Industrial Energy and the Environment: A Clean Air Future

Council of Industrial Boiler Owners (CIBO)

33rd Annual Meeting

Fort Lauderdale, Florida

October 13, 2011

Overview of Topics

- Update on Industrial Boiler MACT, Area Source Boilers, and CISWI
- Update on the Mercury and Air Toxics Standards (MATS)
- Update on the Cross-State Air Pollution Rule (CSAPR)
- Update on the New Source Performance Standards for Greenhouse Gases for EGUs

Industrial Boiler MACT, Area Sources & CISWI

Background on the Reconsideration

- **February 21, 2011:** EPA issued final rules
  - Boiler Major Source Rule
  - Boiler Area Source Rule
  - Commercial and Industrial Solid Waste Incineration (CISWI) Rule
- Concurrently, EPA initiated a reconsideration process affecting all three rules:
  - Address technical issues that arose from public comments
  - Give the public ample opportunity to comment on changes in the final rule that were not in the proposal
- **May 16, 2011:** EPA announced a stay of the Boiler major source and CISWI rules
- **June 24, 2011:** as part of a filing with the U.S. Court of Appeals for the D.C. Circuit, EPA set a schedule for issuing the reconsideration proposals by **October 31, 2011**, and the final rules by **April 30, 2012**

Background on Petitions and Data Submissions

- During the reconsideration process, we received over 50 petitions for reconsideration from industries and industry groups, industrial energy efficiency groups, the state of Washington, and Sierra Club
  - Boiler major source rule: 29 petitions
  - Boiler area source rule: 10 petitions
  - CISWI rule: 17 petitions
- As of **July 15, 2011**, industry provided additional data for our analysis and consideration
  - **Boiler Major Source Rule:**
    - Data on 150 emission tests from 108 units; including at least 8 tests each for mercury, particulate matter (PM), dioxins, carbon monoxide (CO), hydrogen chloride (HCl), and total selected metals (TSM)
    - CO continuous emission monitoring system (CEMS) readings (51,000 hourly readings from 3 units)
    - Data on mercury, chlorine, and metals fuel analyses from 2 facilities and a metals analysis from 1 facility
  - **CISWI Rule:**
    - Approximately 20 data submissions, with majority pertaining to energy recovery units (ERUs)
    - Portland Cement Association (PCA) requested that EPA remove unit and associated information from database

Reconsideration Issues Identified by EPA

- **Boiler Major Source Rule**
  - Revision of dioxin emission limits or replacement with work practice standards
  - Revisions to subcategories
  - Work practice standards for boilers that use clean gases other than natural gas
  - Work practice standards for limited-use boiler subcategory
  - Changes to CO compliance demonstration requirements
- **Boiler Area Source Rule**
  - GACT instead of MACT standards for biomass and oil-fired boilers
  - Applicability of Title V permitting requirements
- **CISWI Rule**
  - Emission limits for ERUs
  - Flexibility in fuel switching
  - Revision of definition of cyclonic burn barrels

Additional Issues Raised by Industry

- **Boiler Major Source Rule**
  - TSM emission limit as an alternative to PM emission limit
  - Removal of PM CEMS requirement for some types of units
  - Creation of additional subcategories (e.g., new category for non-drying suspension burners; separate subcategories for light and heavy liquid fuel units)
  - Separate PM emission limits for each subcategory
  - CEMS-based emission limits for CO as an alternative
- **Boiler Area Source Rule**
  - Compliance period for tune-ups
  - Subcategory for seasonal boilers
- **CISWI Rule**
  - Subcategorization of ERUs
  - Revision of CO monitoring requirements during startup and shutdown periods
  - Affirmative defense provisions
  - Restoration of “contained gaseous material” definition
  - Applicability to foundry sand thermal reclamation units and chemical recovery units

Steam Electric Generating Units (EGUs)

EPA Rules Affecting the Power Sector

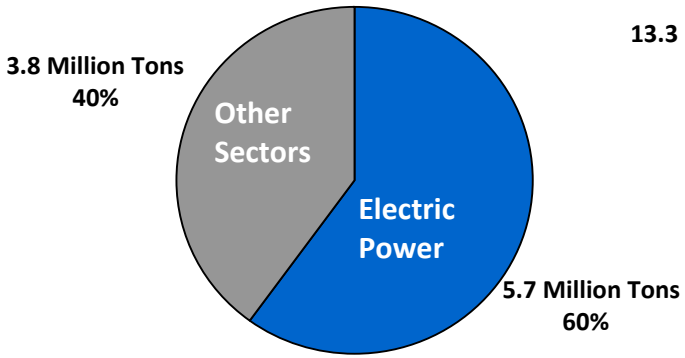
- **Tailoring Rule**
  - Beginning in 2011, power plant projects that will increase greenhouse gas (GHG) emissions substantially will require an air permit
  - Finalized in May 2010
- **Solid waste regulations for EGU coal ash** (coal combustion residuals)
  - Proposed in June 2010; final rule date is uncertain
- **Cross-State Air Pollution Rule (CSAPR) (Clean Air Interstate Rule (CAIR) Remand Response)**
  - Will reduce SO_2 and NO_X emissions from existing power plants in 28 states
  - Proposed July 6, 2010
  - Finalized July 6, 2011 **(new proposal released on October 7, 2011)**
- **Mercury and Air Toxics Standards (MATS) for coal- and oil-fired electric utility steam generating units (EGUs)**
  - Will regulate Hg, acid gases and non-Hg toxic metals emissions from new and existing EGUs
  - Proposed in March 2011
  - Expected to be finalized in November 2011
- **New Source Performance Standards (NSPS) for coal- and oil-fired electric utility steam generating units (EGUs)**
  - Will regulate SO_2, NO_X, and PM emissions from new EGUs
  - Proposed in March 2011
  - Expected to be finalized in November 2011

EPA Rules Affecting the Power Sector (cont.)

