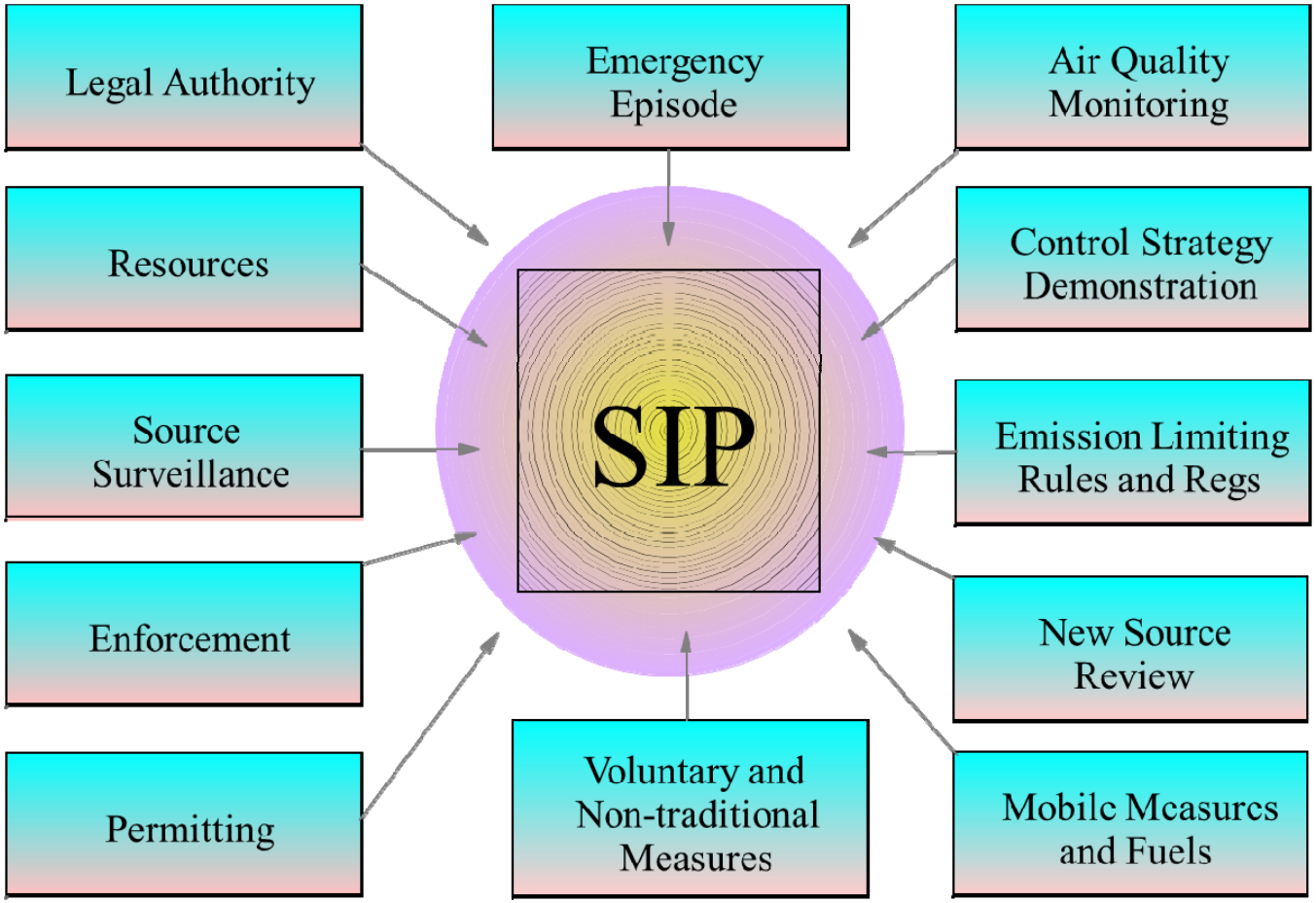
Improvements to Air Quality

Dallas Baker, P.E., BCEE

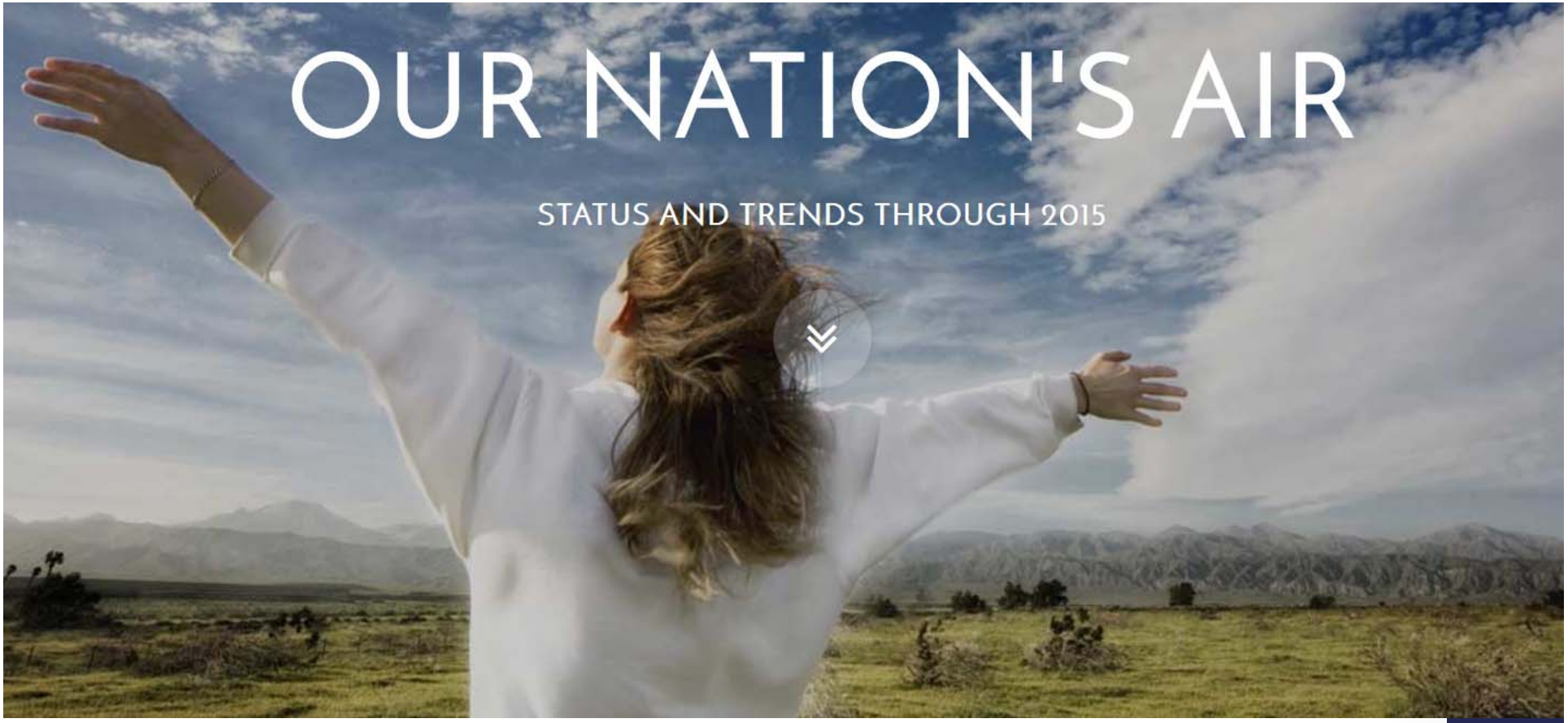
MDEQ Air Director

September 22, 2016

State Implementation Plan (SIP)



