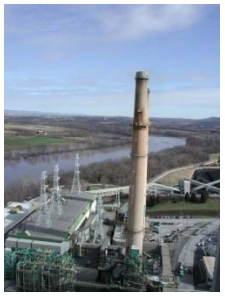
Cross-State Air Pollution Rule

Reducing Air Pollution
Protecting Public Health

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



Overview of Action

- EPA is finalizing the Cross-State Air Pollution Rule (CSAPR) under the "good neighbor" provision of the Clean Air Act to 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.
- It will level the playing field by requiring under-controlled power plants to make long-overdue investments in proven, readily-available pollution control technologies already in place at many power plants.
- 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 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 may vary, but 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.

Overview of Presentation

I. Purpose and goals of this rule

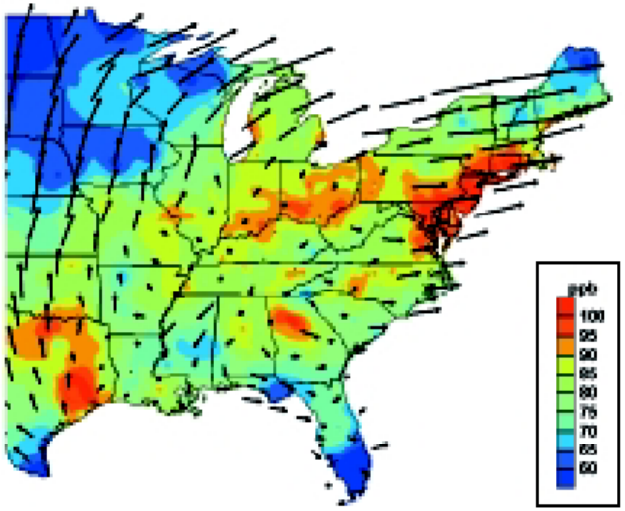
II. Benefits and costs of the Cross-State Air Pollution Rule

III. How the rule works and addresses the 2008 court action remanding Clean Air Interstate Rule (CAIR)

Air Quality in Any One Place Is Affected by Sources in Many States

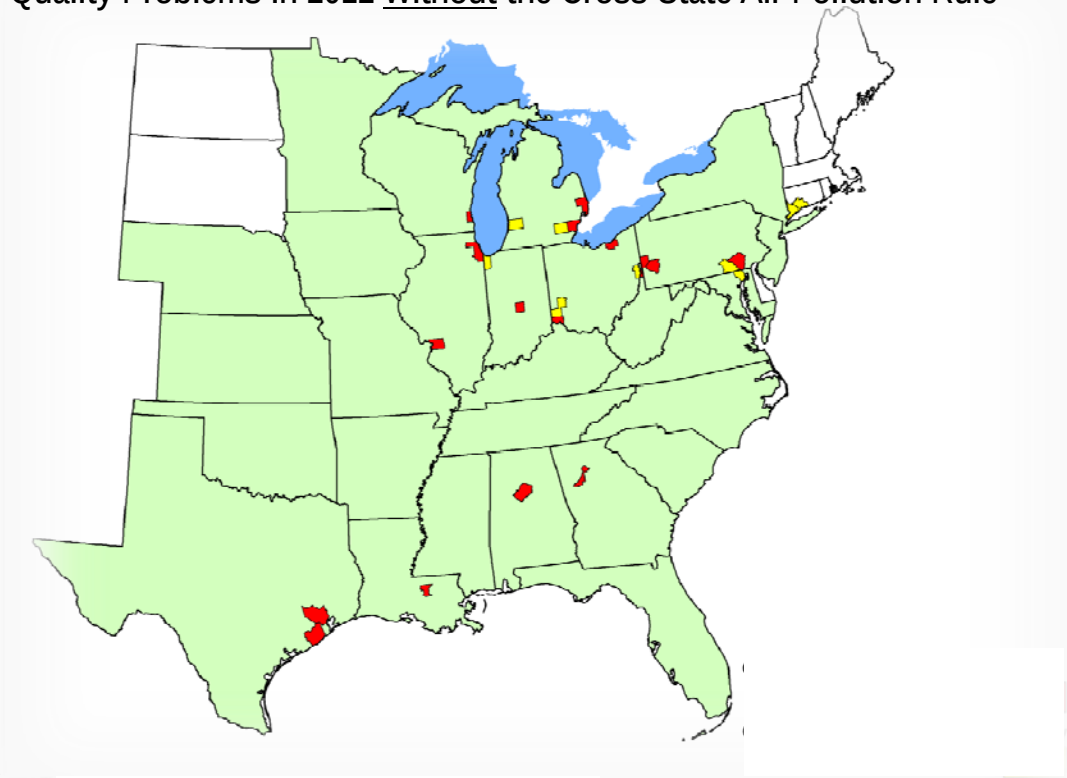
- Air pollution can travel hundreds of miles and cause multiple health and environmental problems on regional or national scales.
- This rule reduces air emissions contributing to fine particle ($PM_{2.5}$) and ozone nonattainment that often travel across state lines:
  - Sulfur dioxide (SO_2) and nitrogen oxides (NO_X) contribute to $PM_{2.5}$ transport
  - NO_X contributes to ozone transport
- Many areas are still violating the 1997 ozone and the 1997 and 2006 fine particulate health-based air quality standards.
- Attaining national ambient air quality standards will require some combination of emission reductions from:
  - Sources located in or near nonattainment areas (local pollution).
  - Sources located further from the nonattainment area (transported pollution), and
  - Pollution emitted by power plants, cars, trucks, and other industrial facilities.

Transport Winds and Ozone Patterns on High Ozone Days



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)*

* Includes states in the supplemental proposal

- **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.

