Cross-State Air Pollution Rule

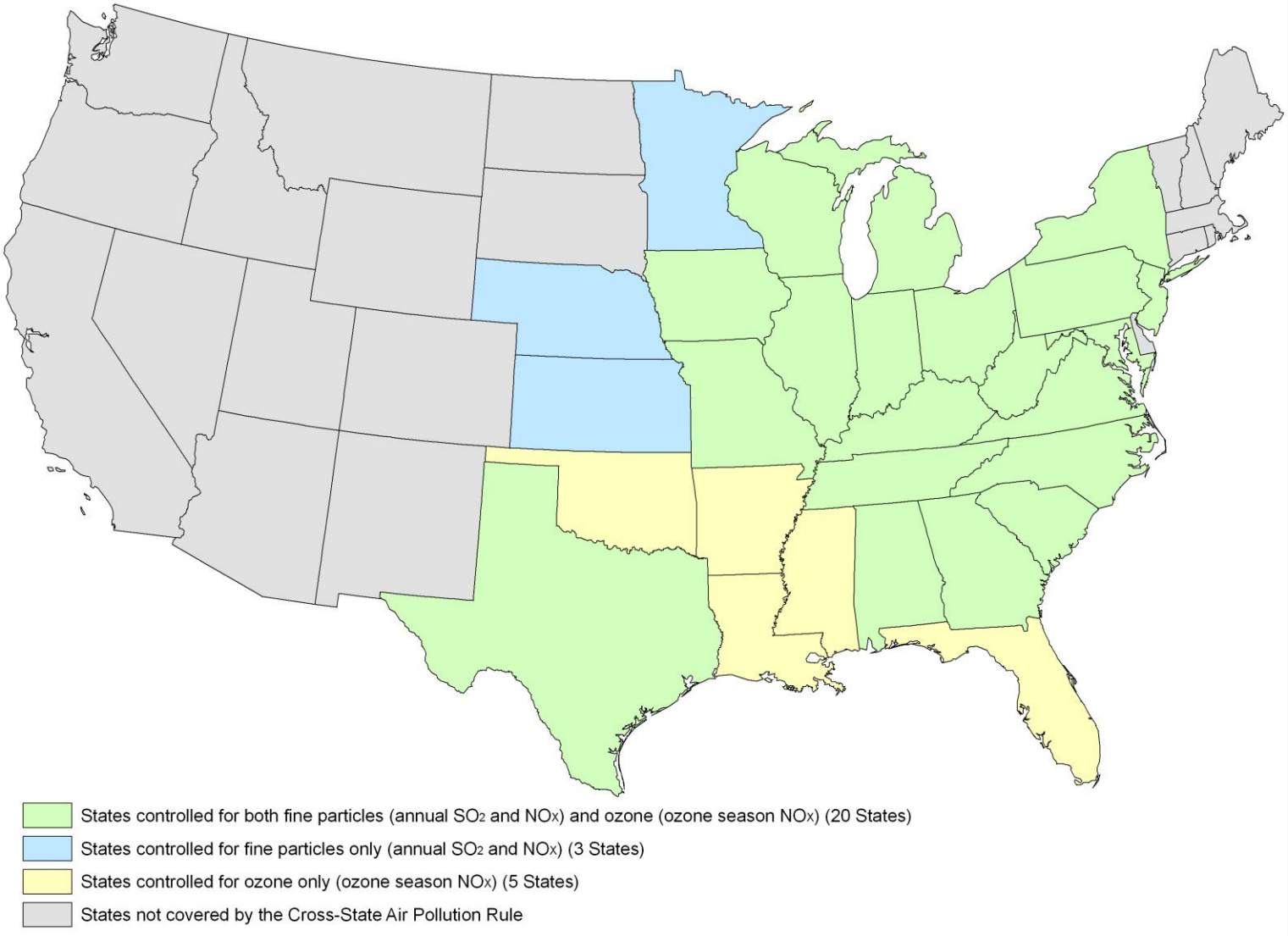
Reducing Air Pollution
Protecting Public Health

U.S. Environmental Protection Agency
Office of Air and Radiation

Overview of Action

- EPA finalized the Cross-State Air Pollution Rule (CSAPR) under the "good neighbor" provision of the Clean Air Act to reduce transported pollution that significantly affects downwind nonattainment and maintenance problems.
- CSAPR will reduce emissions of SO_2 and NO_X from power plants in the eastern half of the United States.
- The rule will reduce fine particle and ozone air pollution, saving lives, preventing illnesses, creating jobs, and protecting communities.
- The costs are affordable, and greatly outweighed by the benefits:
  - The $800 million spent annually on this rule in 2014, along with the roughly $1.6 billion per year in capital investments already under way as a result of the Clean Air Interstate Rule (CAIR), are improving air quality for over 240 million Americans and will result in $120 to $280 billion in annual benefits.
  - The effect on electricity prices for specific regions or states are well within the range of normal price fluctuations.
- The rule puts in place a new framework to address pollution that affects air quality in downwind states:
  - Helps states meet air quality standards as quickly as possible.
  - Similar to previous allowance trading programs, the rule encourages innovation and cost-savings and helps power plants achieve their mission of providing clean, affordable, and reliable energy.