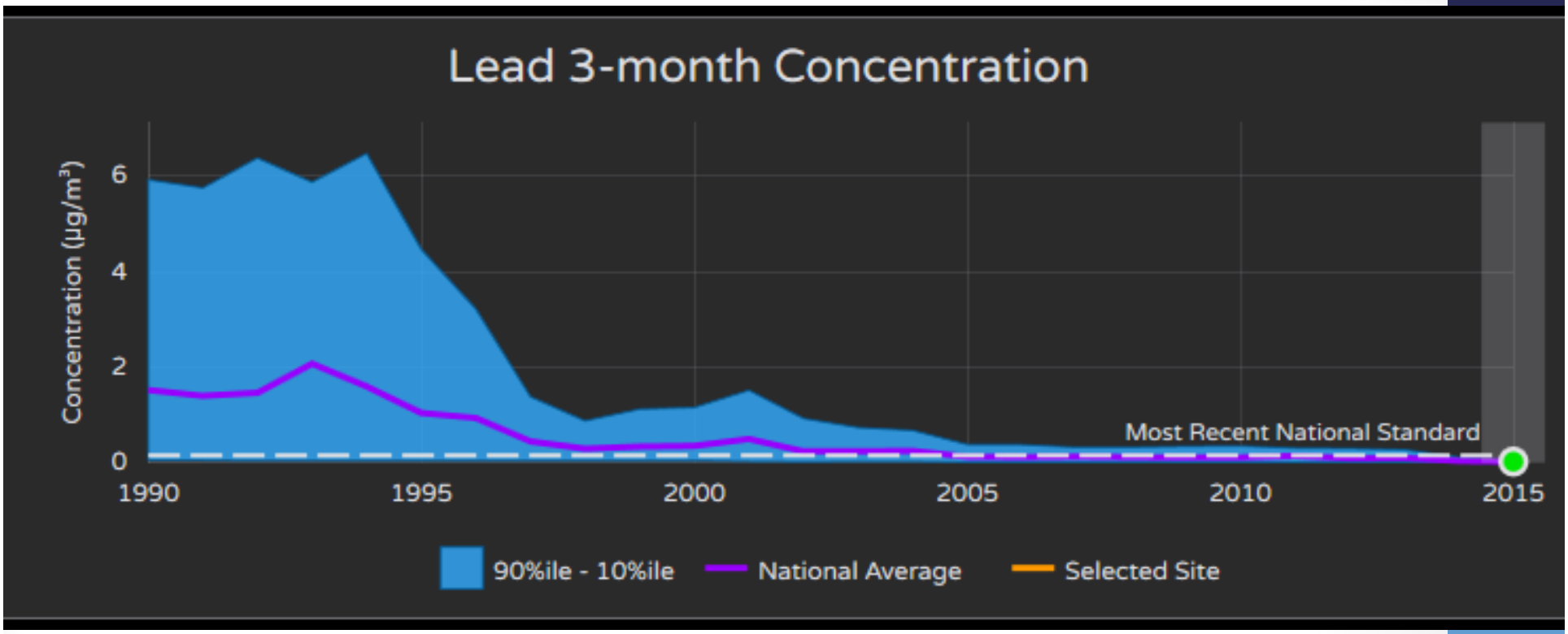
Source: epa.gov

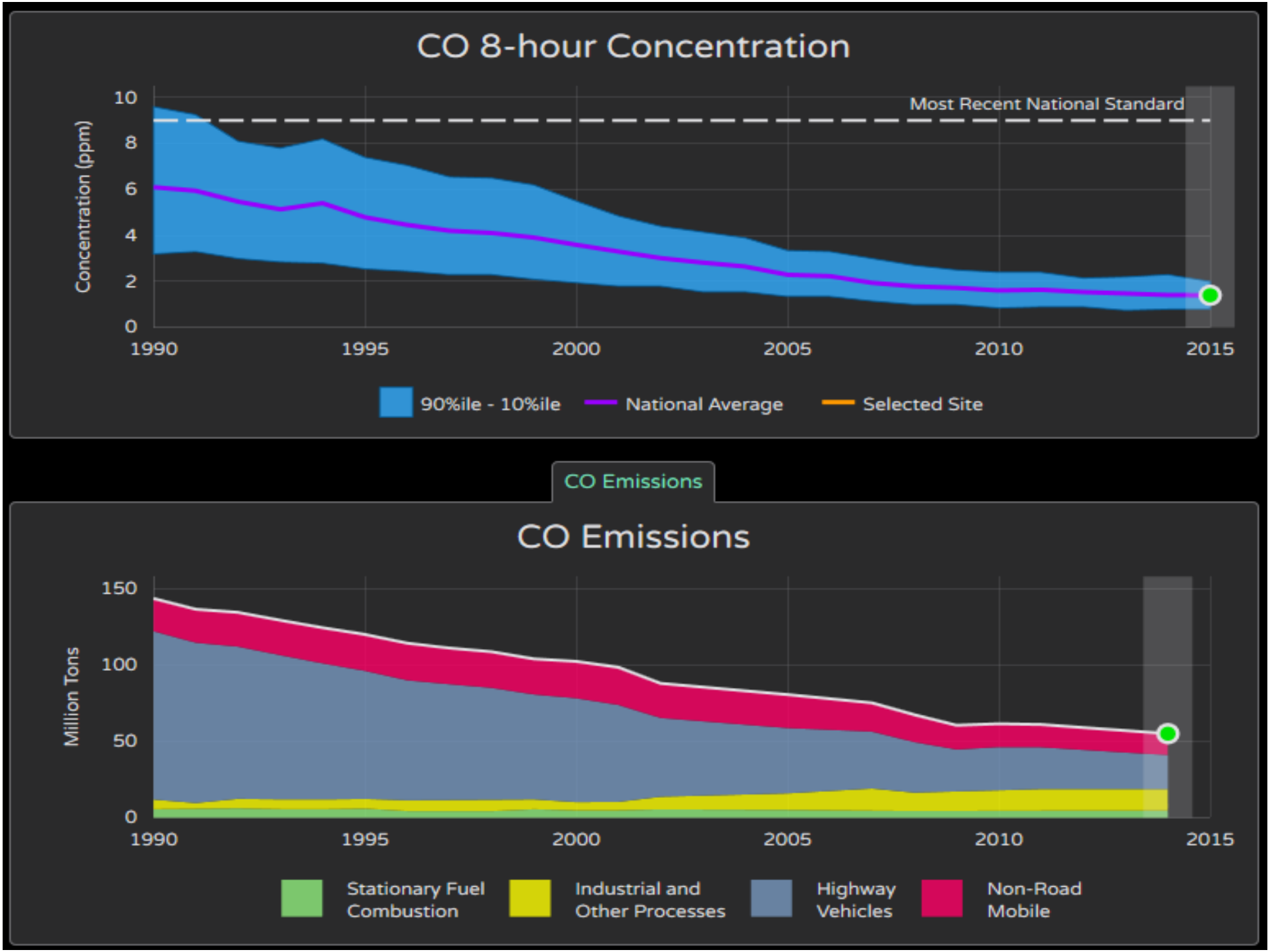


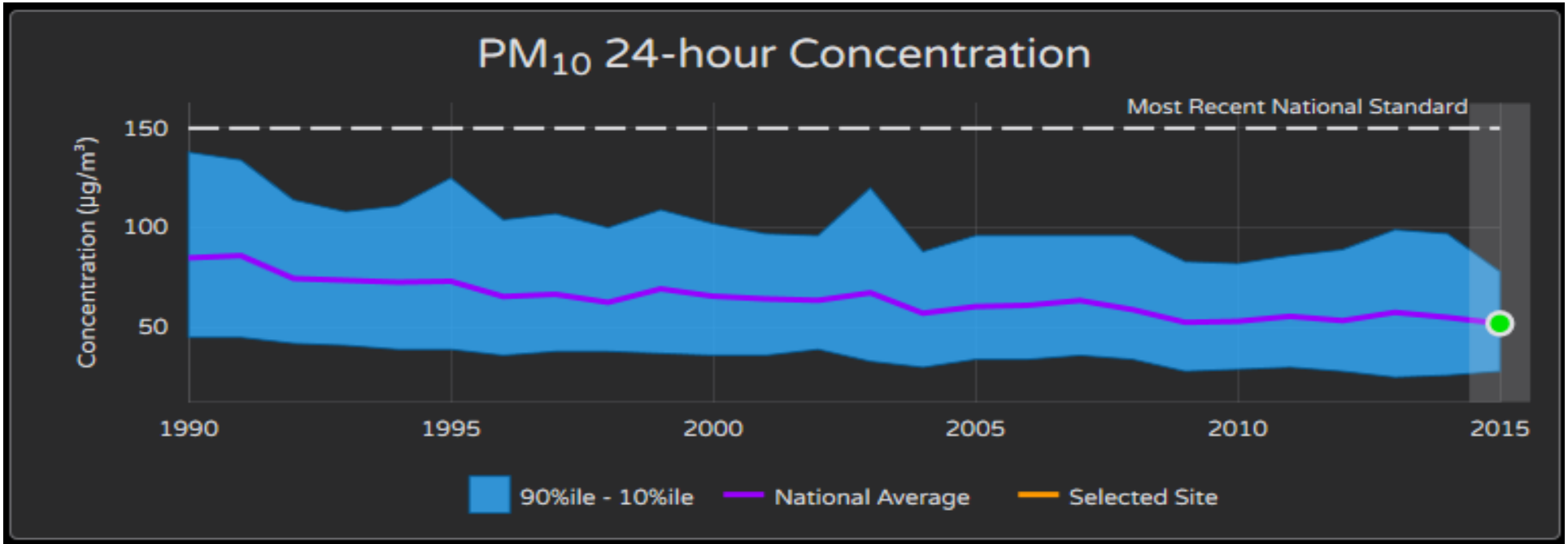
Source:

gispub.epa.gov/air/trendsreport/2016

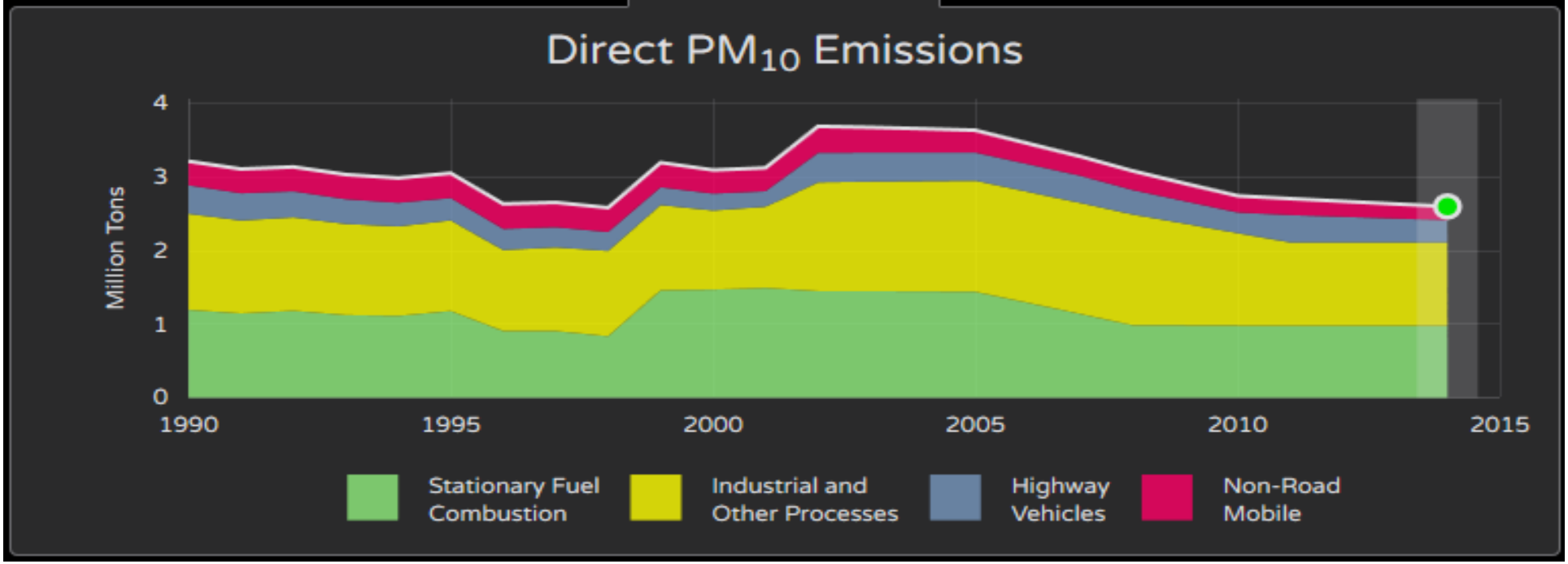
LEAD (Pb)

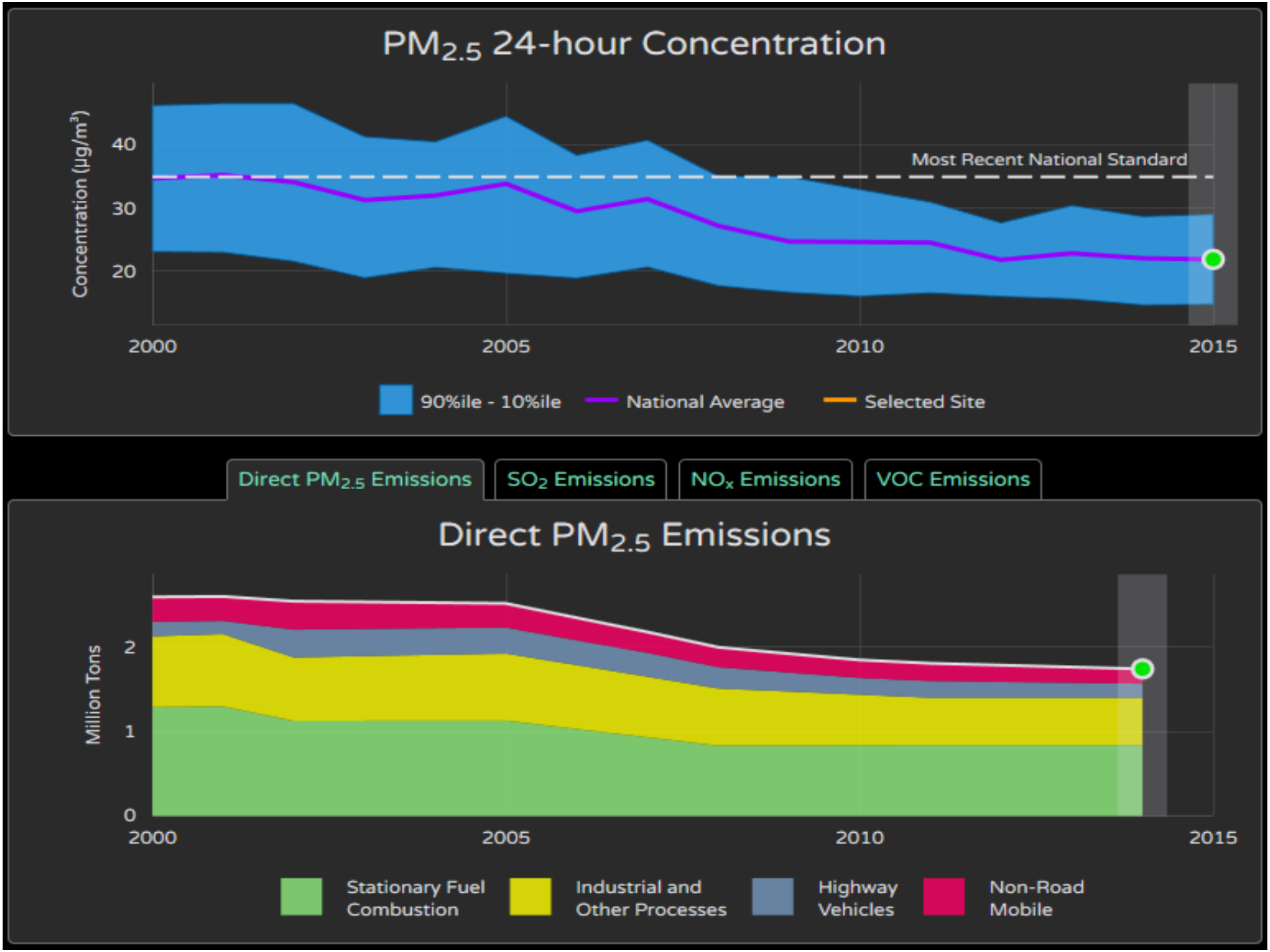

Lead 3-month Concentration
Concentration (µg/m³)
6
4
2
0
1990
1995
2000
2005
2010
2015
Most Recent National Standard
90%ile - 10%ile
National Average
Selected Site

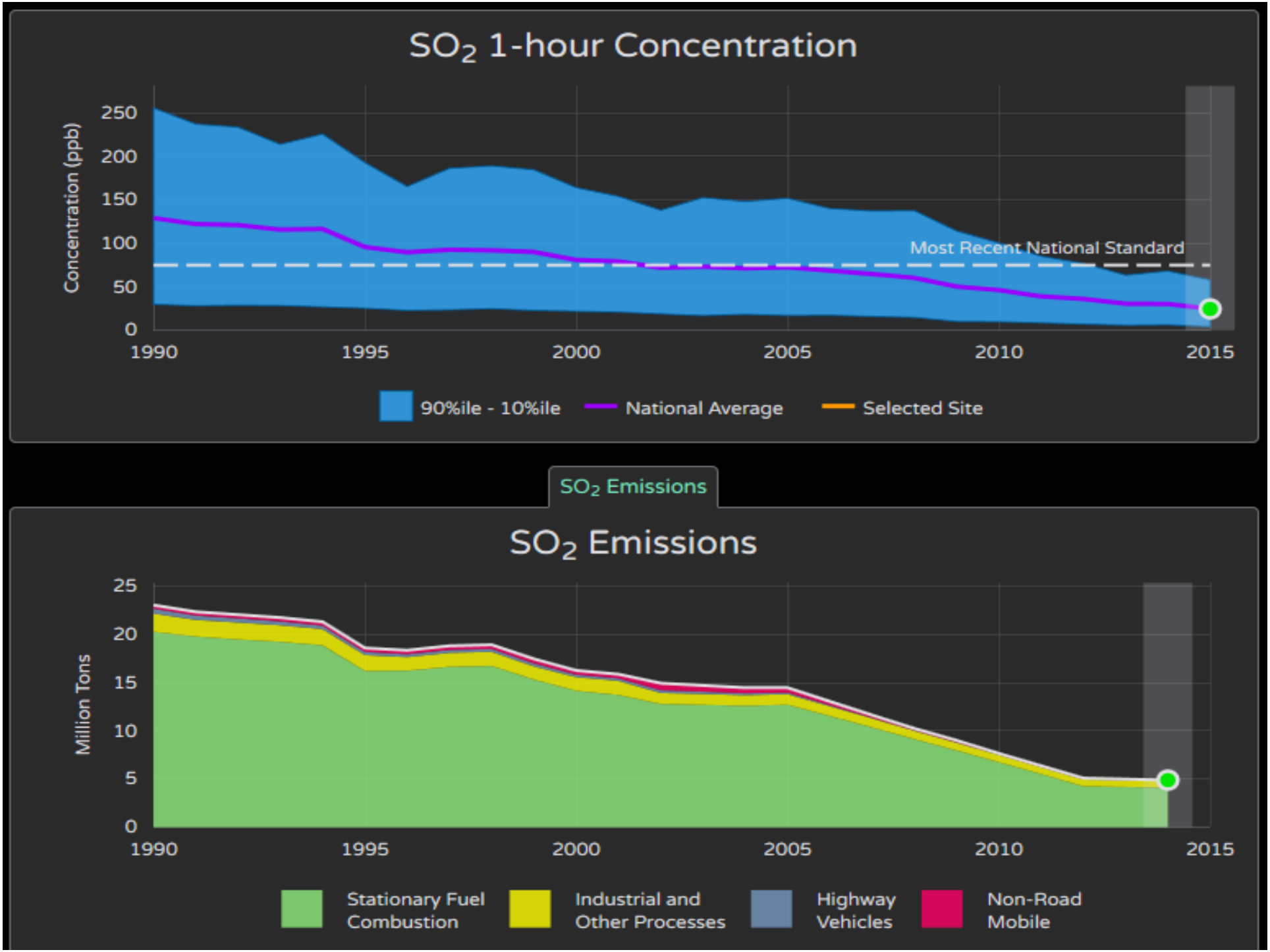

CO 8-hour Concentration
Concentration (ppm)
10
8
6
4
2
0
1990
1995
2000
2005
2010
2015
Most Recent National Standard
90%ile - 10%ile
National Average
Selected Site
CO Emissions
CO Emissions
Million Tons
150
100
50
0
1990
1995
2000
2005
2010
2015
Stationary Fuel Combustion
Industrial and Other Processes
Highway Vehicles
Non-Road Mobile

