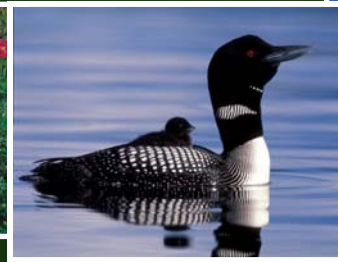




Energy

Environment

*Status of*  
**Clean Air Interstate Rule Implementation  
and Outreach for Replacement Rules**



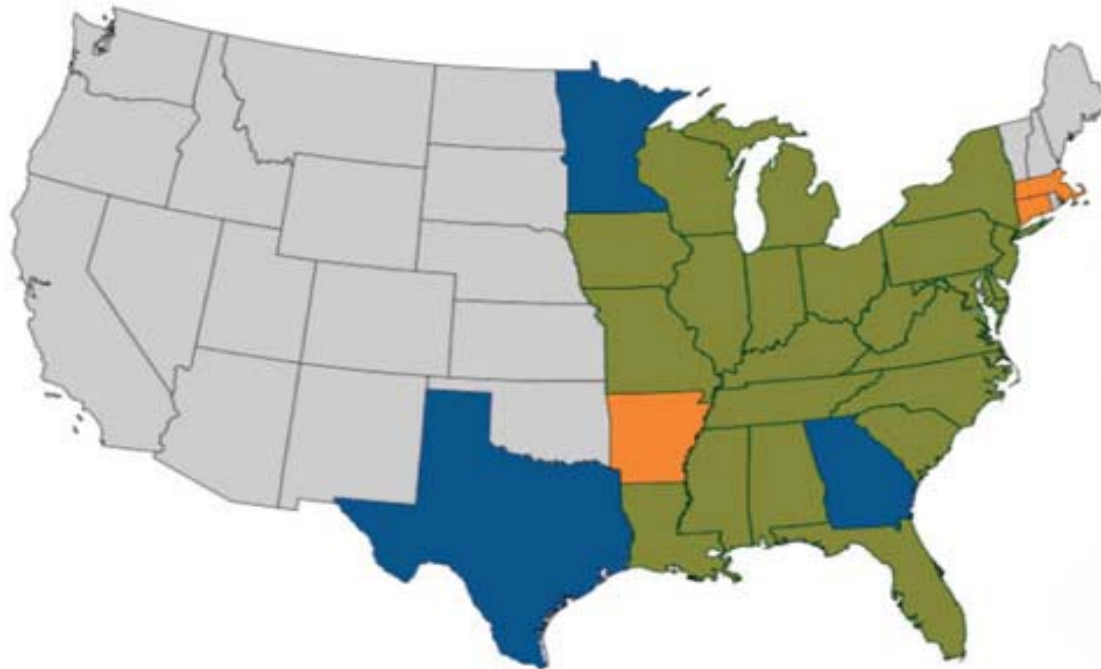
**EPA's Clean Air Act Advisory Committee Meeting**  
**Washington, D.C.**  
*May 13, 2009*



Sam Napolitano  
U.S. EPA Clean Air Markets Division

Human Health

# Clean Air Interstate Rules (CAIR) Remain In Effect



## CAIR Emission Caps\*

(million tons)

	2009/2010	2015
Annual SO <sub>2</sub> (2010)	3.7	2.6
Annual NO <sub>x</sub> (2009)	1.5	1.3
Seasonal NO <sub>x</sub> (2009)	0.6	0.5

\*for the affected regions

- States not covered by CAIR, but covered by CAVR
- States controlled for fine particles (annual SO<sub>2</sub> and NO<sub>x</sub>)
- States controlled for ozone (ozone season NO<sub>x</sub>)
- States controlled for both fine particles (annual SO<sub>2</sub> and NO<sub>x</sub>) and ozone (ozone season NO<sub>x</sub>)

Source: EPA, 2007

# State Responses to CAIR

- All states have chosen the regional trading program
- Some states still working on SIPs and NO<sub>x</sub> allocation
- NO<sub>x</sub> allocation methodology
  - About 1/3 use model rule approach
  - Remaining 2/3 chose their own approach
    - Varies from permanent allocation to annual updating (after initial 3 year block)
- Compliance Supplement Pool for Annual NO<sub>x</sub> Program
  - 2 out of 23 states chose not to distribute
  - EPA administers in six states
  - Issued as 2009 annual NO<sub>x</sub> allowances
  - Discussing with states expediting CSP awards

# State Flexibilities under CAIR

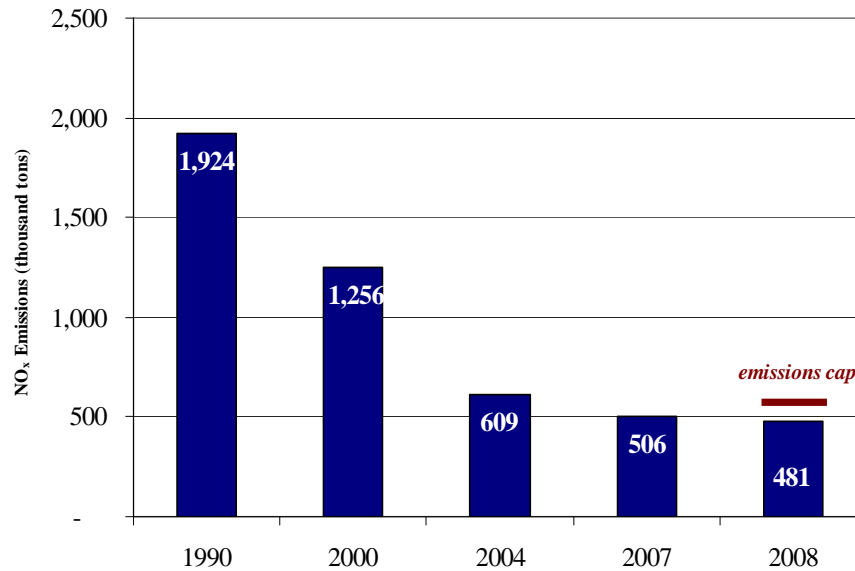
- Opt-ins
  - 13 states chose to include opt-in provisions
  - 16 states chose not to include opt-ins
- Expanding applicability to include major non-power sector sources (like in NO<sub>x</sub> SIP Call) in the CAIR ozone season trading program
  - 14 out of 20 states chose to expand applicability