Cross-State Air Pollution Rule States



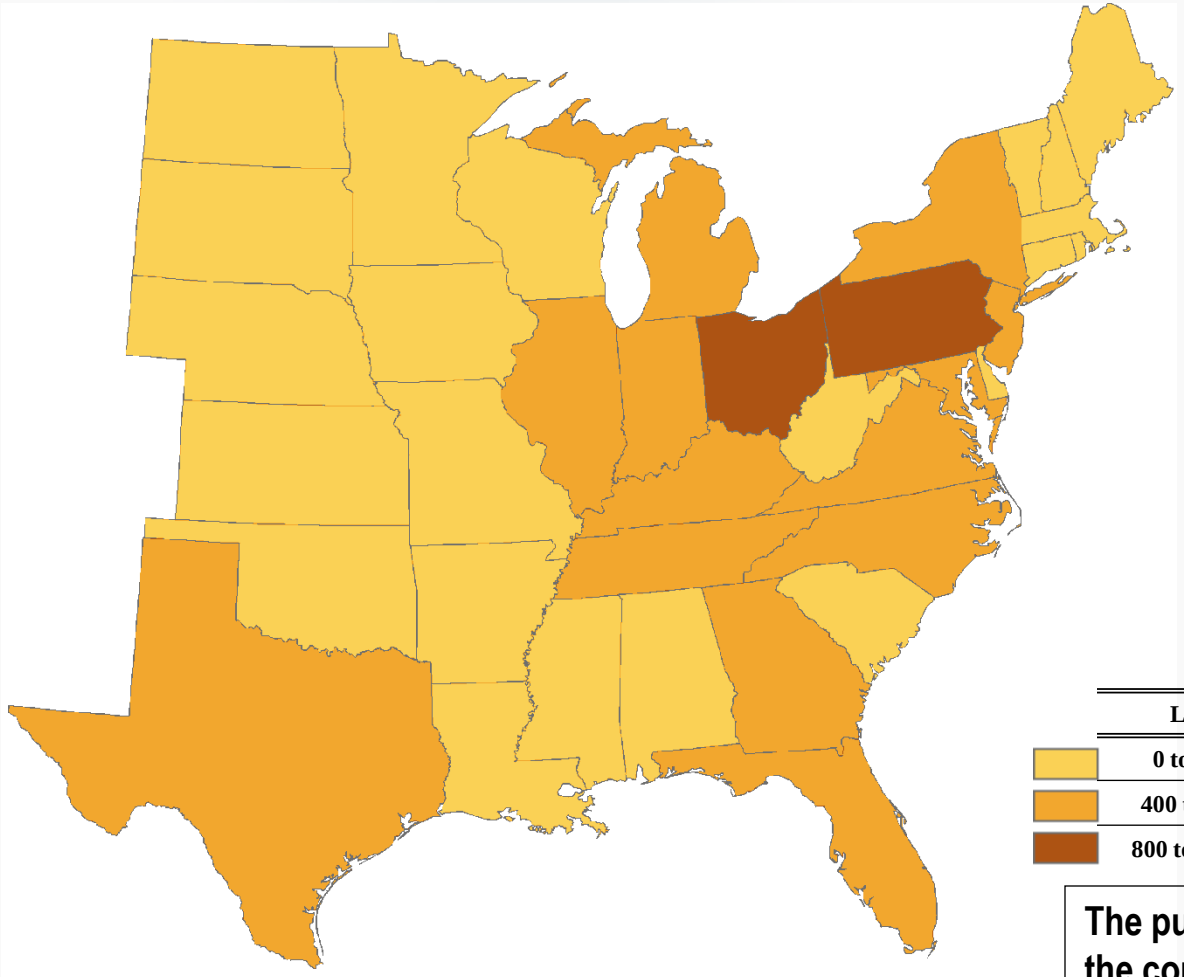
Key Dates

- October 17, 2011: Deadline to notify EPA if a state wants to replace 2013 FIP allocations with state allocations.
  - As of this deadline, twelve states notified EPA that they intended to distribute 2013 CSAPR allowances to sources in their states.
- January 1, 2012: Cross-State Air Pollution Rule Phase 1 SO_2 and annual NO_X trading programs begin.
  - Sources must demonstrate compliance by March 1, 2013.
- May 1, 2012: Cross-State Air Pollution Rule ozone season NO_X trading program begins.
  - Sources must demonstrate compliance by December 1, 2012.
  - Ozone season ends September 30.
- January 1, 2014: Phase 2 SO_2 and annual NO_X trading programs begin.
  - Sources must demonstrate compliance by March 1, 2015.
- May 1, 2014: Cross-State Air Pollution Rule Phase 2 ozone season NO_X trading program begins.
  - Sources must demonstrate compliance by December 1, 2014.

Transition to CSAPR

- CAIR will be implemented through 2011 compliance periods.
- CSAPR covers emissions in 2012 and beyond.
- CSAPR establishes new allowances for all programs.
  - There is no carryover of Acid Rain Program, NO_X SIP Call/NO_X Budget Trading Program (NBP), or CAIR allowances.
- To comply with the rule, EPA anticipates power plants will:
  - Improve efficiency at existing sources
  - Improve performance of existing SO_2 and NO_X pollution control equipment
  - Use previously planned or constructed clean generating sources
  - Load shift to existing cleaner units
  - Use lower sulfur coal, switch fuels
  - Install or upgrade pollution control equipment, such as low NO_X burners or scrubbers (Flue Gas Desulfurization) over time
  - Buy allowances

States Investing in Pollution Control Will See Large Benefits



- EPA estimates the annual benefits from the rule range between $120-$280 billion (2007 $) in 2014.
- Much of the annual benefit results from the prevention of 13,000 to 34,000 premature mortalities.

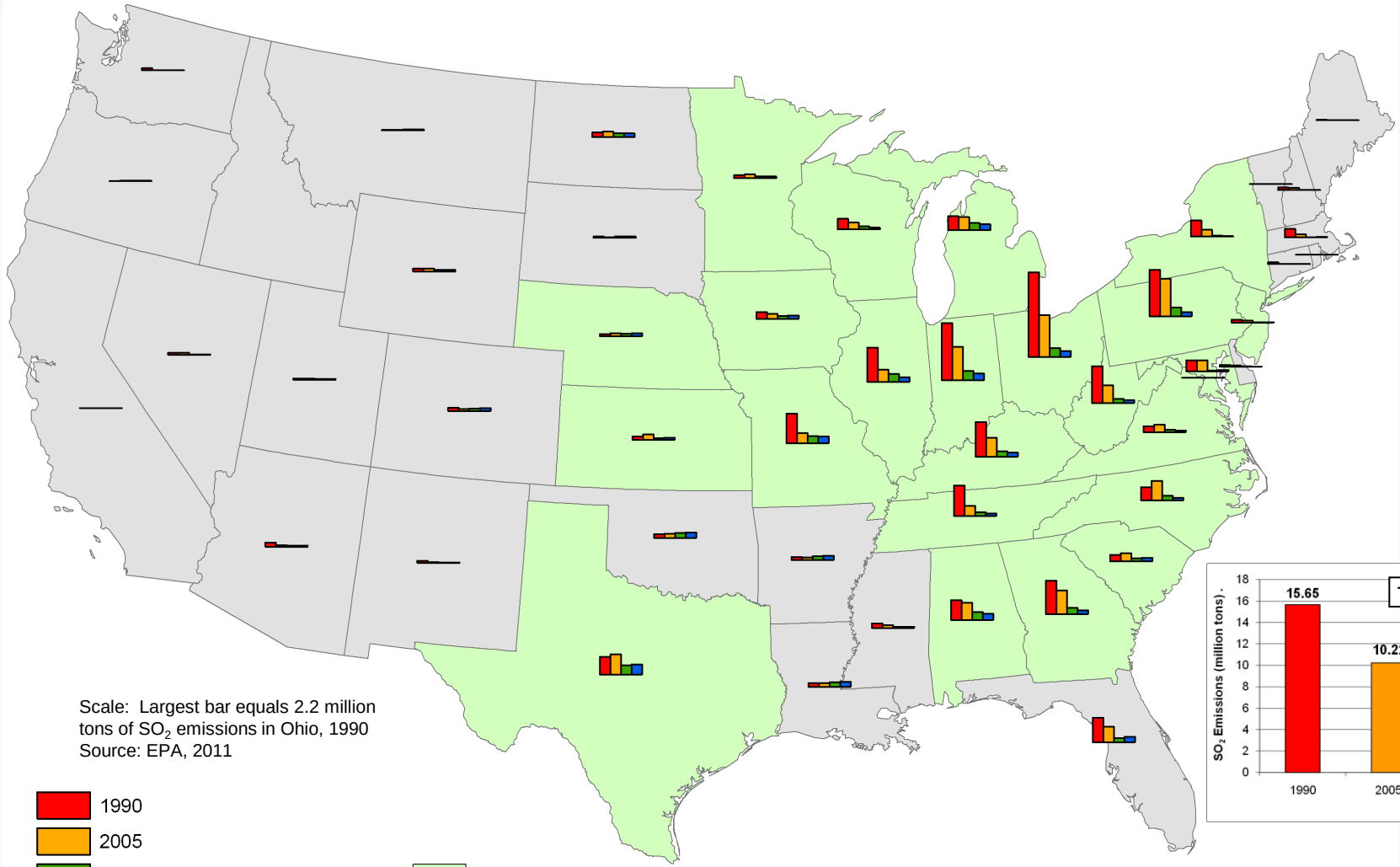
State-Level Benefits in 2014

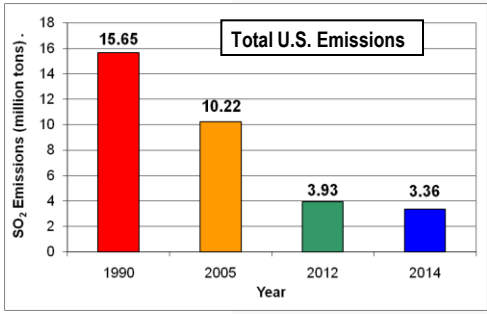
	Mortality Avoided		Monetized Benefits (billion $)	
	Low	High	Low	High
	0 to 400	0 to 1,000	0 to 3.3	0 to 8
	400 to 800	1,000 to 2,000	3.3 to 7	8 to 17
	800 to 1,300	2,000 to 3,300	7 to 11	17 to 27

The public health benefits in most states exceed the combined annual costs of implementing the Cross-State Air Pollution Rule for the entire region.