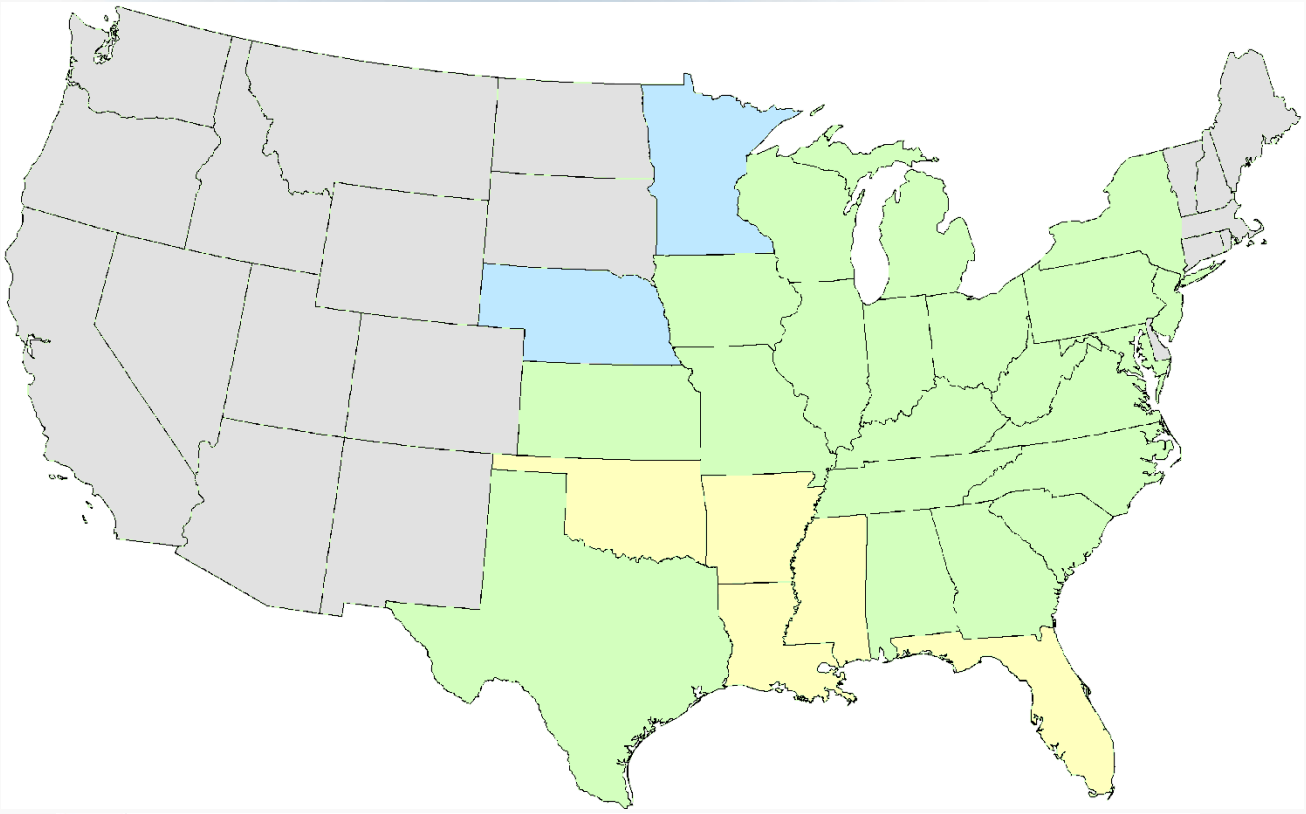
Cross-State Air Pollution Rule Replaces CAIR

- This rule responds to the court ruling remanding the 2005 CAIR and the 2006 CAIR Federal Implementation Plans (FIPs).
- Addresses the December 2008 court decision
  - The decision kept the requirements of CAIR in place temporarily and directed EPA to issue a new rule addressing the provisions of the Clean Air Act concerning interstate transport of air pollution.
- Achieves emission reductions beyond those originally required by CAIR through additional air pollution reductions from power plants beginning in 2012.

Supplemental Notice of Proposed Rulemaking

- The supplemental proposal requests comment on inclusion of six states in the Cross-State Air Pollution Rule ozone season program: Iowa, Kansas, Michigan, Missouri, Oklahoma, and Wisconsin.
  - The final Cross-State Air Pollution Rule does not include ozone season NO_X reduction requirements for these six states.
  - Except for Oklahoma, all of these states are included in the final Cross-State Air Pollution Rule annual NO_X program for $PM_{2.5}$ that begins January 1, 2012.
- EPA intends to finalize the supplemental proposal by October 31, 2011
  - The total number of covered states in the Cross-State Air Pollution Rule region would increase to 28.
  - Twenty-six states would be required to reduce ozone season NO_X emissions.

