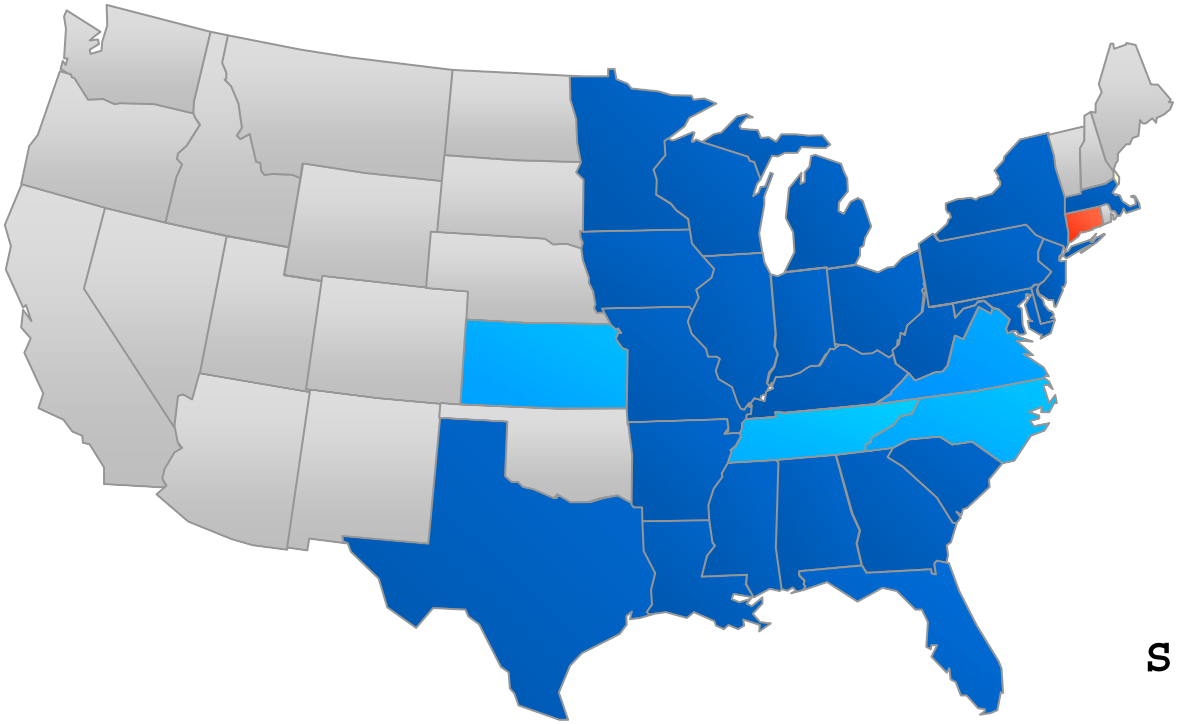
Interstate Air Quality Rule Proposal

Reducing Sulfur Dioxide (SO_2)
and Nitrogen Oxides (NO_x)
Emissions in the Eastern U.S.

Proposed IAQR: Key Elements

- Sets the **geographic scope based on air quality impact of emissions (SO_2 and NO_x) from individual states on 8-hour ozone and $PM_{2.5}$ nonattainment**
- Sets an **emission reduction requirement** for each State, based on capping EGU emissions at levels that EPA believes are highly cost effective to achieve.
- Provides an **optional cap and trade program** based on successful Acid Rain trading program as a method to implement the necessary reductions
- Allows **states flexibility** on how to achieve the reductions, including which sources to control and whether to join the trading program
- Proposes a **two-phase program** with declining EGU **caps (budgets)**
  - SO_2: 3.9 million tons in 2010 and 2.7 million in 2015
  - NO_x: 1.6 million tons in 2010 and 1.3 million in 2015

IAQR: Affected Region and EGU Emission Caps



States controlled for both SO_2 and NOx

States controlled for ozone season NOx only

States not covered under the IAQR

EGU Emissions Caps*

(million tons)

	2010	2015
SO_2	3.9	2.7
NOx	1.6	1.3

**For the affected region.*

Clean Air Act Section 110(a)(2)(D)

- Gives the EPA authority to require states to develop plans to prohibit "*any source ... from emitting any air pollutant in amounts which will contribute significantly to nonattainment in, or interfere with maintenance by, any other State ...*"

- The Interstate Air Quality Rule interprets this section of the Clean Air Act as it applies to nonattainment of the 8-hour ozone and annual average $PM_{2.5}$ national ambient air quality standards.

Significant Contribution - Overview

- Two-step approach for interpreting section 110(a)(2)(D). Patterned after successful 1998 NOx SIP Call.

  - **Step 1** – Air quality assessment to identify upwind States that contribute significantly (before considering cost) to downwind nonattainment.

  - **Step 2** – Control cost assessment to determine the amount of emissions in each upwind State that should be reduced to eliminate each upwind State's significant contribution to downwind nonattainment. EPA has proposed that highly cost-effective reductions for EGUs should be achieved.

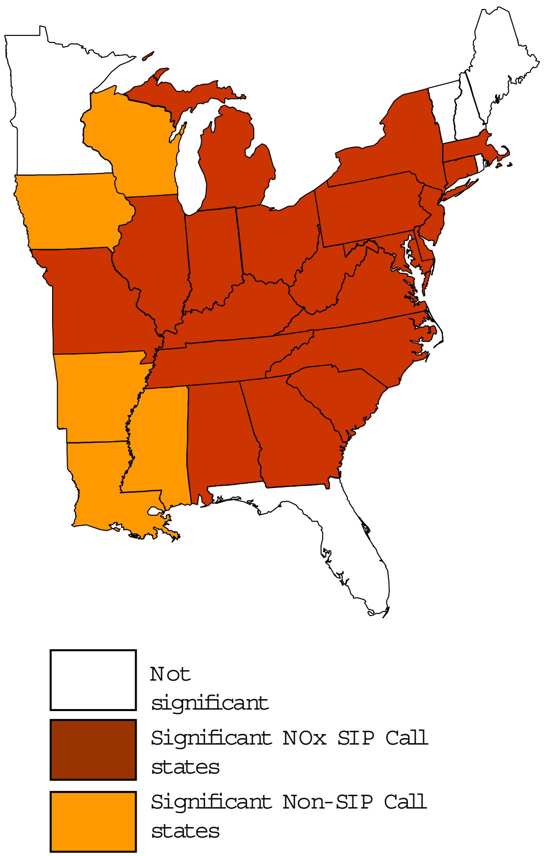
- Factors considered:
  - Degree and geographic extent of current and expected future nonattainment;
  - Potential impact of local controls on future nonattainment;
  - Potential for individual pollutants to be transported between States;
  - Extent to which pollution transport across State boundaries will contribute to future nonattainment; and
  - Availability and timing of controls to achieve highly cost-effective reductions.

EPA's Evaluation of Control Costs: Marginal vs. Average Cost-Effectiveness

- Both measures are indicators of the relative cost-effectiveness of controlling emissions, expressed as $/ton controlled.
- Average cost = the total cost of the control strategy divided by the number of tons controlled.
- Marginal cost = the cost of controlling a ton of emissions from the highest cost emissions unit.
- Marginal cost is an especially useful indicator of the relative expense of strategies being compared when the amount of reductions between the strategies varies significantly.
- EPA examined the cost of the IAQR strategy relative to both the average and marginal costs of other regulatory actions.
- EPA believes that controls with costs toward the low end of the range of cost effectiveness may be considered highly cost effective because they are self-evidently more cost effective than most other controls in the range.

Significant Contribution to 8-hr Ozone Nonattainment

8-Hour Ozone: Summertime NOx reduction requirements for 25 states



- **Step 1** – New air quality assessment to identified upwind States that contribute significantly (before considering cost) to downwind nonattainment.
  - Five additional states identified (AR, IA, LA, MS, WI) and RI status reconsidered, bringing the total number of ozone-related areas to 25 states plus D.C.
  - All but CT are also significant for $PM_{2.5}$, therefore, all but CT would be subject to an annual NOx reduction requirement.

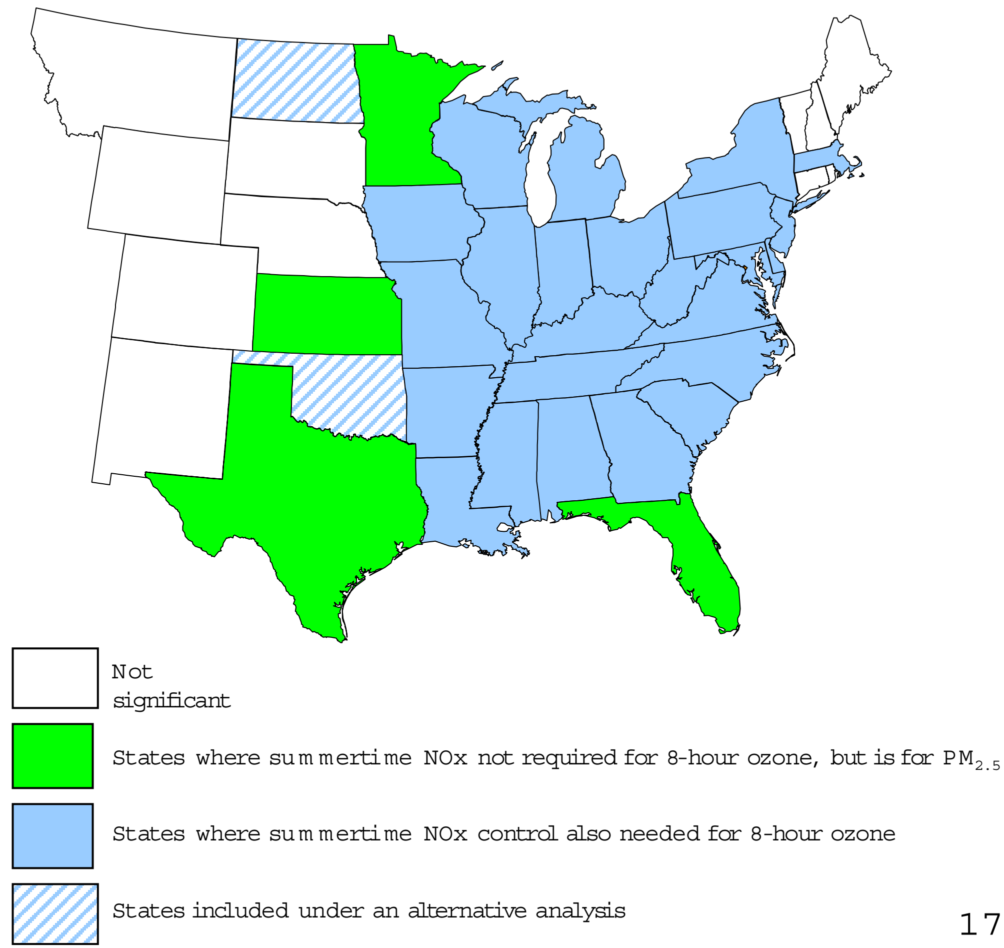
- **Step 2** – Updated analysis of NOx control costs for EGUs during the ozone season. EPA found emissions levels (caps in the proposal) corresponding to average cost effectiveness of up to $1,500/ton, and marginal cost effectiveness of up to $2,600/ton, are highly cost effective.