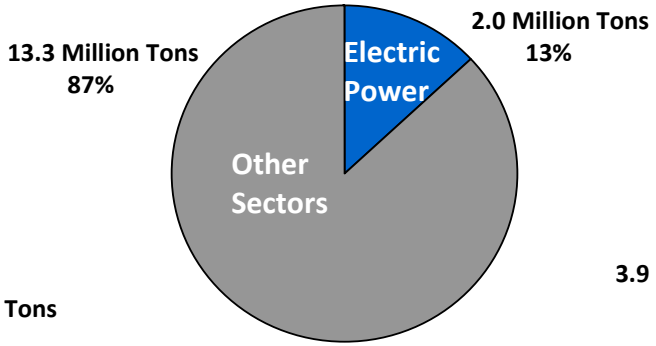
- **316(b) Cooling Water Intake Structures**
  - Under a settlement agreement, proposed rule was issued on April 20, 2011
  - Final rule expected in July 2012
- **New Source Performance Standards (NSPS) for Greenhouse Gases from Fossil Fuel-Fired Power Plants**
  - Anticipated proposal by September 30, 2011 **(Now Delayed)**
  - Anticipated final rule by May 26, 2012
- **Effluent Guidelines** for steam electric power generating (wastewater, ash handling, wastewater treatment, surface impoundment and landfill operations, etc.)
  - Consent decree requires proposal in July 2012
  - Final action in January 2014

Power Sector:
A Major Share of U.S. Air Emissions

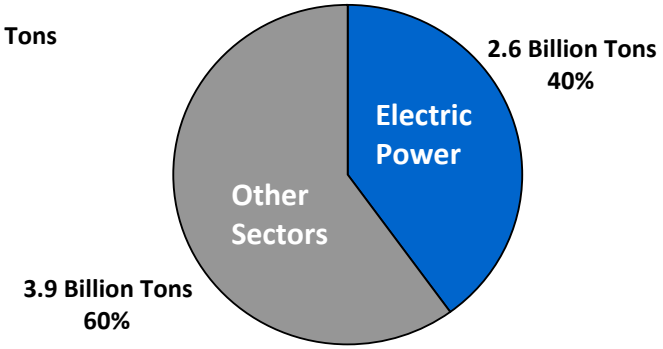
Sulfur Dioxide (SO_2), 2009
9.5 Million Tons



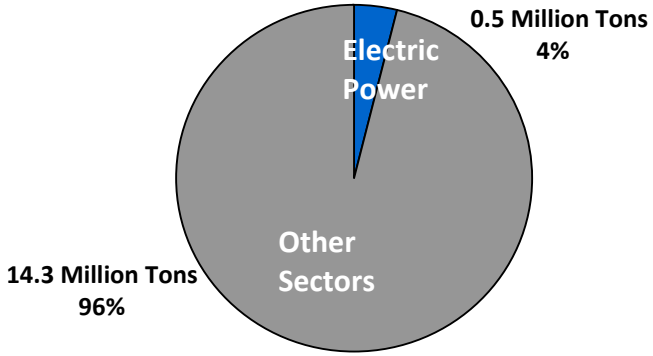
Nitrogen Oxides (NO_x), 2009
15.3 Million Tons



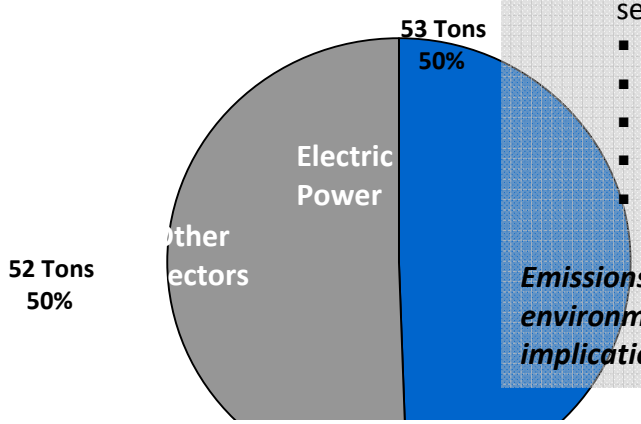
Carbon Dioxide (CO_2), 2008
6.5 Billion Tons



Particulate Matter (PM_{10}), 2008
14.8 Million Tons



Mercury (Hg), 2005
105 Tons



Other emissions include:

- Trace metals (nickel, arsenic, selenium and others)
- HCl, HF
- Dioxin/furans
- Trace organics
- Others (e.g., cyanide)
- Radionuclides

Emissions have substantial public health, environment, and other welfare implications.