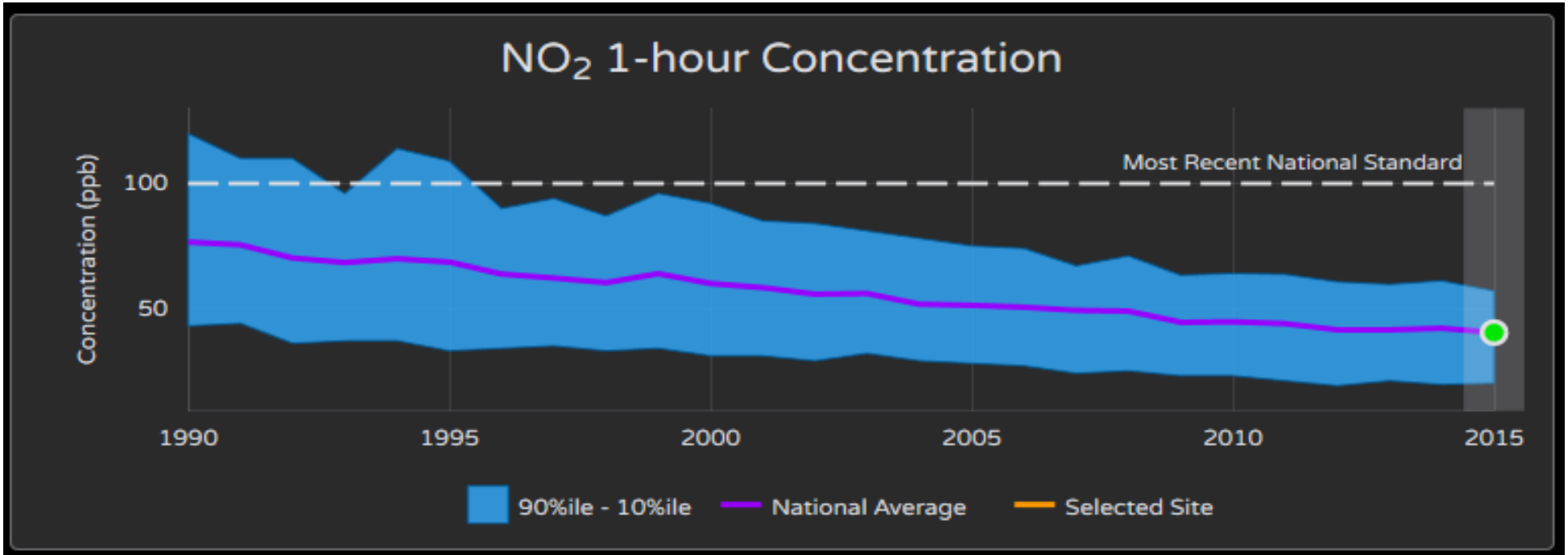


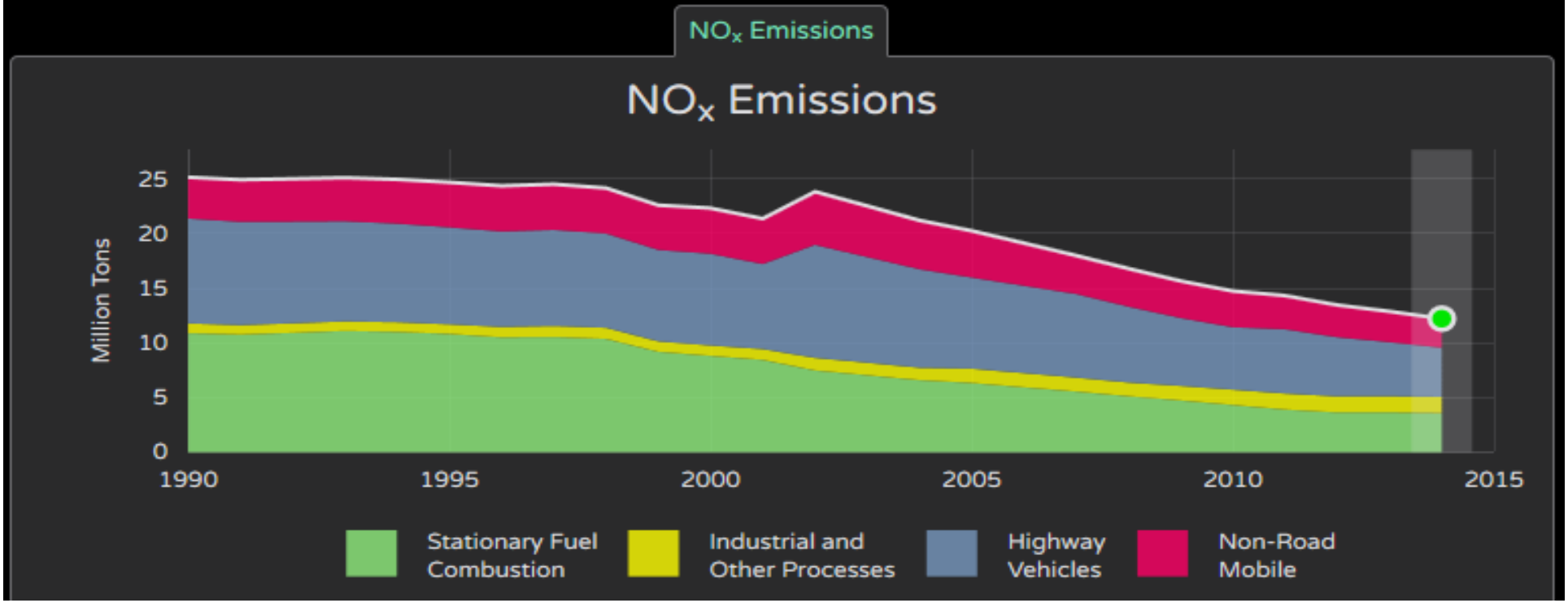
Direct PM_{10} Emissions

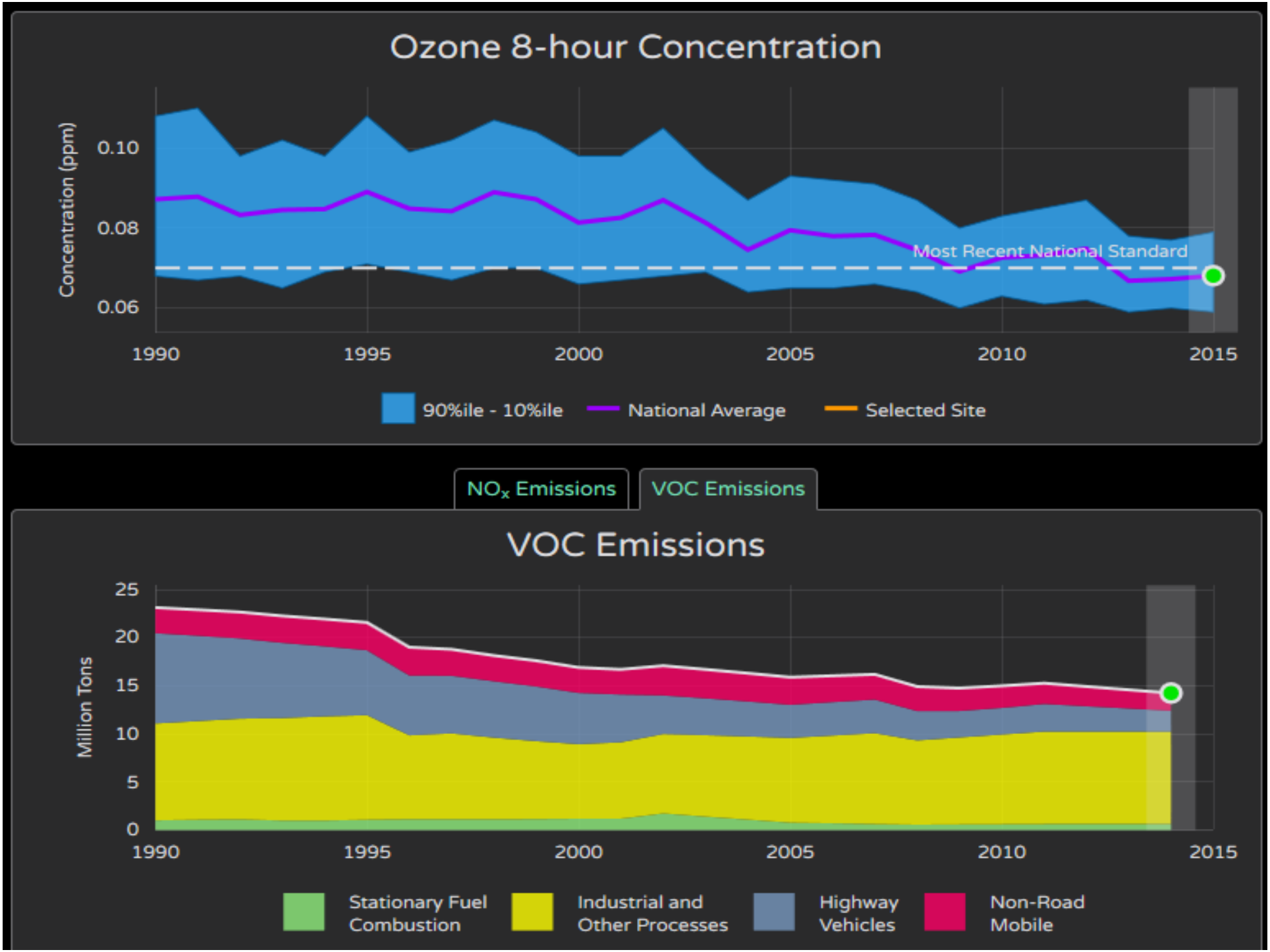



PM2.5 24-hour Concentration
Concentration (µg/m³)
40
30
20
Most Recent National Standard
2000
2005
2010
2015
90%ile - 10%ile
National Average
Selected Site
Direct PM2.5 Emissions
SO2 Emissions
NOx Emissions
VOC Emissions
Direct PM2.5 Emissions
Million Tons
2
1
0
2000
2005
2010
2015
Stationary Fuel Combustion
Industrial and Other Processes
Highway Vehicles
Non-Road Mobile

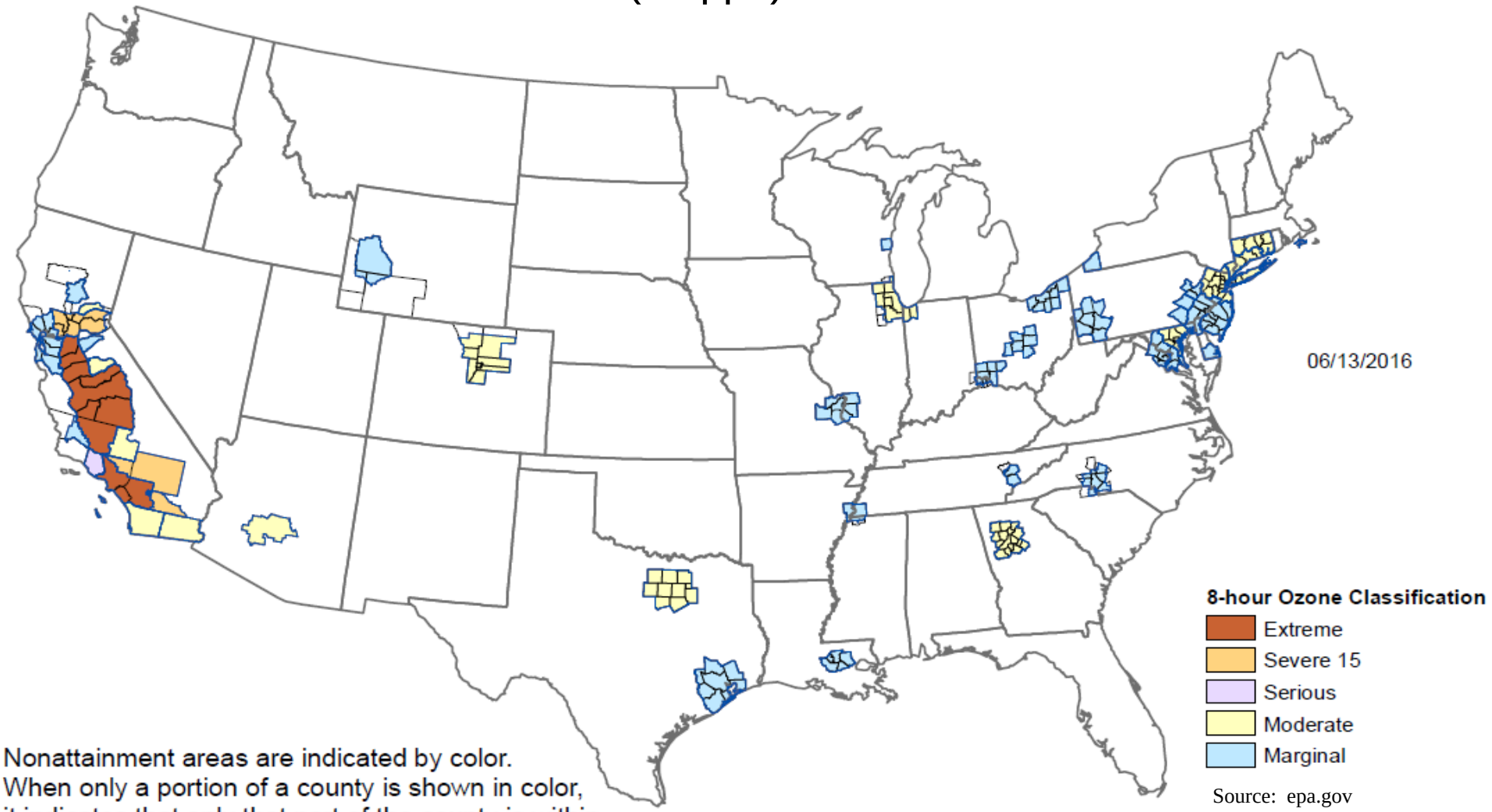

SO_2 1-hour Concentration
Concentration (ppb)
250
200
150
100
50
0
1990
1995
2000
2005
2010
2015
Most Recent National Standard
90%ile - 10%ile
National Average
Selected Site
SO_2 Emissions
SO_2 Emissions
Million Tons
25
20
15
10
5
0
1990
1995
2000
2005
2010
2015
Stationary Fuel Combustion
Industrial and Other Processes
Highway Vehicles
Non-Road Mobile