Significant Contribution to $PM_{2.5}$ Nonattainment

- **Step 1** – Air quality assessment to identify upwind States that contribute significantly (before considering cost) to downwind nonattainment using an EPA-proposed threshold of 0.15 µg/m³, i.e., 1% of annual NAAQS. EPA's analysis indicates 28 states plus D.C. exceed the threshold in 2010.

- **Step 2** – Analysis of SO_2 and NOx control costs for EGUs.
  - SO_2: EPA found that reductions achieved for an average cost of $800 per ton or less, or a marginal cost of $1,000 per ton or less, are highly cost effective.
  - NOx: EPA found that that additional reductions achieved by vast majority of States running ozone-season pollution controls year-round are on average $700 per ton or less. Remaining states have average cost of annual controls of $800 per ton or less, and marginal costs of $1,500 per ton or less. EPA believes these are highly cost effective.

$PM_{2.5}$: Annual SO_2 and NOx reduction requirements for 28 states

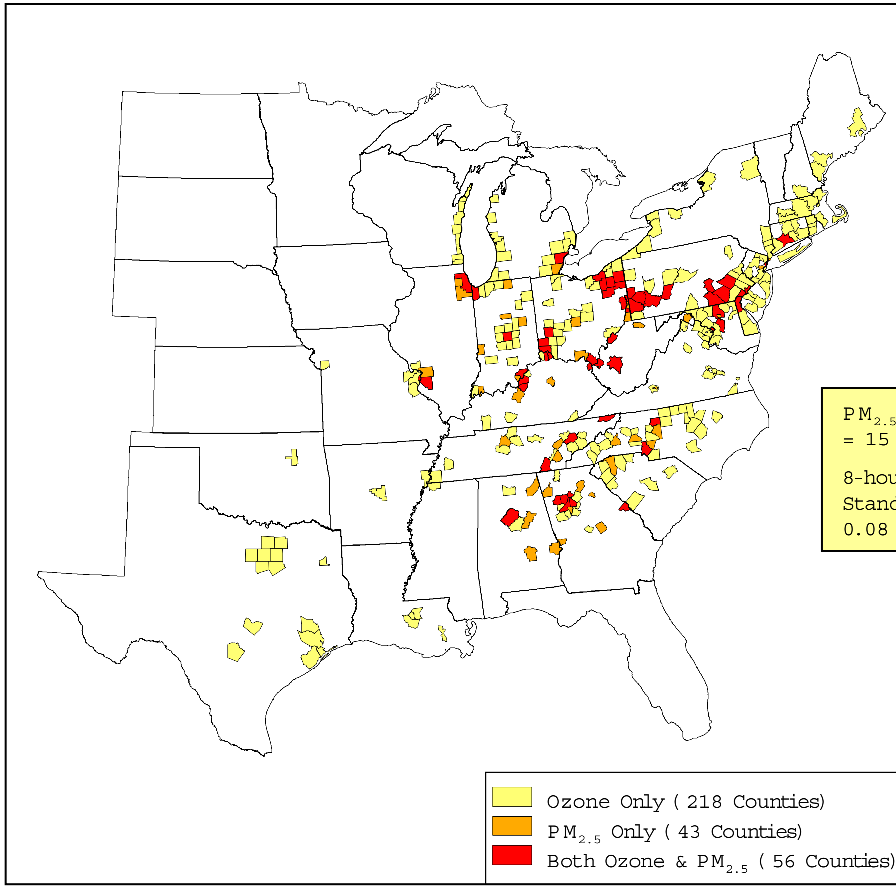


IAQR Delivers Environmental and Public Health Benefits at Reasonable Cost

- Reduced $PM_{2.5}$ and ozone exposures would begin immediately and result in $82.4 billion in annual public health benefits in 2015, including:
  - 13,000 avoided premature deaths;
  - 6,900 fewer cases of chronic bronchitis;
  - 18,000 fewer non-fatal heart attacks;
  - 240,000 fewer asthma exacerbations;
  - 9.3 million fewer days with respiratory illnesses and symptoms;
  - 22,500 fewer hospitalizations and emergency room visits; and
  - 1.7 million fewer absences from work and school.
- 28 additional counties would attain the annual $PM_{2.5}$ standard and 8 additional counties would attain the 8-hour ozone standard in 2015.
- In 2015, annual visibility benefits would be $1.4 billion for improvements in Southeastern national parks and forests.
- Reductions in sulfur and nitrogen deposition would improve the quality of lakes, streams, and estuaries.
- Additional human health & environmental benefits would result, but cannot be monetized (e.g., co-benefits of mercury reductions).
- **Benefits far exceed costs**
  - More than $22 benefits for every dollar of costs
  - Annual costs by 2015 are $3.7 billion

Ozone and Particle Pollution: The IAQR, Together with Other Clean Air Programs, Will Bring Cleaner Air to Areas in the East

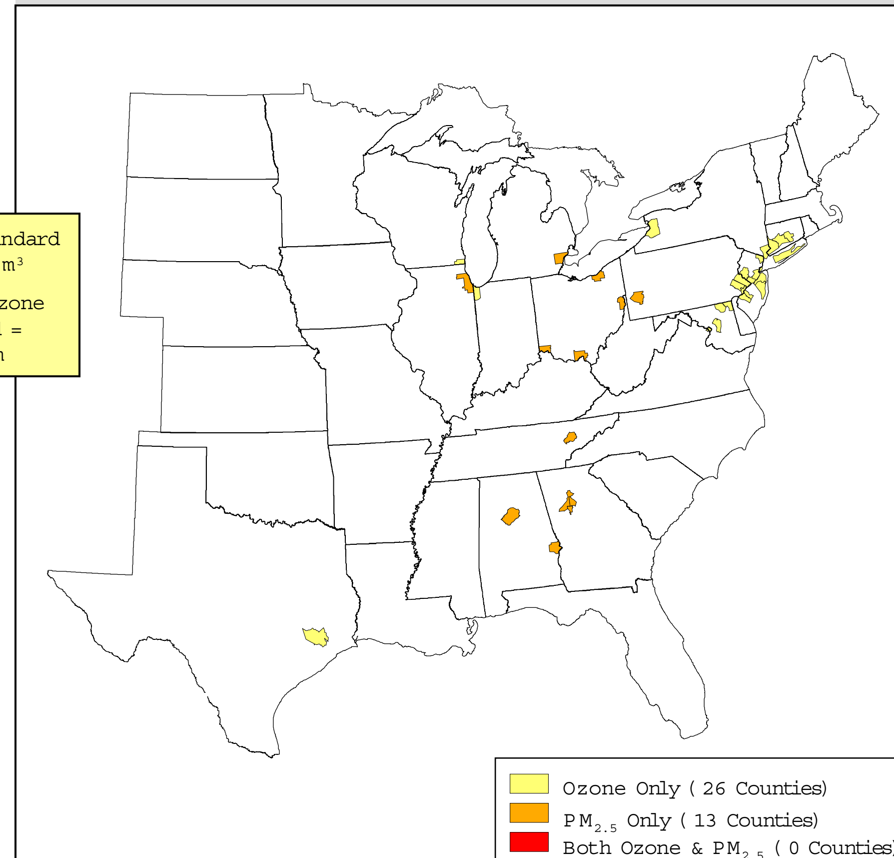
317 Eastern Counties Exceeding Standards in 2002



$PM_{2.5}$ standard = 15 µg/m^3

8-hour Ozone Standard = 0.08 ppm

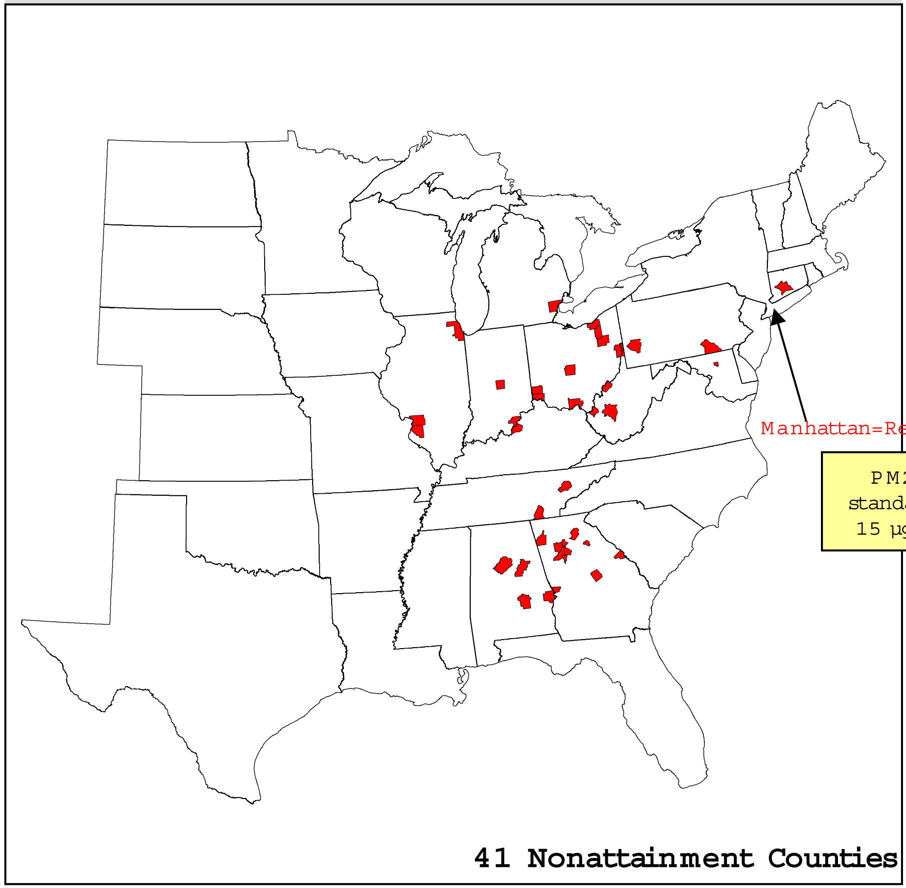
39 Remaining Eastern Counties Likely to Exceed Standards with Interstate Air Quality Rule in 2015



Notes: Based on 2000-2002 data of counties with monitors that have three years of complete data. The IAQR is not expected to bring additional counties into attainment in the West by 2015. Therefore, the western region is not presented here.