Sources:

NEI Trends Data (2009) and CAMD Data & Maps (2010) (SO_2, NO_x)
NEI Trends Data (2009) (PM_{10})
2005 NATA Inventory Modified for the Utility MACT 2005 Base Year (2010) (Hg)
Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008 (2010) (CO_2)
"Other" sources include transportation, other mobile sources, and industrial sources

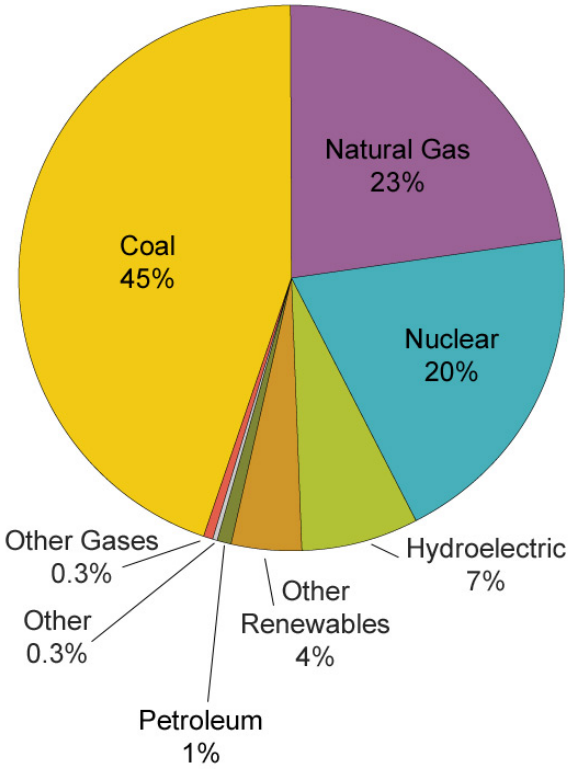
Overview of the MATS Regulatory Action

- On March 16, the Administrator signed the proposed National Emissions Standards for Hazardous Air Pollutants for Coal- and Oil-Fired Utilities, *the first national standards* to reduce emissions of toxic air pollutants from new and existing coal- and oil-fired power plants – often the biggest contributors to air pollution – **Mercury and Air Toxics Standards (MATS)**
- Standards would reduce emissions of:
  - Metals, including mercury (Hg), arsenic (As), chromium (Cr), and nickel (Ni)
  - Acid gases, including hydrogen chloride (HCl) and hydrogen fluoride (HF)
  - Particulate matter
- The standards would also result in additional reductions of SO_2 emissions, which, by reducing ambient SO_2 and particle levels, will prevent thousands of deaths and hundreds of thousands of illnesses each year
- Standards create uniform emissions-control requirements based on proven, currently in-use technologies and processes
- Compliance time line set by Clean Air Act: up to 4 years (3 years plus an additional year if granted by the permitting authority)
- EPA is also proposing a new source performance standard (NSPS) for particulate matter, sulfur dioxide (SO_2), and nitrogen oxide (NO_X) emissions from new sources

Affected Facilities: 1,350 Coal and Oil-Fired Units at 525 Power Plants

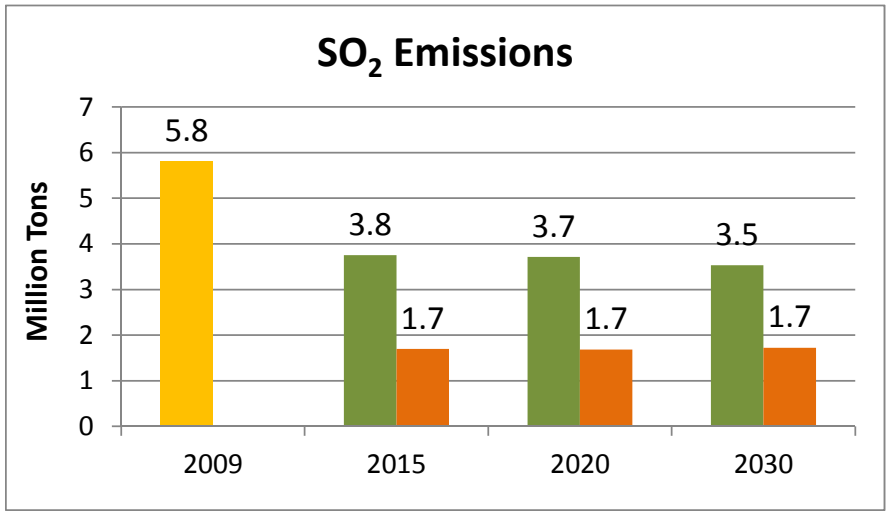
- Approximately 1,200 coal-fired units
  - 45% percent of nationwide electricity generation
    - Bituminous coal ~ 50% of coal generation
    - Subbituminous ~45% of coal generation
    - Lignite ~ 5% of coal generation
  - Includes units that burn coal, coal refuse, a synthetic gas derived from coal, or solid oil-derived fuel (e.g., petroleum coke) either exclusively, in any combination together, or in any combination with other supplemental fuels that are not solid wastes
- Approximately 150 oil-fired units
  - 1% of nationwide electricity generation
- Natural gas power plants are not affected by this rule
- EPA expects most facilities would install technologies to comply with this rule