NO_2 1-hour Concentration
Concentration (ppb)
100
50
Most Recent National Standard
1990
1995
2000
2005
2010
2015
90%ile - 10%ile
National Average
Selected Site


NO_x Emissions
NO_x Emissions
Million Tons
25
20
15
10
5
0
1990
1995
2000
2005
2010
2015
Stationary Fuel Combustion
Industrial and Other Processes
Highway Vehicles
Non-Road Mobile


Ozone 8-hour Concentration
Concentration (ppm)
0.10
0.08
0.06
Most Recent National Standard
1990
1995
2000
2005
2010
2015
90%ile - 10%ile
National Average
Selected Site
NOx Emissions
VOC Emissions
VOC Emissions
Million Tons
25
20
15
10
5
0
1990
1995
2000
2005
2010
2015
Stationary Fuel Combustion
Industrial and Other Processes
Highway Vehicles
Non-Road Mobile

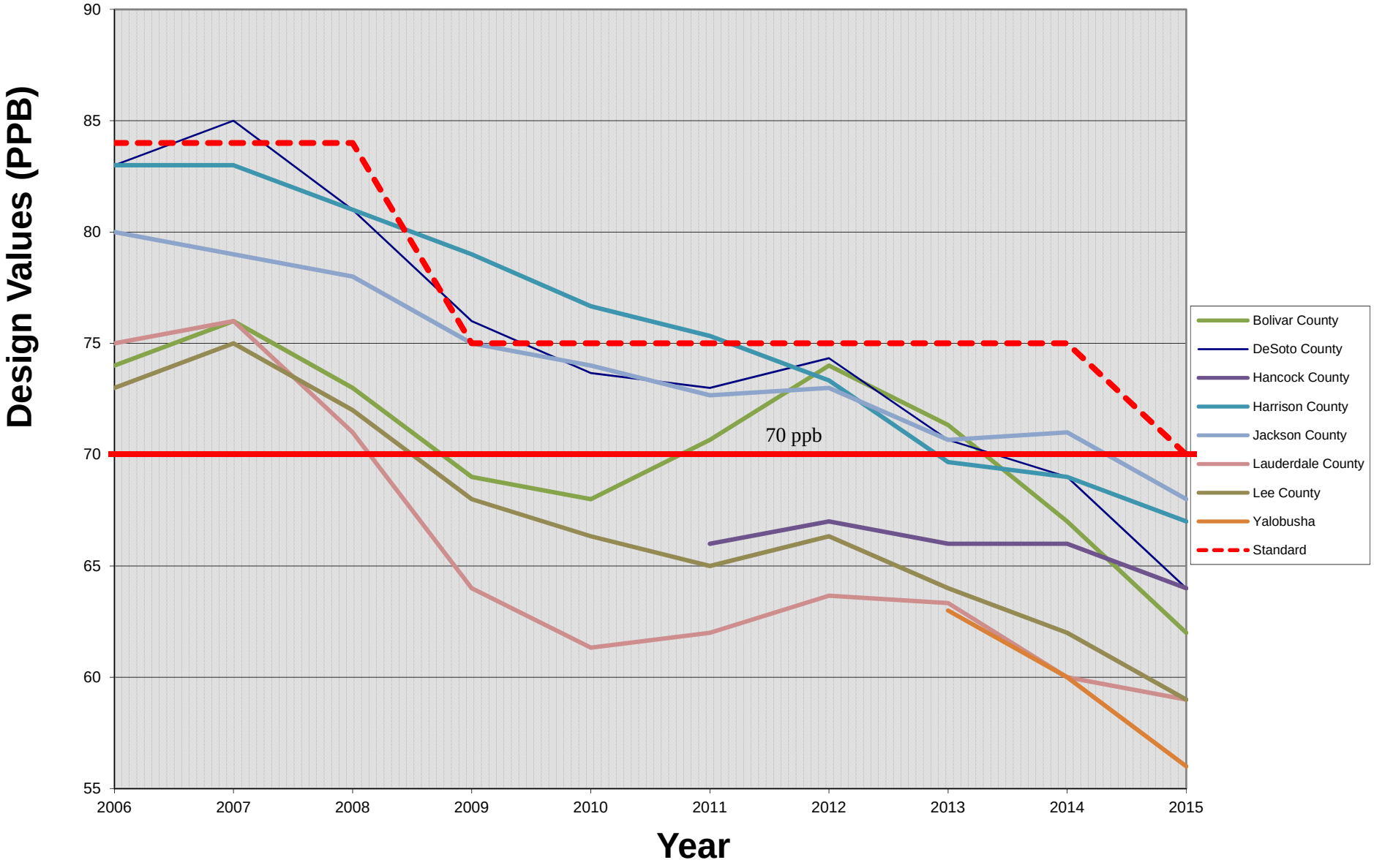
8-Hour Ozone Nonattainment Areas (2008 Standard)
(75 ppb)



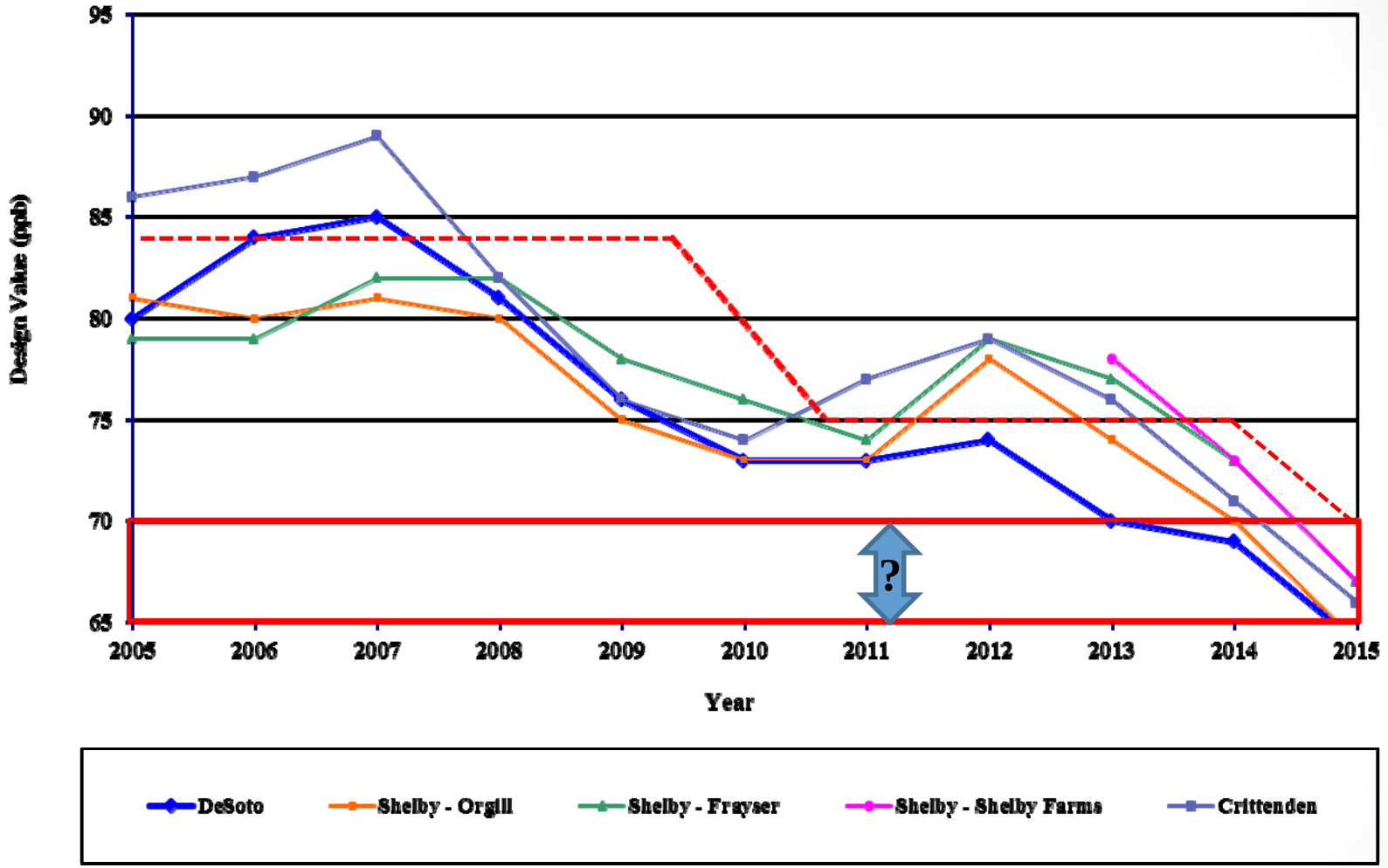
Nonattainment areas are indicated by color.
When only a portion of a county is shown in color, it indicates that only that part of the county is within a nonattainment area boundary.

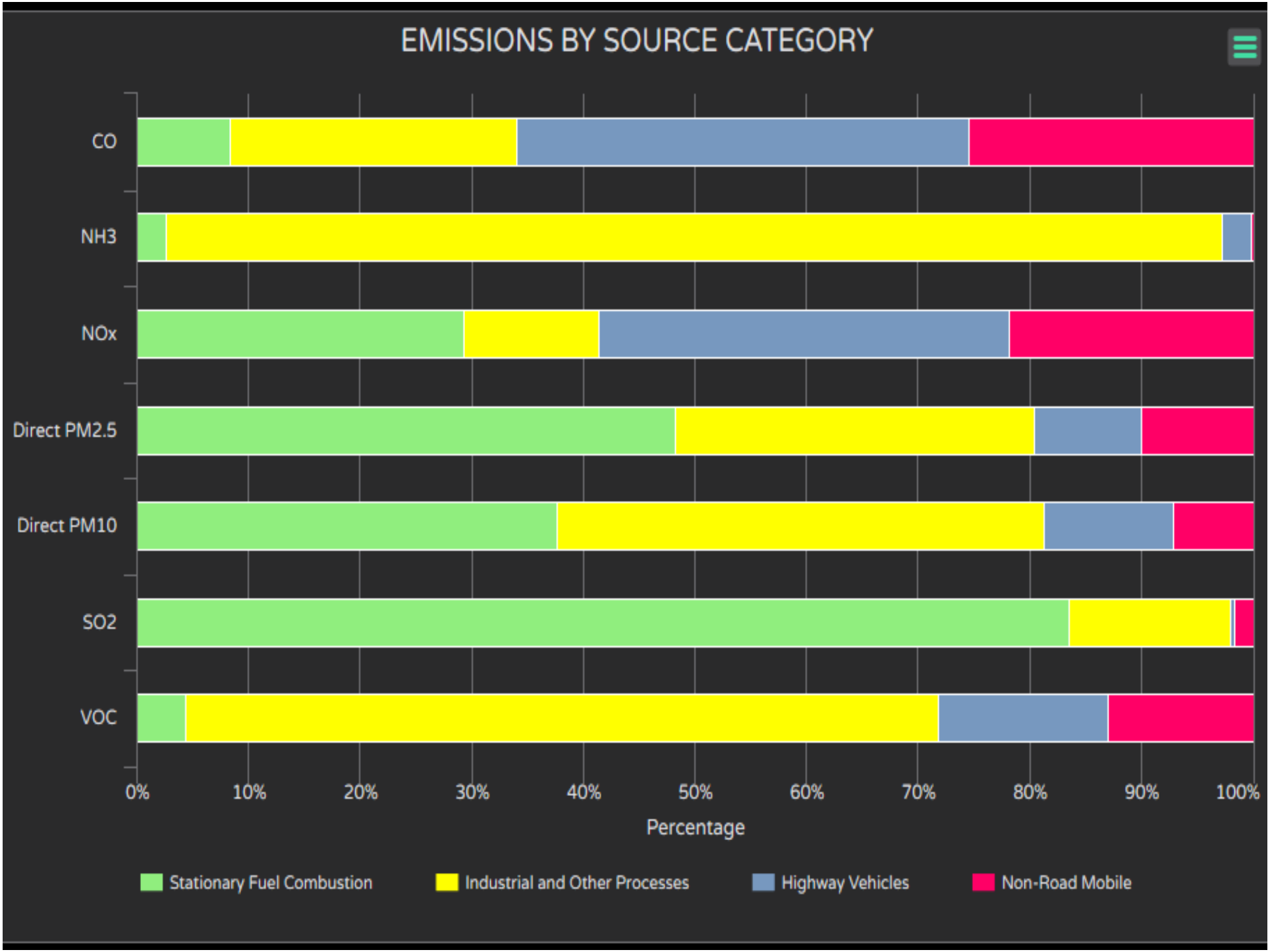
For the Ozone (2008 Standard) Memphis, TN-MS-AR nonattainment area, the Mississippi portion was redesignated on May 9, 2016 and the Arkansas portion was redesignated on May 25, 2016. The Tennessee portion has not been redesignated. The entire area is not considered in maintenance until all states in a multi-state area are redesignated.