IAQR Brings 28 More Areas into Attainment with the $PM_{2.5}$ Standard by 2015 and Remaining Areas Closer to Attainment

Remaining Counties Likely to Exceed the Annual Fine Particle Standard under the Base Case* in 2015



PM2.5 standard = 15 µg/m³

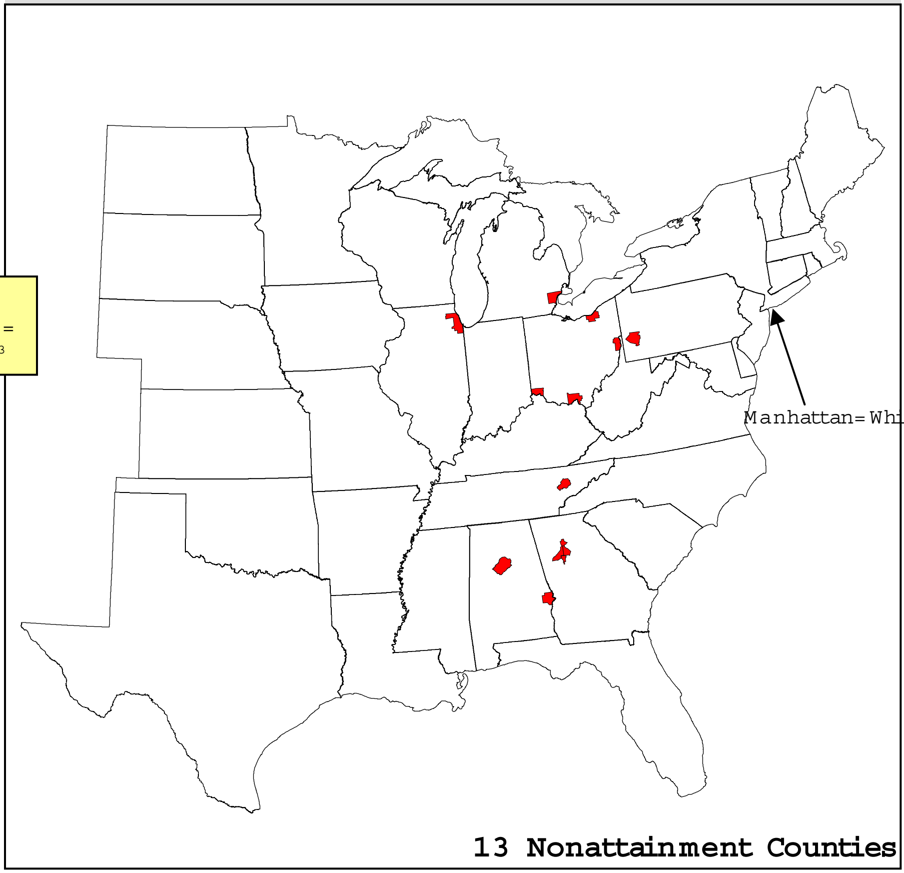
$PM_{2.5}$ attainment status in 2015 base case:

- Existing programs will bring 58 eastern counties into attainment with the fine particle standard (compared to current conditions).

$PM_{2.5}$ attainment status in 2015 IAQR proposal:

- The IAQR proposal would bring 28 additional eastern counties into attainment with the fine particle standard (as compared to the Base Case*).

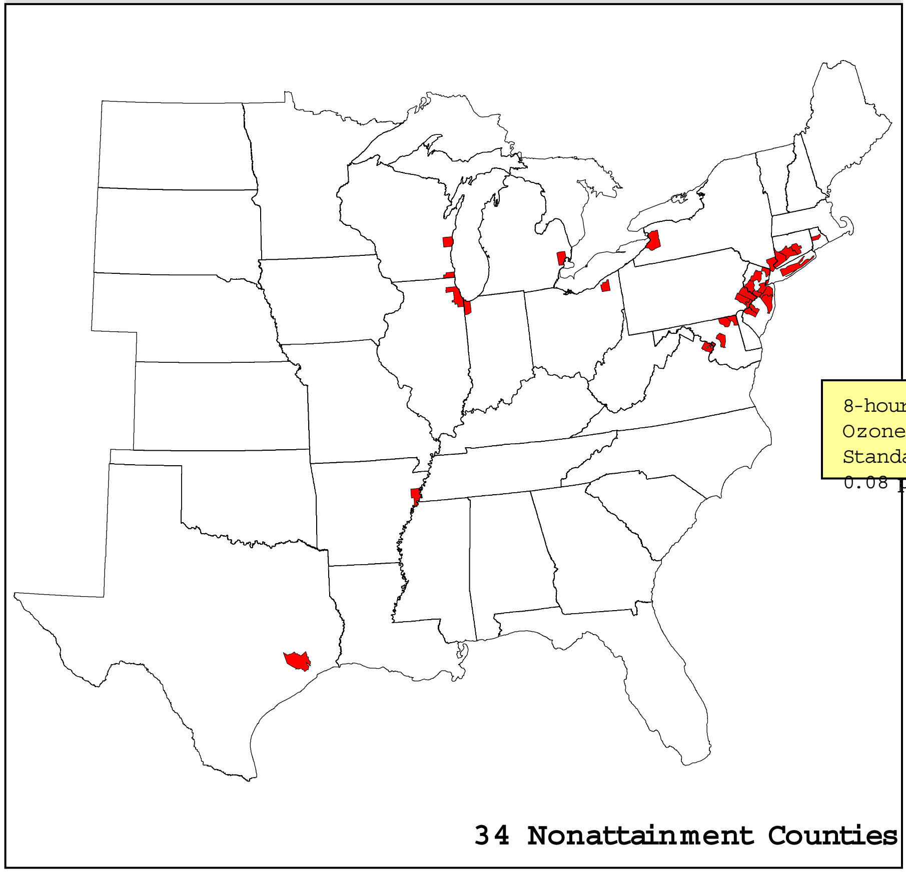
Remaining Counties Likely to Exceed the Annual Fine Particle Standard with IAQR in 2015



Notes: Based on 1999-2001 and 2000-2002 data of counties with monitors that have three years of complete data. The IAQR is not expected to bring additional counties into attainment for 2015 in the West. Therefore, the western region is not presented here. "Base case" assumes implementation of existing Clean Air Act programs and proposed nonroad diesel rule.

IAQR Brings 8 More Areas into Attainment with the 8-hour Ozone Standard by 2015 and Remaining Areas Closer to Attainment

Remaining Counties Likely to Exceed the 8-hour Ozone Standard under Base Case in 2015



8-hour Ozone Standard = 0.08 ppm

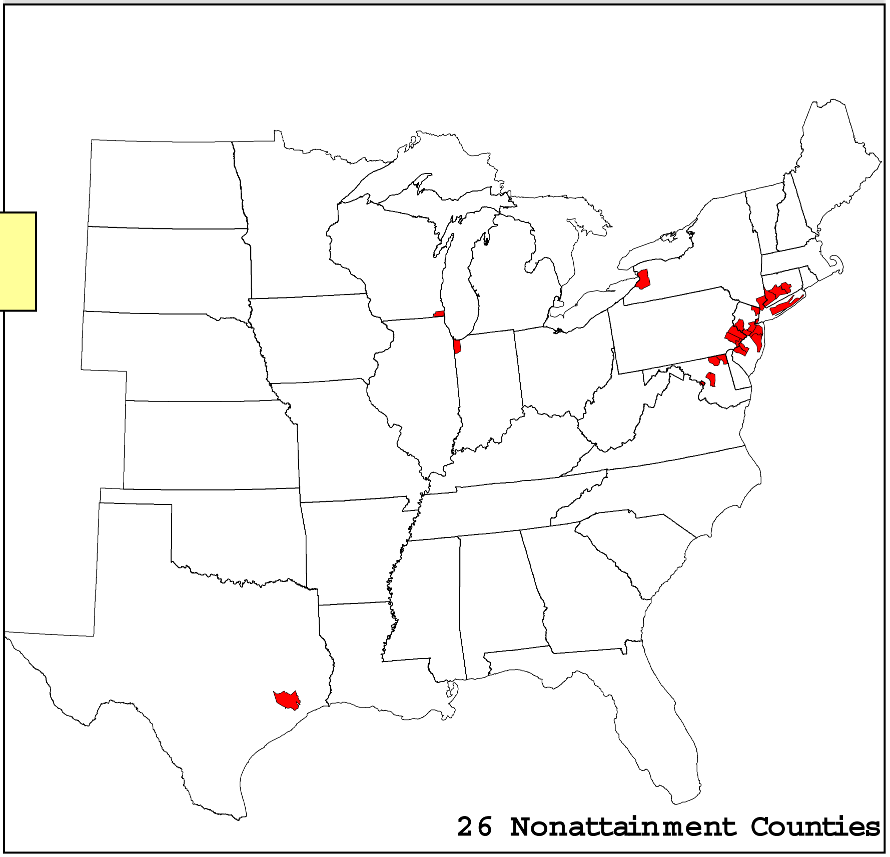
Ozone attainment status in 2015 base case:

- Existing programs (primarily the NOx SIP Call and vehicle rules) will bring 240 additional eastern counties into attainment with the 8-hour ozone standard (compared to current conditions).

