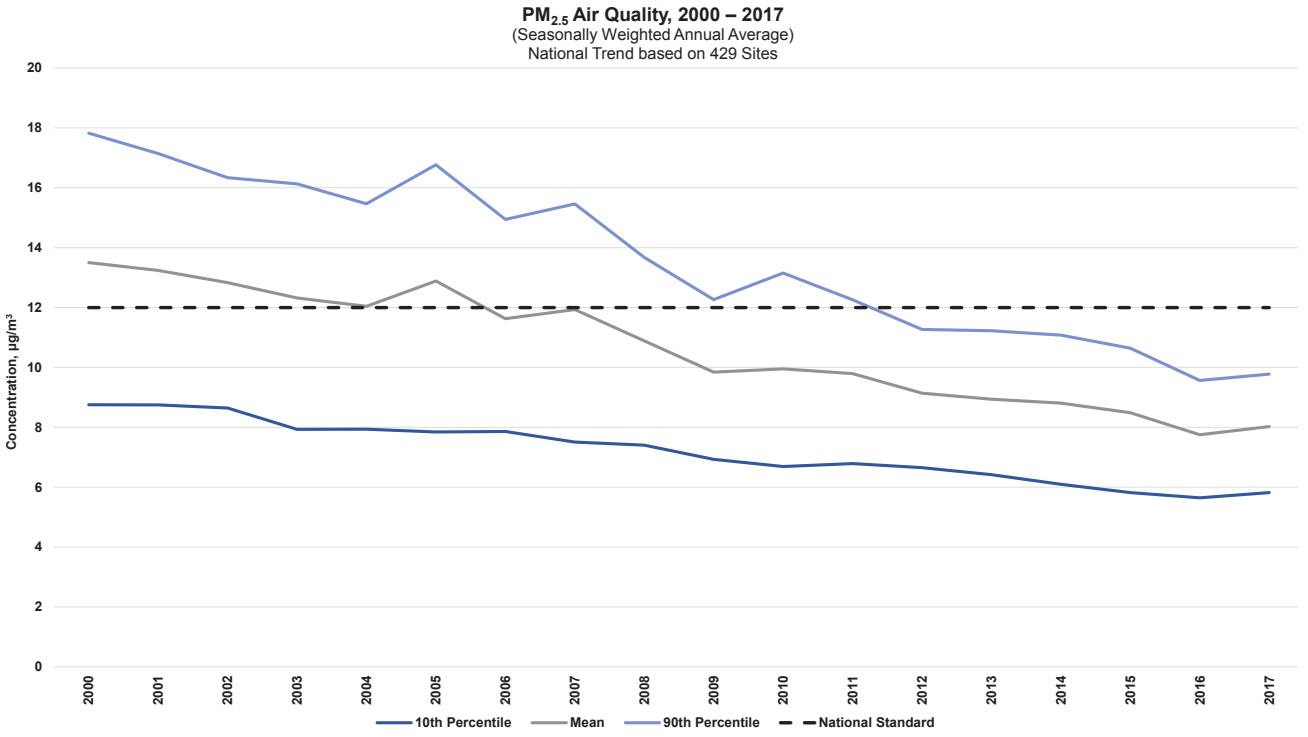


COARSE PARTICULATE MATTER



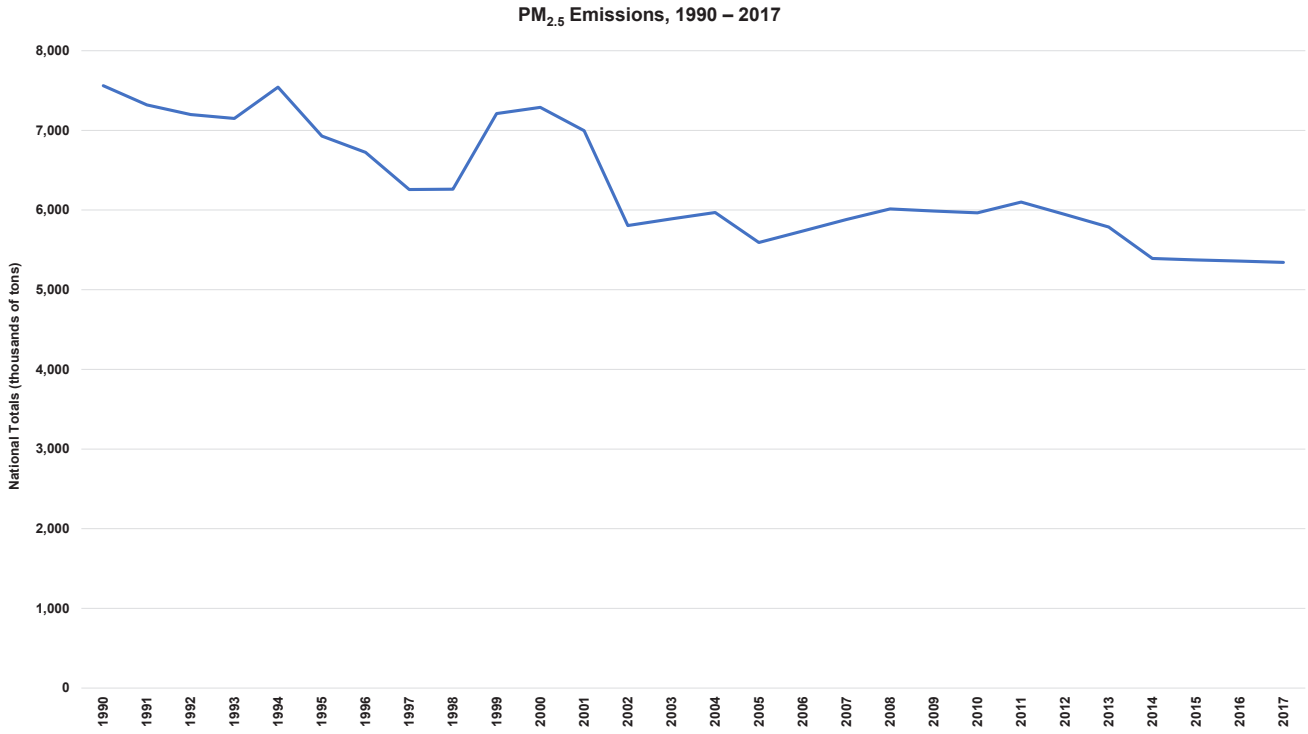
Source: U.S. EPA, **Air Pollutant Emissions Trends**. Data file: "Average Annual Emissions, Criteria pollutants National Tier 1 for 1970 - 2017."

CRITERIA AIR POLLUTANT TRENDS | FINE PARTICULATE MATTER



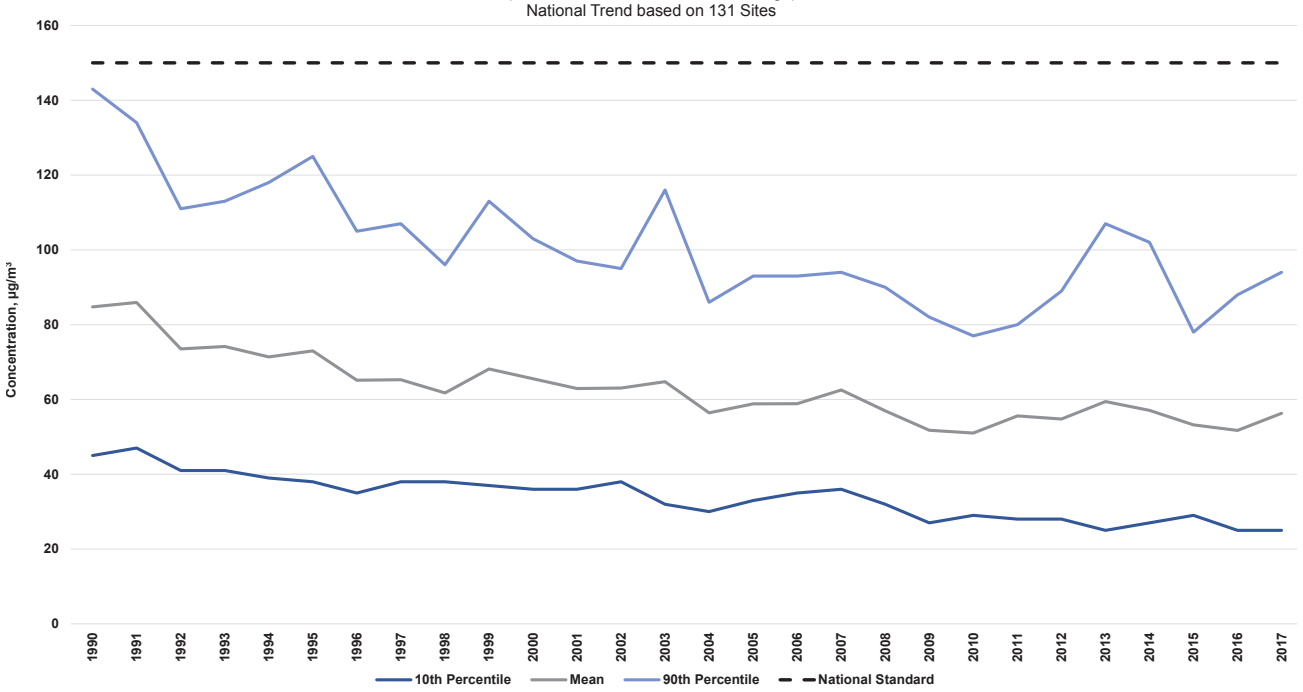
Source: U.S. EPA, **Particulate Matter ($PM_{2.5}$) Trends**.