# Source Response to CAIR

- Sources established Designated Representatives for CAIR programs
- Facility allowance accounts have been established and allocations recorded
- Sources began monitoring and reporting emissions
  - Jan. 1, 2008 for NO<sub>x</sub>
  - Jan. 1, 2009 for SO<sub>2</sub>
- Some sources have earned early reduction credits in the annual NO<sub>x</sub> program (awarded as CSP allowances)
- Vast majority of sources have NO<sub>x</sub> allowances for 2009 and 2010 and most have additional years
  - General concern exists over trading allowances after 2010
  - “Buyer beware” language posted on EPA web site

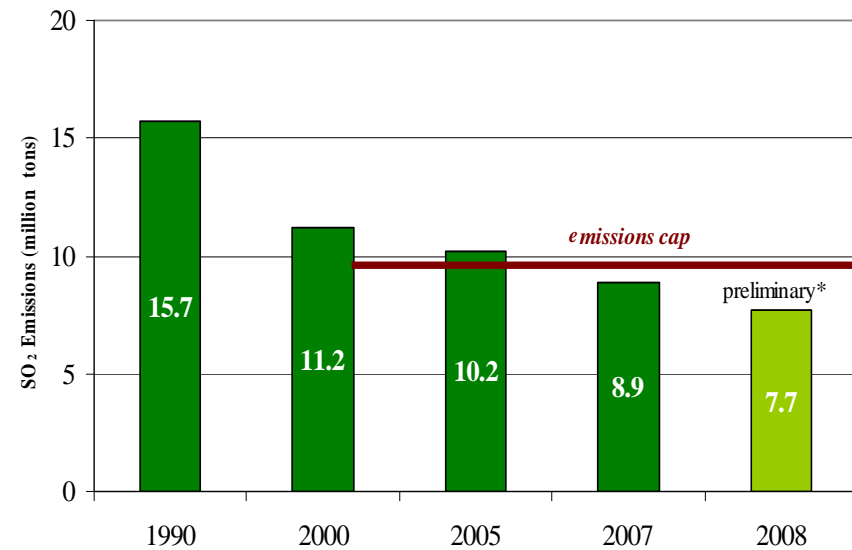
# Progress under the Acid Rain, NO<sub>x</sub> Budget Trading, and CAIR Programs

### Ozone Season NO<sub>x</sub> Emissions<sup>1</sup>



1. From all NO<sub>x</sub> Budget Trading Program sources including about 2,600 units from the electric power industry and other large stationary sources.

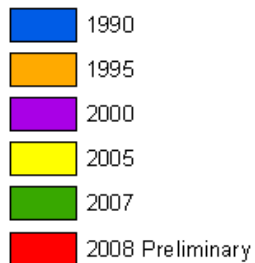
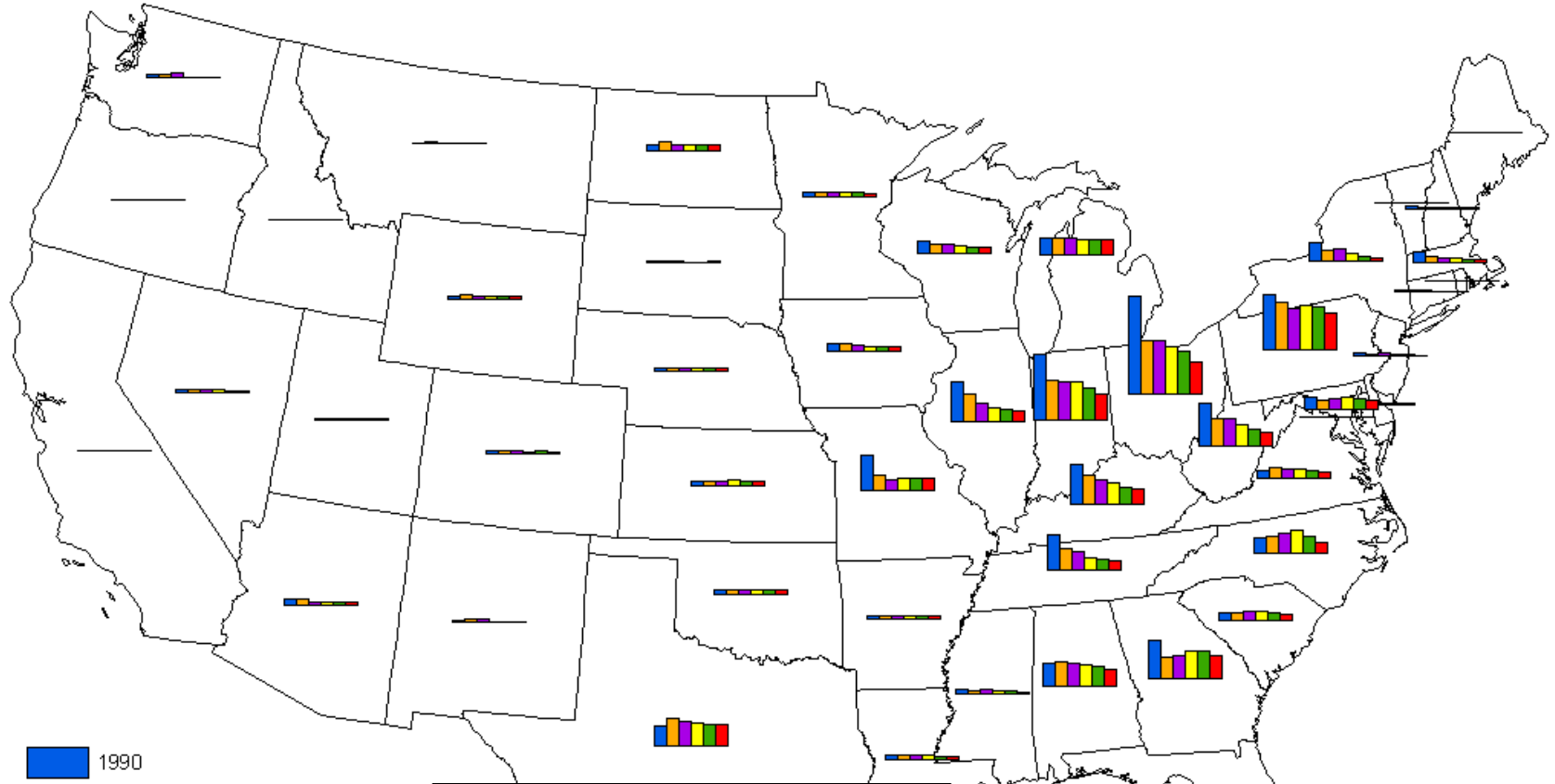
### Annual SO<sub>2</sub> Emissions<sup>2</sup>