Cross-State Air Pollution Rule States

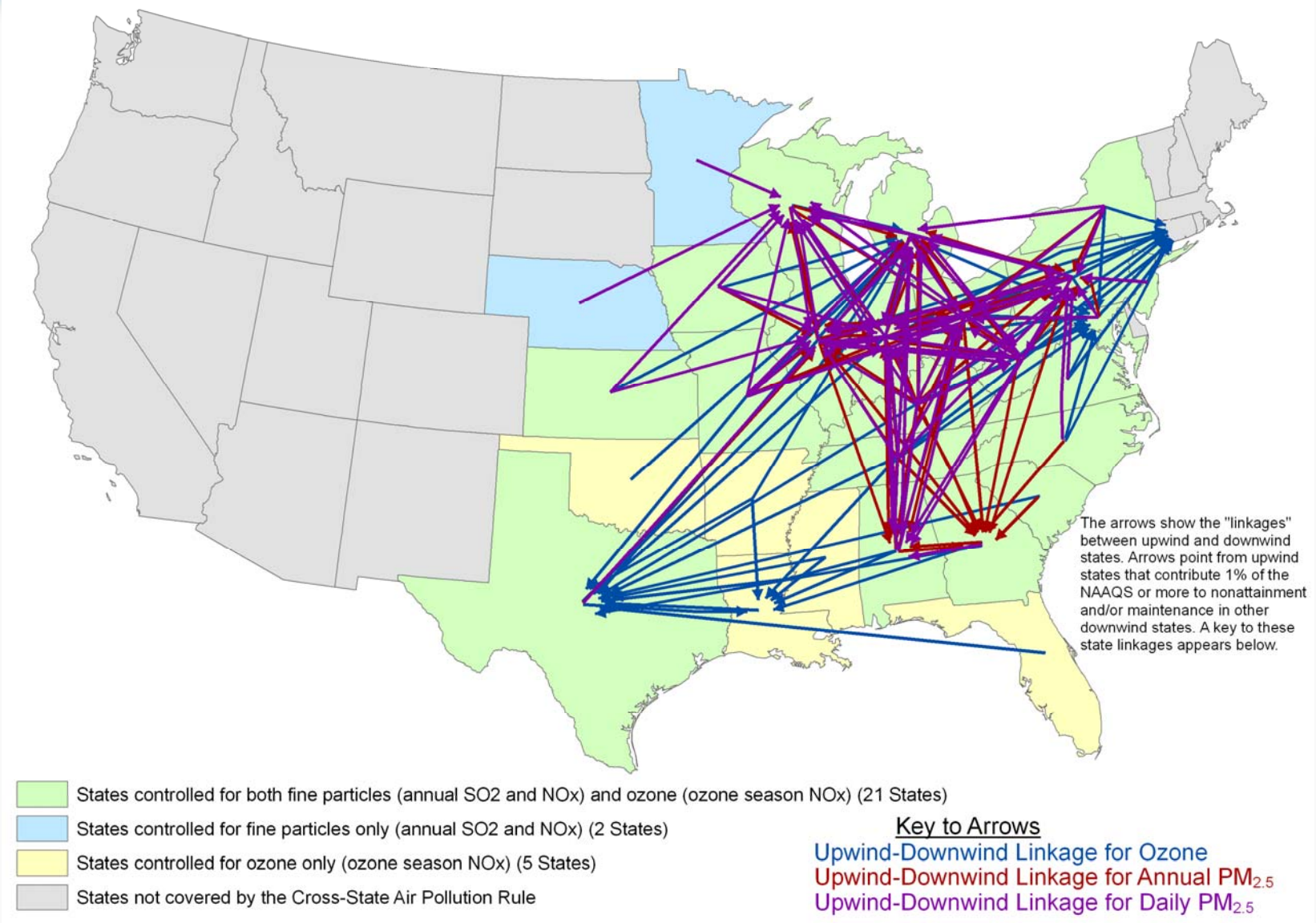


- States controlled for both fine particles (annual SO_2 and NO_x) and ozone (ozone season NO_x) (21 States)
- States controlled for fine particles only (annual SO_2 and NO_x) (2 States)
- States controlled for ozone only (ozone season NO_x) (5 States)
- States not covered by the Cross-State Air Pollution Rule

- Cross-State Air Pollution Rule includes separate requirements for:
  - Annual SO_2 reductions
  - Annual NO_x reductions
  - Ozone-season NO_x reductions

*This map includes states covered in the supplemental notice of proposed rulemaking.

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



HEALTH AND ENVIRONMENTAL BENEFITS

Significant NO_X and SO_2 Reductions from Cross-State Air Pollution Rule

- By 2014, EPA modeling projects that implementation of the Cross-State Air Pollution Rule, combined with other state and EPA actions, will reduce 2005 emissions from electric generating units in the covered states by:
  - 6.4 million tons of SO_2 per year (2005 emissions were 8.8 million tons)
  - 1.4 million tons of NO_X per year (2005 emissions were 2.6 million tons)
    - 340,000 tons of NO_X during ozone season (included in NO_X estimate above)
- These reductions represent a 73% reduction in SO_2 and a 54% reduction in NO_X emissions from power plants from 2005 levels in the covered states.
- The Cross-State Air Pollution Rule sets emission budgets that cap emissions in covered states in 2014:
  - SO_2 emissions will be 2.4 million tons per year
  - NO_X emissions will be 1.2 million tons per year
    - Ozone season NO_X emissions will be limited to 600,000 tons per year

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**

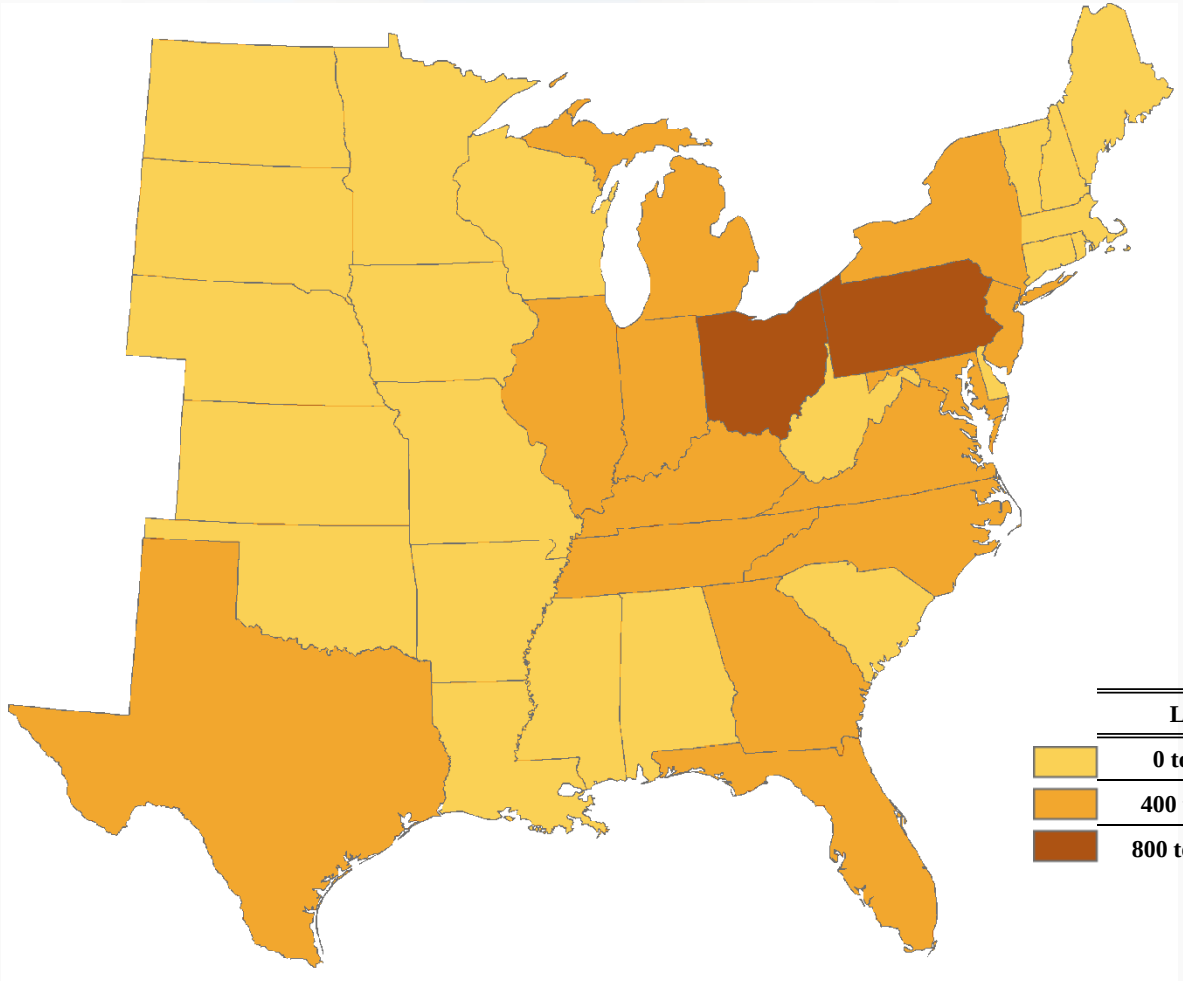
* Impacts avoided due to improvements in $PM_{2.5}$ and ozone air quality in 2014