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



CRITERIA AIR POLLUTANT TRENDS | COURSE PARTICULATE MATTER

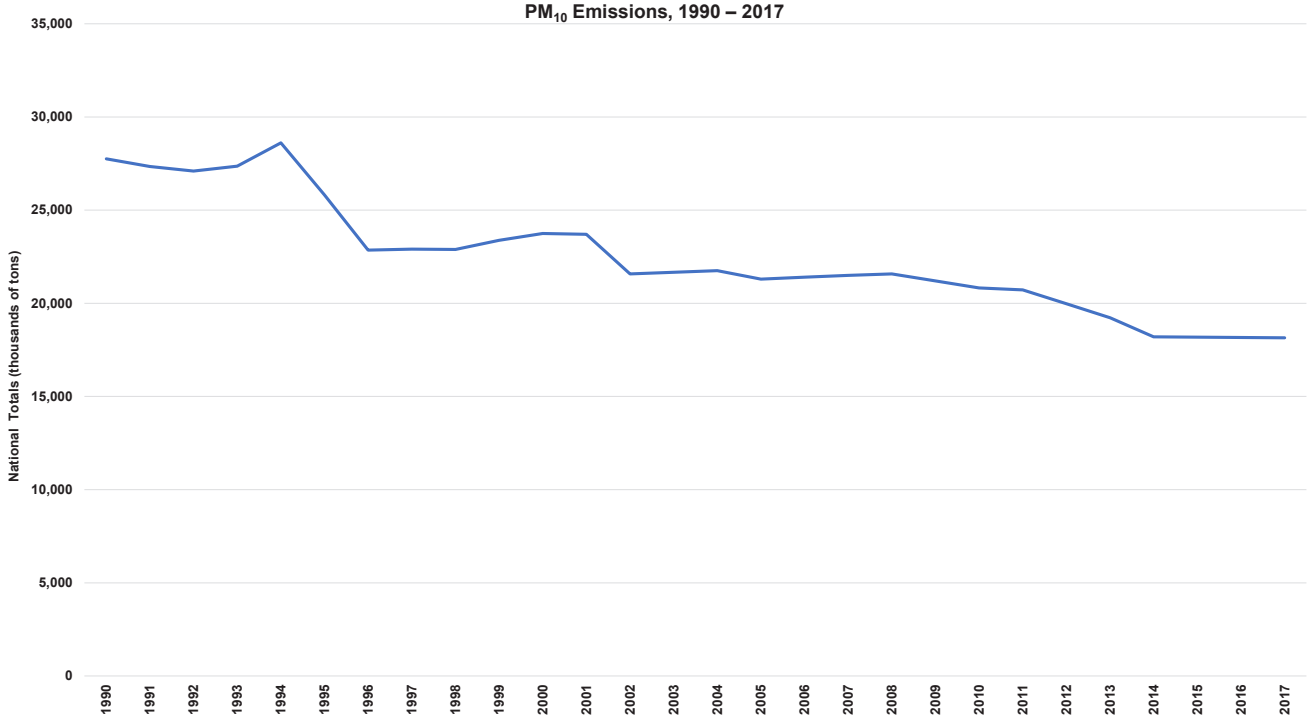
PM_{10} Air Quality, 1990 – 2017
(Annual 2nd Maximum 24-Hour Average)
National Trend based on 131 Sites



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

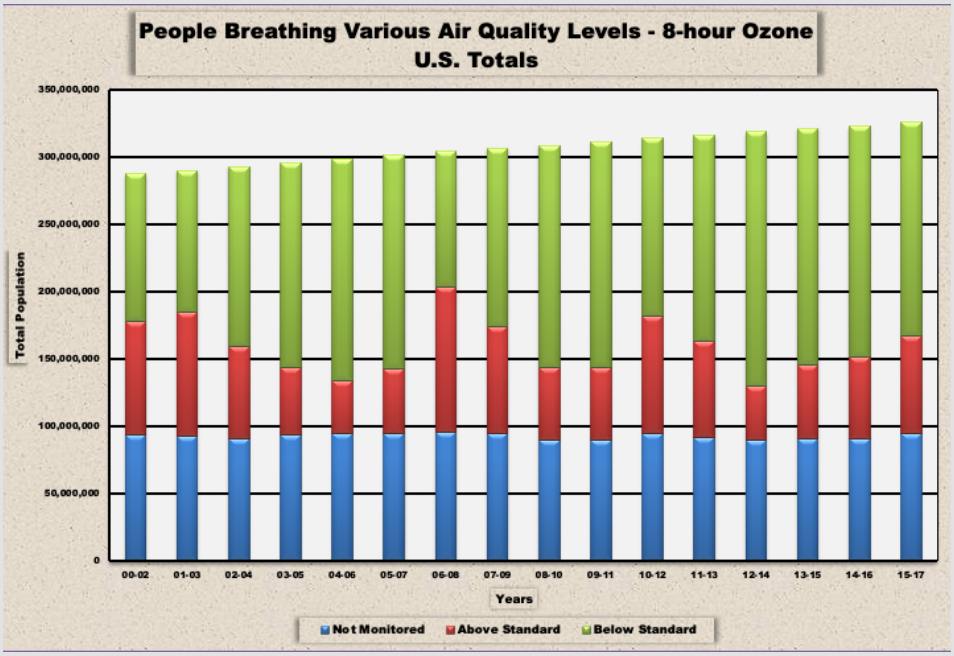
Source: U.S. EPA, **Air Pollutant Emissions Trends Data**.
Data file: Average Annual Emissions.