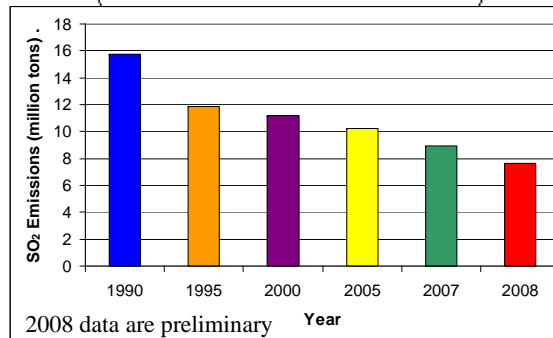
\* Based on initial data submissions in early 2009 that are currently under EPA review and revision as needed.

2. From all Acid Rain Program sources that include over 3,500 electric generation units that use fossil fuels.

# State-by-State Annual SO<sub>2</sub> Emission Levels for Acid Rain Program Sources, 1990-2008



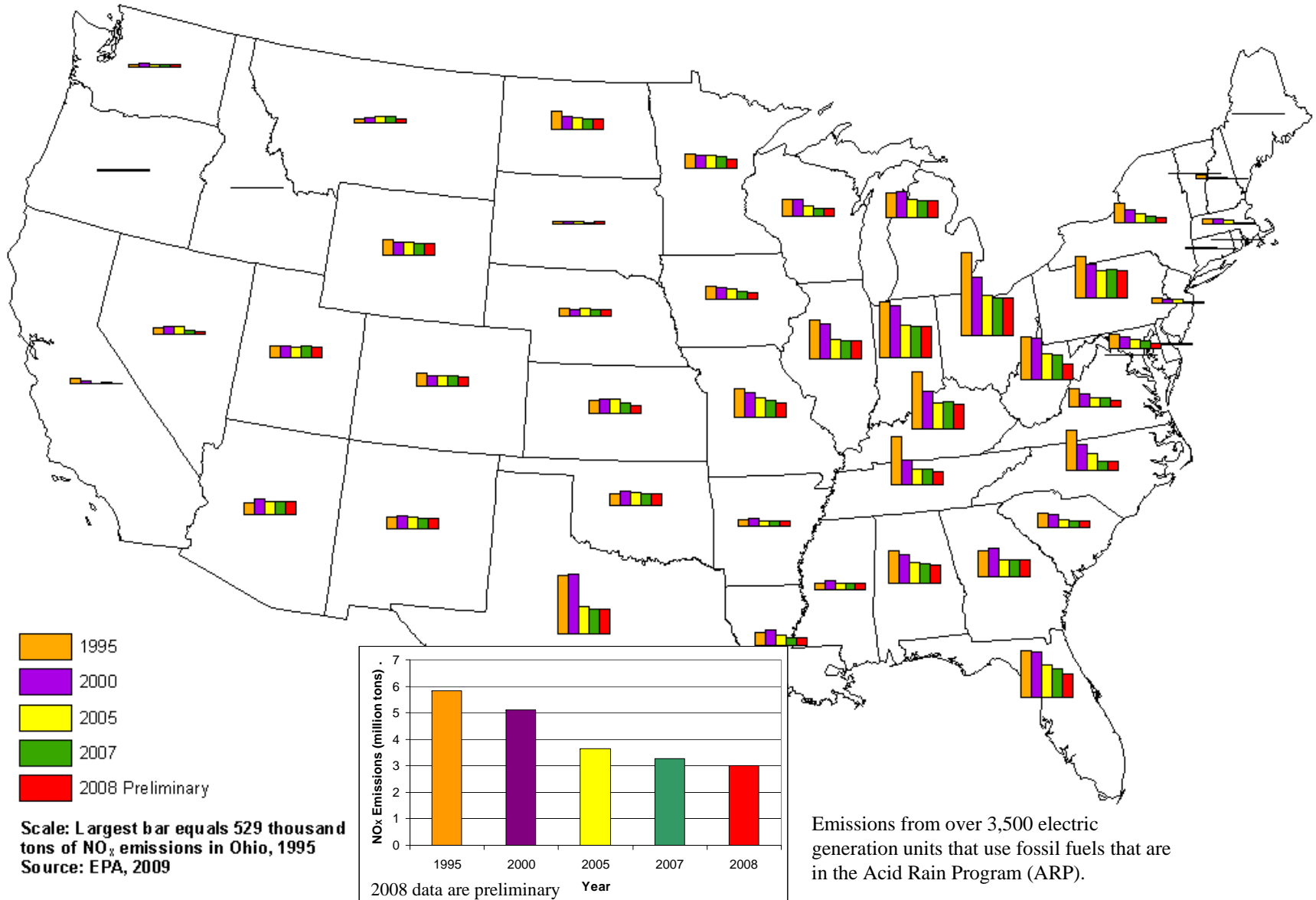
**Scale: Largest bar equals 2.2 million tons of SO<sub>2</sub> emissions in Ohio, 1990**  
Source: EPA, 2009



2008 data are preliminary

Emissions from over 3,500 electric generation units that use fossil fuels that are in the Acid Rain Program (ARP).