Cross-State Air Pollution Rule RIA, Table 1-1 and 1-2; mortality impacts estimated using Laden et al. (2006), Levy et al. (2006), Pope et al. (2002) and Bell et al. (2004); monetized benefits discounted at 3%

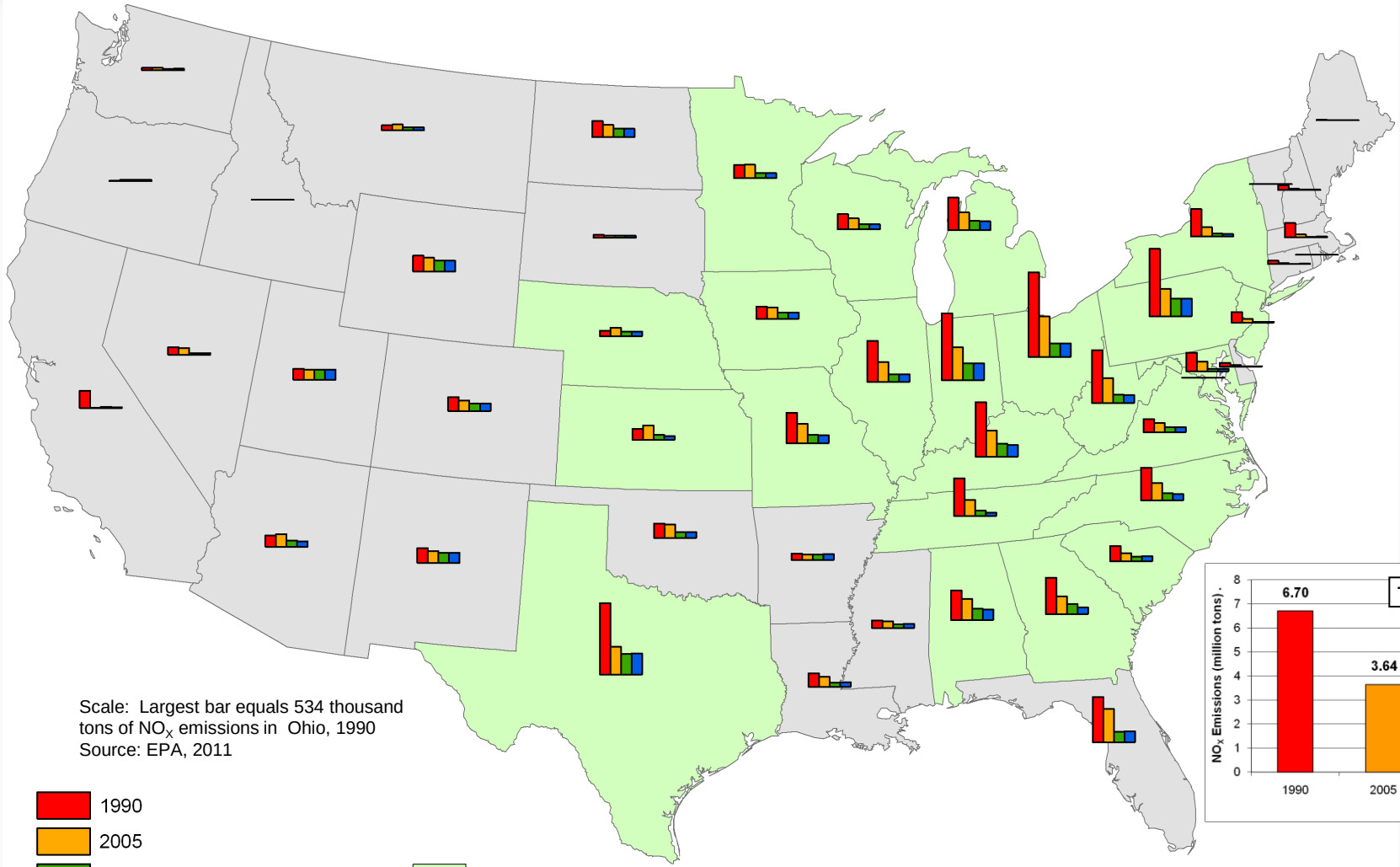
Annual SO_2 Power Plant Emissions 1990-2014 *

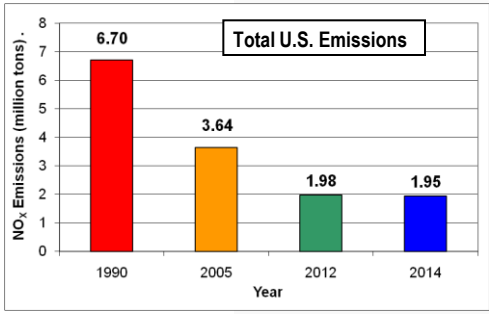




*** Emissions shown include only Acid Rain Program sources; these sources include 96% of modeled annual SO_2 emissions and 71% of modeled units in 2014.**