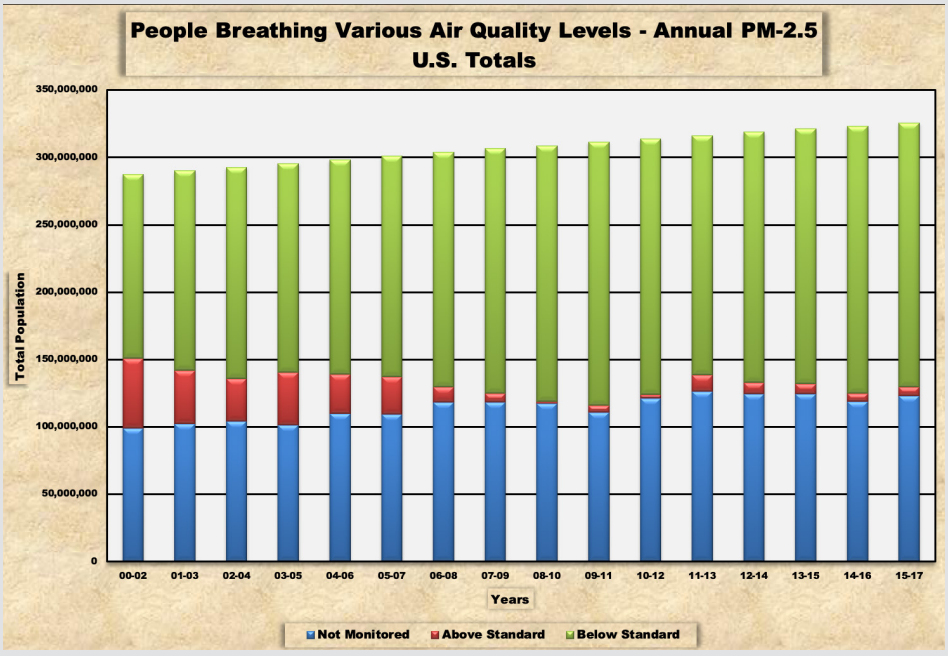
PM_{10} Emissions, 1990 – 2017



THE STATES' VIEW OF THE AIR

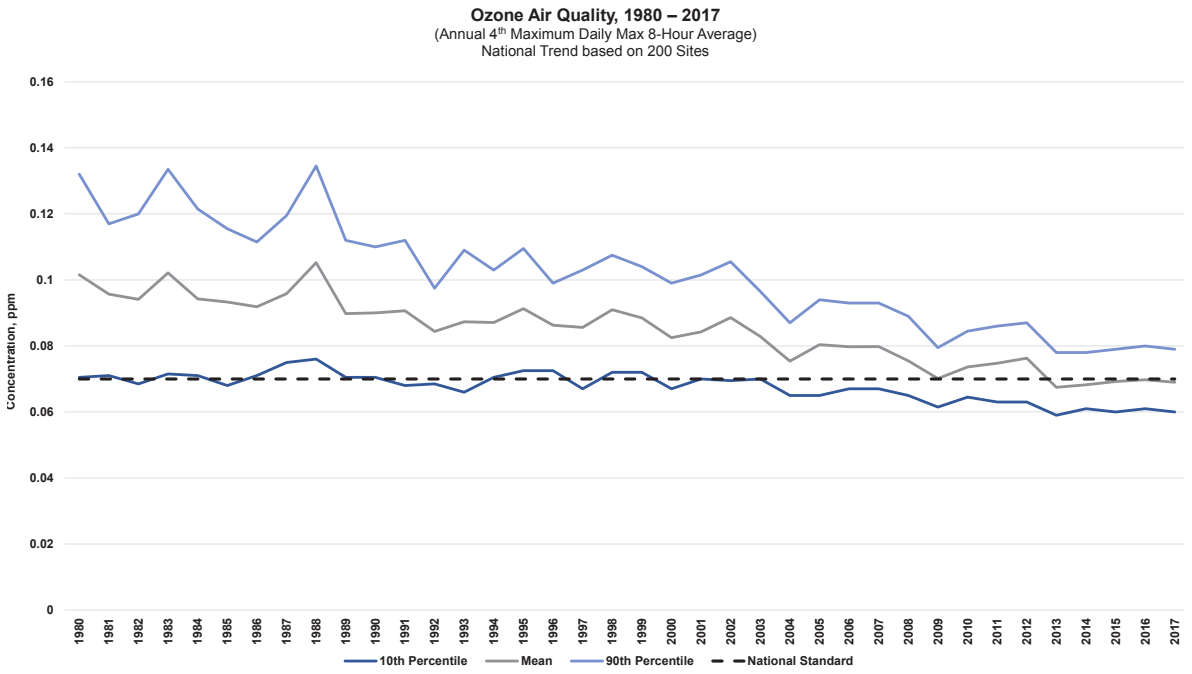
In April 2019, the Indiana Department of Environmental Management (IDEM) released the 2019 edition of *The States' View of the Air* report. The report highlights the air quality in counties and cities in the United States. Like a report card, IDEM has graded areas on the state of their air quality under 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.





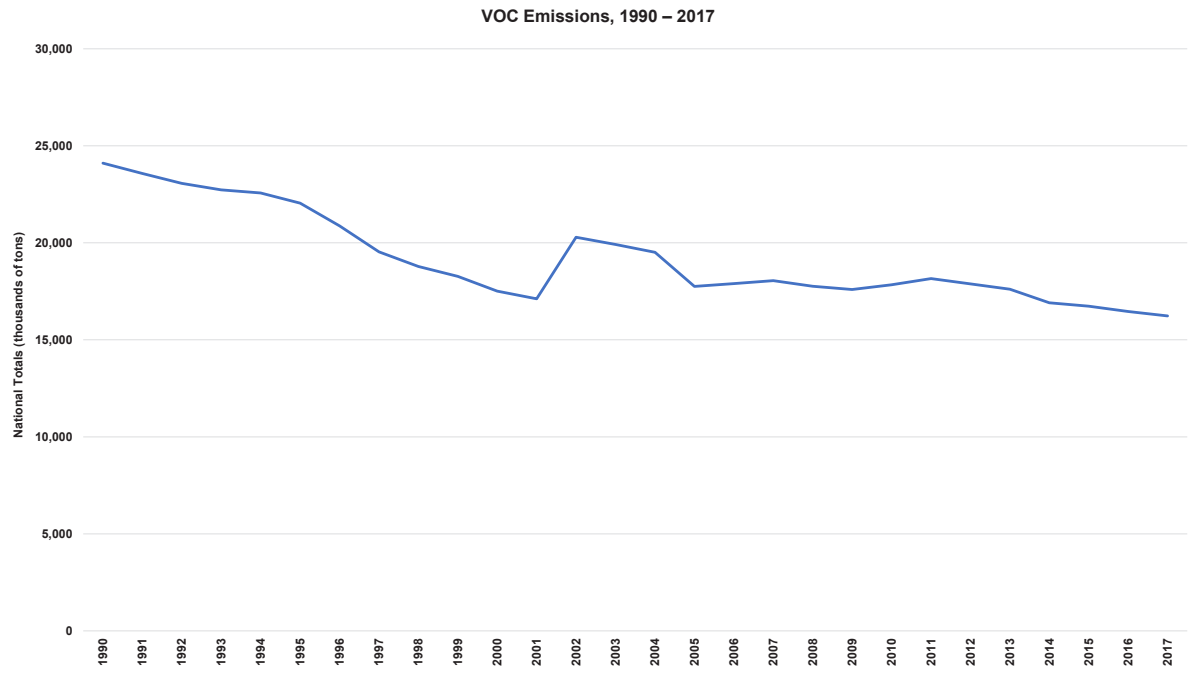
Source: Assistant Commissioner Keith Baugues, IDEM, ***The States' View of the Air***, April 2019. Note: "The blue portion of the bar represents the number of people that live in counties where air quality is not measured."

CRITERIA AIR POLLUTANT TRENDS | OZONE



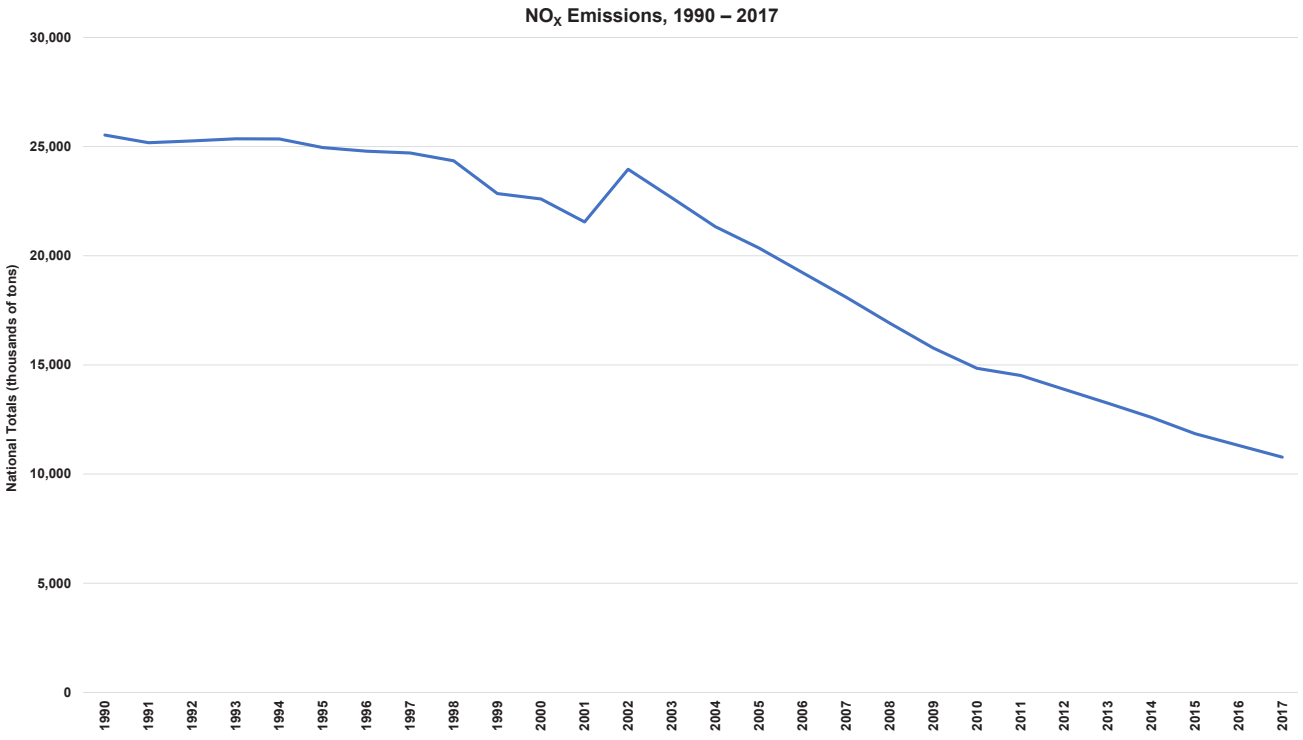
Source: U.S. EPA, **Ozone Trends**.