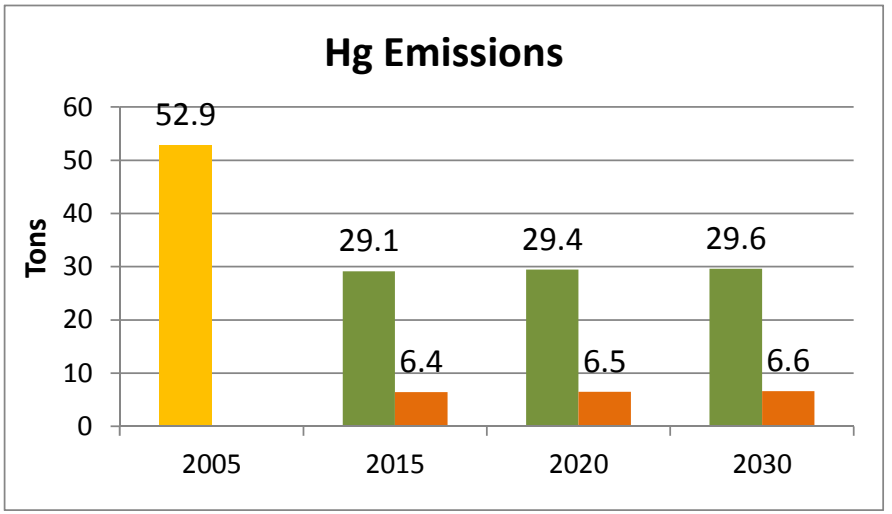
U.S. Electric Power Industry Net Generation by Fuel, 2009

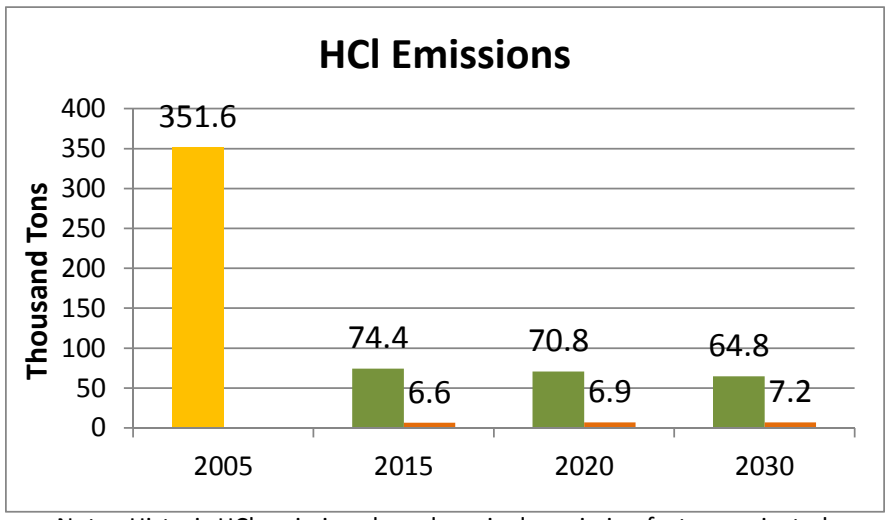


Source: U.S. Energy Information Administration, *Annual Energy Review 2009* (August 2010).

Emissions from Covered Sources





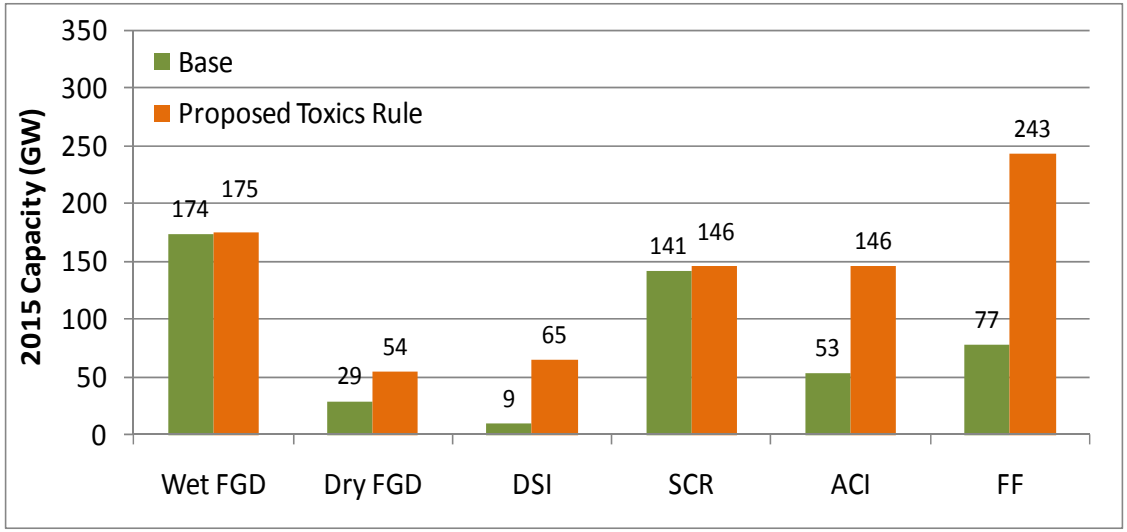


Note: Historic HCl emissions based on single emission factor; projected emissions based on fuel-specific Cl assumptions and removal efficiencies.

- **The base case includes the Transport Rule as proposed and all other existing Federal controls and Federally enforceable agreements**
- **Emission totals presented here reflect all covered coal steam and IGCC electric generating units > 25 MW**
- **The policy case imposes mercury and HCl emission rate limitations on these units, and requires fabric filters on a subset of those units**
- **The mercury content of the coal consumed in the base case by EGUs > 25 MW is 75 tons in 2015; emissions from those units under the Toxics Rule represent more than a 90% reduction in that mercury**

Sources Can Achieve These Standards

- Proven control technologies to reduce these emissions such as scrubbers, fabric filters, and activated carbon injection are widely available
- Many units already use one or more of these technologies
- As a result of this standard, some power plants will upgrade existing controls (especially particulate matter controls like electrostatic precipitators)
- Power plants may also install new controls (such as fabric filters, dry sorbent injection, or activated carbon injection)