Many Benefits with Modest Impact

- 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 CAIR, are improving air quality for over 240 million Americans.
- Modest costs mean small effects on electricity generation. EPA estimates that in 2014:
  - Average monthly household electricity bill increases by 1 percent.
  - Natural gas prices increase less than 1 percent.
  - Small changes in power generation.
- Projected allowance prices will be reasonable:

	Emission Allowance Prices (2007$/ Ton)	
	2012	2014
Annual SO_2 Group 1 Trading Program	$1,000	$1,100
Annual SO_2 Group 2 Trading Program	$600	$700
Annual NO_x Trading Program	$500	$600
Ozone Season NO_x Trading Program	$1,300	$1,500

Will See Large Benefits



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

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

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%

Cross-State Air Pollution Rule Helps States Attain the NAAQS

- The Cross-State Air Pollution Rule will improve air quality in thousands of counties throughout the eastern, central, and southern U.S. – counties that are home to over 75% of the U.S. population.
- State, local, and federal actions have already improved air quality so that many counties meet the National Ambient Air Quality Standards for ozone and fine particle pollution.
- By 2014, with the Cross-State Air Pollution Rule in place, EPA projects that only the Houston-Galveston metropolitan area will continue to violate the 1997 ozone standard and only the Liberty-Clairton, PA area will continue to violate the 24-hour fine particle standard.
- In addition, the Cross-State Air Pollution Rule emission reductions will help many more areas continue to meet the level of the standards.

Ozone:
More Needs to Be Done

- EPA moved quickly on this rule to ensure the earliest public health protection and respond to the court as soon as possible.
- This rule achieves reductions in seasonal ozone levels.
- EPA also intends to analyze what additional reductions in air pollution transport would be required under the 2011 revised ozone standard.
- EPA plans to identify any needed emission reductions from upwind states in time to help downwind states attain the reconsidered ozone standards.

Supporting States

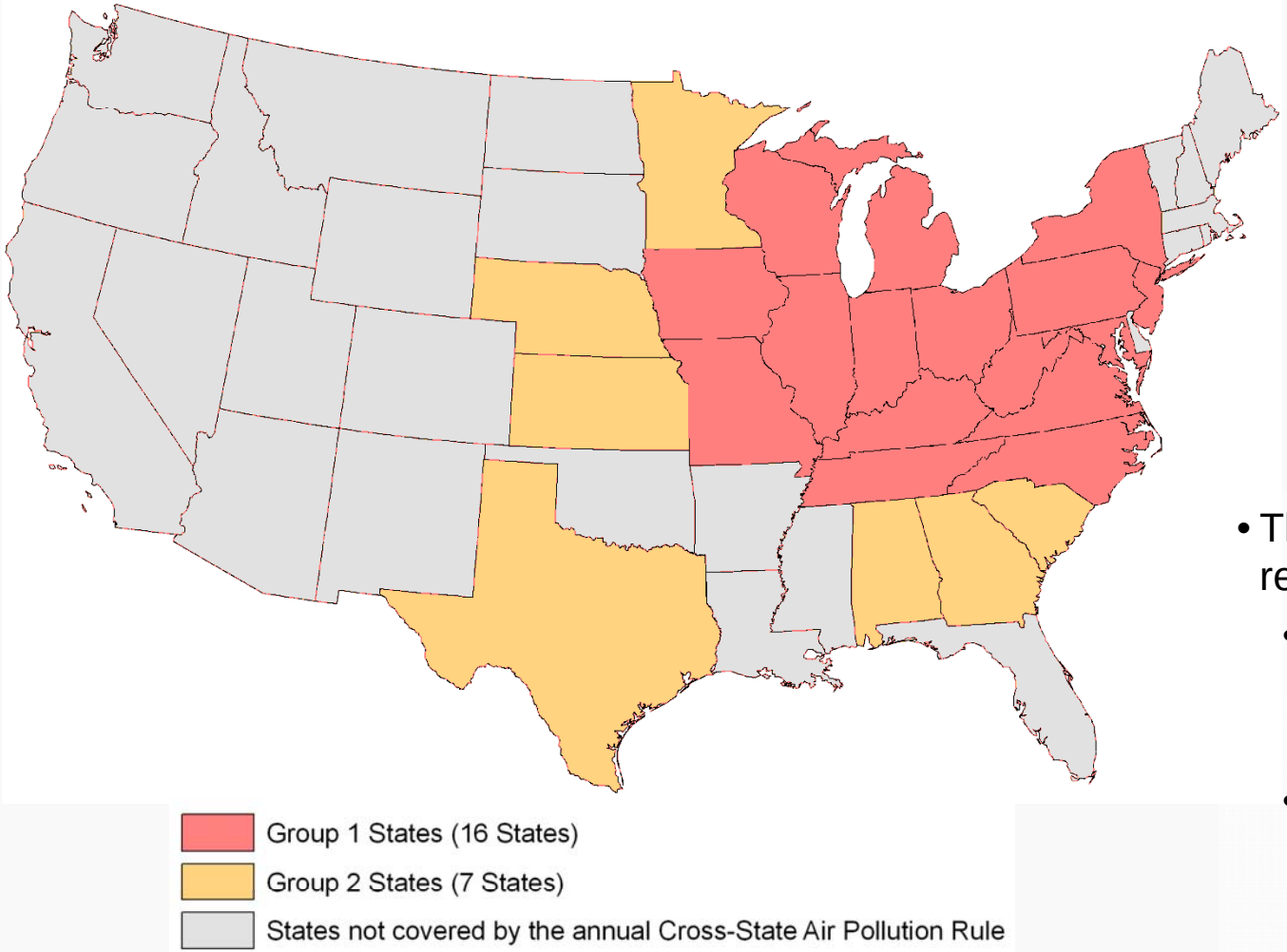
- EPA is finalizing federal implementation plans, or FIPs, for each state covered by this rule.
- EPA designed the Cross-State Air Pollution Rule to make it as easy as possible for states to use SIPs to implement any or all Cross-State Air Pollution Rule programs at any time
  - A state may develop a state plan to achieve the required reductions and may choose which types of sources to control and how to administer the programs.
  - States also can choose only to allocate allowances for any or all programs, starting as early as 2013.
- With today's action, EPA is making an ongoing commitment to help states implement the "good neighbor" provision of the Clean Air Act, which prohibits each state from significantly contributing to air quality problems in another state
  - This rule lays out a process for determining each upwind state's emission control responsibility. Each time the NAAQS are changed, EPA can apply this process and determine if interstate pollution transport contributes to the air quality problem and whether new emission reductions will be required from upwind states.
  - EPA has not yet determined whether the reconsidered ozone NAAQS, currently scheduled to be finalized July 2011, and the new fine particle NAAQS, currently scheduled to be proposed summer 2011, will trigger additional emission reduction requirements from upwind states.