CRITERIA AIR POLLUTANT TRENDS | OZONE PRECURSOR EMISSIONS



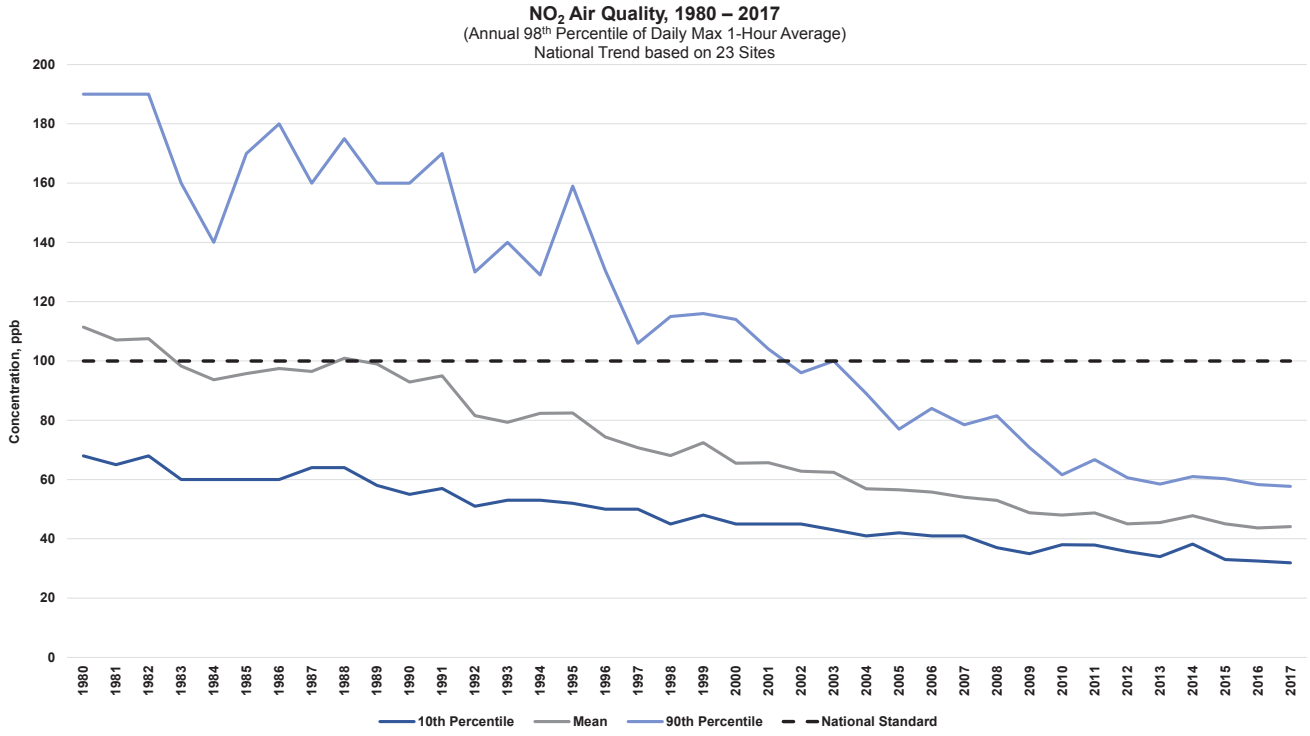
Source: U.S. EPA, **Air Pollutant Emissions Trends Data**. Data file: Average Annual Emissions.

CRITERIA AIR POLLUTANT TRENDS | NITROGEN DIOXIDE

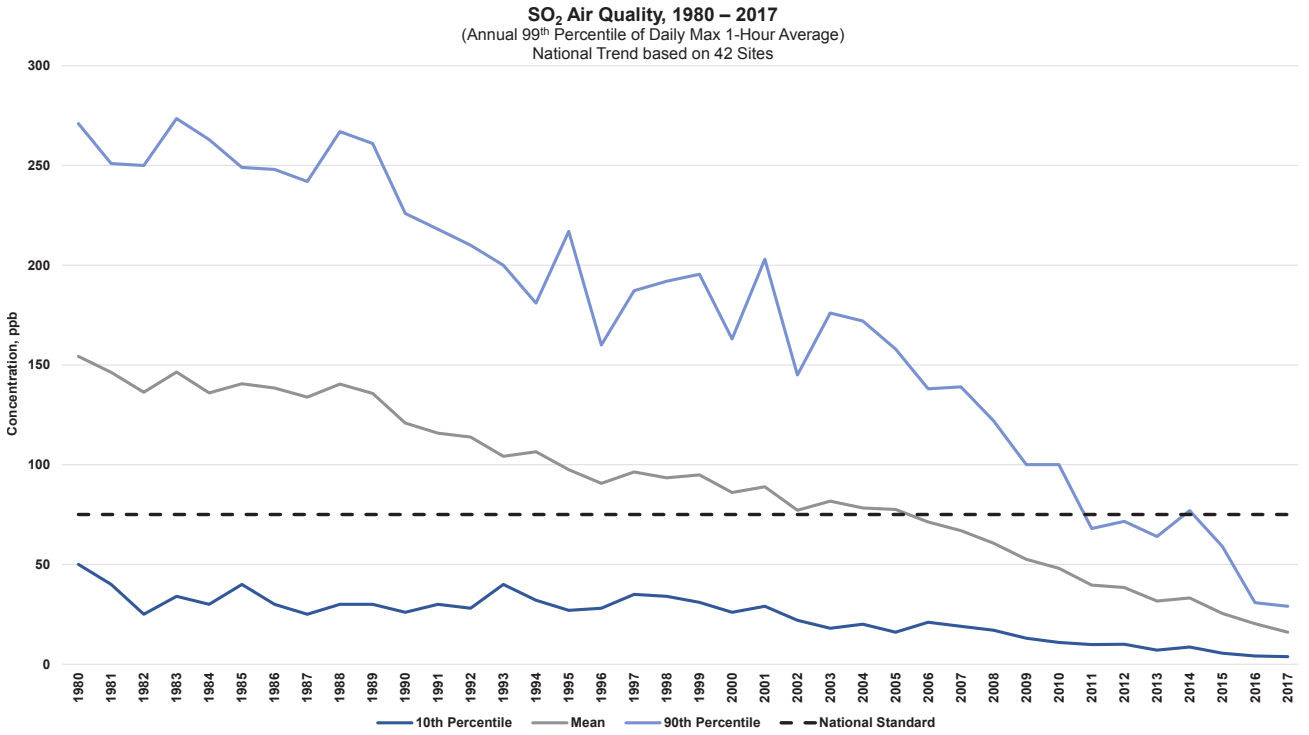


Source: U.S. EPA, **Air Pollutant Emissions Trends Data**.
Data file: Average Annual Emissions.