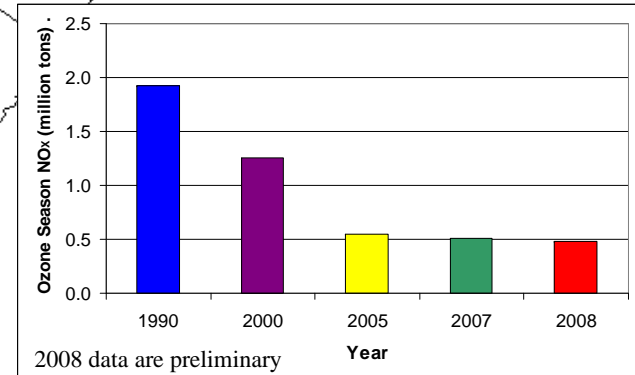
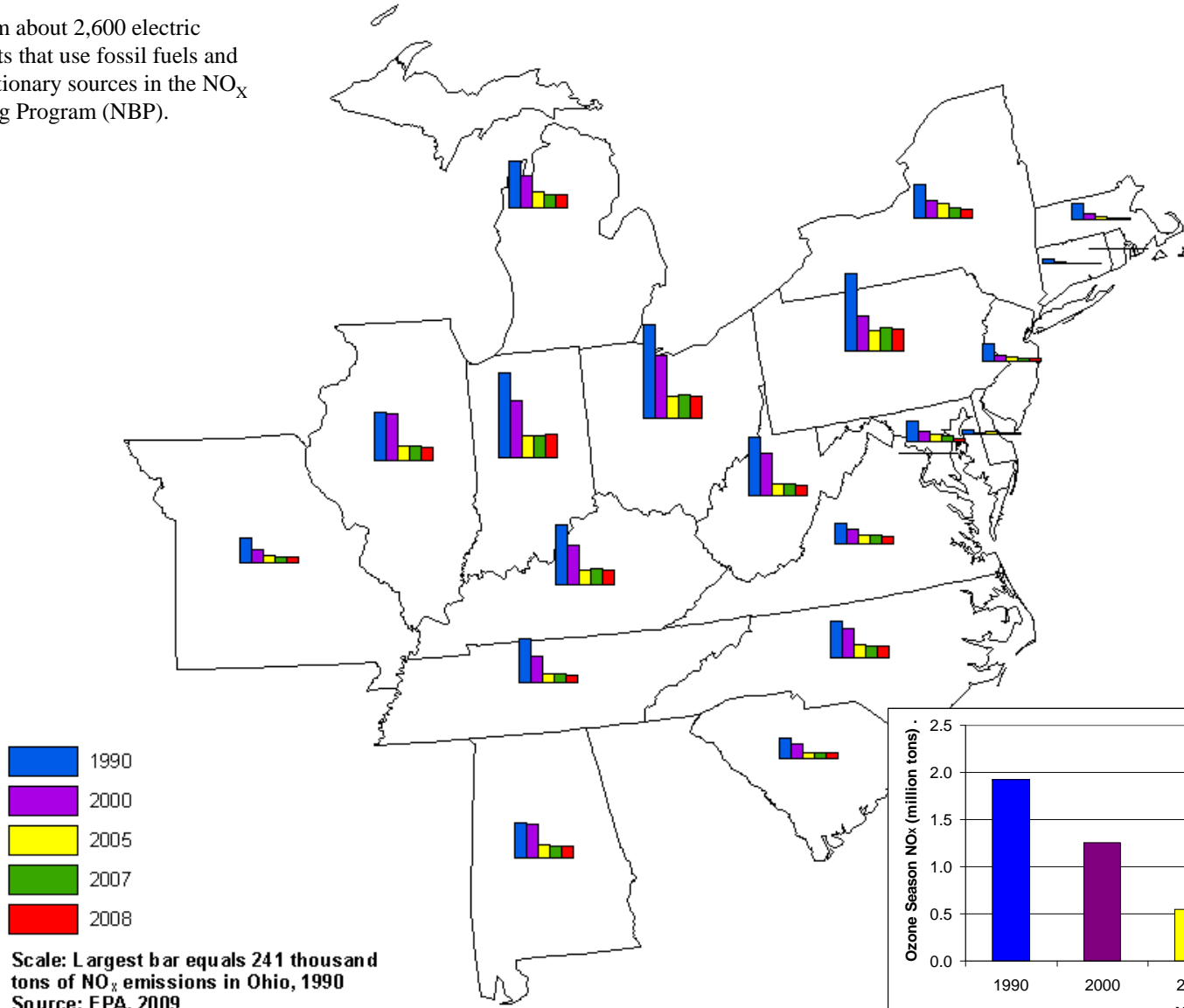
# State-by-State Annual NO<sub>x</sub> Emission Levels for Acid Rain Program Sources, 1995-2008