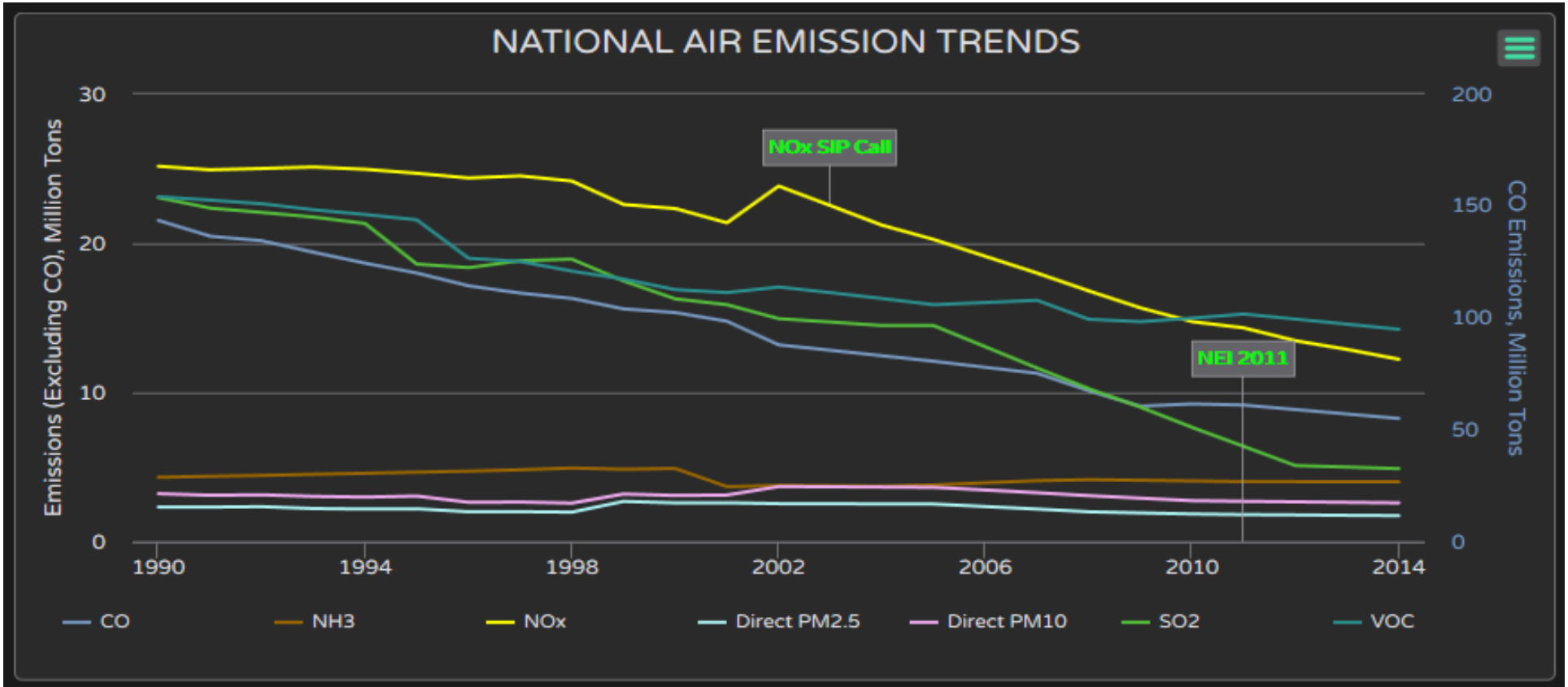
Mississippi 10 Year Ozone Trends
2006 - 2015



Memphis Area 8-Hour Ozone Data 2005-2015




EMISSIONS BY SOURCE CATEGORY
CO
NH3
NOx
Direct PM2.5
Direct PM10
SO2
VOC
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percentage
Stationary Fuel Combustion
Industrial and Other Processes
Highway Vehicles
Non-Road Mobile

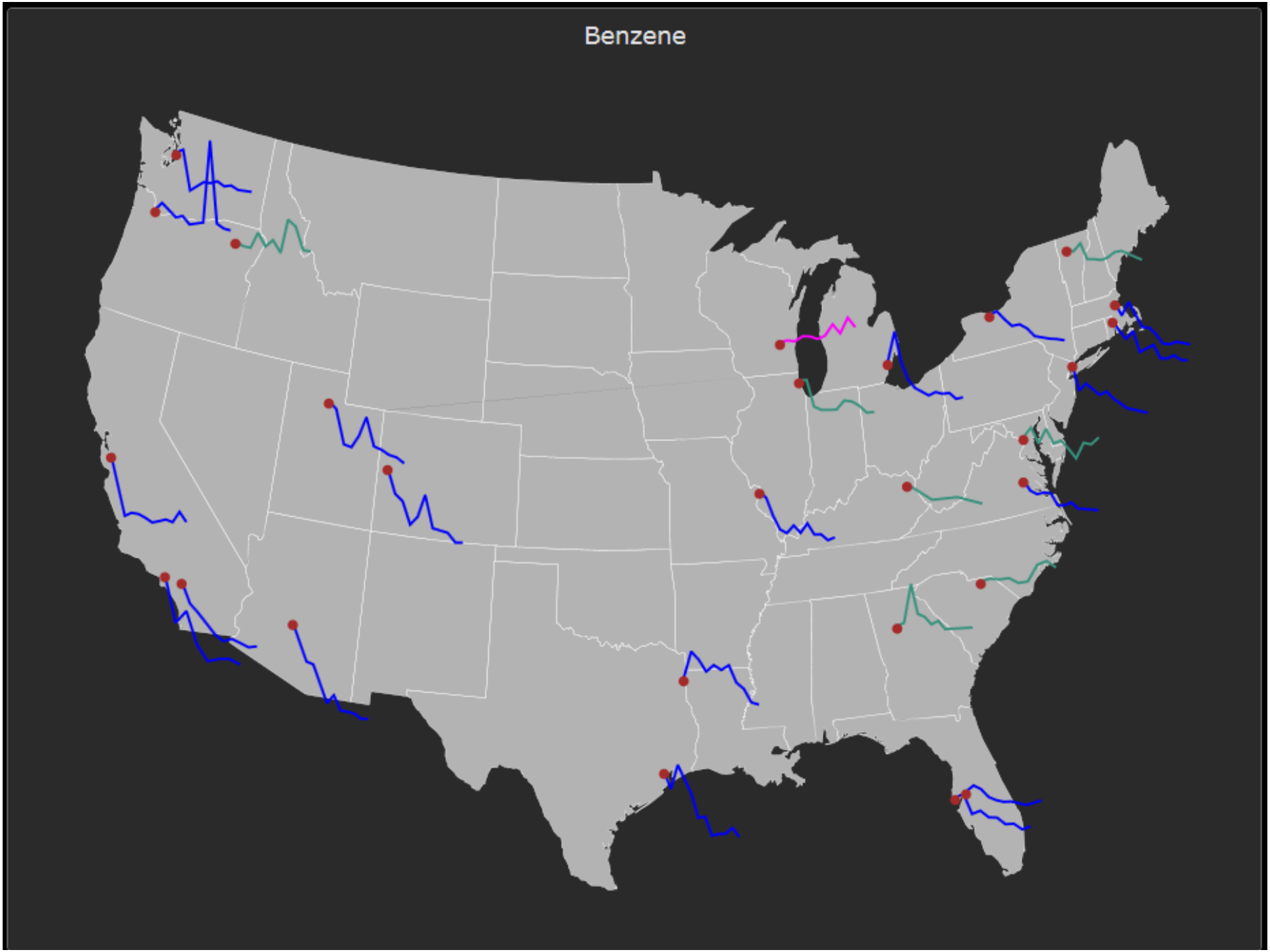


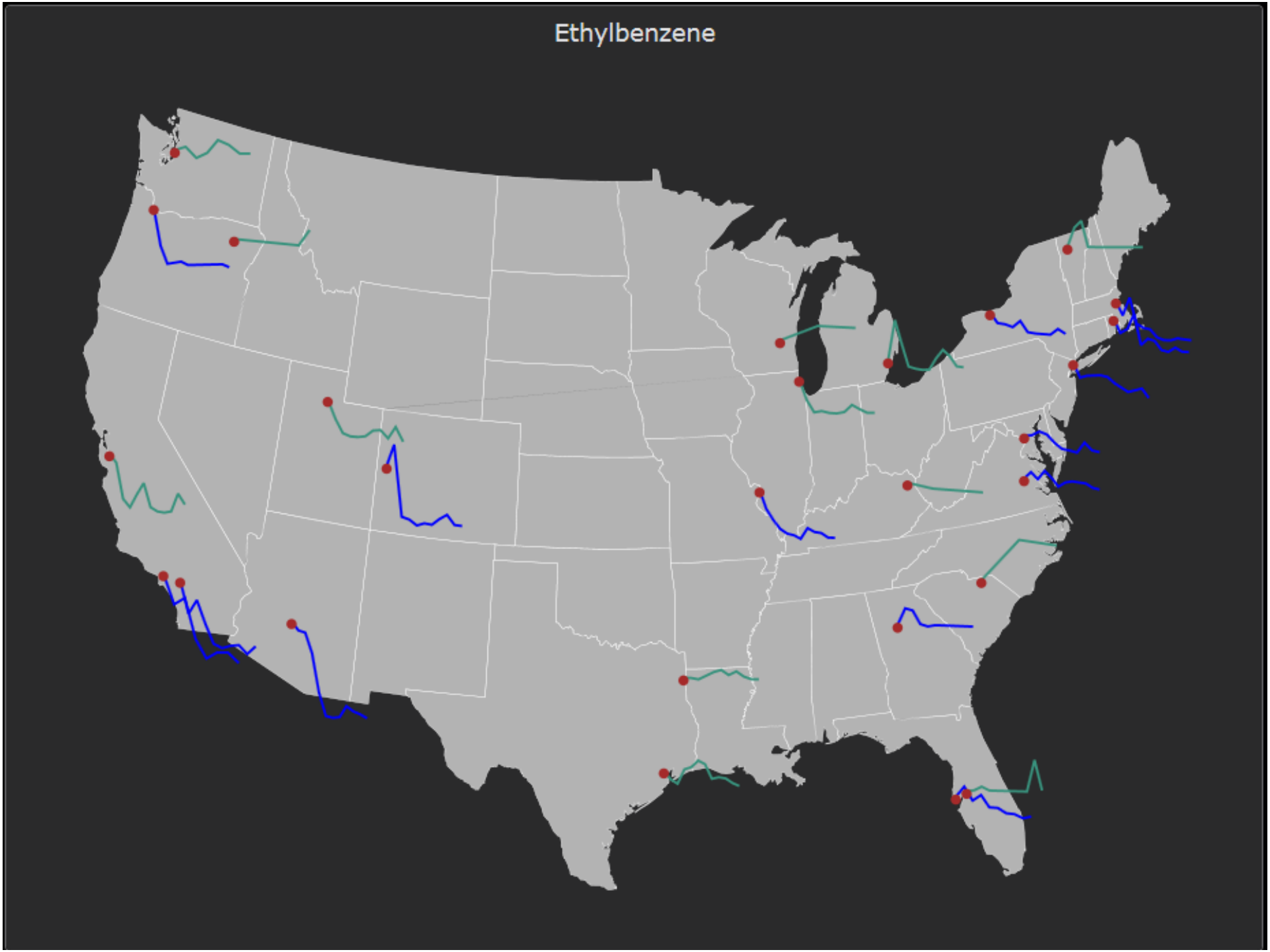
Emissions of key air pollutants continue to decline from 1990 levels:

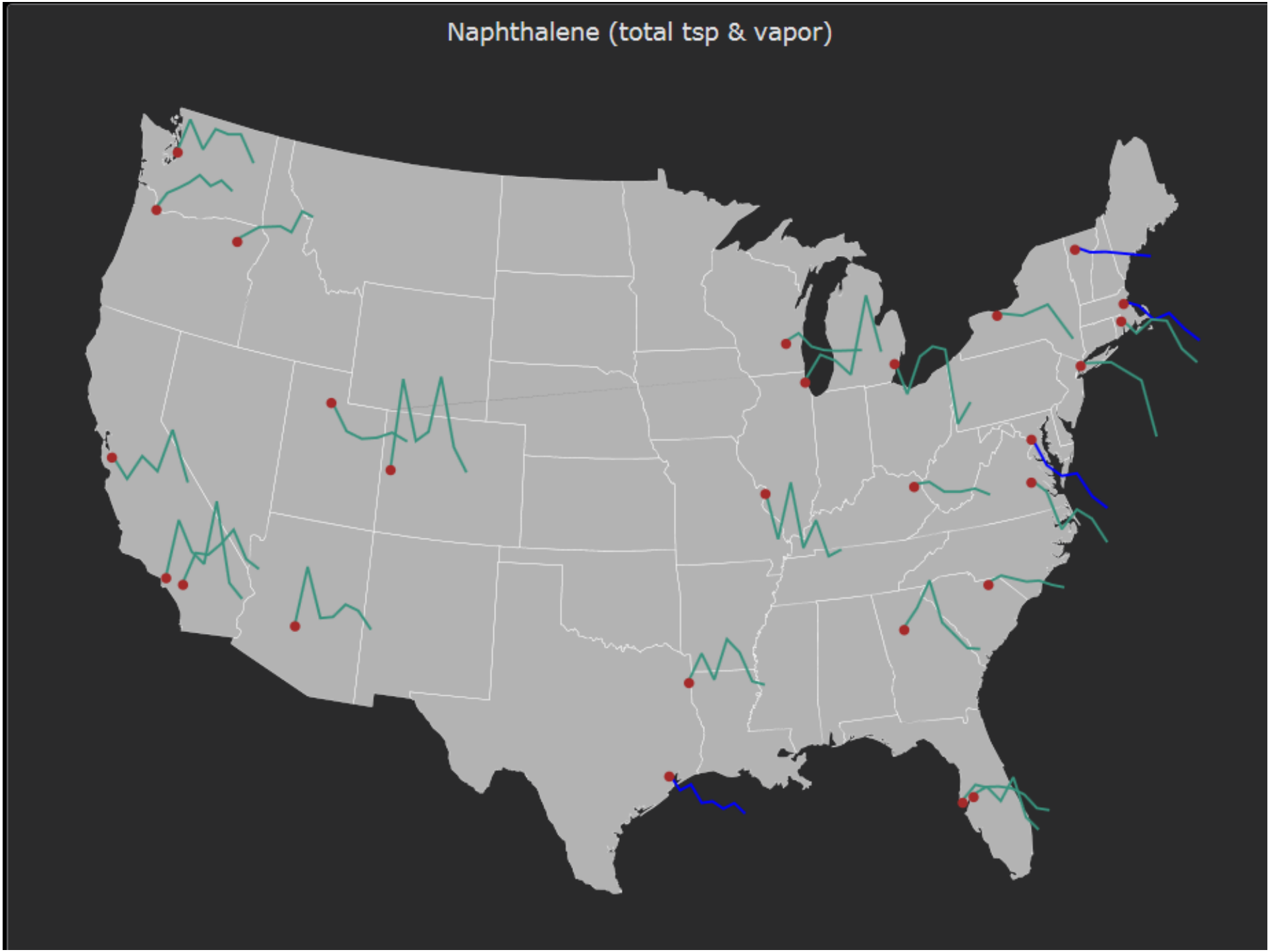
- Carbon Monoxide (CO), ↓ 62%
- Ammonia (NH_3), ↓ 7%
- Nitrogen Oxides (NO_x), ↓ 51%
- Direct Particulate Matter 2.5 microns ($PM_{2.5}$), ↓ 25%
- Direct Particulate Matter 10 microns (PM_{10}), ↓ 19%
- Sulfur Dioxide (SO_2), ↓ 79%
- Volatile Organic Compounds (VOC), ↓ 38%