Annual NO_X Power Plant Emissions 1990-2014 *





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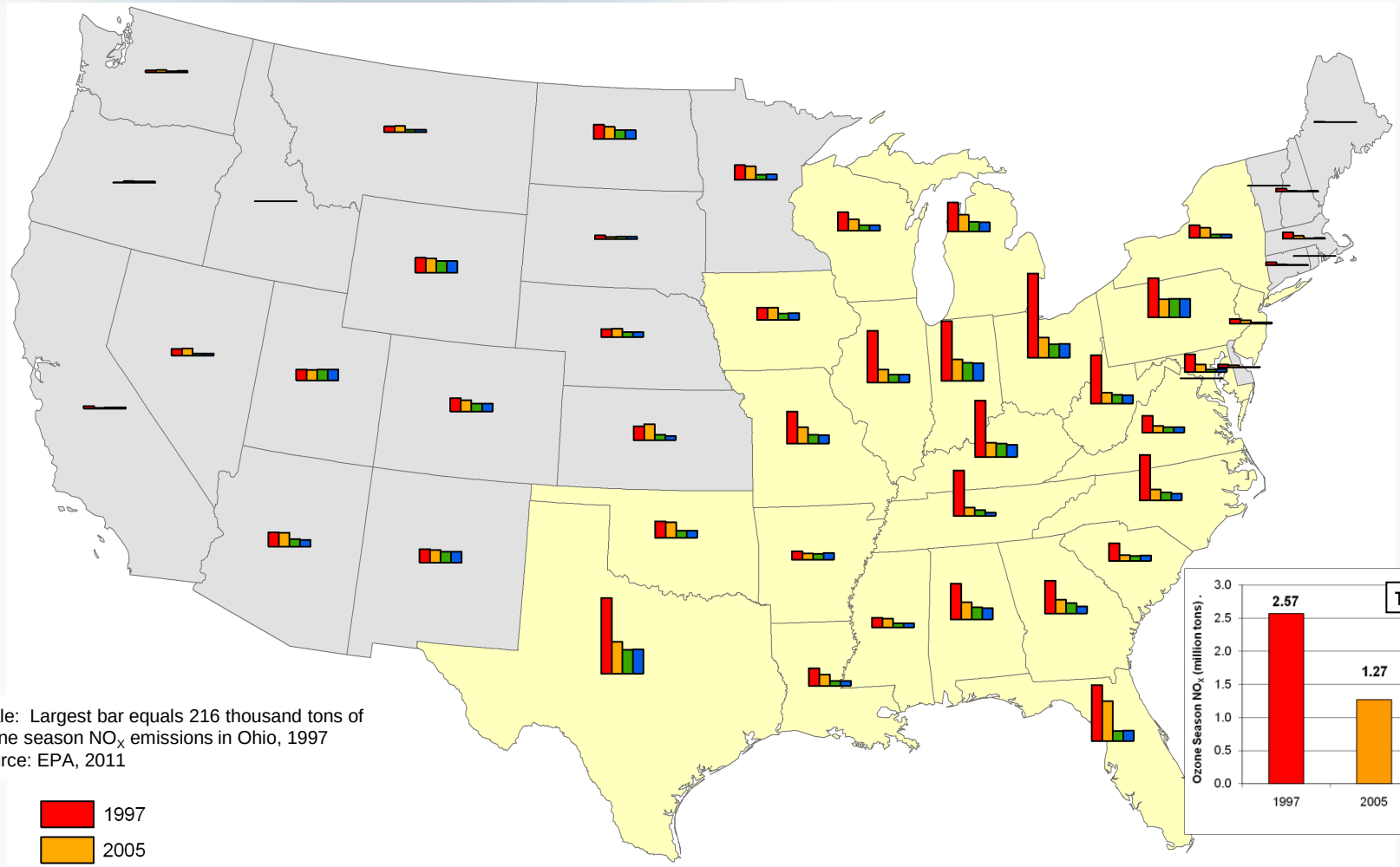
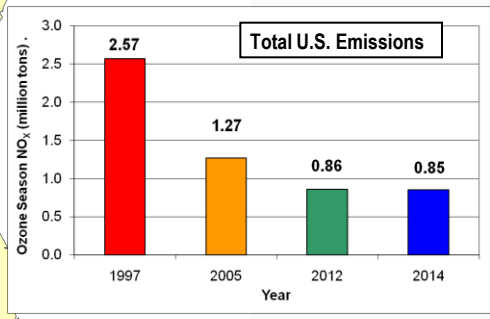
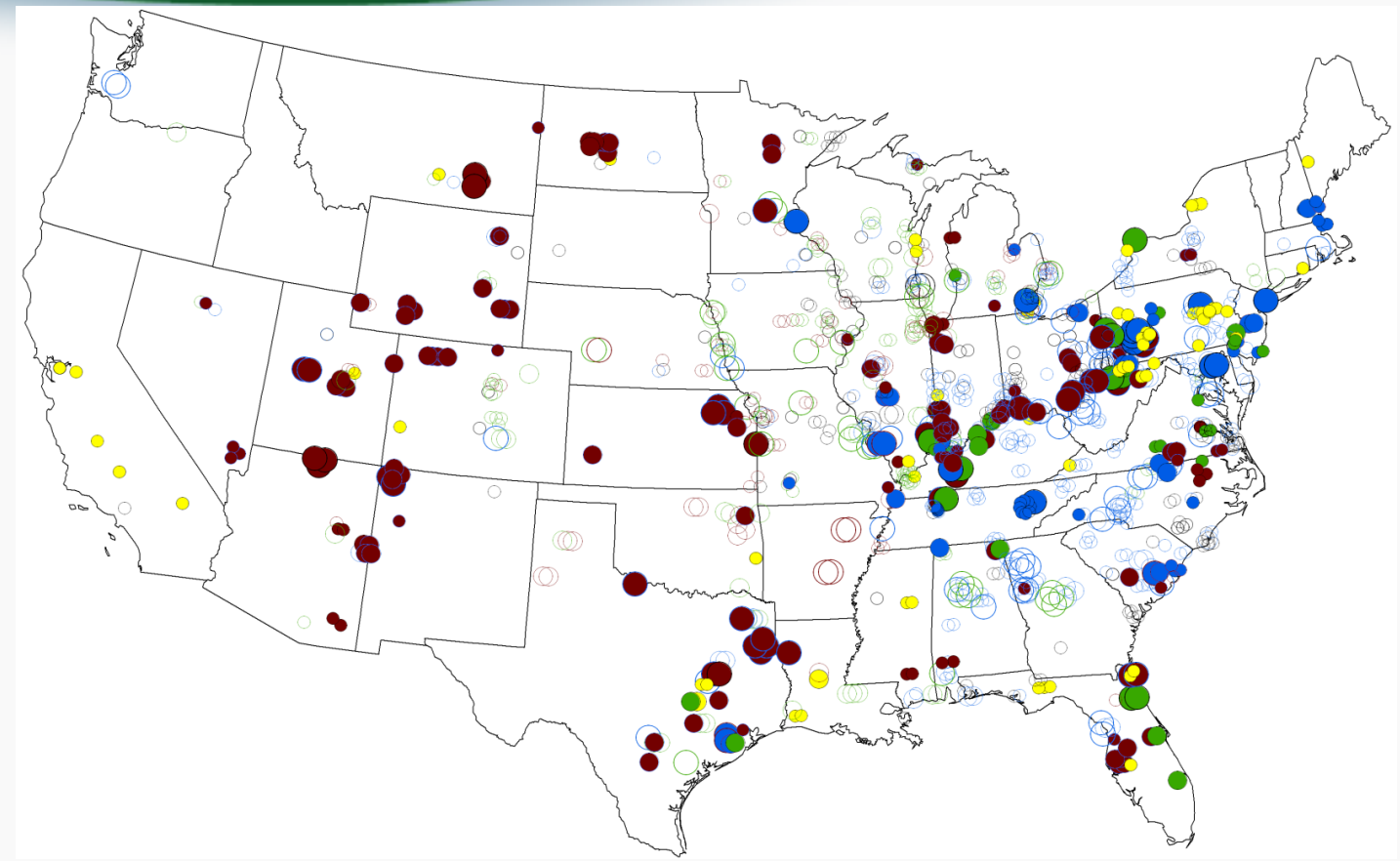
Ozone Season NO_X Power Plant Emissions 1997-2014 *





*** Projected emissions are taken from the final CSAPR modeling as of July 6, 2011, which included the six states proposed for inclusion in the ozone season NO_X program. While December's final supplemental rule included revisions that are not reflected in this map, the changes overall amount to only a small proportion of the millions of tons of pollution reduction secured by the CSAPR. Emissions shown include only Acid Rain Program sources; these sources include 94% of modeled ozone season NO_X emissions and 71% of modeled units in 2014.**

2000 Coal Controls for SO_2 and NO_X



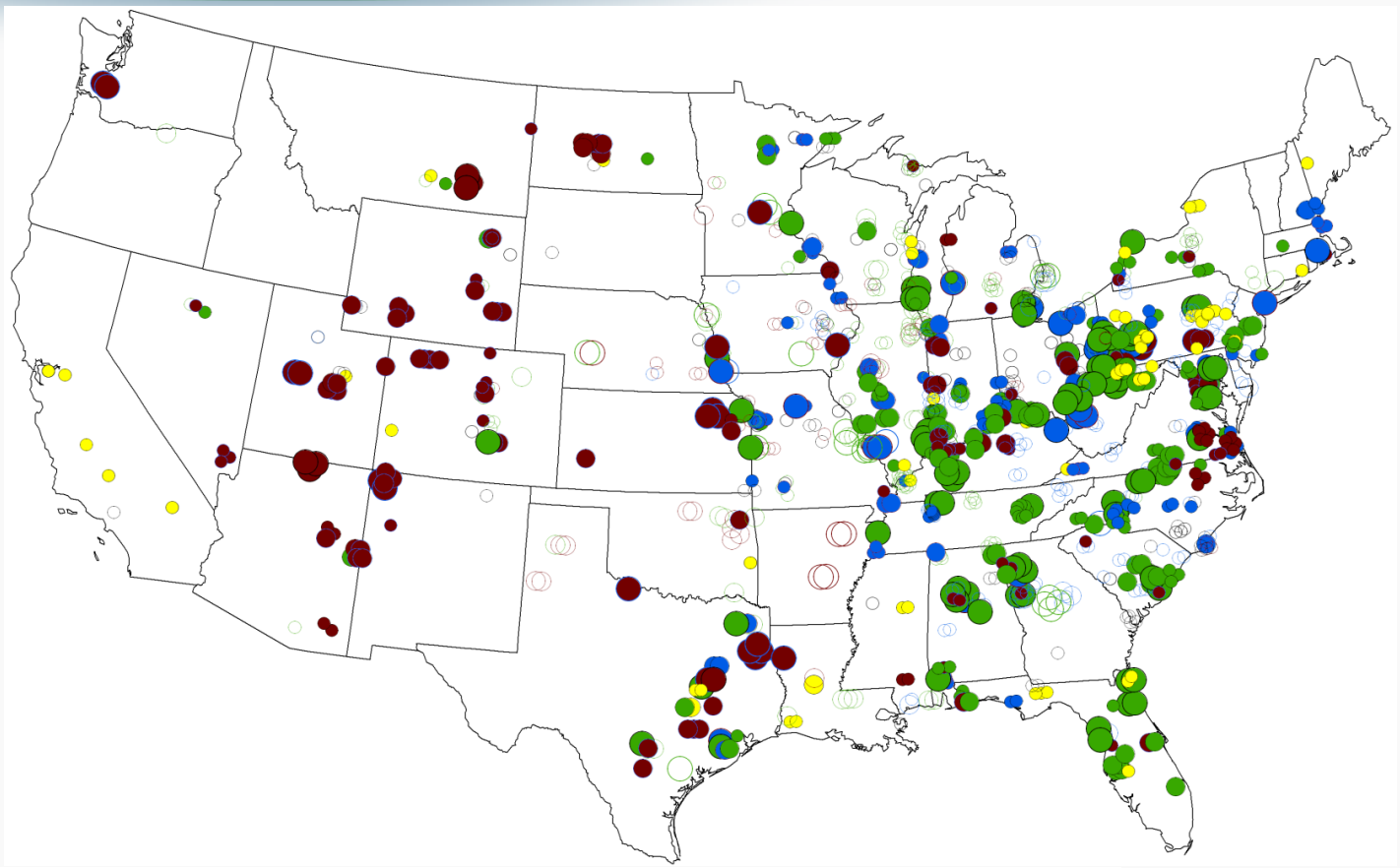
Scrubber and SCR/SNCR	Scrubber	LNB and Under 1.0 lb SO_2/mmBtu	Under 1.0 lb SO_2/mmBtu
Under 300 MW	Under 300 MW	Under 300 MW	Under 300 MW
300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW
Over 600 MW	Over 600 MW	Over 600 MW	Over 600 MW