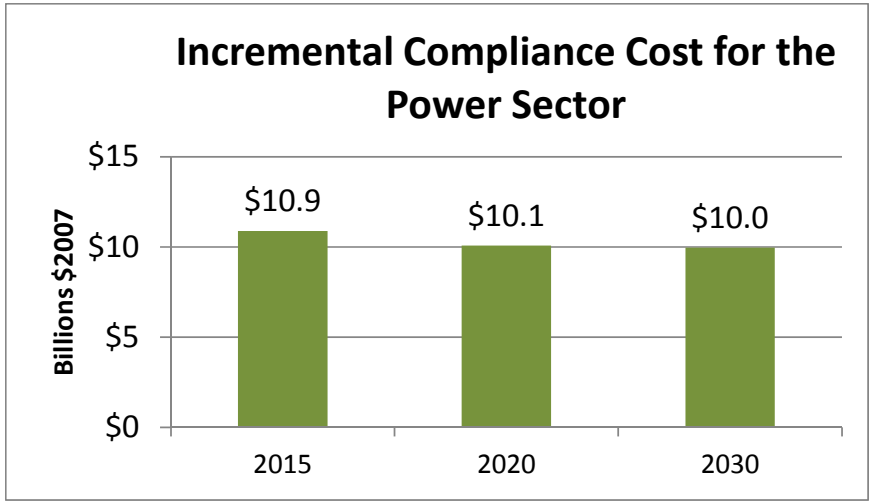


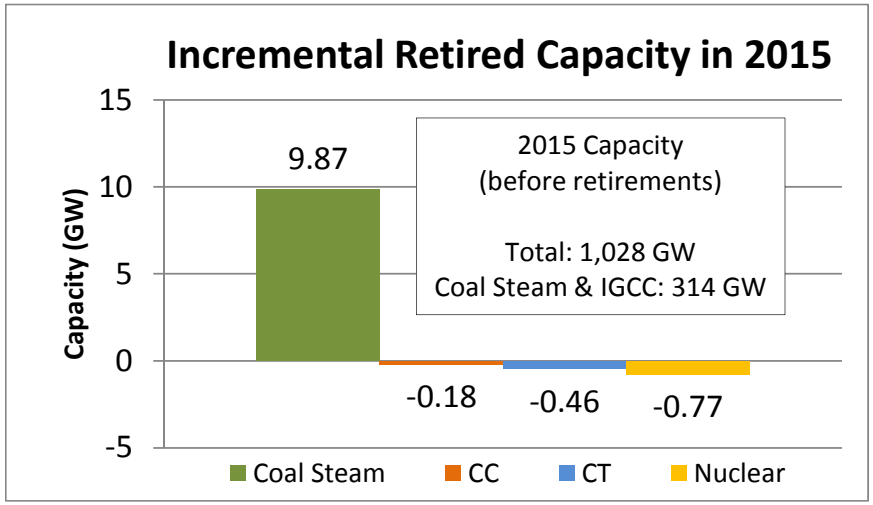
Retrofit pollution control installations on coal-fired capacity (by technology) with the base case and with the proposed Toxics Rule, 2015 (measured in GW capacity). Source: Integrated Planning Model run by EPA, 2011

FGD: flue gas desulfurization (scrubber)
DSI: dry sorbent injection
SCR: selective catalytic reduction
ACI: activated carbon injection
FF: fabric filter

FGD – 96% SO_2 removal; 99% HCl removal
SCR – 80% NOx removal
FF – PM control
DSI – 70% SO_2 removal; 90% HCl removal
ACI – 90% Hg removal

Cost and Retirement Projections





- **Private compliance costs to utilities are distinct from the overall social cost of the policy. The compliance costs depicted are increased costs of operating the electric generation system throughout the U.S.**
- **Incremental retired coal capacity in 2015 is about 10 GW. Also, it is important to recognize:**
  - **EPA identified about 11 GW of firm retirements announced for 2010-2015 that were removed from modeling**
  - **EPA modeling suggests forecasted natural gas prices alone close about 4 GW of coal-fired capacity in 2015 in the base case, and Transport Rule may close an additional 1 GW**
  - **Toxics Rule and Transport Rule (as proposed) together close 11 GW of coal in 2015**
  - **Closures are distributed throughout the U.S.**

Cross-State Air Pollution Rule (CSAPR)