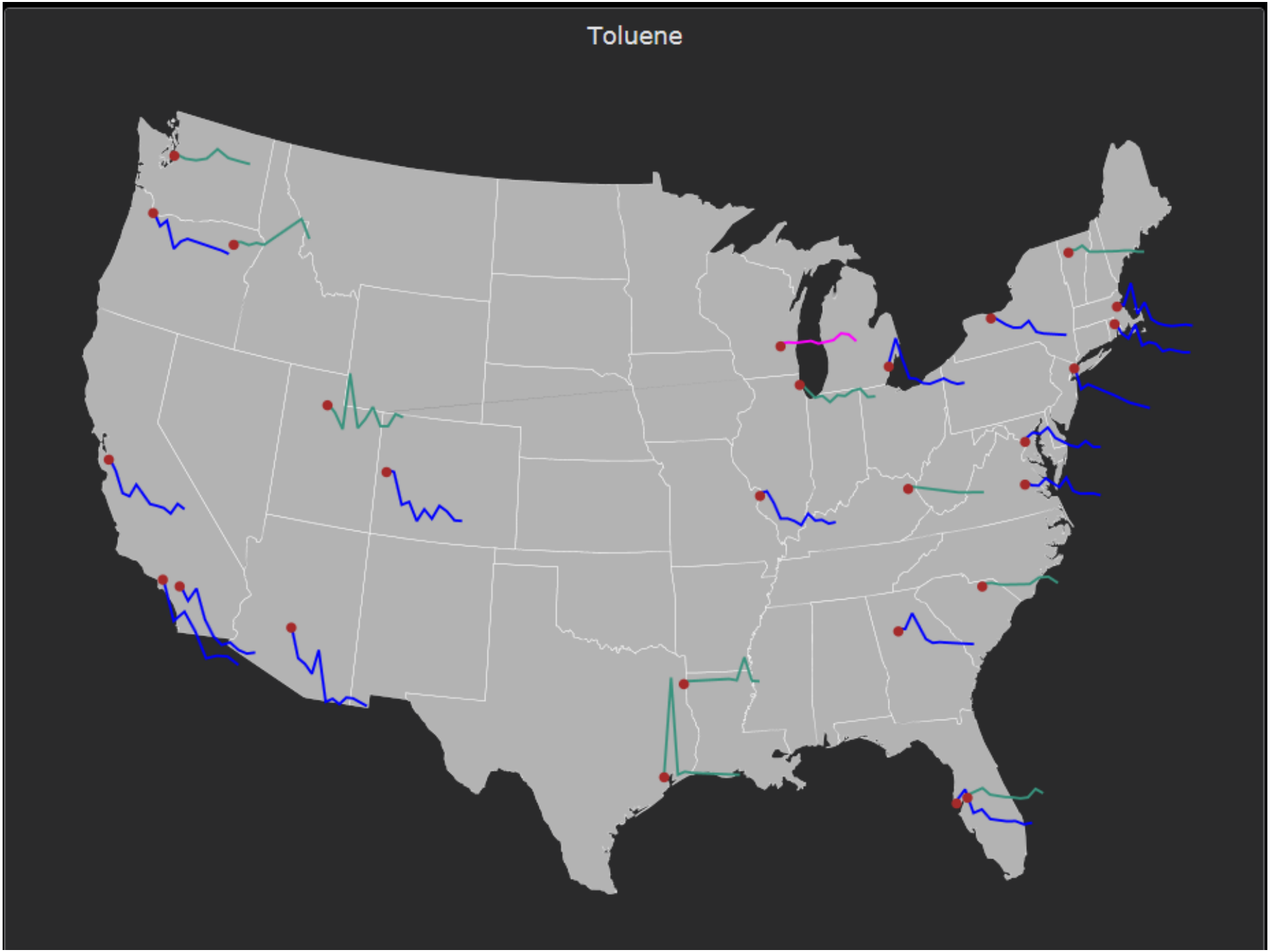
In addition, from 1990 to 2011, emissions of air toxics declined by over 60 percent. These reductions are driven by federal and state implementation of stationary and mobile source regulations.

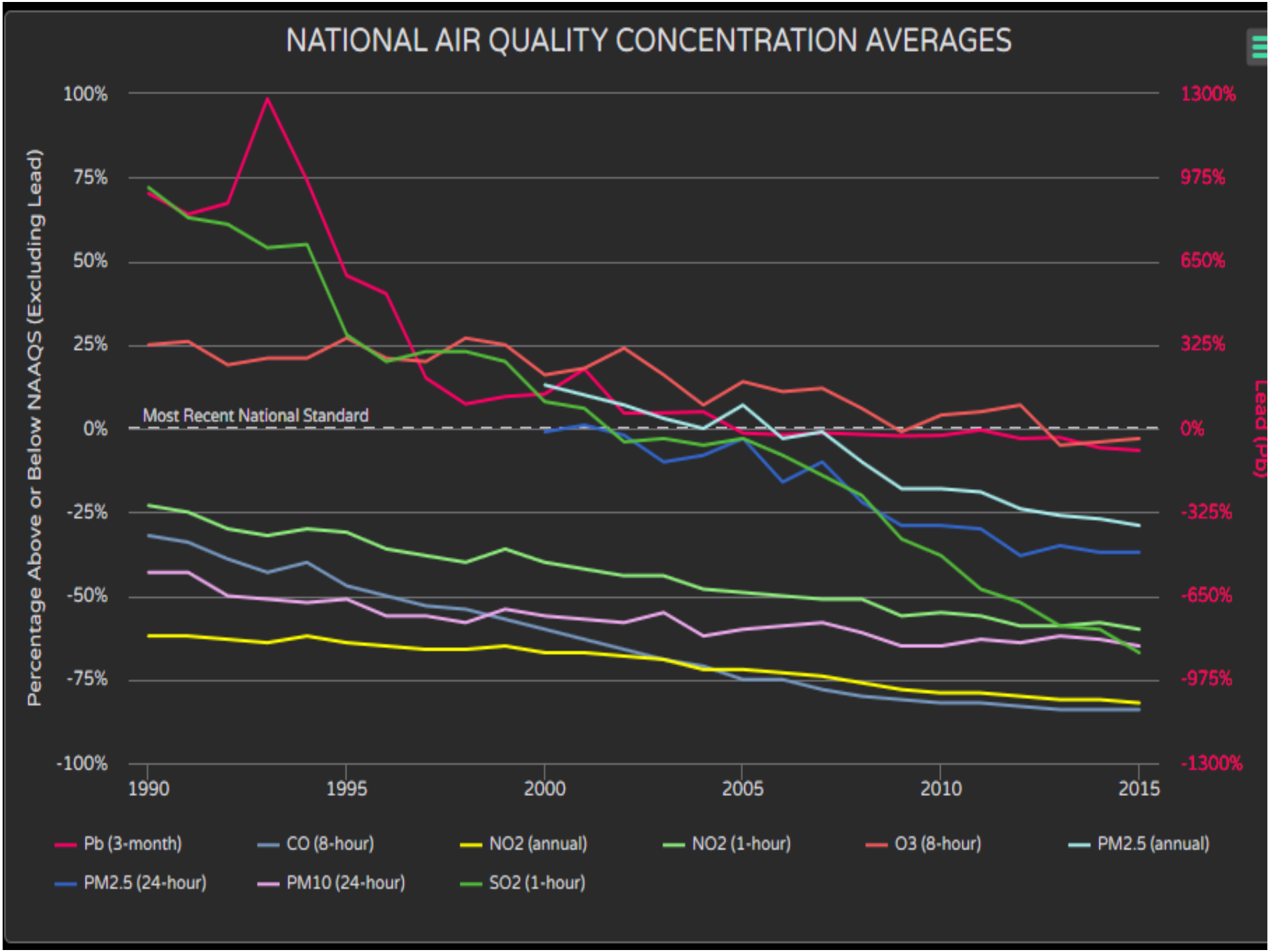
*2015 emissions will be released later in 2016. Wildfire data excluded for all pollutants except for NH_3 pre-2002; PM emissions also exclude miscellaneous emissions (i.e., agricultural dust and prescribed fire data). Visit the emissions trends website to learn more.


Benzene


Ethylbenzene


Naphthalene (total tsp & vapor)


Toluene

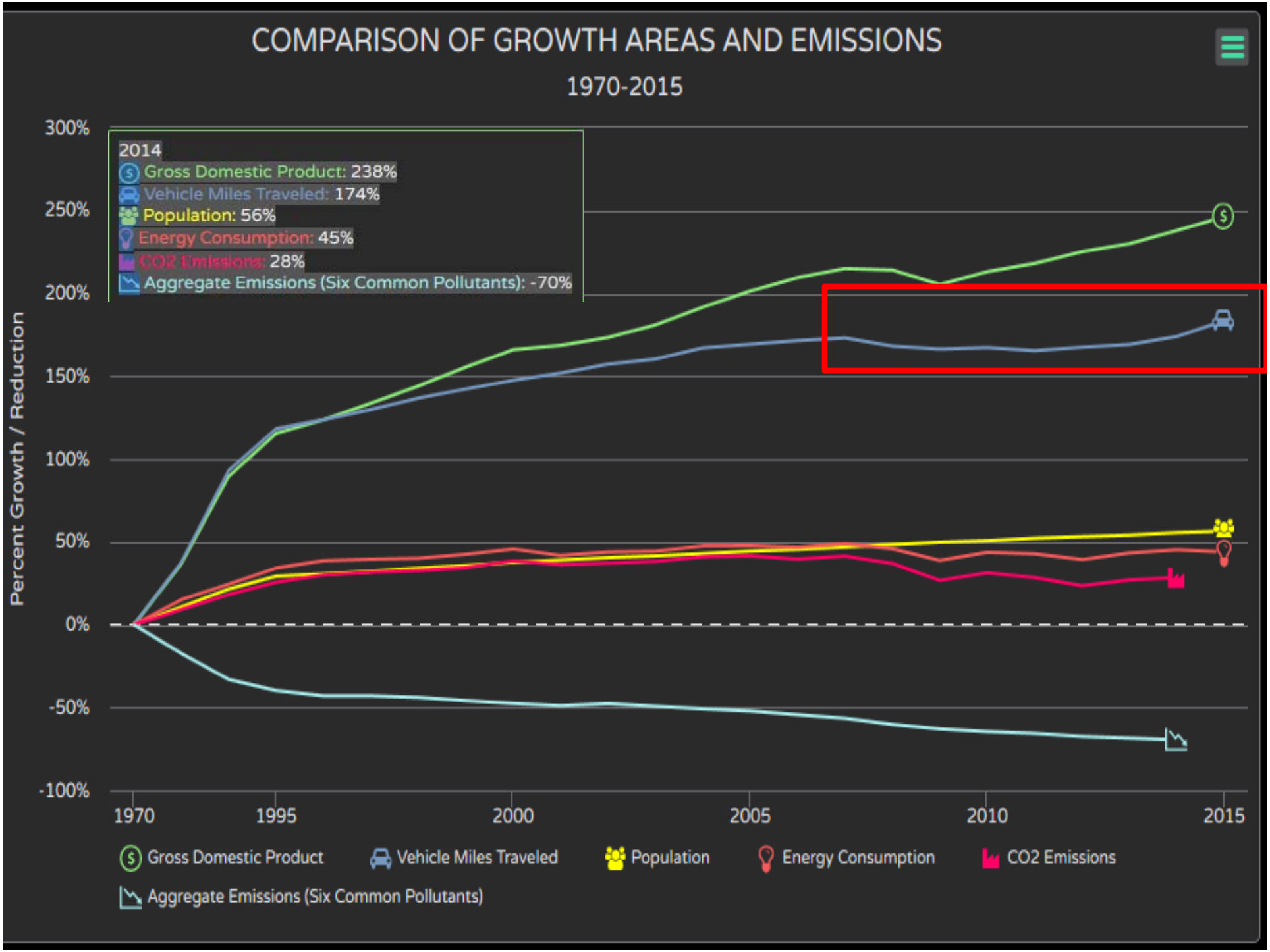

NATIONAL AIR QUALITY CONCENTRATION AVERAGES
Percentage Above or Below NAAQS (Excluding Lead)
Lead (Pb)
100%
75%
50%
25%
0%
-25%
-50%
-75%
-100%
1300%
975%
650%
325%
0%
-325%
-650%
-975%
-1300%
Most Recent National Standard
1990
1995
2000
2005
2010
2015
Pb (3-month)
CO (8-hour)
NO2 (annual)
NO2 (1-hour)
O3 (8-hour)
PM2.5 (annual)
PM2.5 (24-hour)
PM10 (24-hour)
SO2 (1-hour)