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

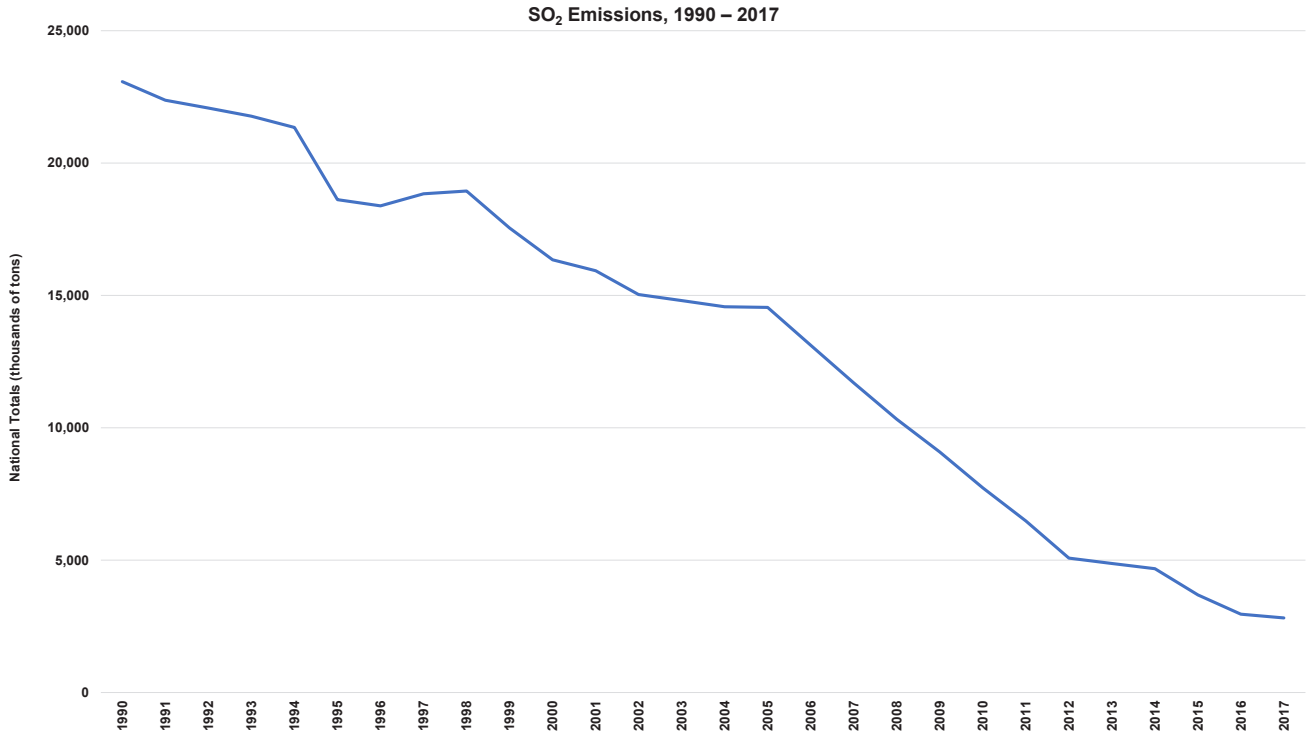


CRITERIA AIR POLLUTANT TRENDS | SULFUR DIOXIDE

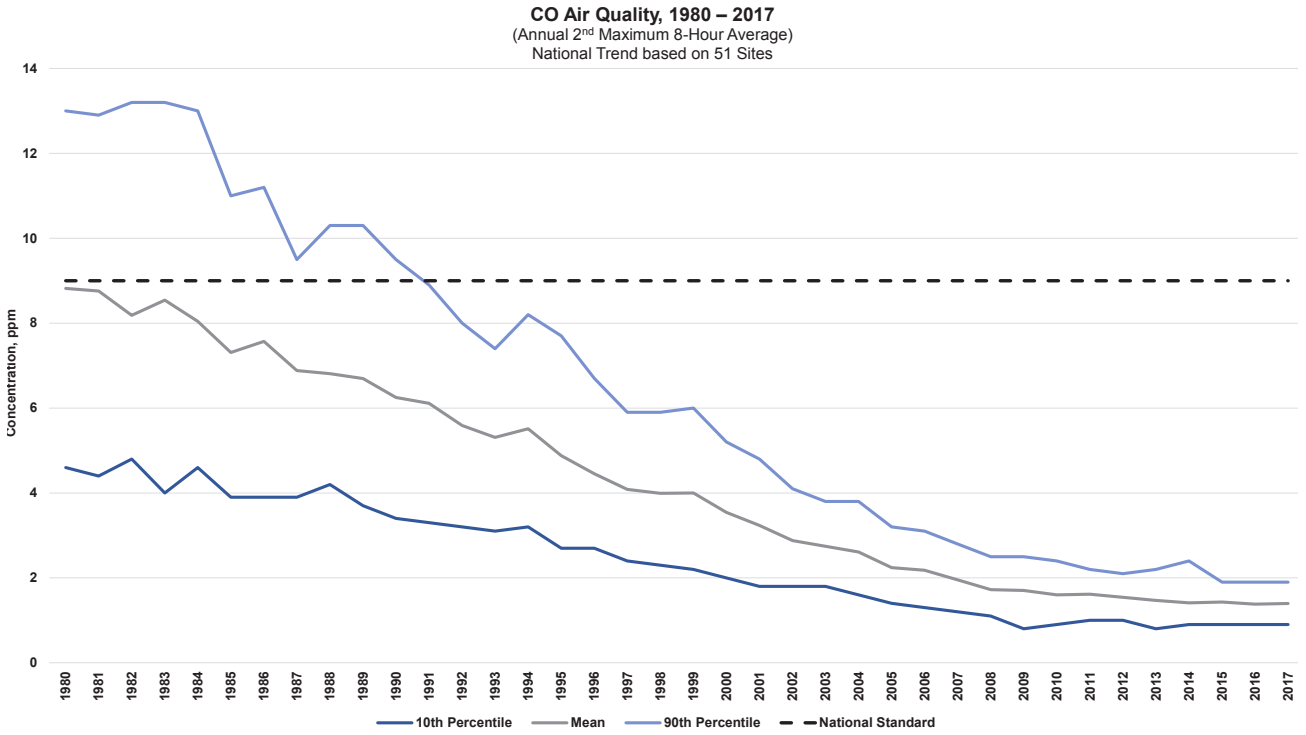


Source: U.S. EPA, **Sulfur Dioxide Trends**.

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

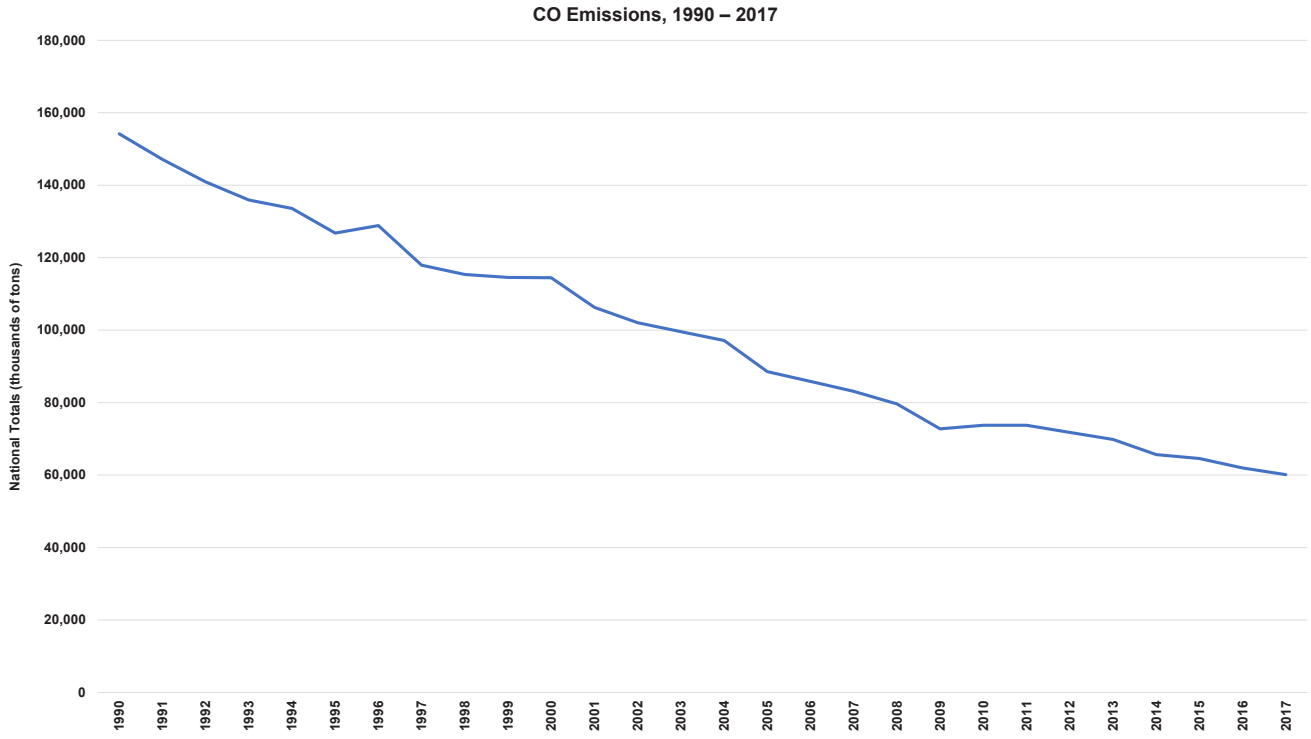


CRITERIA AIR POLLUTANT TRENDS | CARBON MONOXIDE

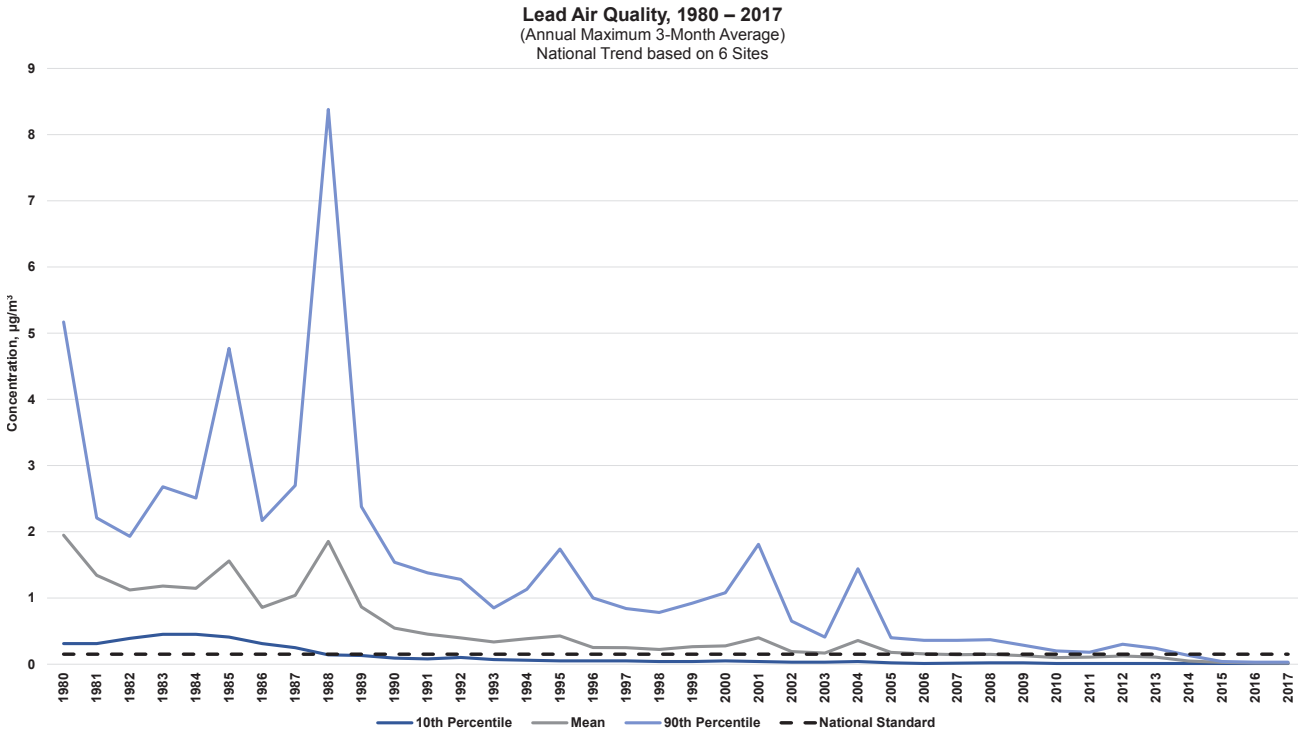


Source: U.S. EPA, **Carbon Monoxide Trends**.