SCR/SNCR	FBC/IGCC	LNB	None
Under 300 MW	Under 300 MW	Under 300 MW	Under 300 MW
300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW
Over 600 MW	Over 600 MW	Over 600 MW	Over 600 MW

Virtually all coal-fired units have electrostatic precipitators, baghouses, or other advanced controls for high levels of particulate removal.

Source: National Electric Energy Data System (NEEDS 4.10) (EPA, December 2010) and Data & Maps (EPA, August 2011)

2010 Coal Controls for SO_2 and NO_X



Scrubber and SCR/SNCR	Scrubber	LNB and Under 1.0 lb SO_2/mmBtu	Under 1.0 lb SO_2/mmBtu
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300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW
Over 600 MW	Over 600 MW	Over 600 MW	Over 600 MW
SCR/SNCR	**FBC/IGCC**	**LNB**	**None**
Under 300 MW	Under 300 MW	Under 300 MW	Under 300 MW
300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW	300 MW to 600 MW
Over 600 MW	Over 600 MW	Over 600 MW	Over 600 MW

Virtually all coal-fired units have electrostatic precipitators, baghouses, or other advanced controls for high levels of particulate removal.

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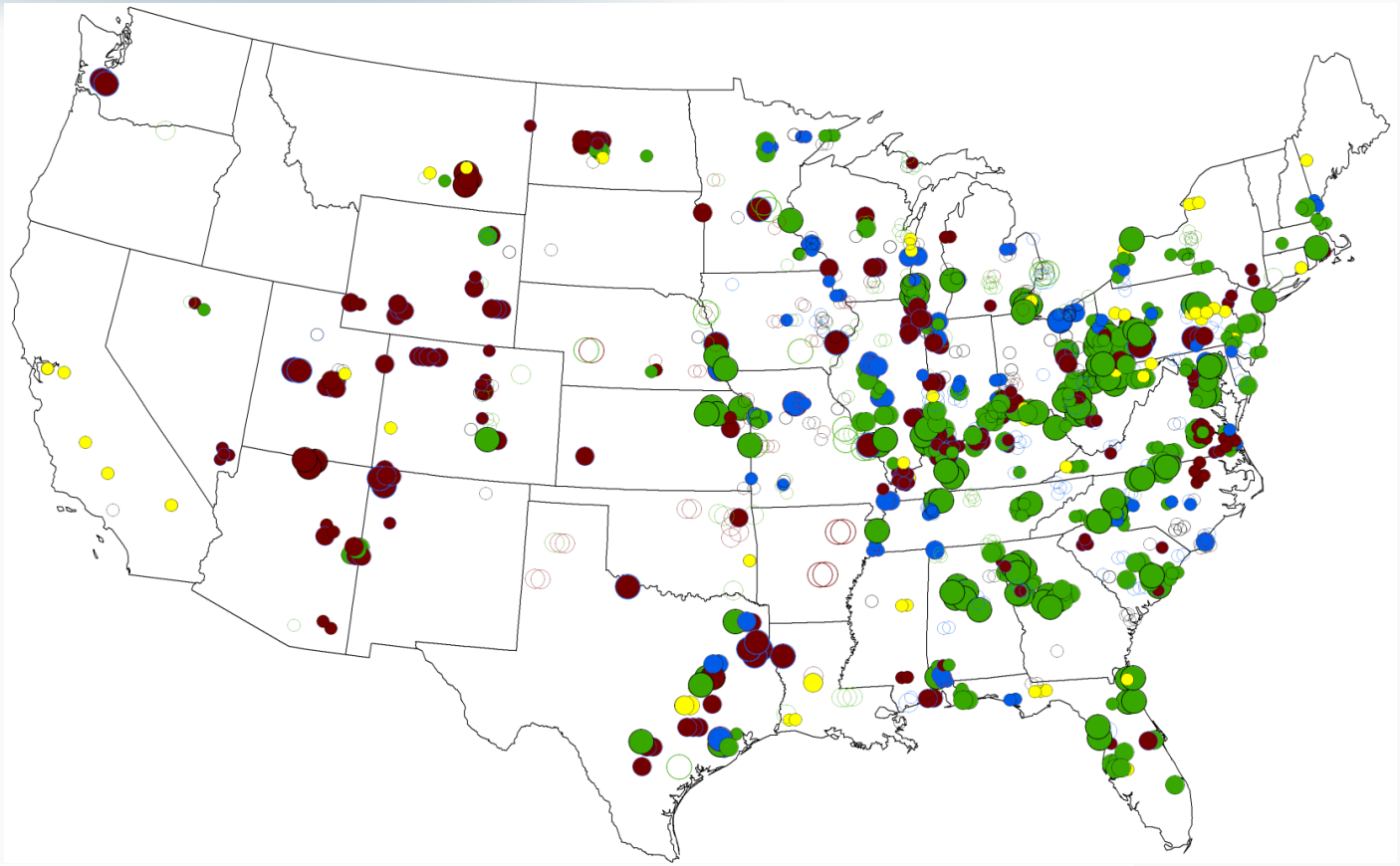
2014 Coal Controls for SO_2 and NO_X



Dry Sorbent Injection (DSI) is included as a scrubber for the purpose of this map. Virtually all coal-fired units have electrostatic precipitators, baghouses, or other advanced controls for high levels of particulate removal.

Source: National Electric Energy Data System (NEEDS 4.10) (EPA, December 2010) and Data & Maps (EPA, August 2011)

Supplemental Notice of Final Rulemaking

- On December 15, 2011, EPA finalized a supplemental rulemaking to require the following five states to make summertime NO_X reductions under the CSAPR ozone-season control program:
  - Iowa
  - Michigan
  - Missouri
  - Oklahoma
  - Wisconsin
- EPA has concluded that these five states plus Kansas significantly contribute to nonattainment and/or interference with maintenance of the 1997 ozone National Ambient Air Quality Standard (NAAQS) in other states.
  - However, EPA is not taking action on the inclusion of Kansas in the ozone season NO_X program at this time due to the unique status of Kansas' state implementation plan for ozone.
- EPA is finalizing the ozone season NO_X program as federal implementation plans for IA, MI, MO, OK, WI.