HOW THE CROSS-STATE AIR POLLUTION RULE WORKS

Key Elements of Cross-State Air Pollution Rule

- The rule defines upwind state obligations to reduce pollution significantly contributing to downwind nonattainment and maintenance areas based on the:
  - Magnitude of a state's contribution,
  - Cost of controlling pollution from various sources, and
  - Air quality impacts of reductions.
- Once these obligations were determined, including the amount of necessary pollution reductions, state budgets were set accordingly.
- State budgets were set with variability limits to assure that each state will meet its pollution control obligations.
- EPA carefully considered the court's direction in correcting CAIR's flaws.
- The rule allows air quality-assured allowance trading among power plants, utilizing an allowance market infrastructure based on existing, successful allowance trading programs.

Separate SO_2 Control Groups



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

Achieving Compliance

- To meet the requirements of this rule, EPA anticipates power plants will:
  - Maximize use of installed SO_2 and NO_X pollution control equipment, including running clean units more than would otherwise occur;
  - Use lower sulfur coal, switch fuels; or
  - Install or upgrade pollution control equipment, such as low NO_X burners or scrubbers (Flue Gas Desulfurization).
- CAIR will be implemented through 2011 compliance periods – CAIR then will be replaced by the Cross-State Air Pollution Rule for 2012.
- Cross-State Air Pollution Rule establishes new allowances for all programs
  - There is no carryover of Acid Rain Program, NO_X SIP Call/NBP, or CAIR allowances.

Key Dates for Final Cross-State Air Pollution Rule

- July 6, 2010: Proposal signed
- July 6, 2011: Final rule signed
- January 1, 2012: Cross-State Air Pollution Rule Phase 1 SO_2 and annual NO_X trading programs begin
- May 1, 2012: Cross-State Air Pollution Rule ozone season NO_X trading program begins
  - Ozone season ends September 30
- January 1, 2014: Beginning of more stringent SO_2 reductions in Group 1 states.

www.epa.gov/crossstaterule

APPENDIX

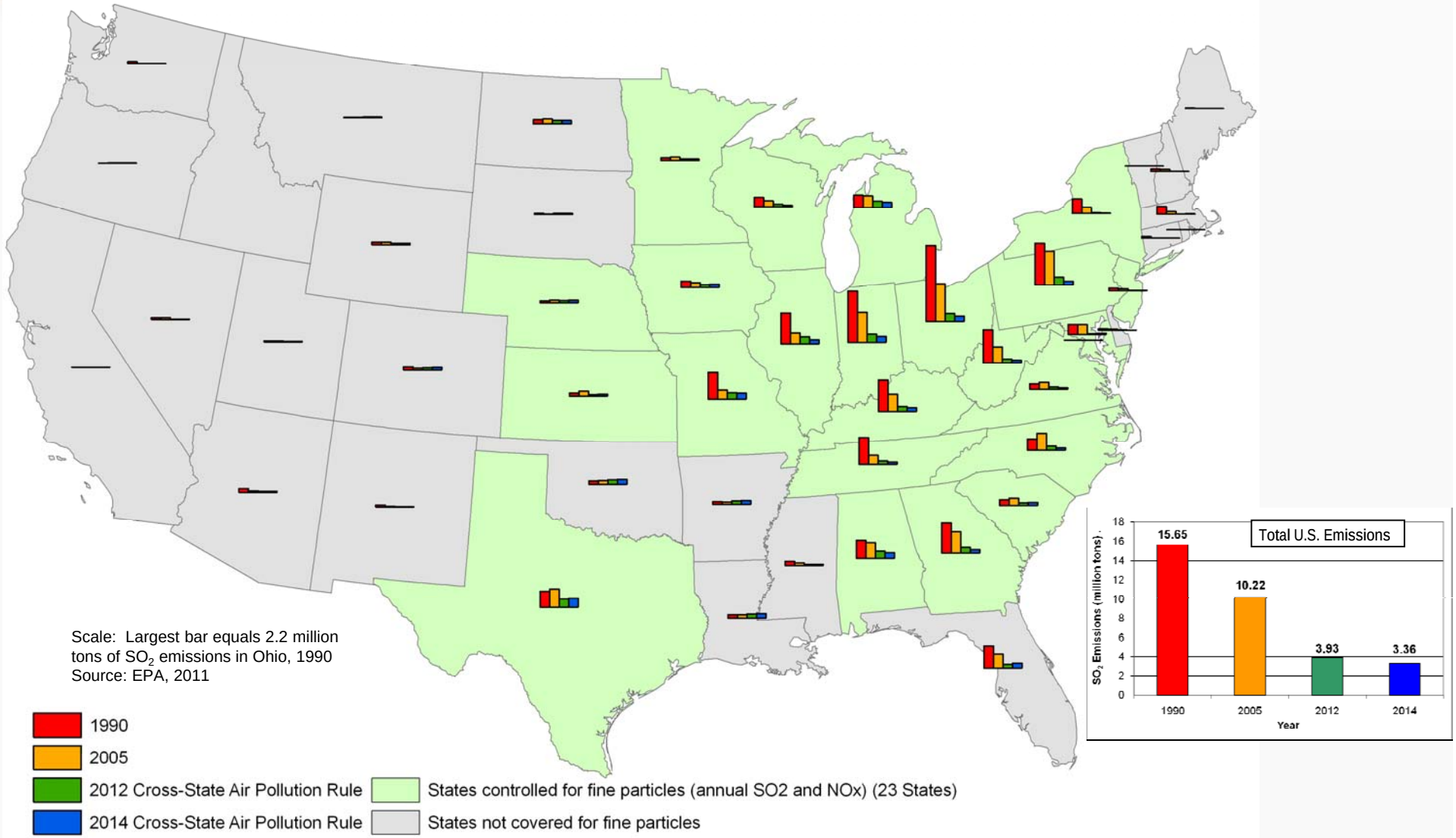
NO_X and SO_2 Emissions Affect the Health of Millions of Americans and Our Environment

- NO_X contributes to the formation of $PM_{2.5}$ and ground-level ozone.
- SO_2 contributes to the formation of $PM_{2.5}$.
- $PM_{2.5}$ has been linked to premature death, serious illnesses such as chronic bronchitis and heart attacks, and respiratory problems.
- Ozone has been linked to premature death, lung damage, respiratory symptoms, aggravation of asthma and other respiratory conditions.
- Sulfur deposition acidifies surface waters, and damages forest ecosystems and soils.
- Nitrogen deposition acidifies surface waters, damages forest ecosystems and soils, and contributes to coastal eutrophication.
- SO_2 and NO_X impair visibility, including at national parks and wilderness areas.