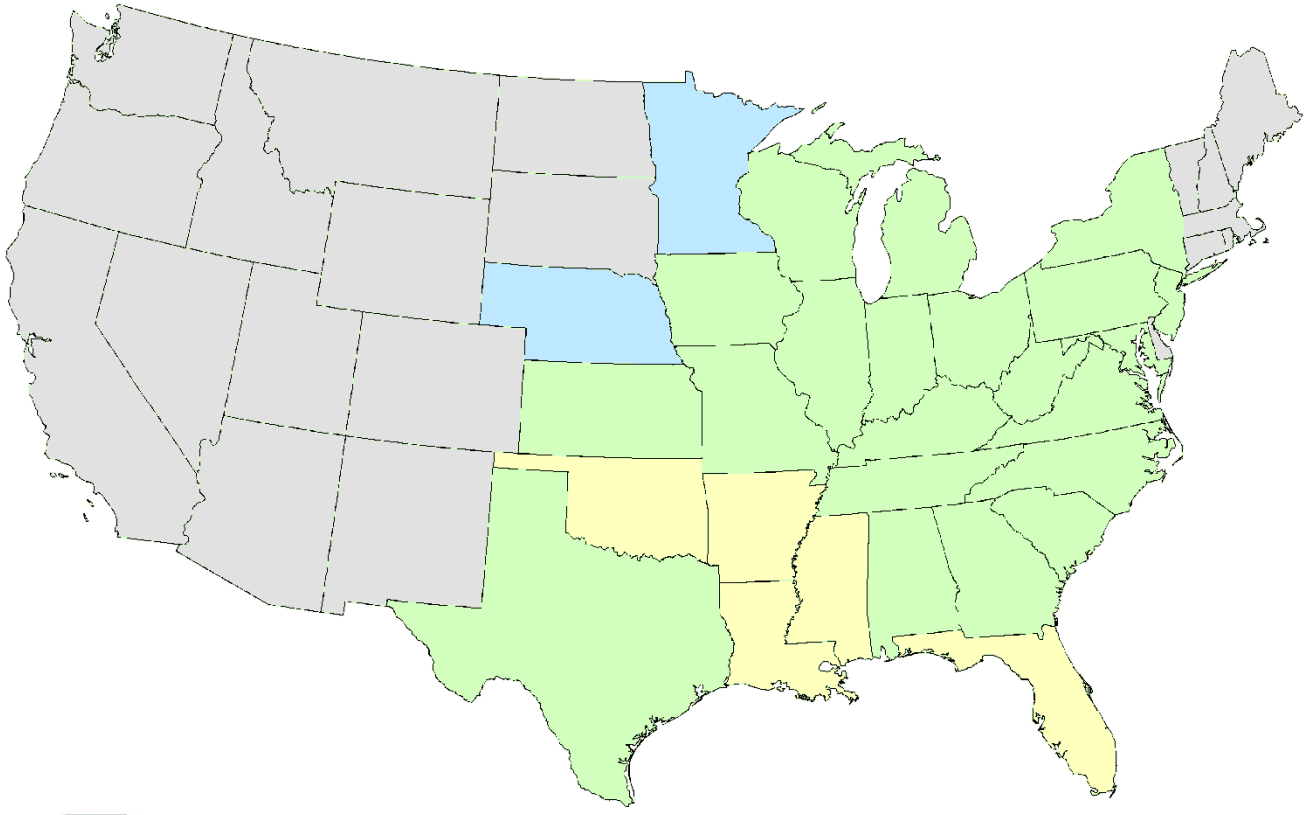
Cross-State Air Pollution Rule (CSAPR)

- On **July 6, 2011**, EPA finalized CSAPR to respond to the court remand of the Clean Air Interstate Rule (CAIR)
  - CSAPR was originally proposed July 6, 2010
  - EPA also issued three notices of data availability (NODAs) to provide additional opportunities for public comment on data, modeling, and other key aspects of the rule

- The first phase of compliance begins January 1, 2012 for SO_2 and annual NO_X reductions, and May 1, 2012 for ozone season NO_X reductions. The second phase, with deeper SO_2 reductions, begins January 1, 2014
  - Unit-level allowance allocations will be distributed into accounts by November 7, 2011
  - Sources have until December 2012 to demonstrate compliance with 2012 emissions of ozone-season NO_X, and until March 2013 for 2012 emissions of SO_2 and annual NO_X

- On **July 6, 2011**, EPA also issued a supplemental proposal for 6 additional states to be included in the ozone season NO_X trading program
  - Expected to be finalized later this year

Cross-State Air Pollution Rule States



States controlled for both fine particles (annual SO_2 and NOx) and ozone (ozone season NOx) (21 States)

States controlled for fine particles only (annual SO_2 and NOx) (2 States)

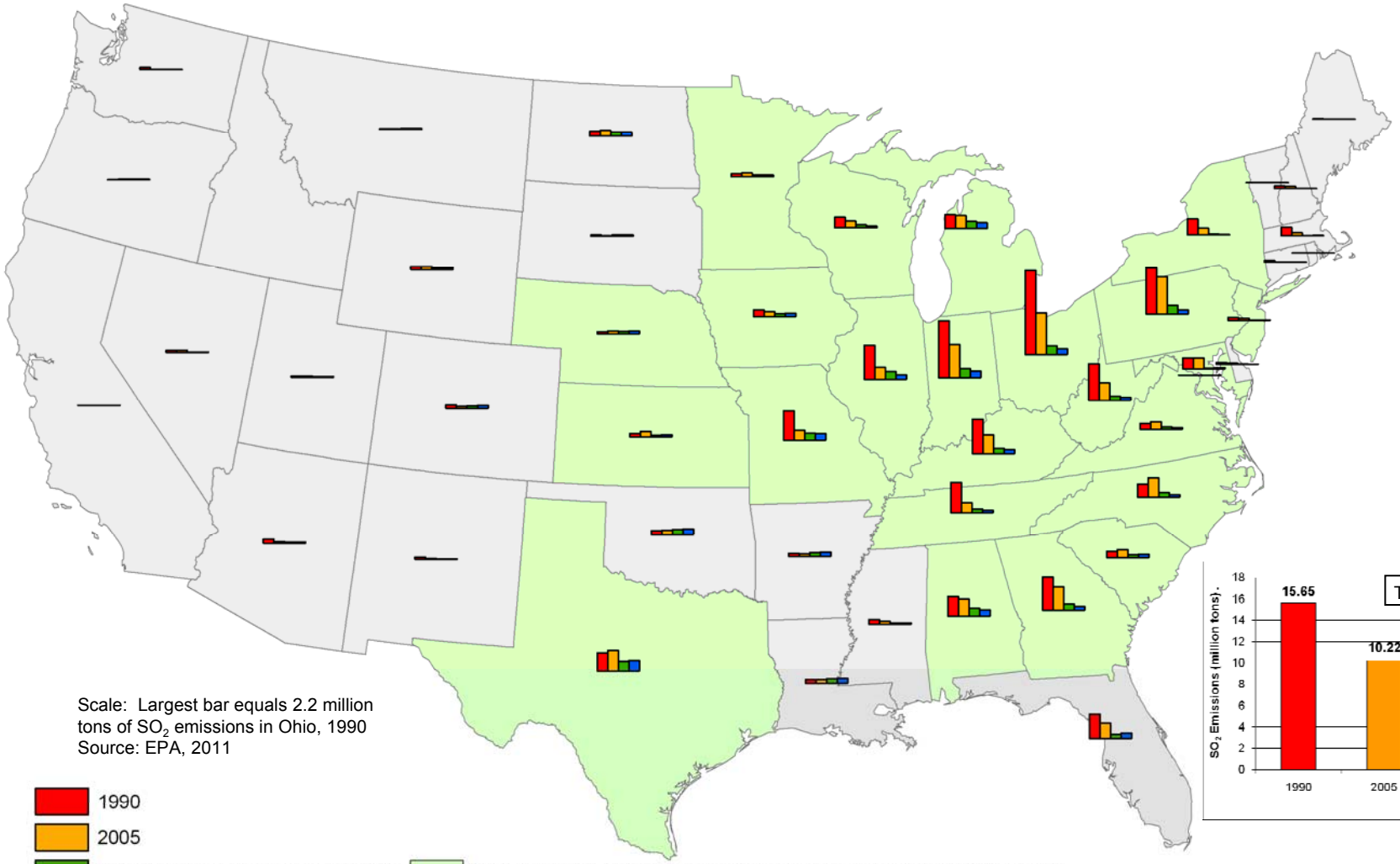
States controlled for ozone only (ozone season NOx) (5 States)