Ozone attainment status in 2015 IAQR proposal case:

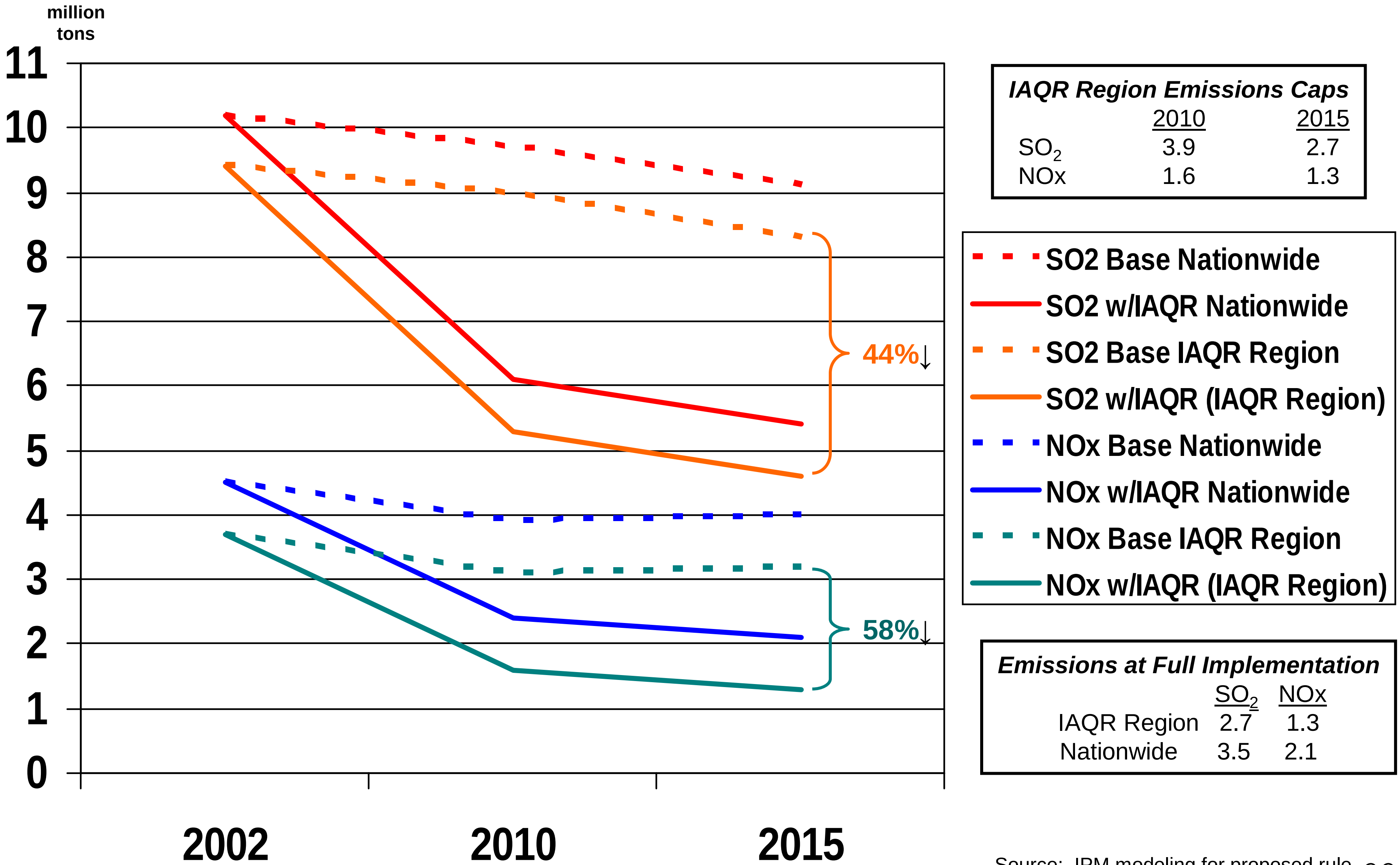
- The NOx SIP Call will bring many Eastern counties into attainment with the 8-hour ozone standard.
- With IAQR proposal, as compared to the Base Case, the number of counties out of attainment with the 8-hour ozone standard decreases from 34 to 26.

Remaining Counties Likely to Exceed the 8-hour Ozone Standard with IAQR in 2015



Notes: Based on 1999-2001 and 2000-2002 data of counties with monitors that have three years of complete data. The IAQR is not expected to bring additional counties into attainment for 2015 in the West. Therefore, the western region is not presented here. "Base case" assumes implementation of existing Clean Air Act programs and proposed nonroad diesel rule.