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



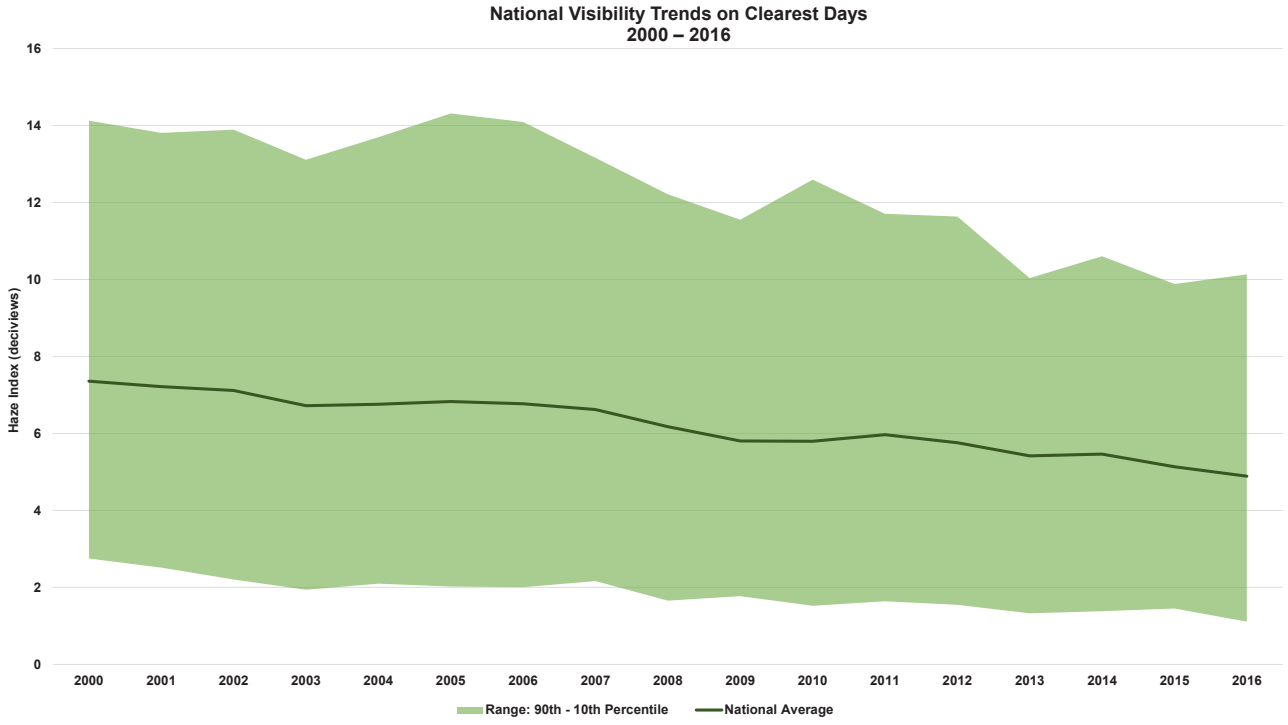
CRITERIA AIR POLLUTANT TRENDS | LEAD

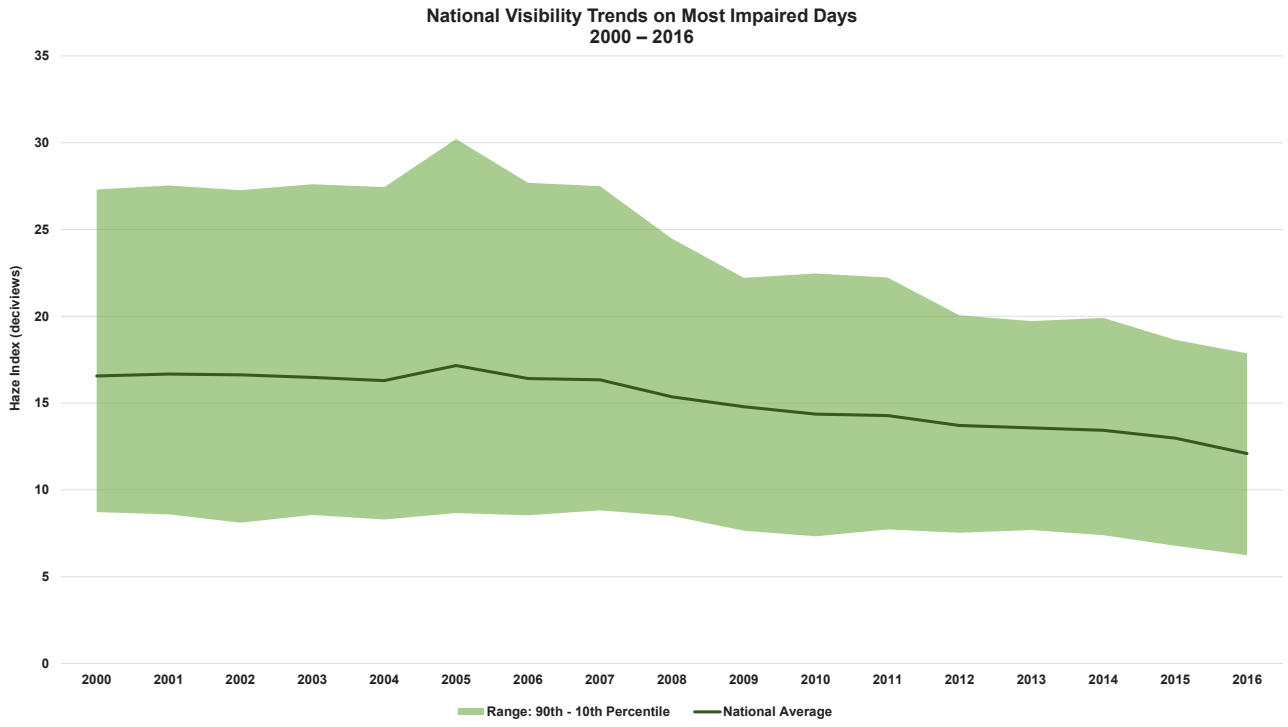


Source: U.S. EPA, **Lead Trends**.

VISIBILITY PROGRESS

U.S. EPA's 2018 report on air quality trends also includes information on visibility progress in national parks and wilderness areas (Class I Areas) from 2000 to 2016. Since 2000, visibility on the 20 percent clearest days has been improved by 34 percent, while there has been a 27 percent improvement in visibility during the 20 percent most impaired days.[5]