States not covered by the Cross-State Air Pollution Rule

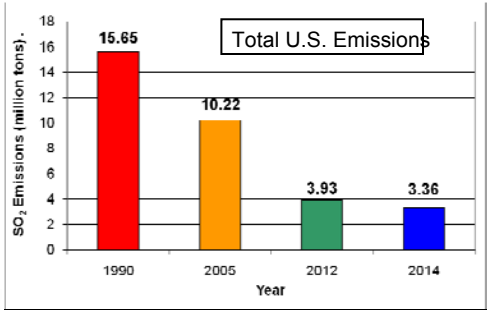
- Cross-State Air Pollution Rule includes separate requirements for:
  - Annual SO_2 reductions
  - Annual NO_x reductions
  - Ozone-season NO_x reductions

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

Annual SO_2 Power Plant Emissions 1990-2014 *



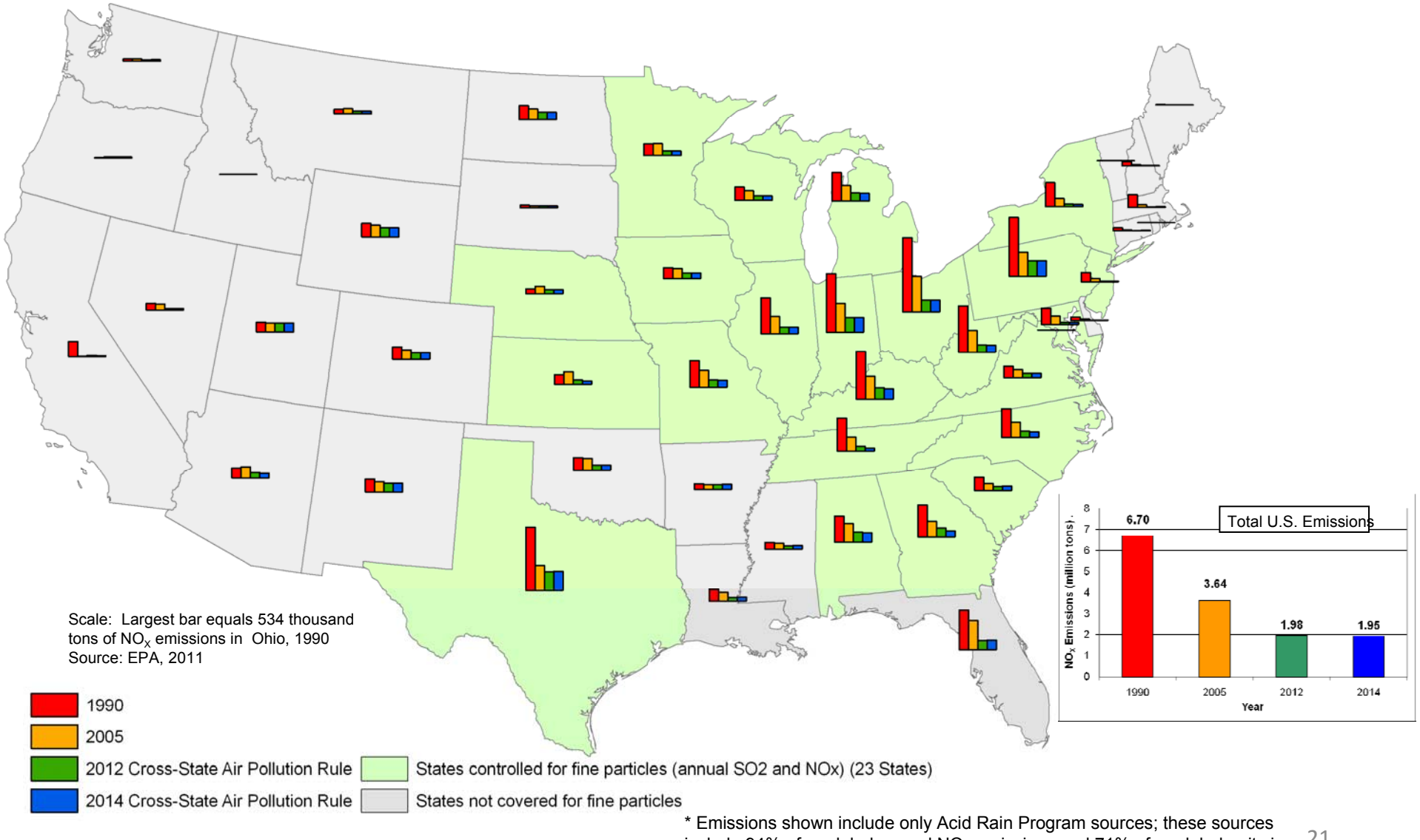
Scale: Largest bar equals 2.2 million tons of SO_2 emissions in Ohio, 1990
Source: EPA, 2011