AIR QUALITY IMPROVES AS AMERICA GROWS

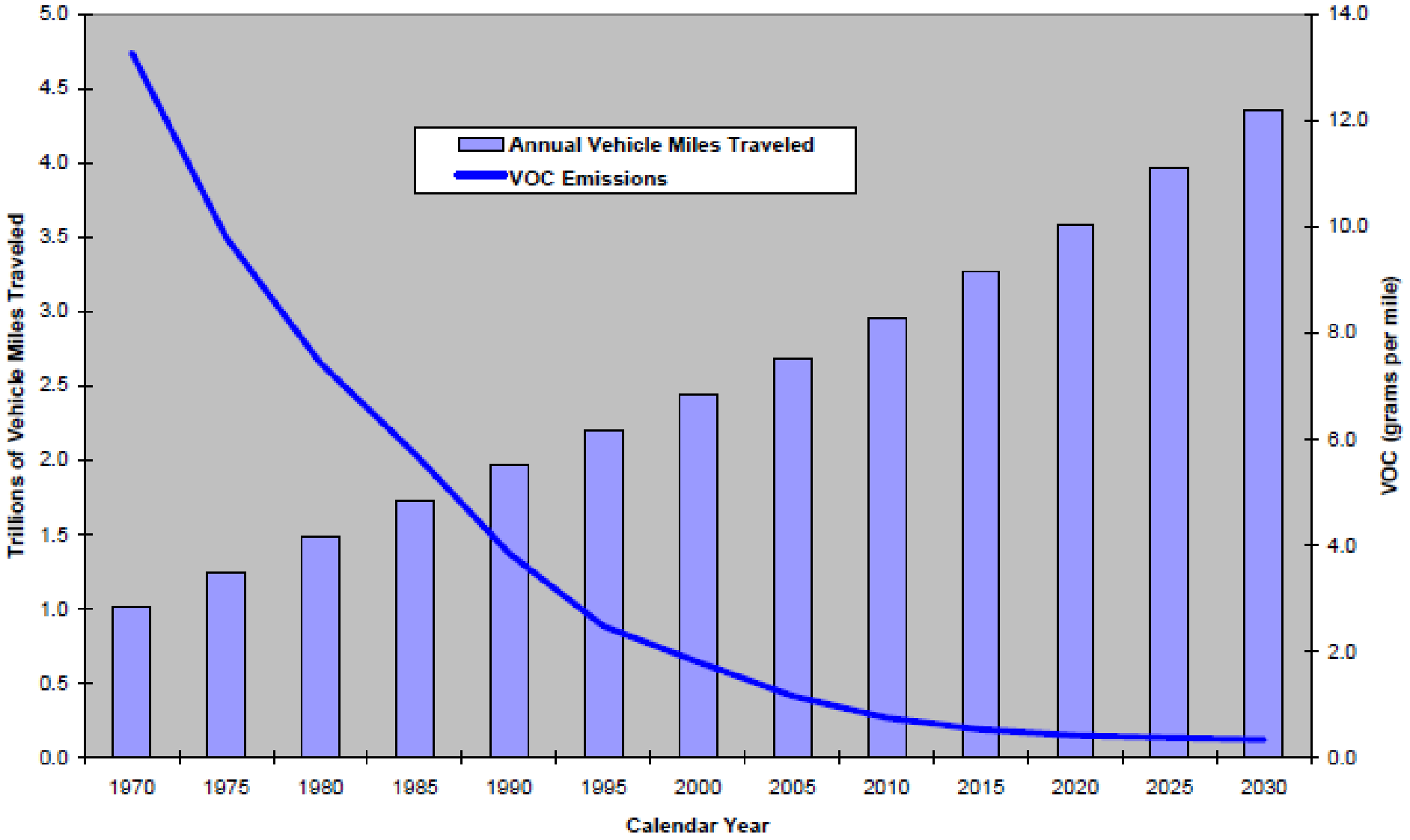
Nationally, concentrations of the criteria air pollutants have dropped significantly since 1990:

- Carbon Monoxide (CO) 8-Hour, ↓ 77%
- Lead (Pb) 3-Month Average, ↓ 99%
- Nitrogen Dioxide (NO_2) Annual, ↓ 54%
- Nitrogen Dioxide (NO_2) 1-Hour, ↓ 47%
- Ozone (O_3) 8-Hour, ↓ 22%
- Particulate Matter 10 microns (PM_{10}) 24-Hour, ↓ 39%
- Particulate Matter 2.5 microns ($PM_{2.5}$) Annual, ↓ 37%
- Particulate Matter 2.5 microns ($PM_{2.5}$) 24-Hour, ↓ 37%
- Sulfur Dioxide (SO_2) 1-Hour, ↓ 81%

During this same period the U.S. economy continued to grow, Americans drove more miles and population and energy use increased.

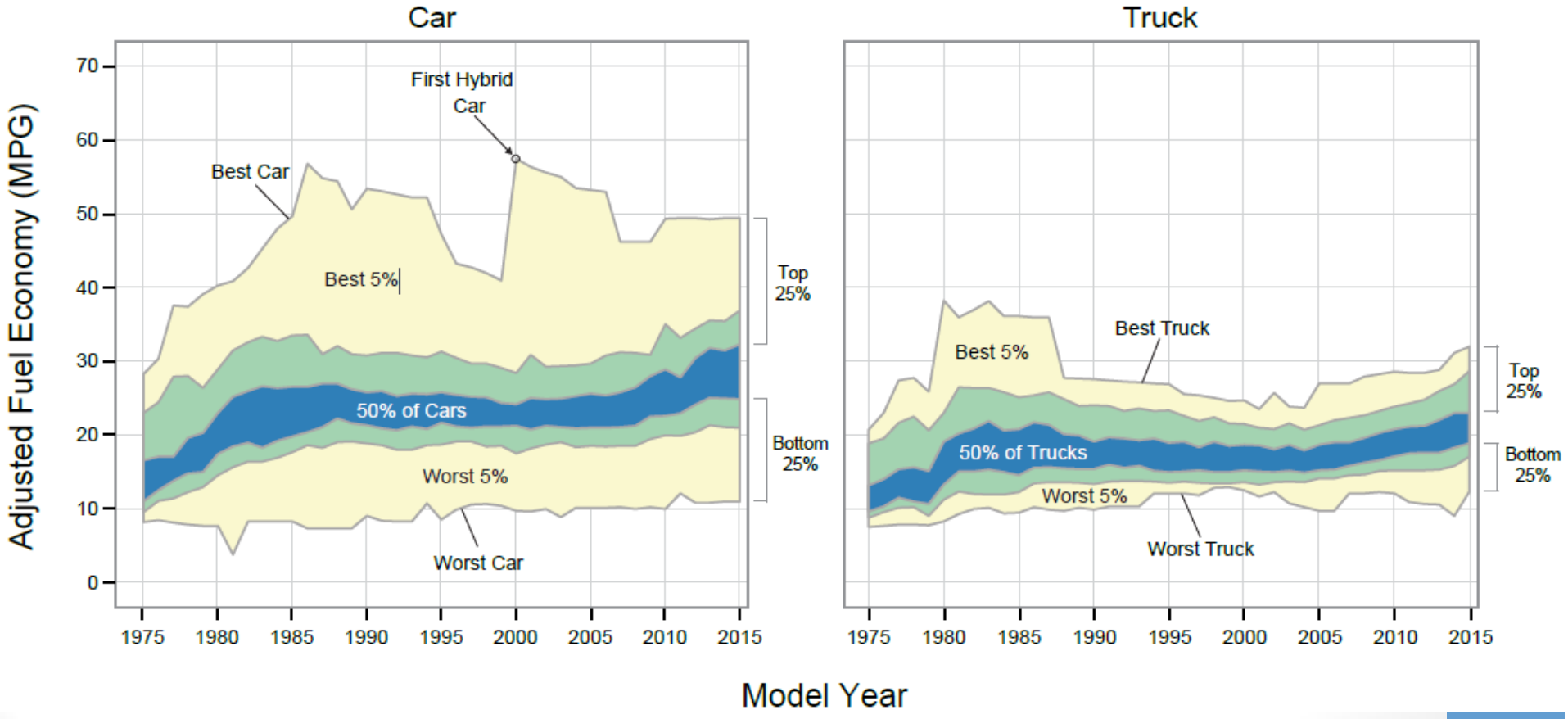

COMPARISON OF GROWTH AREAS AND EMISSIONS
1970-2015
2014
Gross Domestic Product: 238%
Vehicle Miles Traveled: 174%
Population: 56%
Energy Consumption: 45%
CO2 Emissions: 28%
Aggregate Emissions (Six Common Pollutants): -70%
Percent Growth / Reduction
300%
250%
200%
150%
100%
50%
0%
-50%
-100%
1970
1995
2000
2005
2010
2015
Gross Domestic Product
Vehicle Miles Traveled
Population
Energy Consumption
CO2 Emissions
Aggregate Emissions (Six Common Pollutants)

Vehicle Emissions vs. Miles Traveled



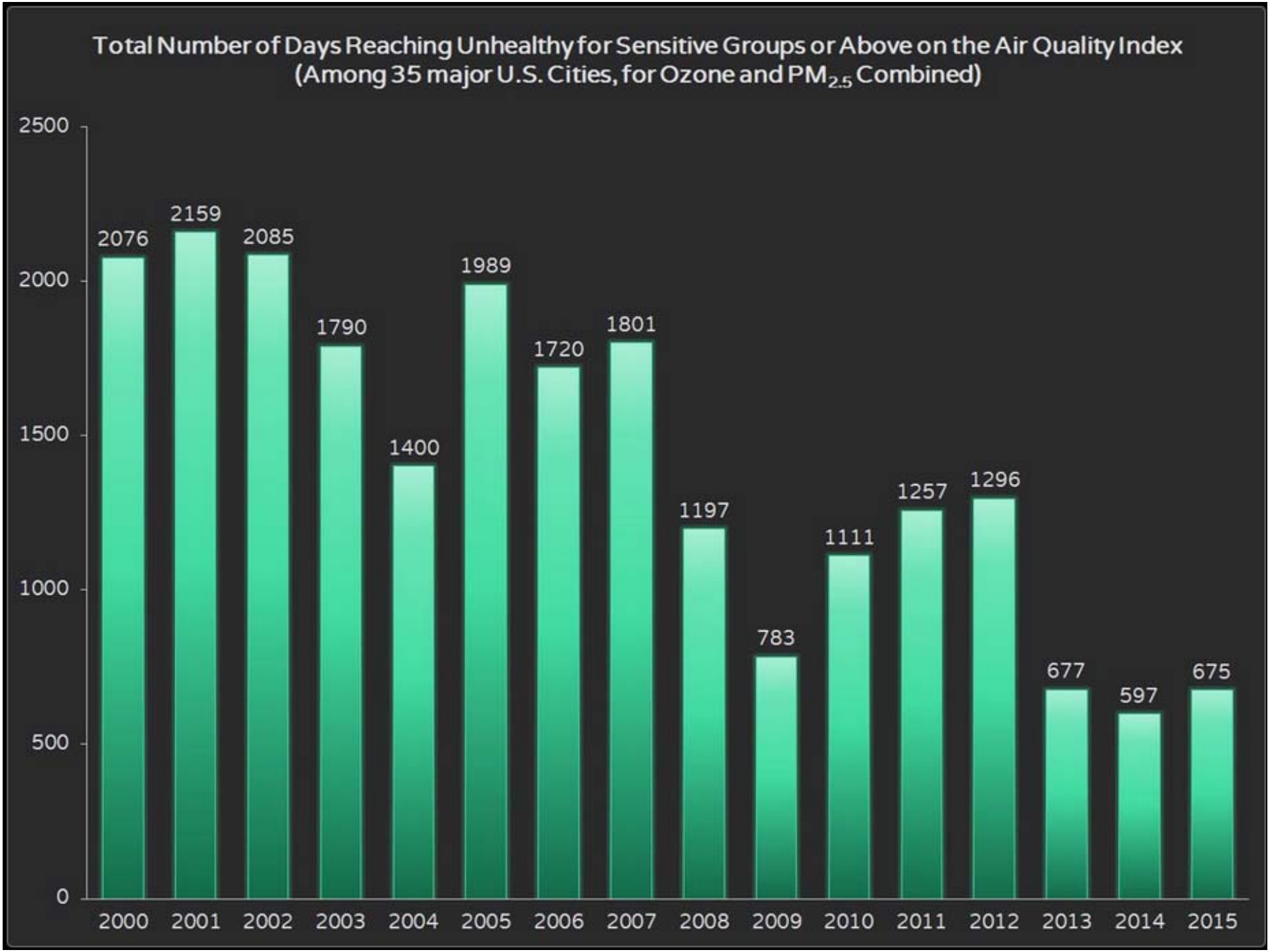
Source: epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health#interstate