Summary of EGU Emissions Estimates



IAQR Region Emissions Caps

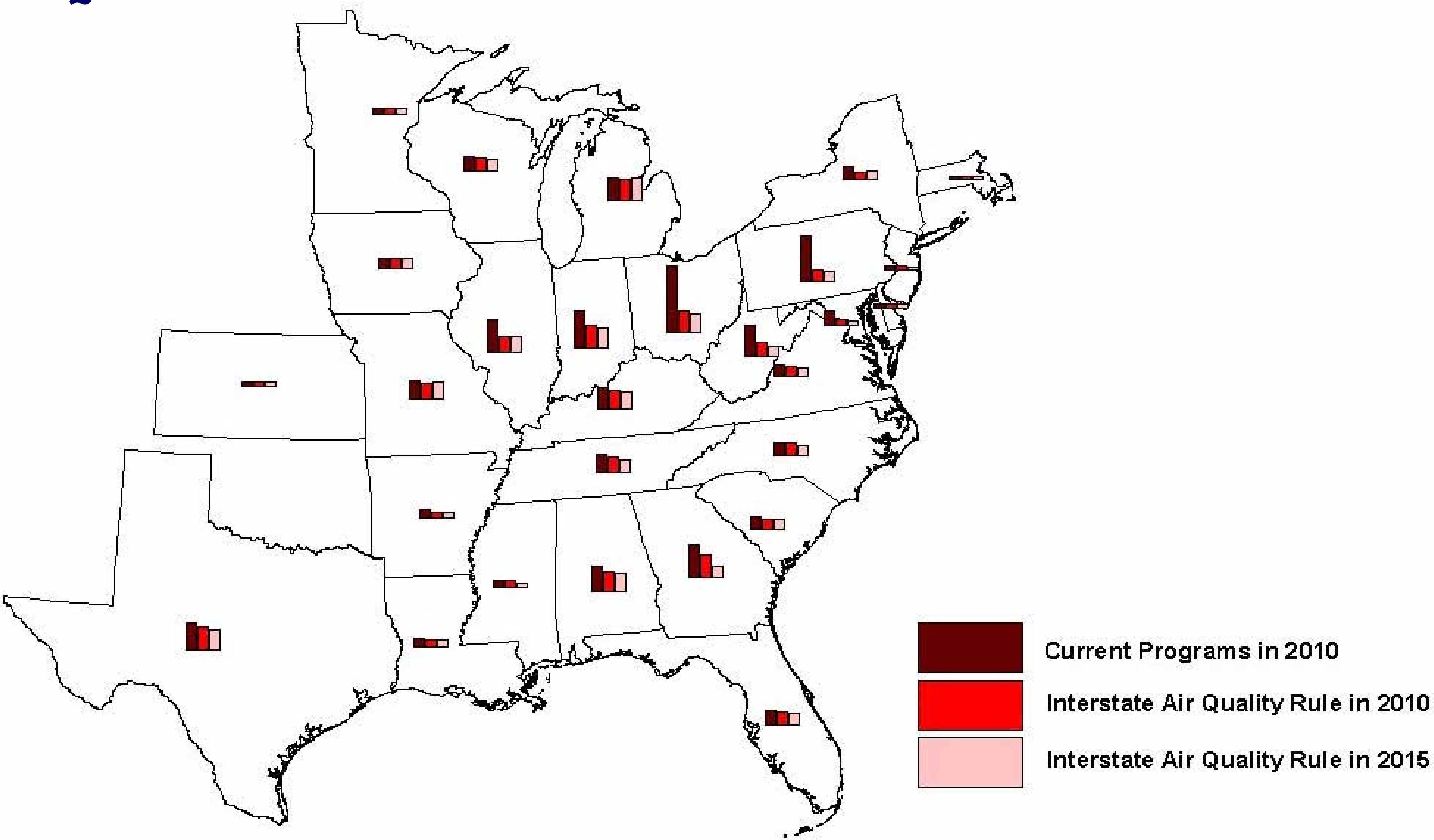
	2010	2015
SO_2	3.9	2.7
NOx	1.6	1.3

Emissions at Full Implementation

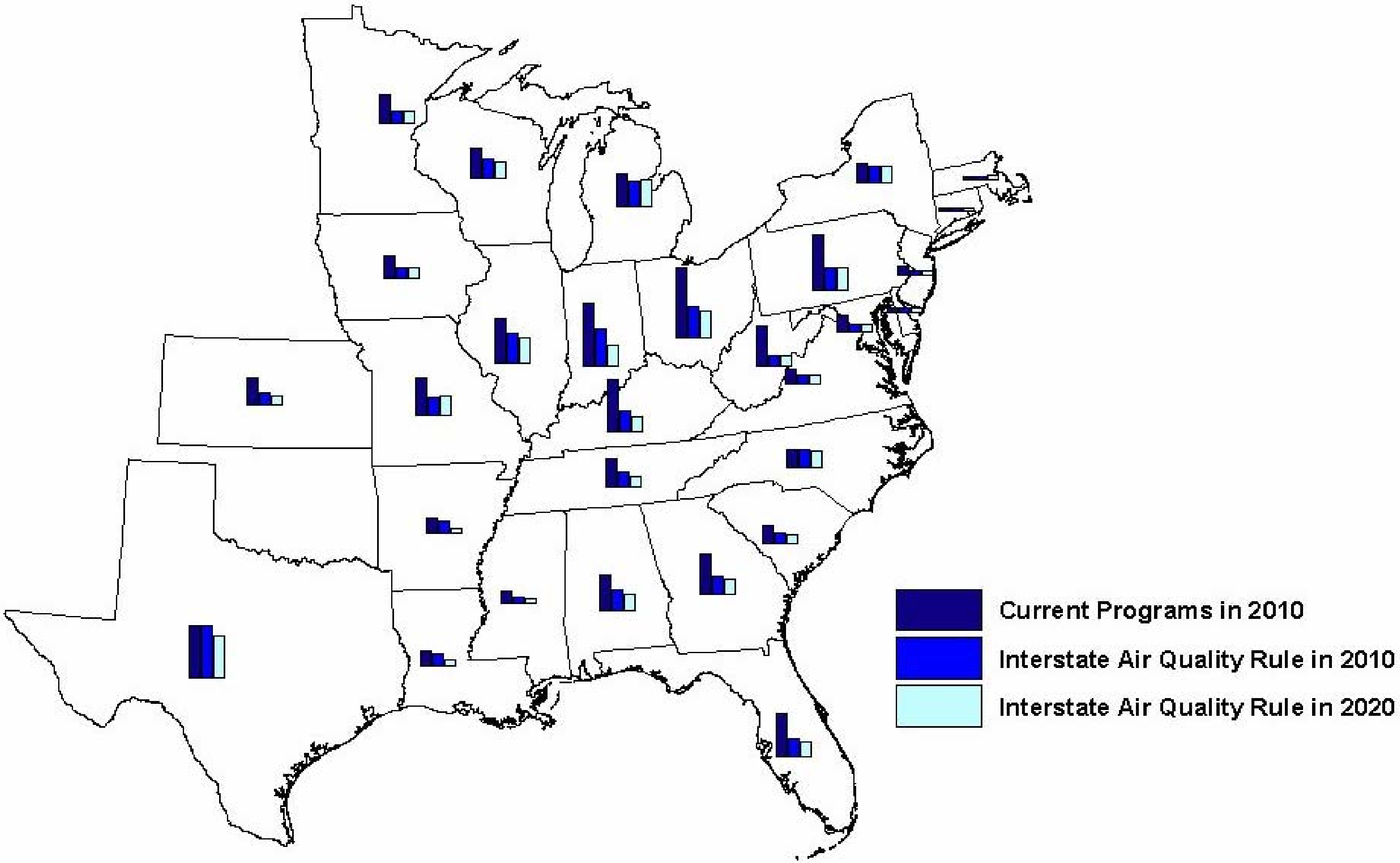
	SO_2	NOx
IAQR Region	2.7	1.3
Nationwide	3.5	2.1

Source: IPM modeling for proposed rule.

Projected Annual SO_2 Emissions for EGUs Under the IAQR



Projected Annual NOx Emissions for EGUs Under the IAQR



Reductions in Acid Deposition Will Reduce the Number of Acidic Lakes

- Significant regional reductions in sulfur and nitrogen deposition are projected to benefit lakes and streams in the eastern U.S. Reductions in nitrogen deposition will also benefit sensitive coastal ecosystems

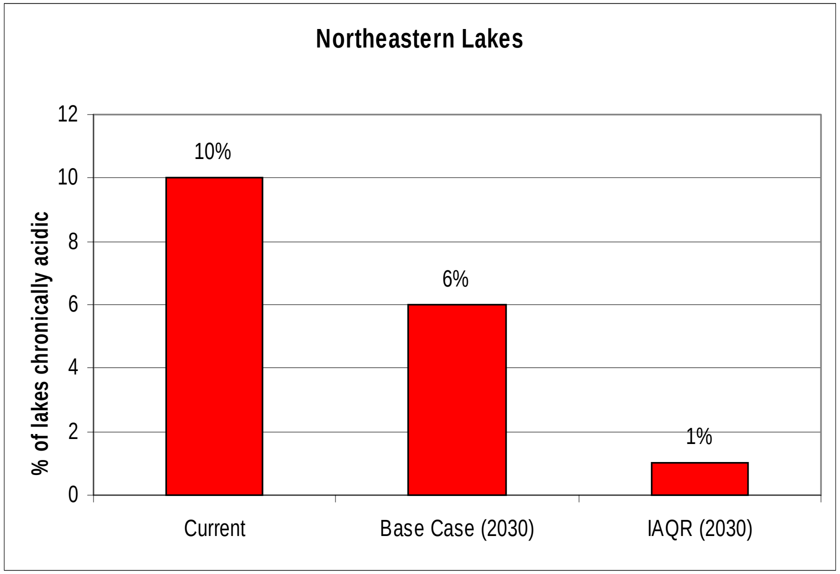
Northeast Region

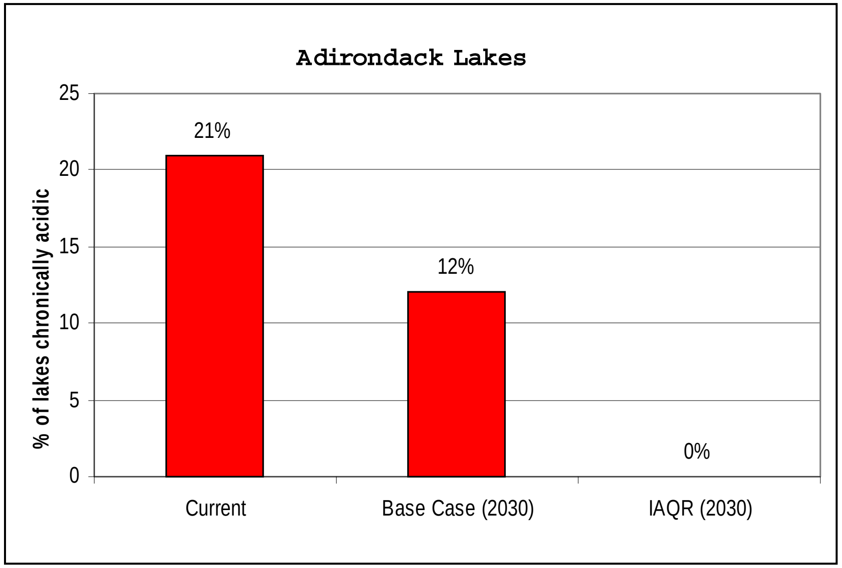
- Chronic acidity would be dramatically reduced by 2030 (only 1% of lakes remain acidic).*