Cross-State Air Pollution Rule Responds to Court Remand

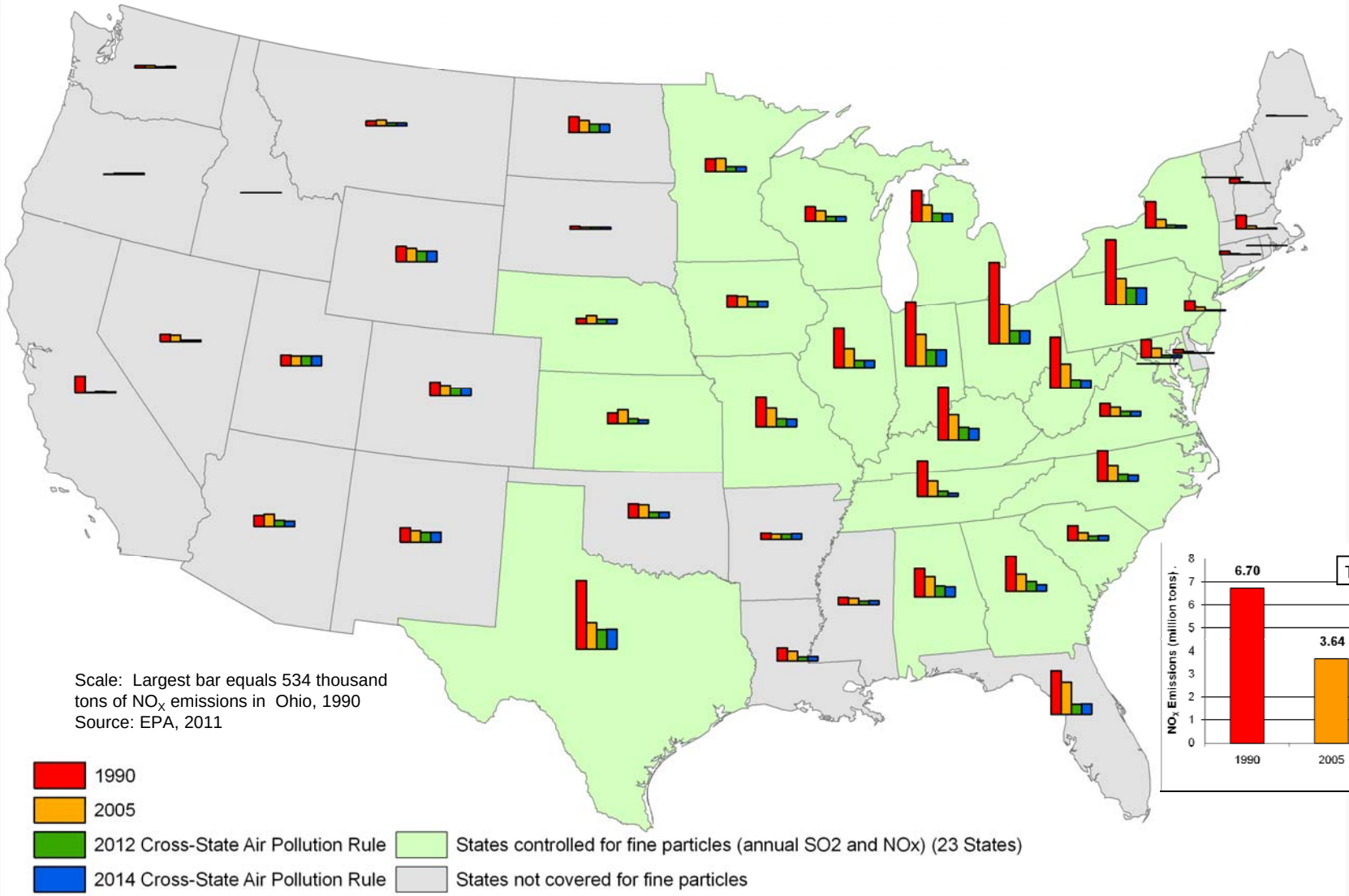
- The methodology used to measure each state's significant contribution to another state emphasizes air quality (as well as cost considerations) and uses state-specific data and information.
- The methodology also gives independent meaning to the "interfere with maintenance" requirement of the Clean 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.

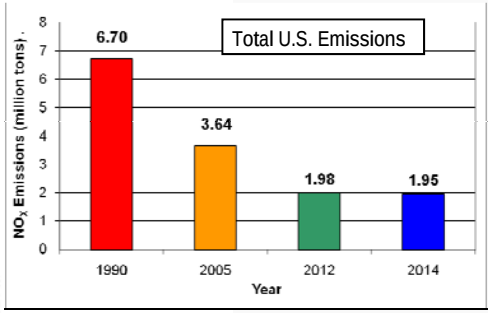
Annual SO_2 Power Plant Emissions 1990-2014 *



* 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.