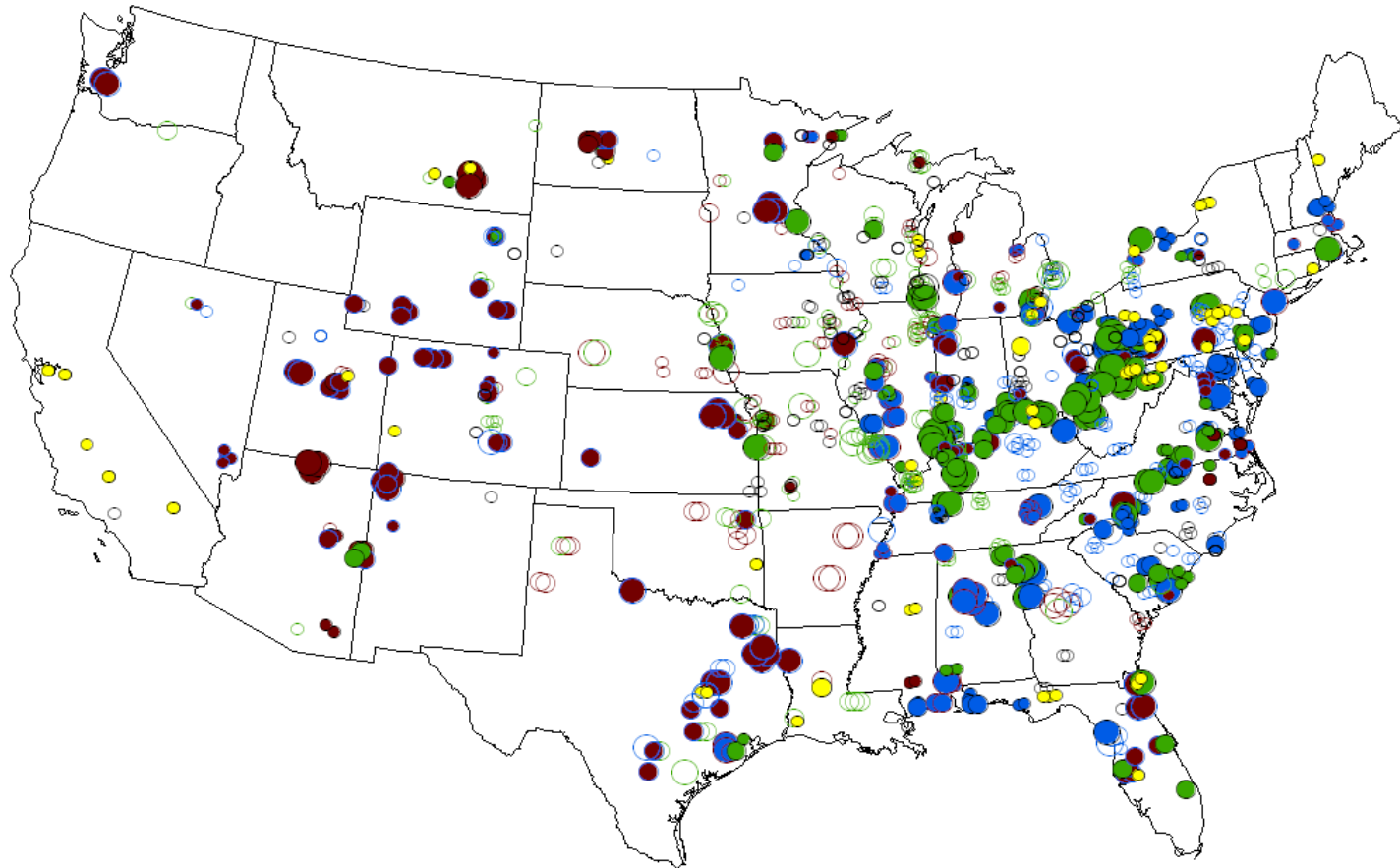


# State-by-State Ozone Season NO<sub>x</sub> Emission Levels for NO<sub>x</sub> Budget Trading Program Sources, 1990-2008

Emissions from about 2,600 electric generation units that use fossil fuels and other large stationary sources in the NO<sub>x</sub> Budget Trading Program (NBP).



# 2008 Coal Controls for SO<sub>2</sub> and NO<sub>x</sub>



**Scrubber and SCR/SNCR Scrubber**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB and Under 1.0 lb SO<sub>2</sub>/mmBtu Under 1.0 lb SO<sub>2</sub>/mmBtu**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**SCR/SNCR**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**FBC/IGCC**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

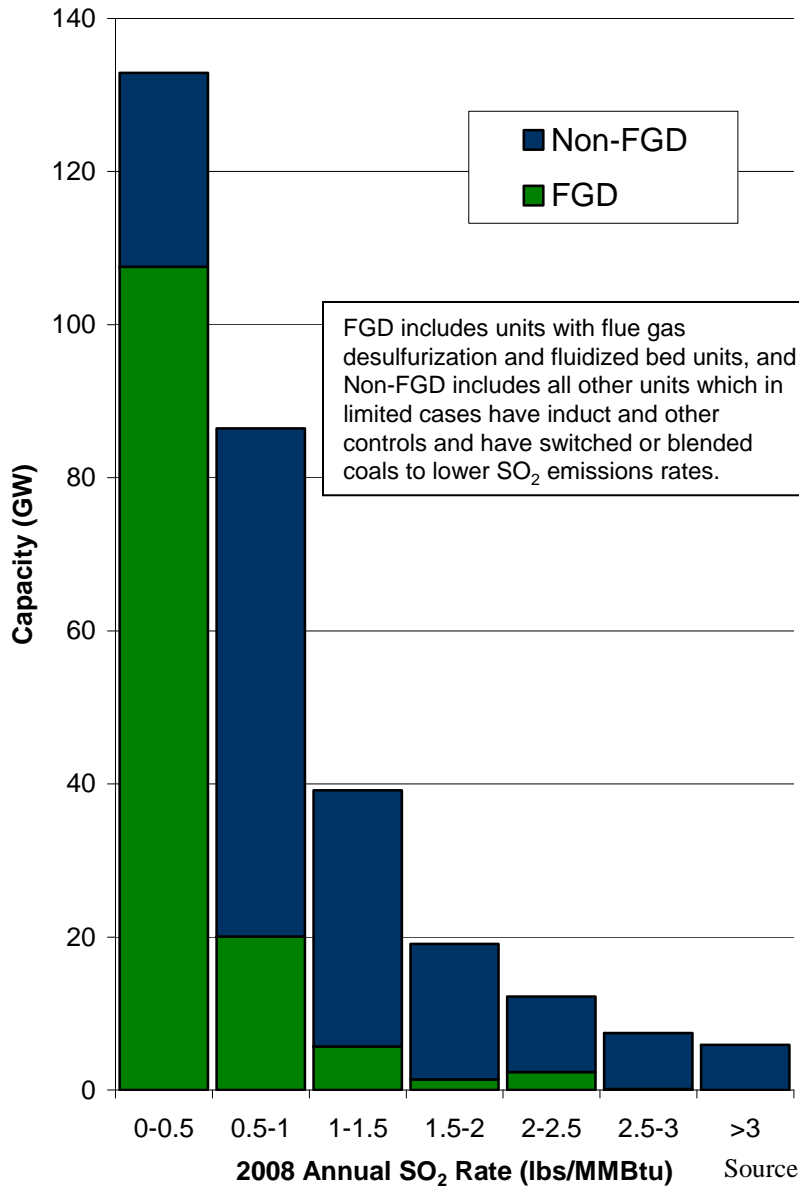
**None**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