Adirondack Mountains

- Eliminates chronic acidity from lakes in the Adirondacks*

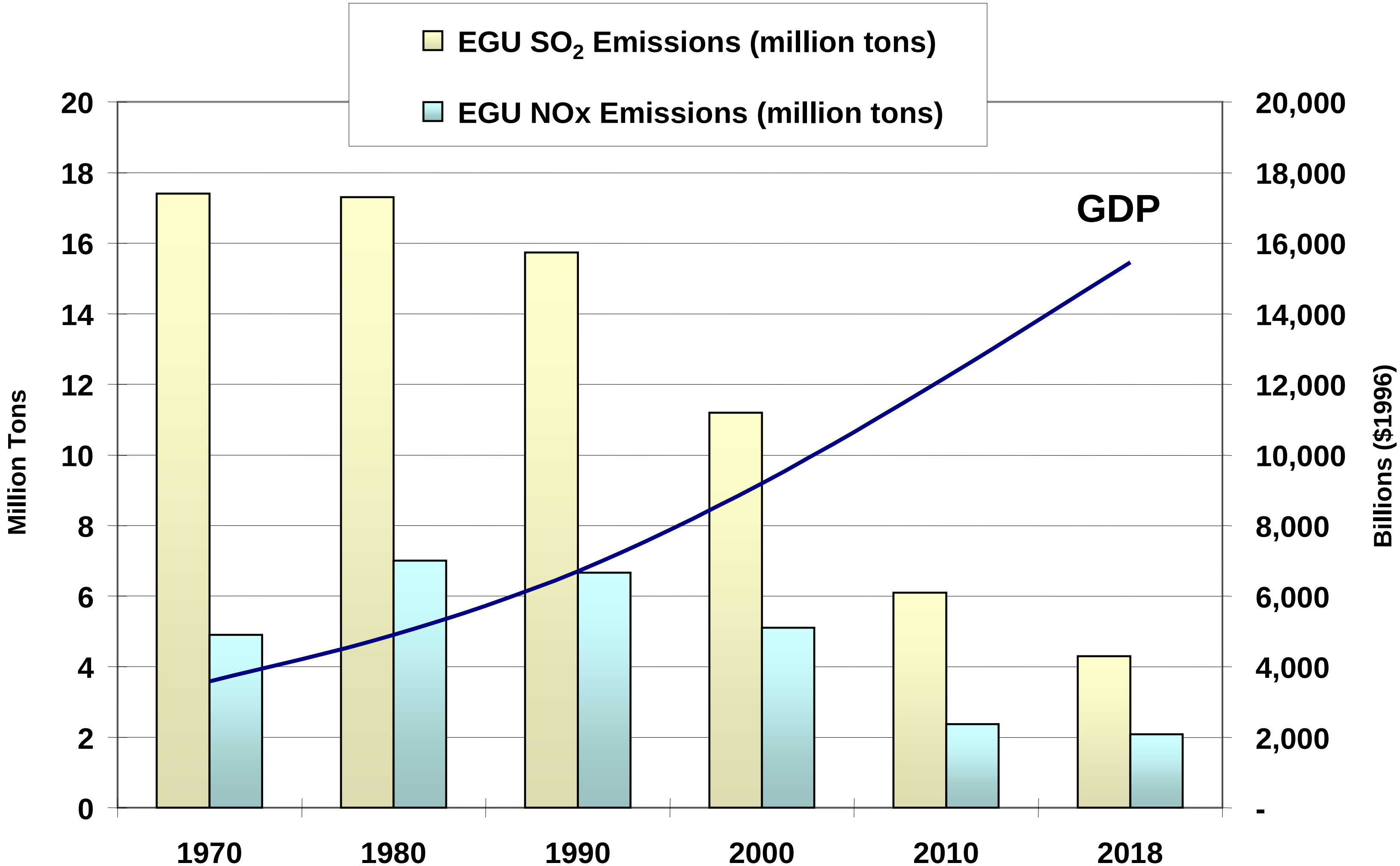
Southeast Region





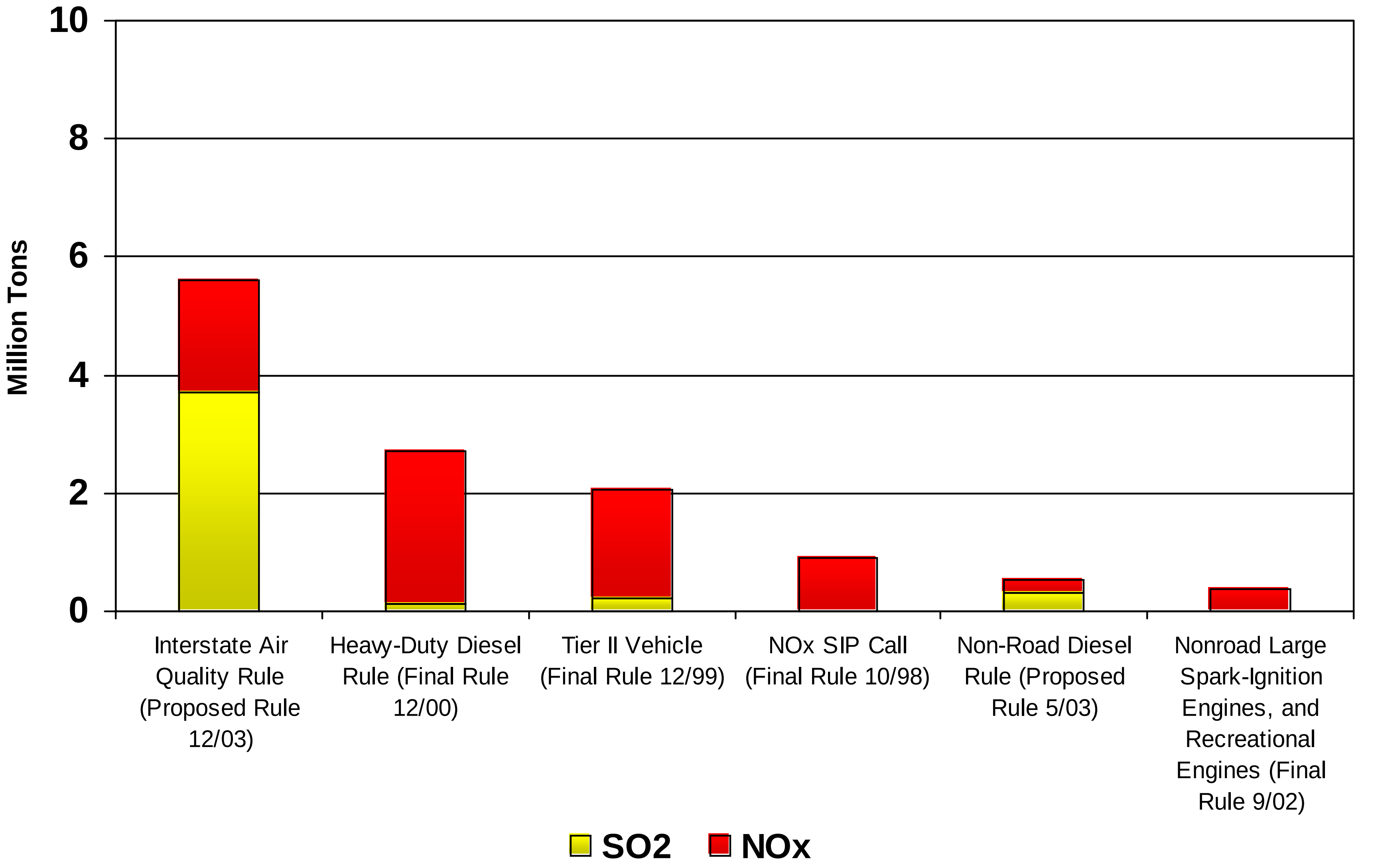
***Note**: This may be an overestimate of recovery under existing programs due to the fact that this modeling focuses only on sulfur deposition. In addition, some lakes would still become acidic periodically due to seasonal or storm events.

Economic Growth & Environmental Improvement

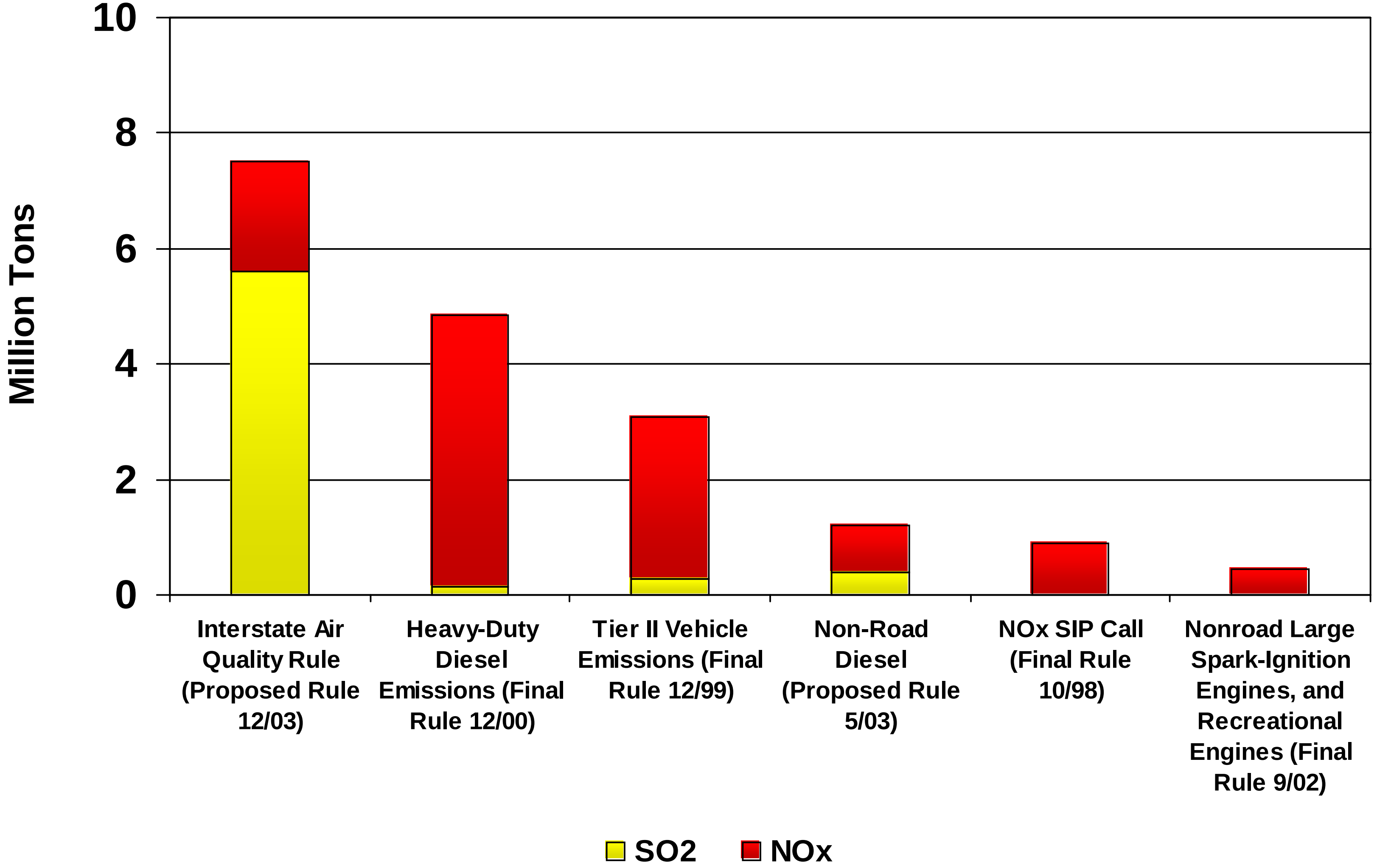


Sources: 1970 - 1999 emissions data are from the National Air Pollutant Emissions Trend Report (EPA, March 2000). Projections for SO_2, NOx and mercury are derived from the Integrated Planning Model (IPM). GDP data for 1970 - 2000 is from the Bureau of Economic Analysis, U.S. Department of Commerce. The GDP projection for 2010 is from OMB's Analytical Perspectives Report for 2003, Table 2-1. The 2010 to 2020 projection follows EIA's assumptions in AEO 2001 of 3% growth per year.

Interstate Air Quality Rule and Other Major Air Pollution Rules Since 1990: Annual Emission Reductions in 2015



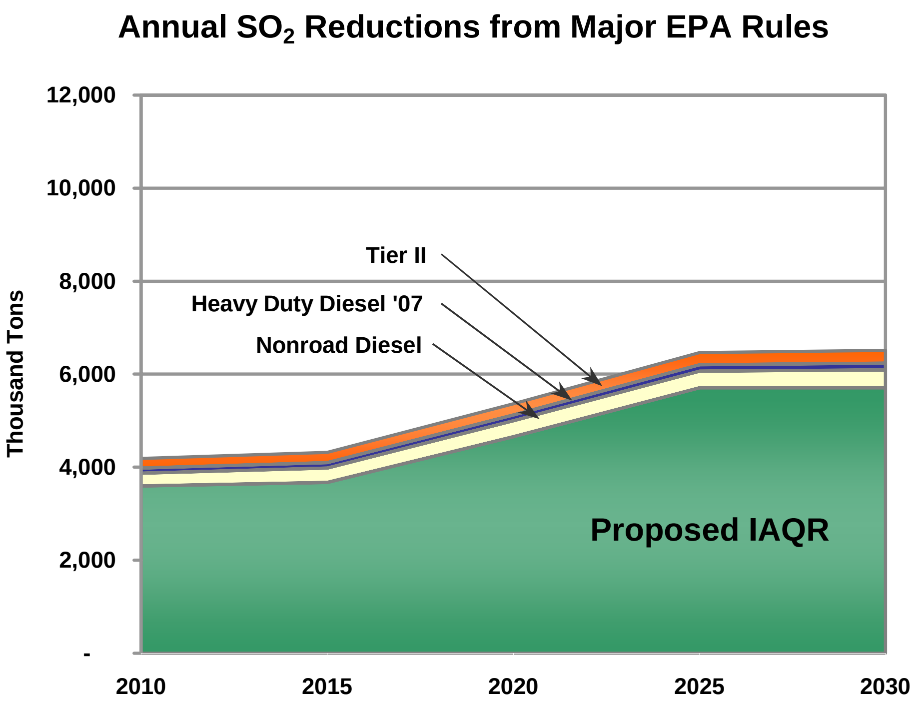
Interstate Air Quality Rule and Other Major Air Pollution Rules Since 1990: Annual Emission Reductions at Full Implementation