CSAPR Proposed Revisions

- On October 6, EPA proposed technical revisions to 9 state budgets.
- Proposal does not change basic CSAPR approach.
- Proposed revisions will not affect the CSAPR air quality improvements or impact CSAPR's goal to reduce interstate transport of pollution to help downwind states.
- Proposed revisions include:
  - Revisions to state budgets for FL, LA, MI, MS, NE, NJ, NY, TX, WI.
  - Recalculation of the New Unit Set Asides for TX and AR.
  - Limitations on allowances to units covered by existing consent decrees in some states – AL, IN, KS, KY, OH, TN.
  - Revision of assurance provisions effective date.
  - Establishes a deadline for stakeholder input on unit corrections.

Budgets under CSAPR and CAIR

Comparison of combined emission budgets for states covered by both CSAPR and CAIR (million tons)

	Initial Phase	
	CAIR Budgets	CSAPR Budgets
Annual SO_2	3.25	3.24
Annual NO_X	1.33	1.16
Ozone Season NO_X	0.56	0.49

Sources: CAIR preamble pages 25329, 25320, and 25323-25324 (http://edocket.access.gpo.gov/2005/pdf/05-5723.pdf); CSAPR preamble tables VI.F–1, VI.F–2, VI.F–3 (http://www.gpo.gov/fdsys/pkg/FR-2011-08-08/pdf/2011-17600.pdf); CSAPR SNPR tables I.C–1 and I.C–2 (http://www.gpo.gov/fdsys/pkg/FR-2011-07-11/pdf/2011-17456.pdf)

- CAIR began covering NO_X emissions in 2009 and SO_2 emissions in 2010.
- CSAPR applies to emissions in 2012 and beyond.
- The initial phase for CSAPR compliance begins in 2012 for all programs.
  - Sources covered by the CSAPR annual NO_X and SO_2 programs must comply – that is, surrender allowances to cover their 2012 annual emissions – in March 2013.
  - Sources covered by the NO_X ozone season program must comply on December 1, 2012 by surrendering allowances sufficient to cover 2012 ozone season NO_X emissions.

Clear Progress Toward 2012 CSAPR Requirements

- Many emission reductions within the CSAPR region are already slated to occur.
- Based on 2010 emission data, many CSAPR states, due in large part to the CAIR requirements that are to be replaced by CSAPR, are already emitting at levels that are below or close to their 2012 CSAPR budgets.
- SO_2 emissions from CSAPR states fell by 8% from 2010 levels over the first nine months of 2011.

Allowance Market Progress

- Viable markets are emerging due to existing trading program infrastructure and sound market fundamentals.
  - The final rule maintains the flexibility of trading and builds on a highly successful market-based approach familiar to the power sector over the past 15 years.

- The data reporting and tracking systems for emissions and allowance data provide a high degree of transparency, allowing market participants unprecedented levels of information for decision-making.

- Allowance trading has already begun in CSAPR markets.
  - On October 18, 2011, EPA placed 2012 allowances for all four CSAPR programs into accounts for sources with a certified account Designated Representative
  - Trades took place even before allowances were formally recorded.
  - EPA has recorded allowance transfers between sources.
  - Initial trades show prices decreasing rapidly as price exploration continues.
  - CSAPR market following normal pattern – prices are initially high and then drop rapidly as parties become familiar with market characteristics.

- Recent market prices are near or below prices forecast in EPA's final CSAPR analysis.

Moving Program Forward…

- Outreach
  - Presentations, meetings…
  - Website - http://www.epa.gov/crossstaterule/
    - Key documents
    - Regularly updated Q&As
  - Training for states
    - Series of topical webinars for states (http://www.epa.gov/crossstaterule/stateinfo.html)
    - EPA Region 7 hosted a CSAPR implementation training in November 2011
  - Assisting States with CSAPR Implementation
    - Q & A on Non-EGUs (developed with OAQPS)
    - Title V Permit Template (final by December/January)
    - Model Rules for SIPs for 2014-beyond (final by January 2012)
- Finalizing Proposed Revisions

For more information, visit the CSAPR website:
http://www.epa.gov/crossstaterule/

APPENDIX

Why Is EPA Doing this Rule?

Counties with Monitors Projected to Have Ozone and/or $PM_{2.5}$ Air Quality Problems in 2012 Without the Cross-State Air Pollution Rule

Counties with Violating PM and/or Ozone Monitors (17)

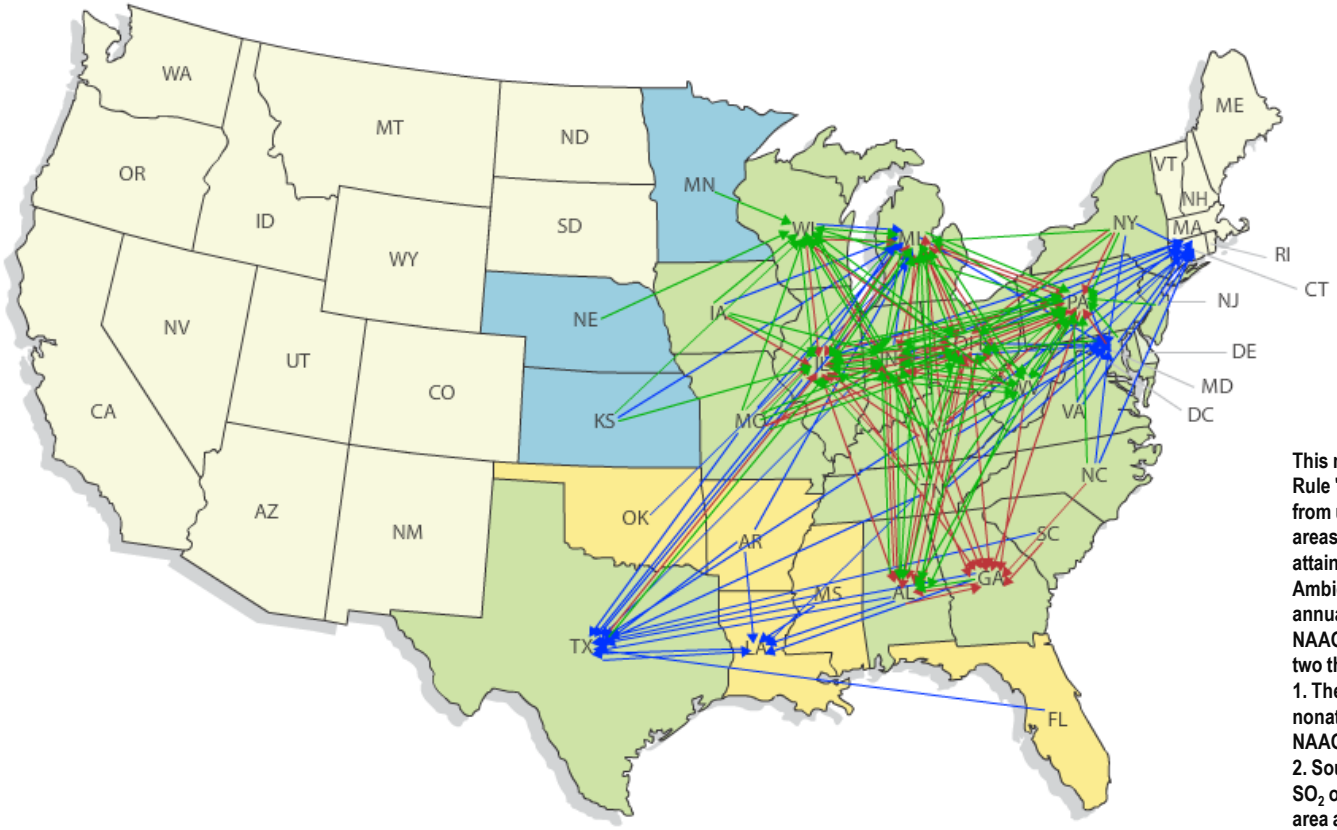
Counties with PM and/or Ozone Maintenance Problems (10)

States covered by the Cross-State Air Pollution Rule (28)

- **In 2012, EPA projects that:**
  - Some communities will still not meet the air quality standards.
  - Many upwind states will still contribute significantly to downwind nonattainment areas.
- **This rule affects power plants because their needed emission reductions are most cost-effective.**
- **In addition to this rule, other actions by EPA and the states must be taken before all areas will attain and maintain compliance with the National Ambient Air Quality Standards (NAAQS).**

This analysis assumes that the Clean Air Interstate Rule is not in effect. It does reflect other federal and state requirements to reduce emissions contributing to ozone and fine particle pollution that were in place as of December 2010.