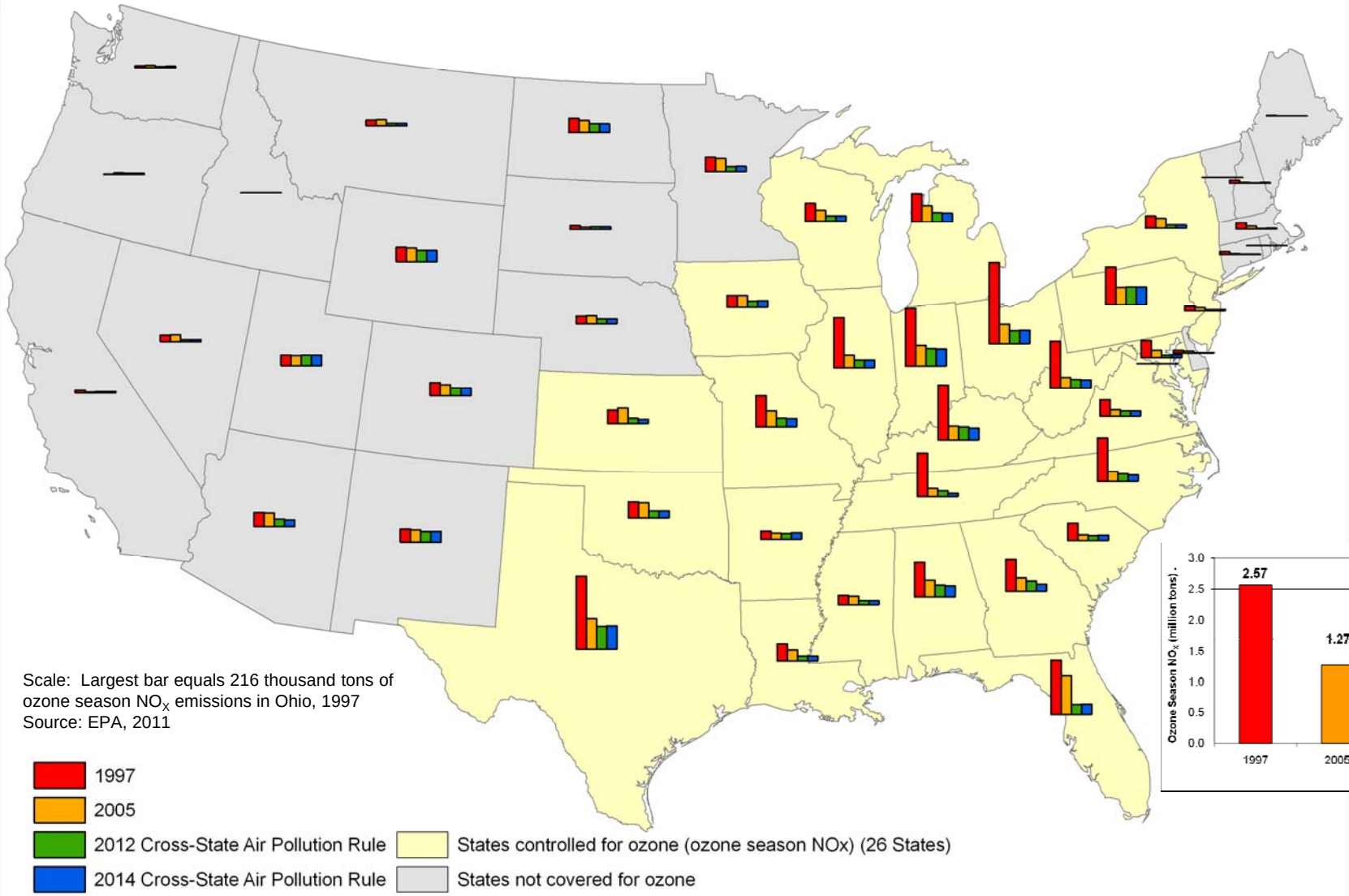
Annual NO_X Power Plant Emissions 1990-2014 *

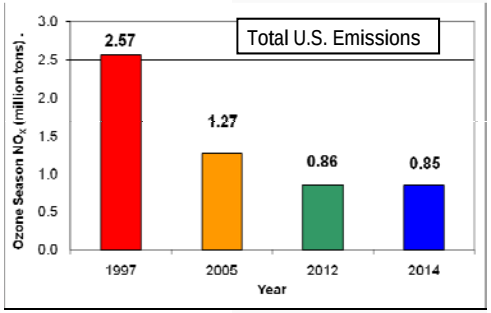




* Emissions shown include only Acid Rain Program sources; these sources include 94% of modeled annual NO_X emissions and 71% of modeled units in 2014.

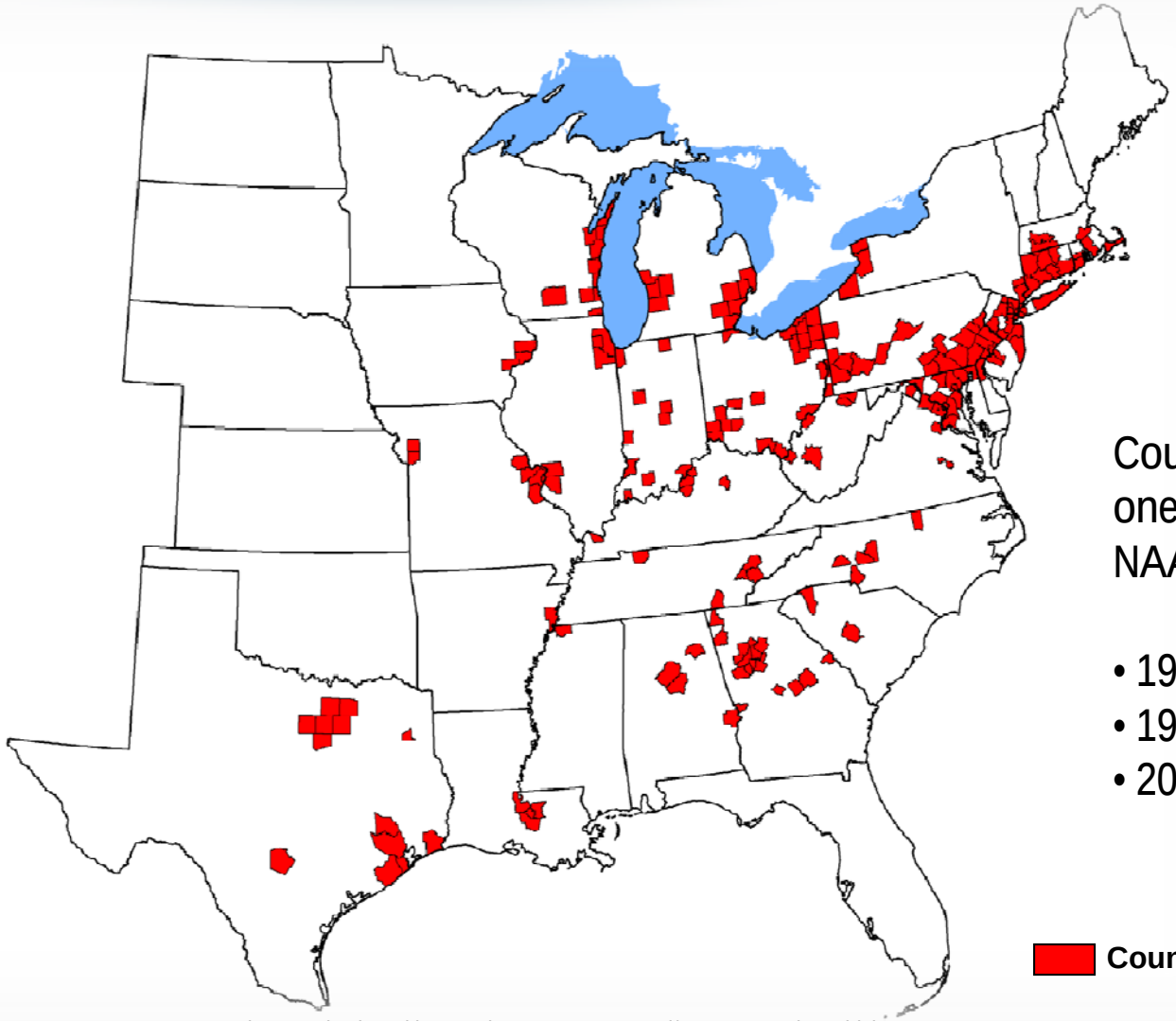
Ozone Season NO_X Power Plant Emissions 1997-2014 *





* 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.