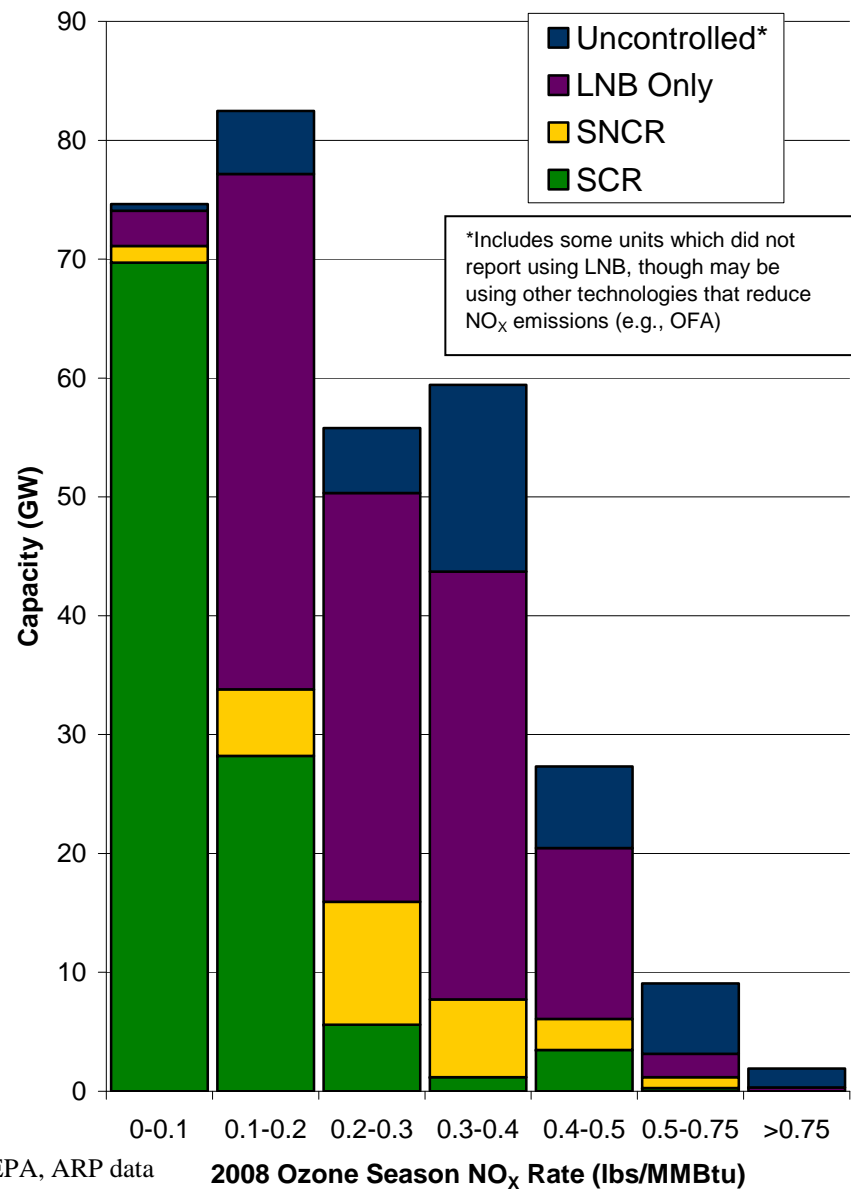
Virtually all coal-fired units have electrostatic precipitators, baghouses, or other advanced controls for high levels of particulate removal.

**Source: Updated NEEDS and Data & Maps, EPA, 2009**

# SO<sub>2</sub> and NO<sub>x</sub> Emissions Rates for Coal-fired Generation



Source: EPA, ARP data



# Outreach on Rules to Replace CAIR

- Over the last two months, EPA staff have held extensive “listening sessions” with major stakeholders on the rules to replace CAIR
  - National Association of Clean Air Agencies (NACAA)
  - Lake Michigan Air Directors Consortium (LADCO)
  - Ozone Transport Commission (OTC)
  - Central States Air Resource Agencies (CENSARA)
  - Southeastern States Air Resource Managers (SESARM)
  - State of Texas
  - Non-Governmental Organizations (environmental and health)
  - Council of Industrial Boiler Owners (CIBO). American Forest Products Association, Automobile Alliance, American Chemistry Council and related industries
  - Electric power industry and related industries and organizations



Energy

Visit the Clean Air Markets web site to view:

- Emissions data
- Allowance transfers
- Program rules and guidelines
- Studies and reports
- Clean Air Markets [www.epa.gov/airmarkets](http://www.epa.gov/airmarkets)