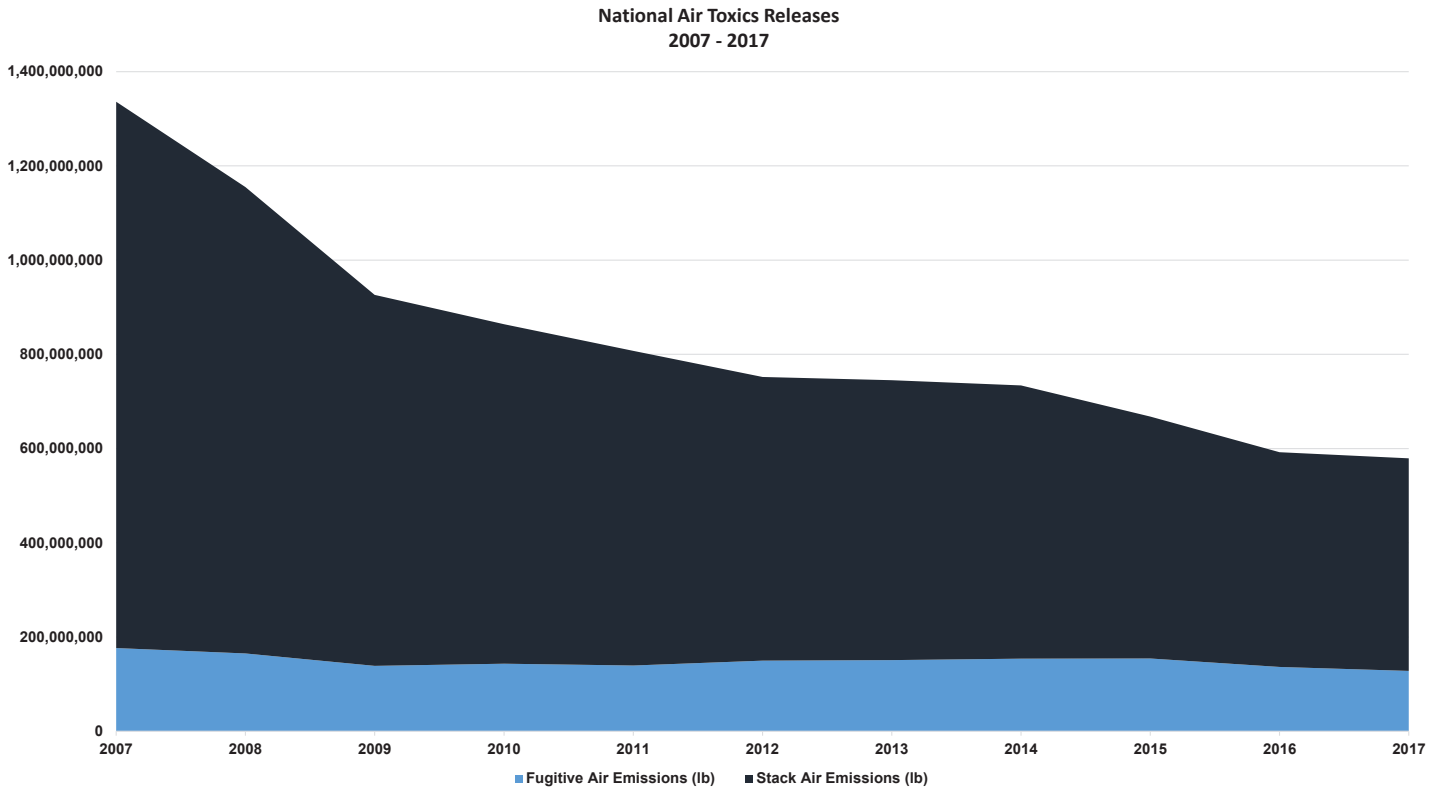




Source: U.S. EPA, ***Our Nation's Air: Status and Trends Through 2017***. Section: "Visibility Improves in Scenic Areas," July 31, 2018.

HAZARDOUS AIR POLLUTANT TRENDS

U.S. EPA tracks 187 hazardous air pollutants, or air toxics. The *2017 Toxic Release Inventory National Analysis* documents a 57-percent reduction in air release over the past ten years, from 1,336,060,145 pounds in 2007 to 579,381,790 pounds in 2017.[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). Over 21,000 facilities reported to the Toxic Release Inventory in 2017.[8]

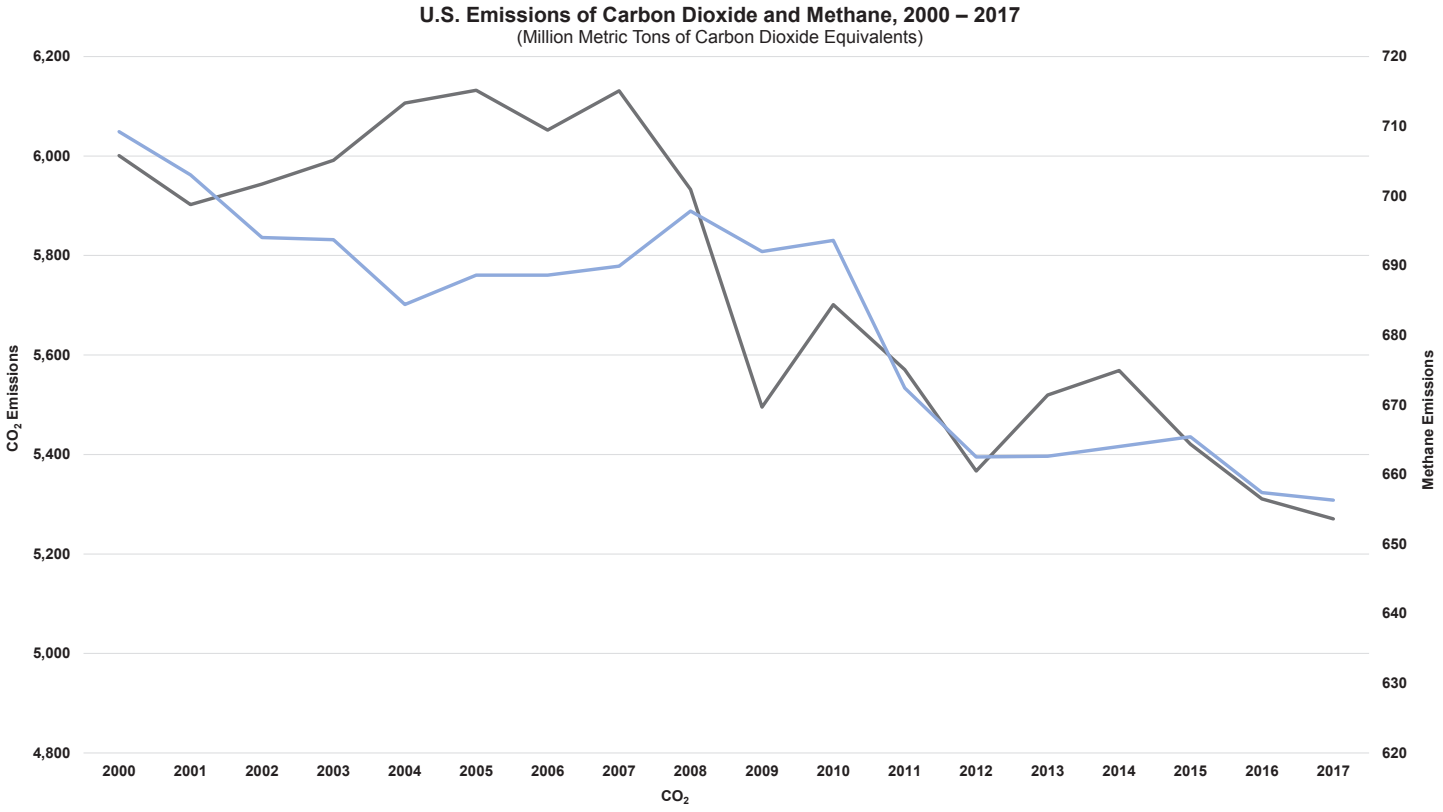


U.S. EPA, ***2017 Toxic Release Inventory National Analysis***, April 2019.

GREENHOUSE GAS TRENDS | CARBON DIOXIDE AND METHANE

According to U.S. EPA's most recent *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, which is "an annual comprehensive accounting of total greenhouse gas emissions from all man-made sources in the United States,"[9] U.S. greenhouse gas emissions totaled 6,472 million metric tons of CO_2 equivalents (mmt CO_2 eq.) in 2017, down 10 percent from 1990 levels.[10]

Specifically, emissions of carbon dioxide (CO_2) and methane have decreased since 2000. The graph below displays the trend lines for both CO_2 and methane, with the dark blue line plotting CO_2 emissions along the left axis and the light blue line tracking methane emissions along the right axis.[11] Comparing 2000 to 2017, CO_2 emissions have been reduced by over 720 mmt CO_2 eq. (12 percent) and methane emissions have fallen 46 mmt CO_2 eq. (6 percent).



Sources: U.S. EPA, ***Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2017***, April 2019.