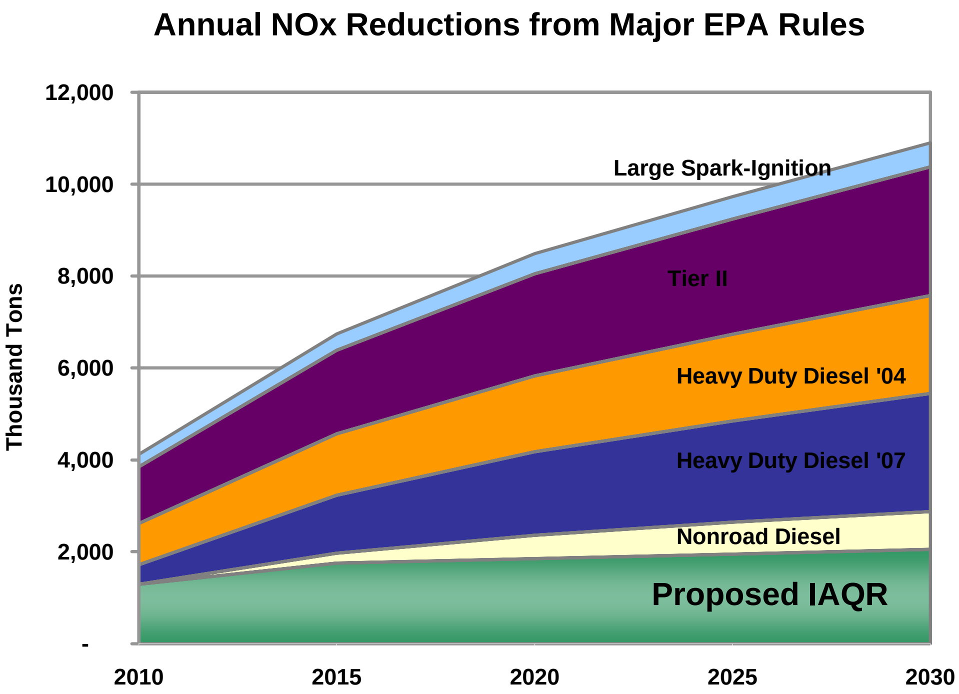


Full implementation for mobile source rules is 2030. Full implementation for the IAQR is between 2020 and 2025.

Projected Emission Reductions of SO_2 and NO_x for the Proposed IAQR and Recent Mobile Source Rules

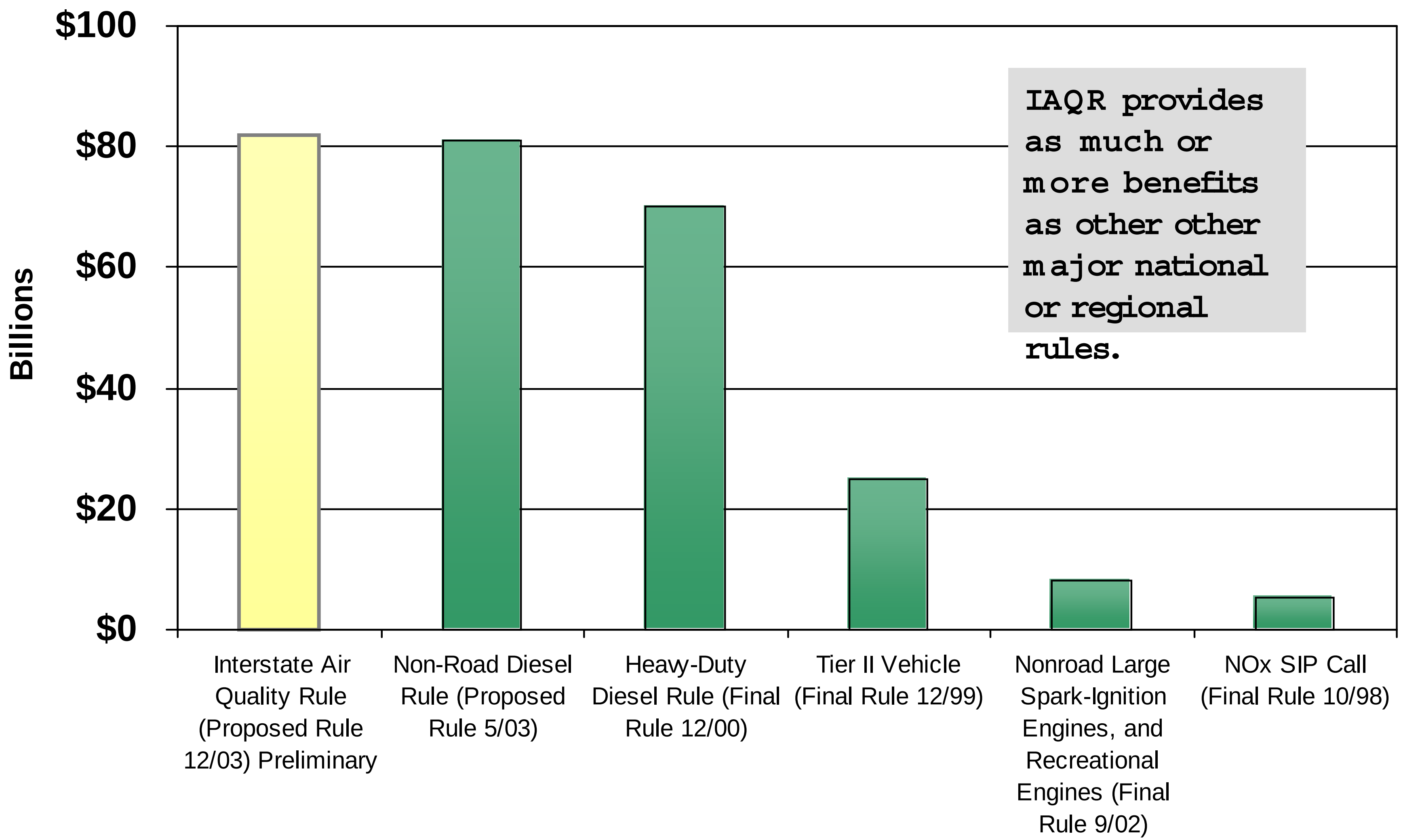
IAQR provides substantial SO_2 and NO_x reductions compared to other major national rul





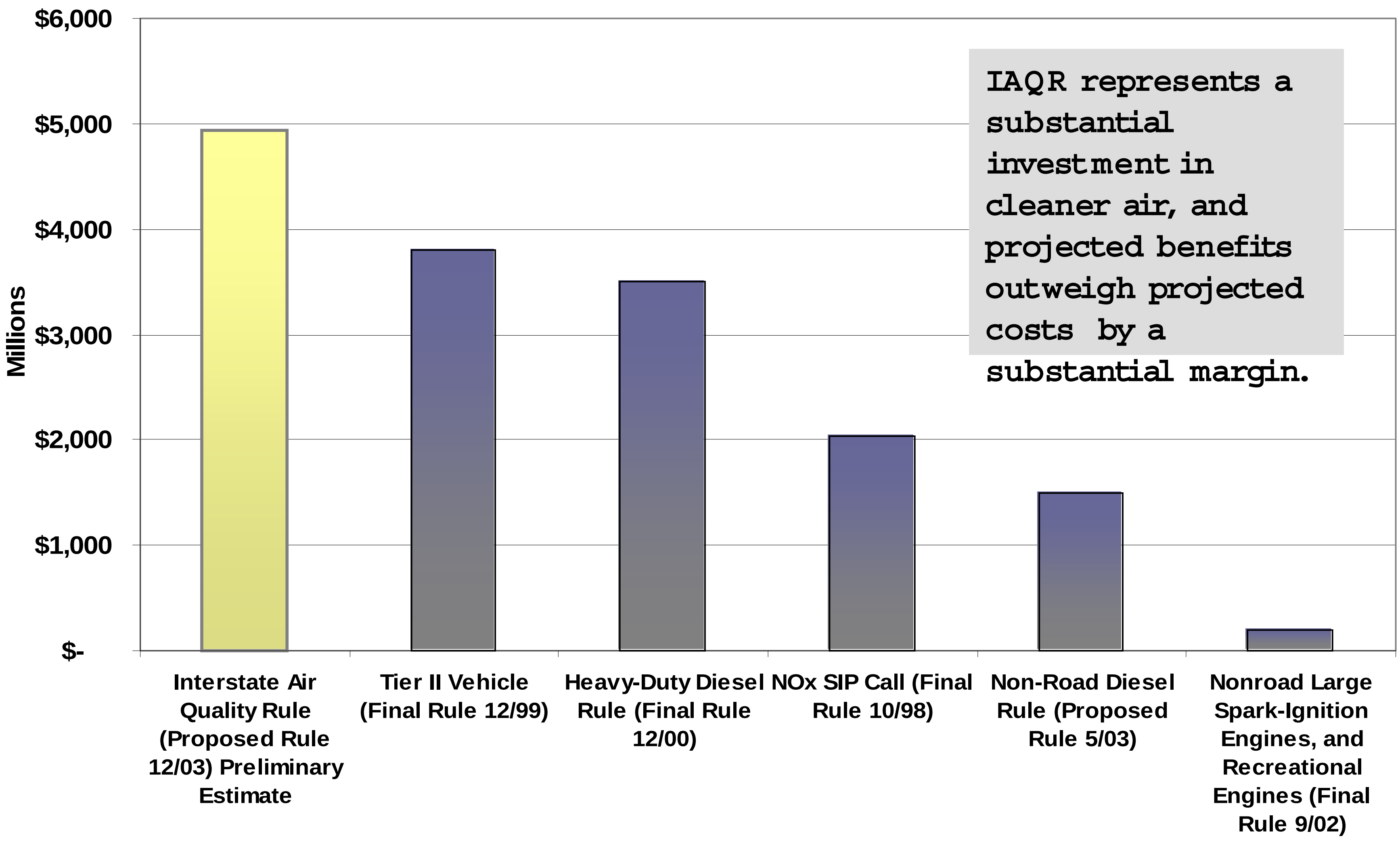
Note: Mobile source rules also result in reductions of VOCs and PM. The IAQR also lowers mercury emissions. Projections for the proposed IAQR are from the Integrated Planning Model. Projections for mobile source rules are from either the MOBILE, NONROAD, MOVES, Fuels, or CALINE models. Notably, the Title IV and NOx SIP call programs have also lead to significant power sector emissions reductions for SO_2 and NOx.