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



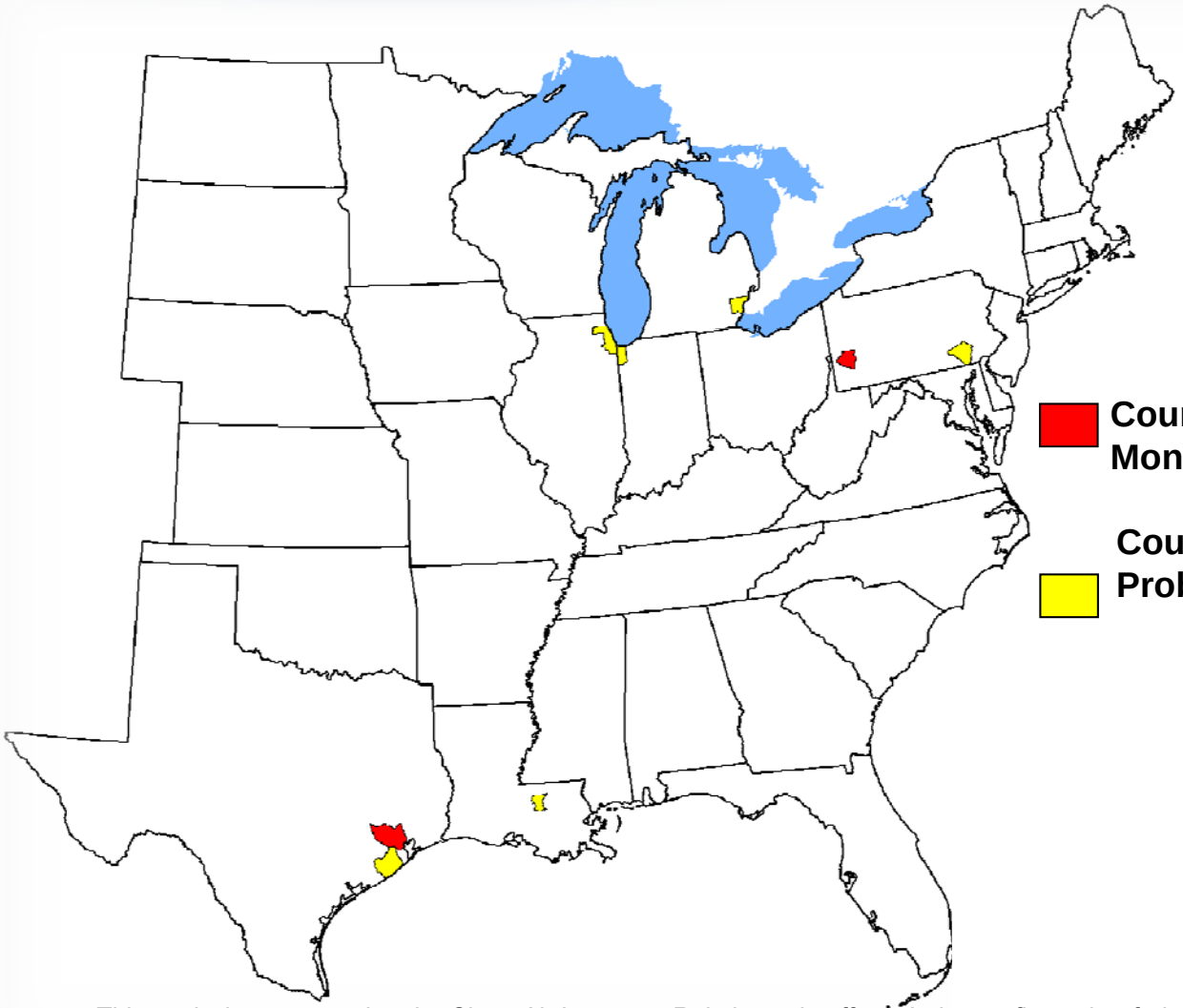
Counties in red are violating one or more of the following NAAQS:

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

Counties with Violating Monitors (207)

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 with Monitors Projected to Have Ozone and $PM_{2.5}$ 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 February 2009.

Changes in Final Rule from Proposed Rule

- Updated emission inventories and modeling tools (generally lower base case emissions; improved alignment between air quality estimates and modeling results).
- Updated conclusions regarding which states significantly contribute to or interfere with maintenance of the NAAQS in other states
  - Texas was added to the annual SO_2 and NO_X programs; Connecticut, Delaware, District of Columbia, Florida, Louisiana, and Massachusetts were removed.
  - Connecticut, Delaware and District of Columbia were removed from the NO_X ozone season program.
- New allowance allocation approach based on historic heat input and a unit's maximum historic emissions.
- Changed state budgets and revised variability limits to one year percentages only (i.e., state assurance levels), no tonnage limits.
- Assurance provision changes
  - Assurance provisions start in 2012
  - Increased assurance provision penalties to 2 allowances for every ton of emissions above the state assurance level; assessed at the common Designated Representative level
- Revised new unit set-asides for potential new units and committed/ planned new units in Cross-State Air Pollution Rule states.
- Added new unit set-aside for future units located in Indian country.
- Removed opt-in provisions.
- Added provisions for full and abbreviated Cross-State Air Pollution Rule SIP revisions and added an accelerated SIP process for 2013.
- Shortened time that retired units receive allowance allocations after they stop operating.

Upcoming Regulations

Action	*Schedule*
Cross-State Air Pollution Rule	Final July 6, 2011
Ozone NAAQS Reconsideration	Final – End of July 2011
Power Plant Mercury and Air Toxics Standards (MATS)	Proposed March 16, 2011/Final Nov 2011
PM NAAQS	Propose Summer 2011
Transport Rule II (NO_X)	TBD