New updated portion of web site:  
<http://www.epa.gov/captrade>



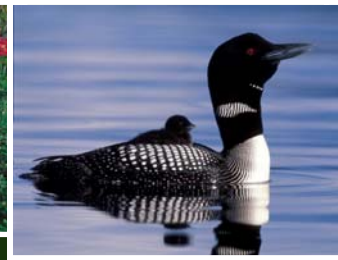
Human Health



Energy

Environment

# Appendix



Human Health

# Sources of Data

- Initial emissions maps are based on Acid Rain Program (ARP) and NO<sub>x</sub> Budget Trading Program (NBP) compliance data reported to EPA's Clean Air Markets Division. All data are final, except annual SO<sub>2</sub> and NO<sub>x</sub> preliminary emissions data for 2008.
- For pollution controls shown in the map in the main body of this presentation and for maps in this appendix, EPA has based this on its draft 2009 data in National Electric Power Emissions Data System (NEEDS) that is used for setting up the Integrated Planning Model (IPM) and EPA ARP emissions and facility data.
  - Includes existing federal controls for ARP and NBP, state controls, NSR settlements, Court decisions, and controls reported to be underway because construction is occurring or binding contracts are in place from broad, although not comprehensive recent survey work. States (through their Regional Planning Organizations) have reviewed and commented on much of the NEEDS data used in this analysis. Notably, plans could change for companies participating in survey.
  - Additional controls from CAIR replacement rules or other federal actions, such as upcoming MACT regulations or State regional haze SIPS are not included.
- Note that in some cases future controls for SO<sub>2</sub> may potentially not operate controls where economic analysis now suggests its cheaper to use SO<sub>2</sub> allowances than operate controls. EPA has not seen clear evidence of this occurring to date and is aware of some countervailing factors that could inhibit this.