Interstate Air Quality Rule and Other Major Air Pollution Rules Since 1990: Annual Benefits at Full Implementation



Notes: NOx SIP Call benefits are inflated from 1990 dollars and represent the higher range of projected final rule benefits.
Full implementation for mobile source rules is 2030. Full implementation for the IAQR is between 2020 and 2025.

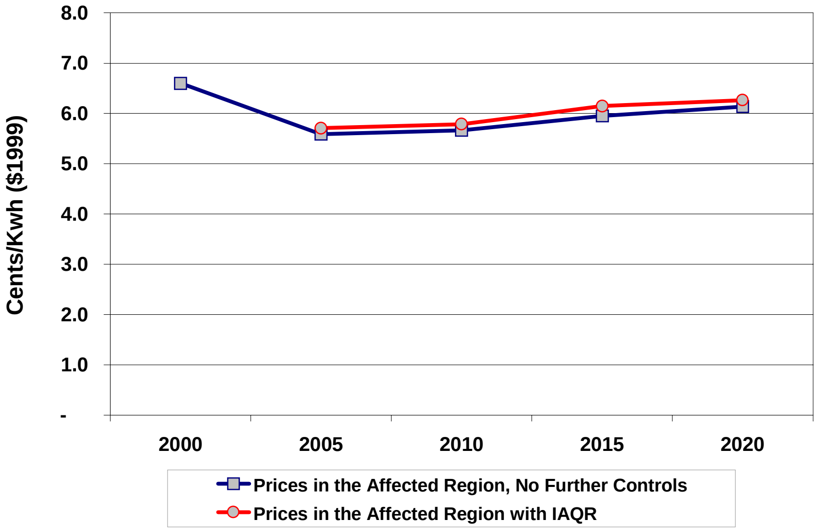
Interstate Air Quality Rule and Other Major Air Pollution Rules Since 1990: Annual Costs at Full Implementation



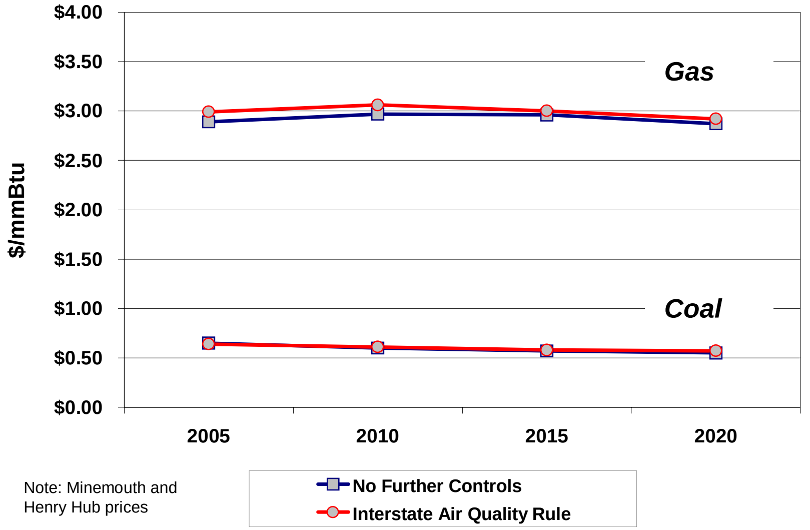
Notes: Annual Costs are EPA projections. NOx SIP Call costs were inflated from 1990 dollars. Full implementation for mobile source rules is 2030. Full implementation for the IAQR is between 2020 and 2025.

Other Projected Impacts

Regional Retail Electricity Prices



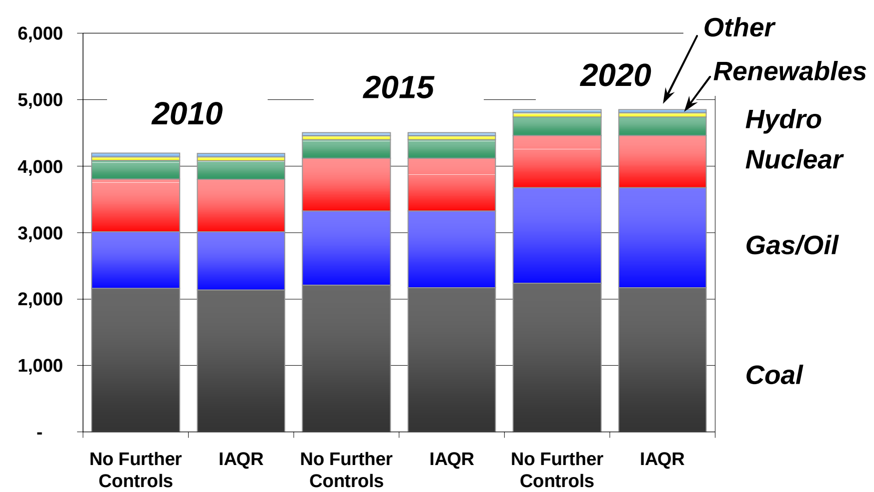
Natural Gas & Coal Prices



Coal Production for Electricity Generation (million tons)

	2000	IAQR 2010	IAQR 2015
Appalachia	299	312	313
Interior	131	198	203
West	475	505	516
National	905	1,015	1,031

Generation Mix

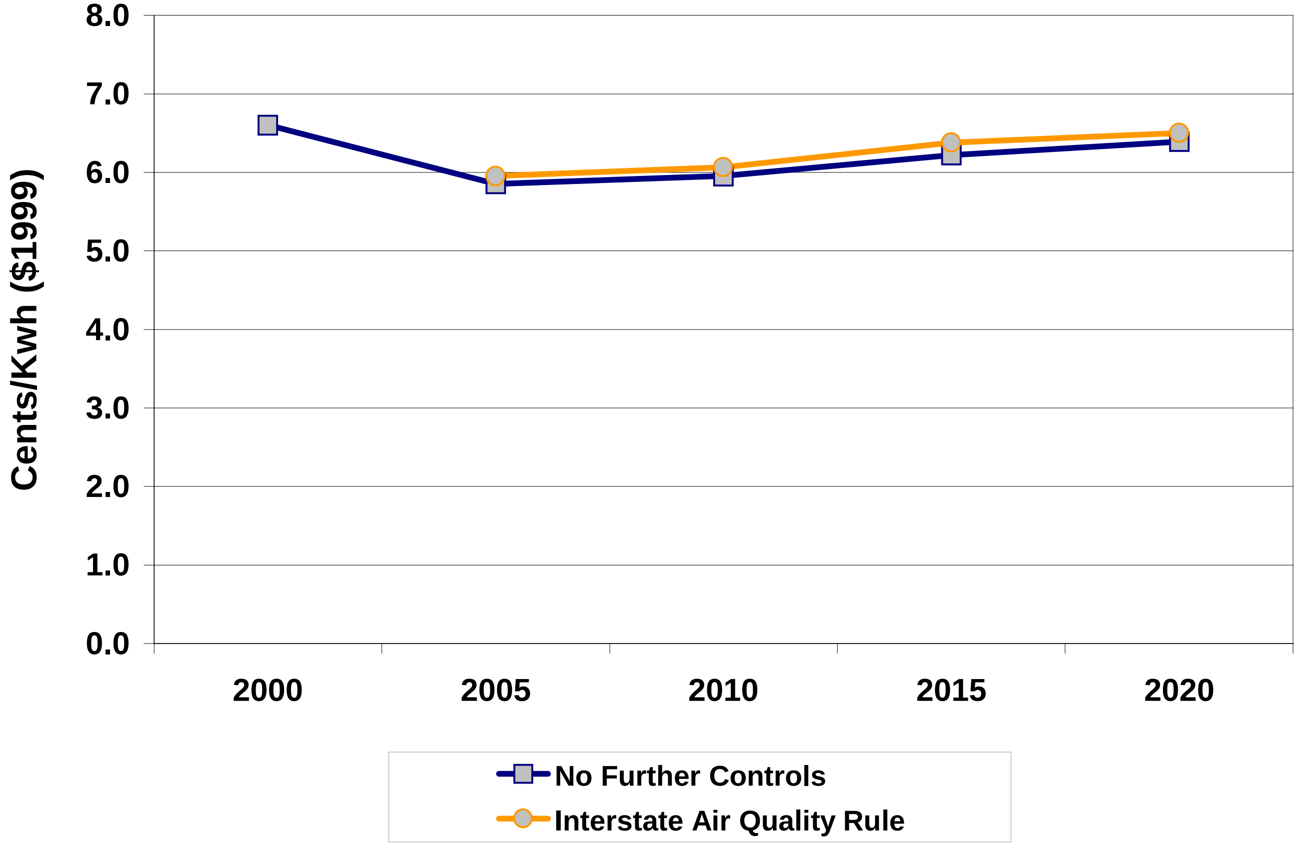


Note: Retail prices from 2000 are from AEO2003. All other data is from EPA's Integrated Planning Model.

Projected National Electricity Prices

Retail electricity prices are expected to gradually decline from today's levels but then rise over time, both with and without the Interstate Air Quality Rule

- The Interstate Air Quality Rule has a small impact on national electricity prices



Note: Retail prices from 2000 are from AEO2003 and represent national prices. Prices for the period 2005 and after were calculated using the Retail Electricity Price Model.