RECENT HEADLINES FROM THE U.S. ENERGY INFORMATION ADMINISTRATION

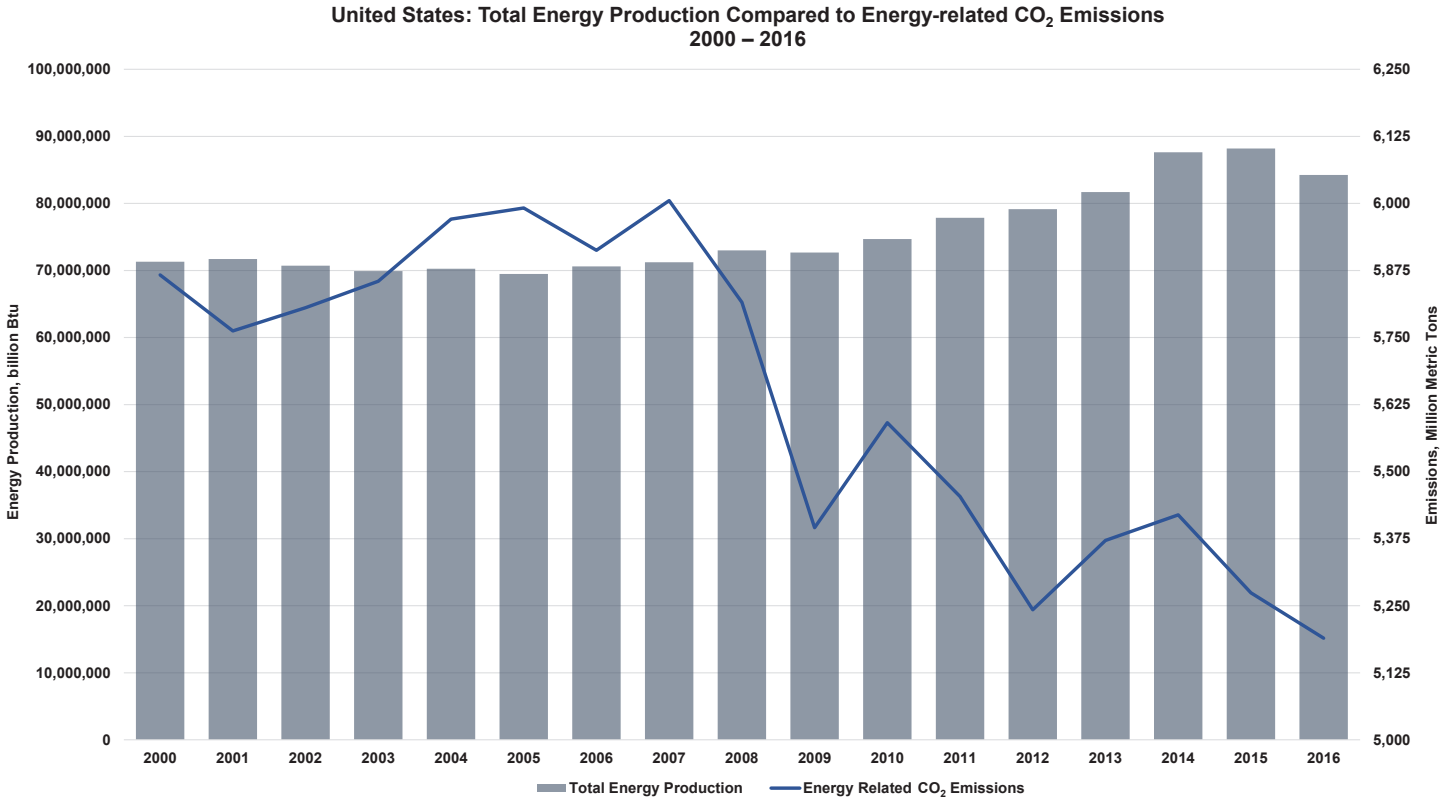
- **Electricity intensity of U.S. homes and commercial buildings decreases in coming decades**, February 13, 2019
- **Emissions from the U.S. electric power sector projected to remain mostly flat through 2050**, February 1, 2019
- **U.S. energy-related CO_2 emissions increased in 2018 but will likely fall in 2019 and 2020**, January 28, 2019
- **Carbon dioxide emissions from the U.S. power sector have declined 28% since 2005**, December 21, 2018
- **Almost all power plants that retired in the past decade were powered by fossil fuels**, December 19, 2018
- **Changes in coal sector led to less SO_2 and NO_x emissions from electric power industry**, December 11, 2018
- **U.S. energy-related CO_2 emissions fell slightly in 2017**, September 5, 2018
- **In 2018, the United States consumed more energy than ever before**, April 16, 2019
- **Energy-related carbon dioxide emission profiles differ dramatically from state to state**, April 1, 2019
- **EIA projects U.S. energy-related CO2 emissions will remain near current level through 2050**, March 20, 2019

GREENHOUSE GAS TRENDS | ENERGY-RELATED CARBON DIOXIDE EMISSIONS

According to the U.S. Energy Information Administration's (EIA) September 2018 report *U.S. Energy-Related Carbon Dioxide Emissions, 2017*, energy related carbon dioxide emissions in 2017 were 14 percent below 2005 levels.[12] Additionally, U.S. EIA's February 2019 analysis *Energy-Related Carbon Dioxide Emissions by State, 2005-2016* reports the following statistics:

- An average state reduction of 20 percent in per capita energy-related carbon dioxide emissions[13];
- Energy intensity by state is down average of nearly 11 percent[14]; and,
- On average, carbon intensity of the economy by state has been reduced by over 30 percent.[15]

From 2000 to 2016, total energy production in the United States increased 18 percent.[16] During that same period, energy-related CO_2 emissions fell nearly 12 percent, from 5,866 million metric tons to 5,189 million metric tons.[17]

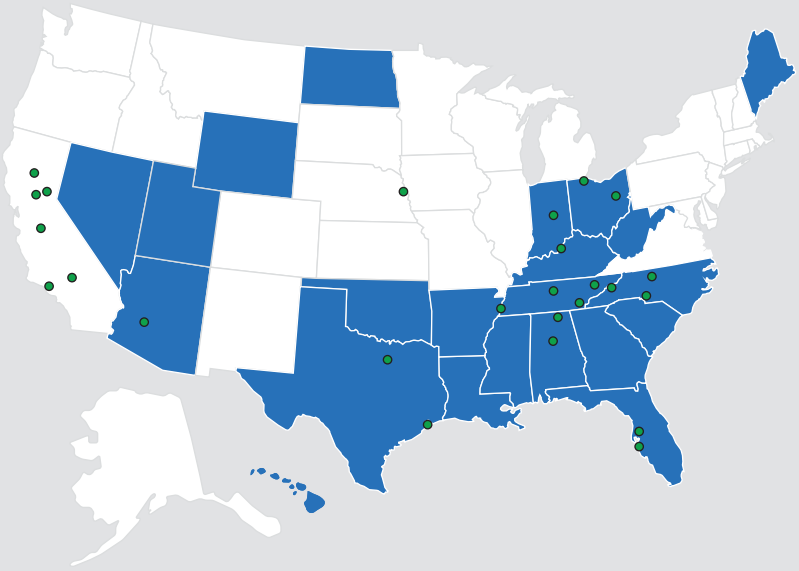


Sources: U.S. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2005-2016***, February 27, 2019. "Table 1. State energy-related carbon dioxide emissions by year, unadjusted (2005–2016);" **U.S. EIA, State Energy Data System (SEDS): 1960-2016**. Data file: "Primary energy production in Btu."

SECTION NOTES: AIR QUALITY TRENDS IN THE UNITED STATES

[1] U.S. EPA, 2017 Air Trends Report: **Air Quality – National Summary**.
[2] U.S. EPA, 2017 Air Trends Report: **Air Quality – National Summary**.
[3] U.S. EPA, 2017 Air Trends Report: **Air Quality – National Summary**.
[4] U.S. EPA **Air Pollutant Emissions Trends Data**. Data file: State Annual Emissions Trend.
[5] U.S. EPA, ***Our Nation's Air: Status and Trends Through 2017***, July 31, 2018. Section: "Visibility Improves in Scenic Areas." A full listing of Class I Areas under U.S. EPA's Regional Haze Program can be found **here**.
[6] U.S. EPA, ***2017 Toxic Release Inventory National Analysis***, April 2019.
[7] **According to U.S. EPA**: "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."
[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. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2000-2016***, February 27, 2019.
[10] U.S. EPA, ***Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2017***, April 2019.
[11] U.S. EPA, ***Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2017***, April 2019.
[12] U.S. EIA, **Energy-Related Carbon Dioxide Emissions by State, 2000-2016**, February 27, 2019.
[13] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2000-2016,*** February 27, 2019. Data file: "Table 6. Per capita energy-related carbon dioxide emissions by state (2005–2016)."
[14] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2000-2016,*** February 27, 2019., February 27, 2019. Data file: "Table 8. Carbon intensity of the energy supply by State (2005–2016)."
[15] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2000-2016,*** February 27, 2019. February 27, 2019. Data file: "Table 9. Carbon intensity of the economy by state (2005–2016)."
[16] U.S. EIA, **State Energy Data System (SEDS): 1960-2016.** Data file: "Primary energy production in Btu."
[17] U.S. EIA, ***Energy-Related Carbon Dioxide Emissions by State, 2000-2016***, February 27, 2019. Data file: "Table 1. State energy-related carbon dioxide emissions by year, unadjusted (2005–2016)."

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
Hawaii Department of Health
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
Oklahoma Department of Environmental Quality
South Carolina Department of Health and Environmental Control
Tennessee Department of Environment & Conservation
Texas Commission on Environmental Quality
Utah Department of Environmental Quality
West Virginia Department of Environmental Protection
Wyoming Department of Environmental Quality

Butte County Air Quality Management District (California)
Canton City Health Department (Ohio)
Chattanooga-Hamilton County Air Pollution Control
El Dorado County Air Quality Management District (California)
Forsyth County Office of Environmental Assistance and Protection (North Carolina)
Fort Worth Environmental Management Department (Texas)
Environmental Protection Commission of Hillsborough County (Florida)
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)
Maricopa Air Quality Department (Arizona)
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)**