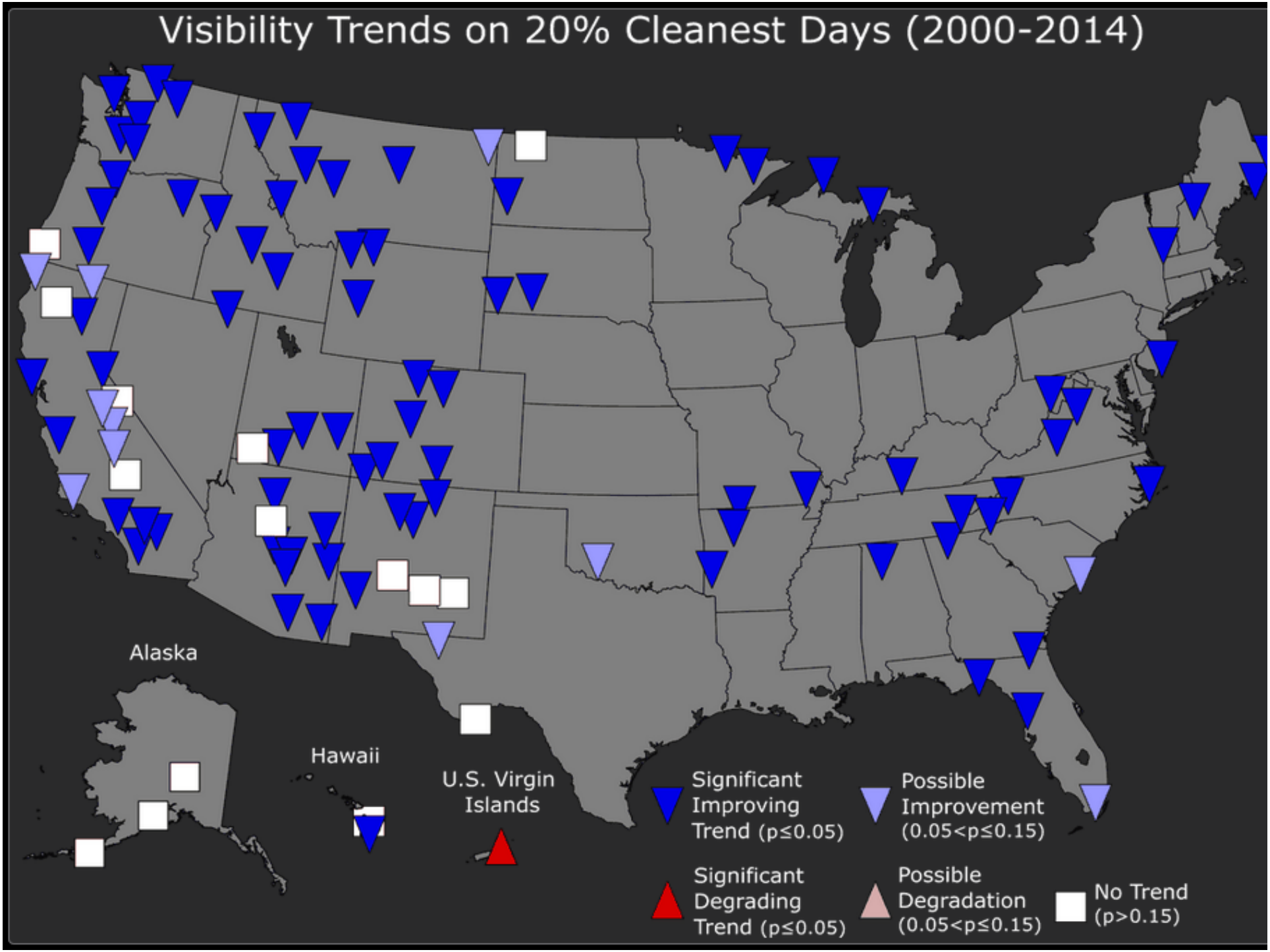
Fuel Economy Trends



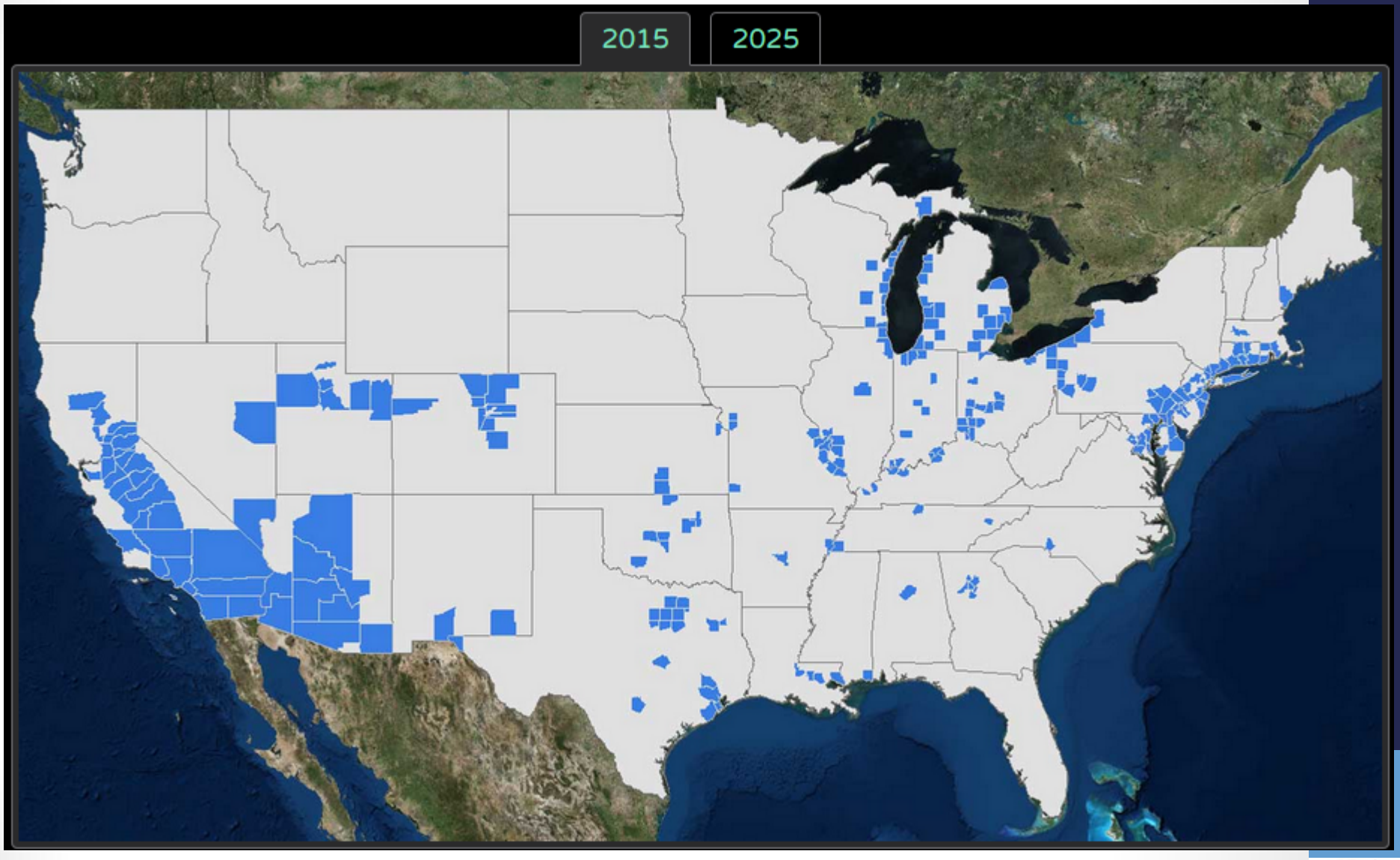
Source: www3.epa.gov/fueleconomy/fetrends/1975-2015/420r15016.pdf

Benefits

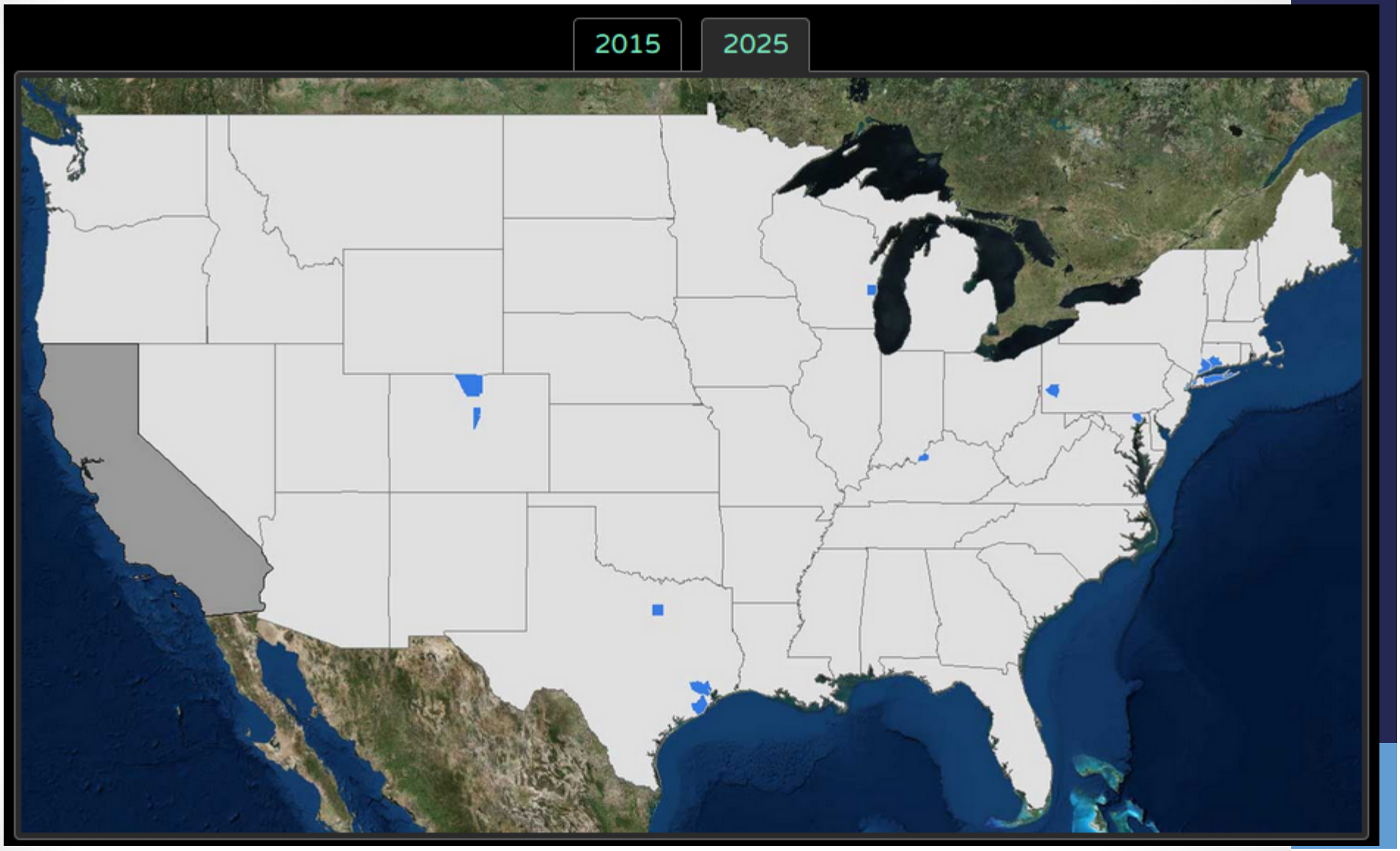

Total Number of Days Reaching Unhealthy for Sensitive Groups or Above on the Air Quality Index
(Among 35 major U.S. Cities, for Ozone and PM2.5 Combined)
2500
2000
1500
1000
500
0
2076
2159
2085
1790
1400
1989
1720
1801
1197
783
1111
1257
1296
677
597
675
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


Visibility Trends on 20% Cleanest Days (2000-2014)
Alaska
Hawaii
U.S. Virgin Islands
Significant Improving Trend (p≤0.05)
Possible Improvement (0.05<p≤0.15)
Significant Degrading Trend (p≤0.05)
Possible Degradation (0.05<p≤0.15)
No Trend (p>0.15)

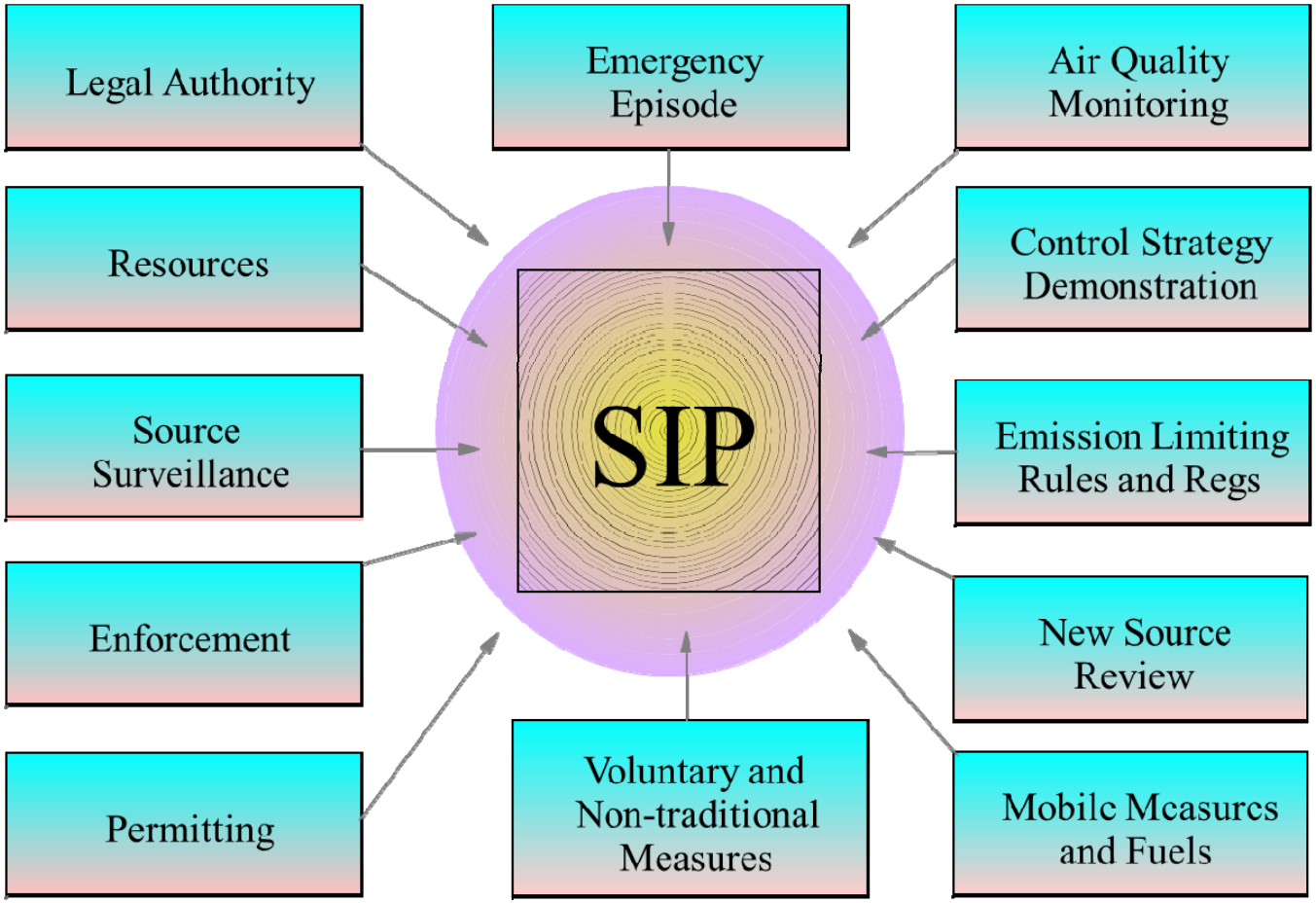
OUTLOOK FOR OZONE IS ENCOURAGING



OUTLOOK FOR OZONE IS ENCOURAGING



State Implementation Plan (SIP)



Source: epa.gov

Dallas Baker, P.E., BCEE
MDEQ Air Director

dbaker@deq.ms.gov / 601.961.5670

THANKS FOR YOUR ATTENTION!

AIR & WASTE MANAGEMENT ASSOCIATION
SINCE 1907