Upwind-Downwind Linkages in Cross-State Air Pollution Rule States



This map shows the Cross-State Air Pollution Rule "linkages" between states where pollution from upwind states is linked to one or more areas in downwind states that have problems attaining or maintaining the 1997 ozone National Ambient Air Quality Standards (NAAQS), 1997 annual $PM_{2.5}$ NAAQS, and the 2006 24-hour $PM_{2.5}$ NAAQS. For states to be "linked" on this map, two things must occur:

1. The downwind state must have at least one nonattainment or maintenance area for these NAAQS; and,
2. Sources in the upwind state must emit enough SO_2 or NO_X pollution to affect air quality in that area at or above the threshold level set by EPA.

Legend

- States controlled for both fine particles (annual SO_2 and NOx) and ozone (ozone season NOx) (20 States)
- States controlled for fine particles only (annual SO_2 and NOx) (3 States)
- States controlled for ozone only (ozone season NOx) (5 States)
- States not covered by the Cross-State Air Pollution Rule

Key to Arrows

- Upwind-Downwind Linkage for Ozone
- Upwind-Downwind Linkage for Annual PM2.5
- Upwind-Downwind Linkage for Daily PM2.5

Health Benefits for Millions of Americans

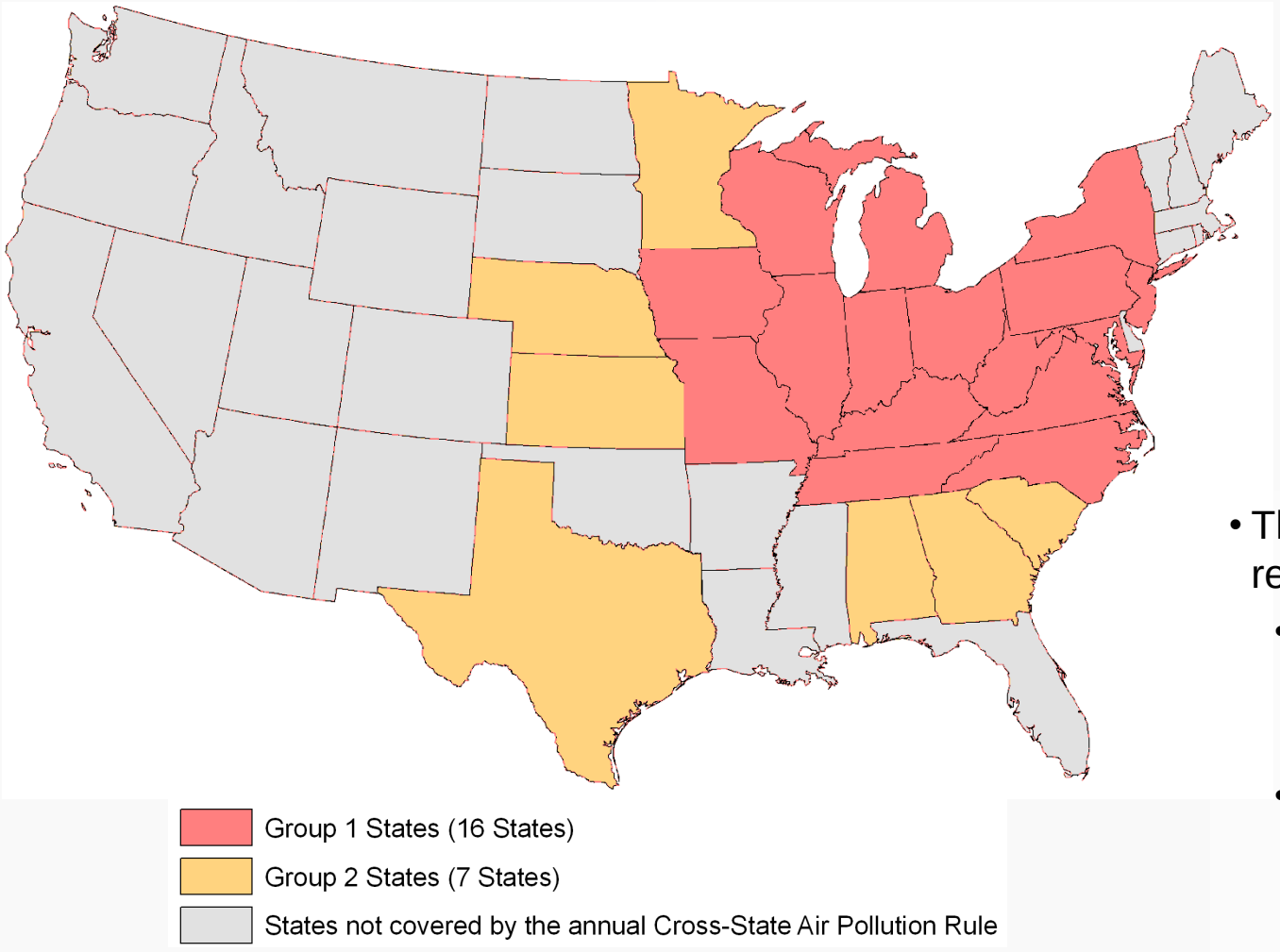
- EPA estimates the annual benefits from the rule range between $120-$280 billion (2007 $) in 2014.
  - Most of these benefits are public health-related.
  - $4 billion are attributable to visibility improvements in areas such as national parks and wilderness areas.
- Other non-monetized benefits include reductions in acidification of lakes, streams and forests, eutrophication of estuaries and coastal waters.

Estimated Number of Adverse Health Effects Avoided under the Cross-State Air Pollution Rule*

Health Effect	Annual Number of Cases Avoided
Premature mortality	**13,000 to 34,000**
Non-fatal heart attacks	**15,000**
Hospital and emergency department visits	**19,000**
Acute bronchitis	**19,000**
Upper and lower respiratory symptoms	**420,000**
Aggravated asthma	**400,000**
Days when people miss work or school	**1.8 million**

* Impacts avoided due to improvements in $PM_{2.5}$ and ozone air quality in 2014