1990
2005
2012 Cross-State Air Pollution Rule
2014 Cross-State Air Pollution Rule
States controlled for fine particles (annual SO2 and NOx) (23 States)
States not covered for fine particles

* 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.

CSAPR Revisions (cont.)

- On **October 7, 2011**, EPA proposed additional revisions to CSAPR to make technical revisions and to smooth the transition from CAIR to CSAPR
  - The proposed revisions to state budgets, new unit set-asides, Indian country new unit set-asides, and unit-level allowance allocations affect 10 states and are based on further review and data submitted after the rule was finalized
  - The proposal would also revise certain unit-level allocations in six states affected by consent decrees to prevent CSAPR allocations from exceeding the terms of these judicial actions
  - This proposed rule amends the assurance penalty provisions (as applied to all states) so they start in 2014, instead of 2012, to facilitate the development and operation of the allowance market
  - This proposed rule would not delay start of the Programs on schedule in January, 2012, as over 99% of final CSAPR allowances will be allocated by November 7

Climate Change & EGUs

Background – EGU GHG NSPS

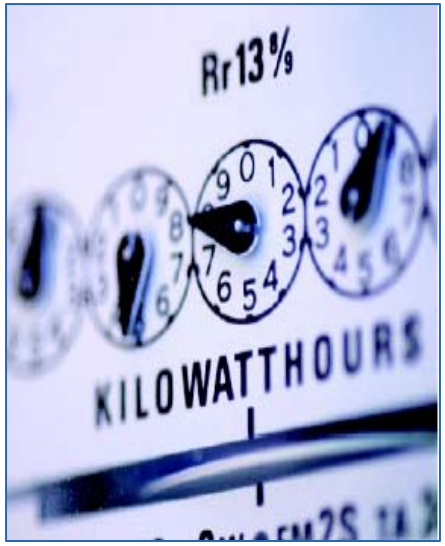
- On **December 15, 2009** (74 FR 66496), EPA published a notice indicating that the EPA Administrator found that the current and projected atmospheric concentrations of greenhouse gases are reasonably anticipated to endanger the public health and welfare of current and future generations (Endangerment Finding).
- On **December 23, 2010**, EPA announced that it entered into a proposed settlement agreement to issue rules that will address greenhouse gas (GHG) emissions from certain fossil fuel-fired electric generating units (EGUs).
  - Agreement addresses, in part, EPA's September 2007 remand of its February 2006 final decision not to set GHG standards for boilers.
- Under the original agreement, EPA committed to issuing proposed regulations by **July 26, 2011**, and final regulations by **May 26, 2012**.
  - The agreement was subsequently amended to change the proposal date to **September 30, 2011**.
  - The Administrator announced, in early September, that the Agency would not meet the September 30, 2011, proposal date.
  - The EPA is presently negotiating with the litigants on a revised schedule.

CAA Section 111 Overview

- There are two particularly relevant provisions:
  - CAA section 111(b) requires EPA to regulate new and modified sources
  - CAA section 111(d) requires EPA to establish emission guidelines under which States will regulate existing sources.
- EPA may distinguish among classes, types, and sizes within categories of sources for the purpose of establishing standards.

Listening Sessions

- EPA held four listening sessions on the EGU GHG NSPS
  - Session 1: Electric Power Industry Representatives
    - February 4, 2011 - Washington, DC
  - Session 2: Environmental and Environmental Justice Organization Representatives
    - February 15, 2011 - Atlanta, GA
  - Session 3: State and Tribal Representatives
    - February 17,2011 - Chicago, IL
  - Session 4: Coalition Group Representatives
    - February 23, 2011 - Washington, DC



Comments from Listening Sessions

- Listening session comments regarding new sources included a range of alternatives:
  - Standards based on carbon capture and storage (CCS)
  - Standards based on energy efficiency (e.g., supercritical steam, integrated gasification combined cycle (IGCC))
  - Fuel/technology/size-specific standards
  - To avoid fuel switching and to recognize costs are higher for smaller facilities
  - Technology and fuel-neutral standards (e.g., natural gas combined cycle (NGCC))
  - Very little comment on reconstructed and modified sources


QUESTIONS?
Thank you!
Robert J. Wayland, Ph.D.
Leader, Energy Strategies Group
(919) 541-1045
wayland.robertj@epa.gov