Separate SO_2 Control Groups

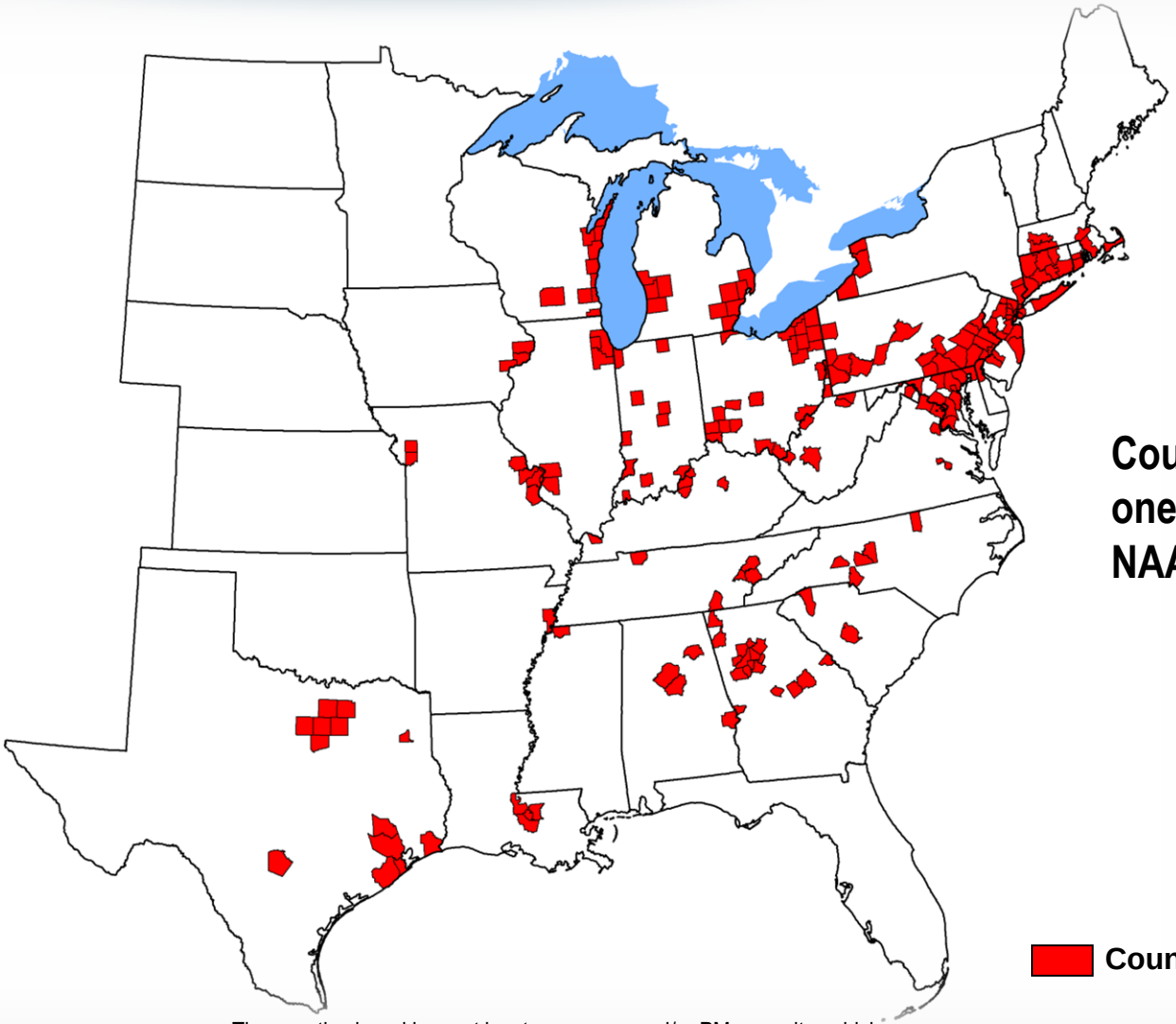


- The rule includes separate requirements for:
  - Annual SO_2 reductions
    - Phase I (2012) and Phase II (2014)
  - Two Control Groups
    - Group 1 – lower budget in 2014
    - Group 2

Cross-State Air Pollution Rule Responds to Court Remand

- The methodology used to measure each state's significant contribution to another state emphasizes air quality (as well as cost considerations) and uses state-specific data and information.
- The methodology also gives independent meaning to the "interfere with maintenance" requirement of the Clean Air Act.
- The state budgets for SO_2, annual NO_X, and ozone season NO_X are directly linked to the measurement of each state's significant contribution and interference with maintenance.
- The compliance deadlines are coordinated with the attainment deadlines for the relevant NAAQS.
- The rule includes provisions to assure that all necessary reductions occur in each individual state.
- The allowance allocation approach is "fuel" and "control" neutral, does not make use of fuel adjustment factors, and does not make use of existing Title IV allowances for SO_2 emissions.

Counties Violating Air Quality Standards in the Cross-State Air Pollution Rule Region (based on 2003-07 air quality monitoring data)



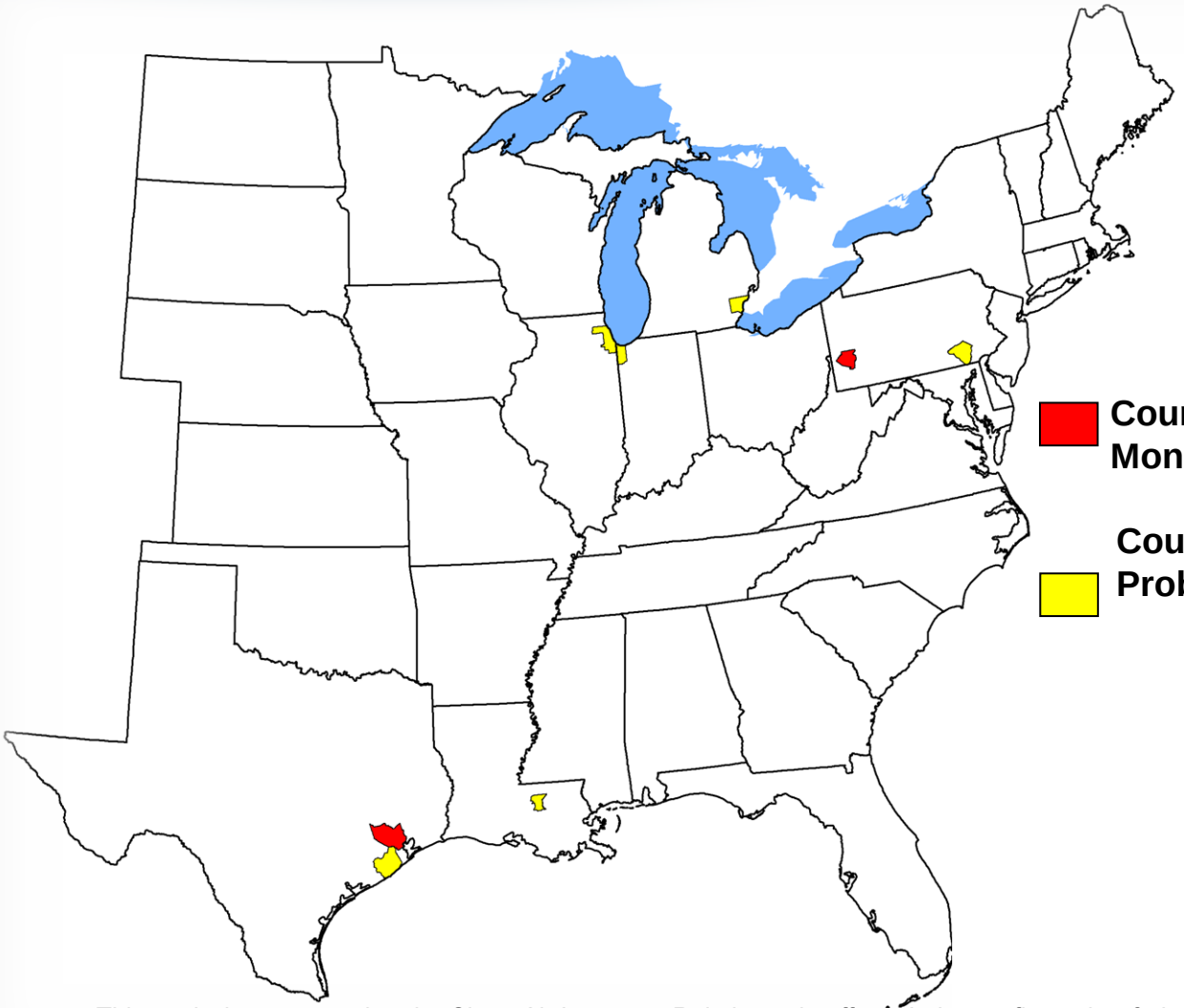
The counties in red have at least one ozone and/or $PM_{2.5}$ monitor which violated the NAAQS in the periods 2003-2005, 2004-2006, and/or 2005-2007.

Counties in red are violating one or more of the following NAAQS:

- **1997 $PM_{2.5}$**
- **1997 ozone**
- **2006 $PM_{2.5}$**

Counties with Violating Monitors (207)

Counties with Monitors Projected to Have Ozone and PM2.5 Air Quality Problems in 2014 With the Cross-State Air Pollution Rule



Counties with Violating Monitors (2)

Counties with Maintenance Problems (6)

This analysis assumes that the Clean Air Interstate Rule is not in effect. It does reflect other federal and state requirements to reduce emissions contributing to ozone and fine particle pollution that were in place as of December 2010. These results reflect the Cross-State Rule as finalized on July 6th, 2011 and includes the emission reductions expected under the SNFR.