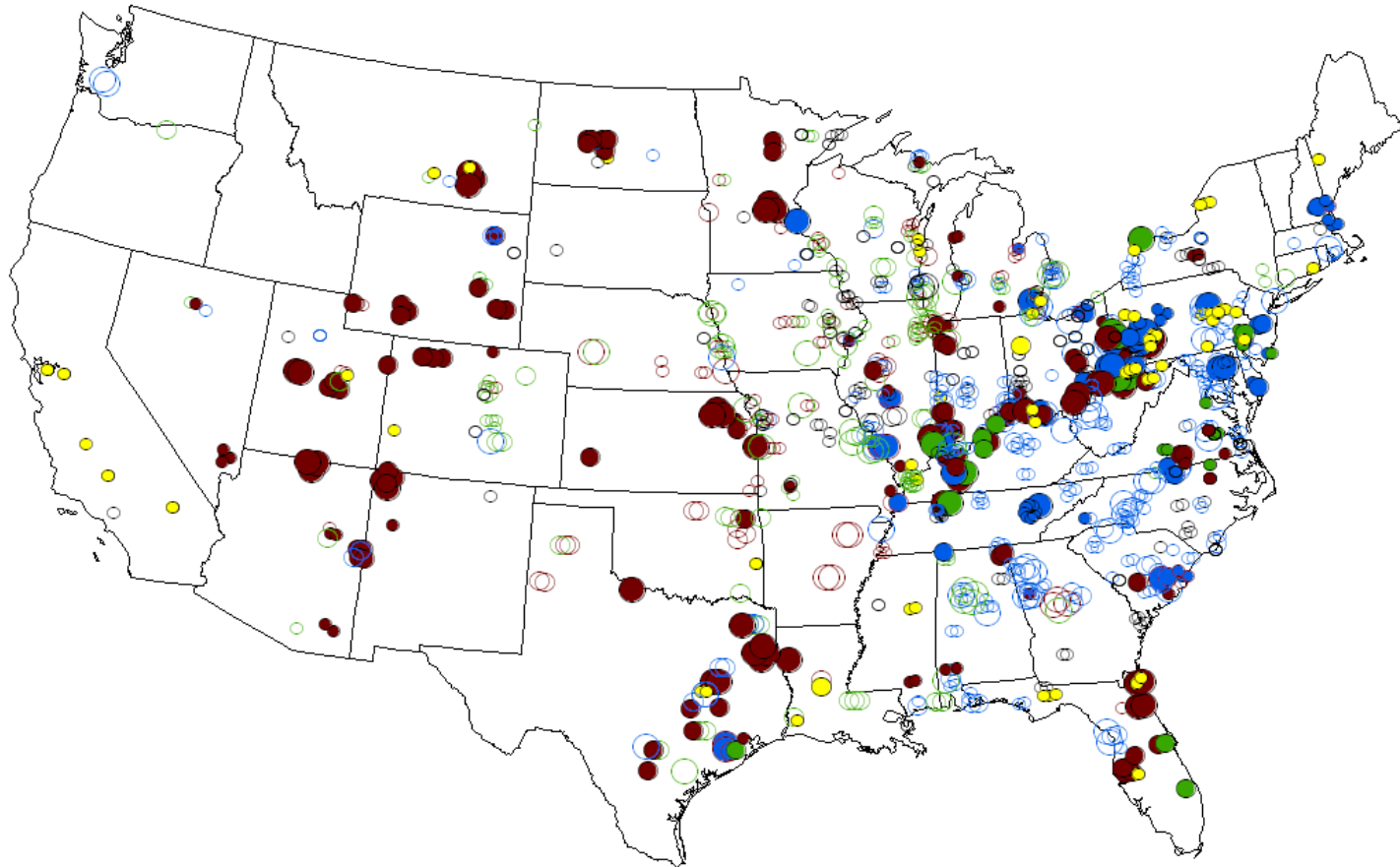


# Selected Facts on Coal-fired Generation: 2008

- Electric Generation Units, Capacity, and Power Plants
  - All units: 1,279 electric generation units and 310 gigawatts of capacity at about 500 power plants
  - Units >25 MW: 1,083 electric generation units and 307 GW of capacity at about 450 power plants
  - Active units in the Acid Rain Program: 988 electric generation units and 296 GW of capacity at close to 400 power plants
- For all units the average age of coal-fired generation capacity is 35 years. Quartile distribution of capacity:
  - Oldest: Over 50 years old (on line 1929-1967)
  - Older Middle: 34-50 years old (on line 1967-1974)
  - Younger Middle: 27-34 years old (on line 1974-1981)
  - Youngest: Less than 28 years old (on line 1981-2008)
- Vast majority of coal-fired generation capacity has advanced pollution controls for direct particulate controls (mostly electrostatic precipitators and some bag houses) that states required before 1990.
- At least 234 GW of coal-fired capacity has some form of low NO<sub>x</sub> burners. About 106 GW of capacity has Selective Catalytic Reduction (SCR) and 27 GW of capacity have Selective Noncatalytic Reduction (SNCR) pollution control technology.
- For SO<sub>2</sub> emissions control, there is 136 GW of total capacity that has flue gas desulfurization (FGD), “scrubbers” and close to 6 GW of fluidized-bed capacity, where the combustion process behaves like a scrubber. Notably, about 80 GW of capacity have both scrubbers and SCR/SNCRs on them. About 42 percent of the capacity has scrubbers or is a fluidized-bed unit east of the Mississippi River, and about 53 percent of the capacity west of the Mississippi has these advance controls.
- Early in 2008, owners of coal-fired generation and other sources reported serious activities to retrofit an additional 33 GW of FGD capacity and 9 GW of SCR/SNCR capacity at existing facilities by the end of 2010.



# 2000 Coal Controls for SO<sub>2</sub> and NO<sub>x</sub>



**Scrubber and SCR/SNCR Scrubber**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB and Under 1.0 lb SO<sub>2</sub>/mmBtu Under 1.0 lb SO<sub>2</sub>/mmBtu**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**SCR/SNCR**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**FBC/IGCC**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

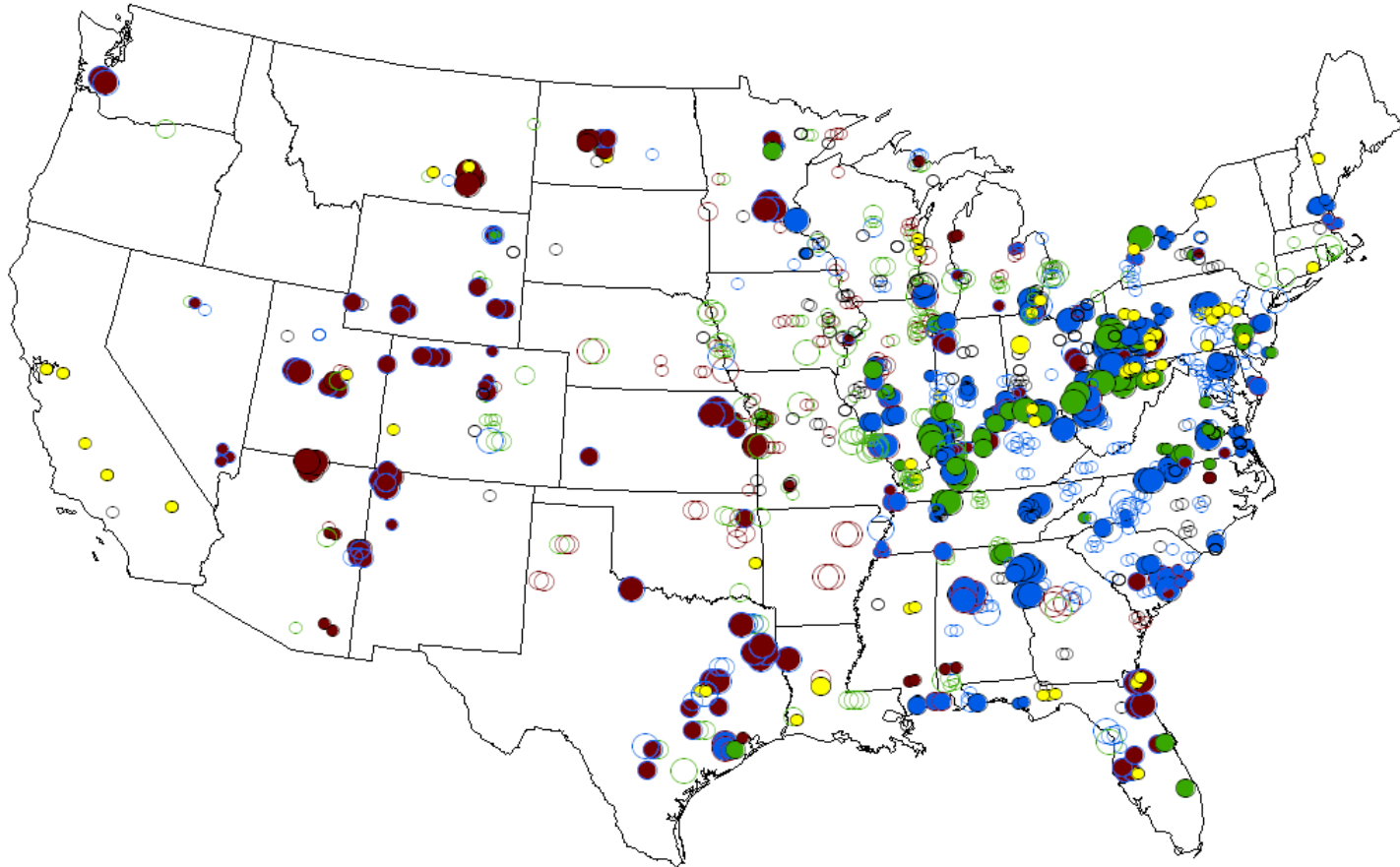
**None**

- Under 300 MW
- 300 MW to 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: Updated NEEDS and Data & Maps, EPA, 2009**

# 2005 Coal Controls for SO<sub>2</sub> and NO<sub>x</sub>



**Scrubber and SCR/SNCR Scrubber**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**SCR/SNCR**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**FBC/IGCC**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB and Under 1.0 lb SO<sub>2</sub>/mmBtu Under 1.0 lb SO<sub>2</sub>/mmBtu**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

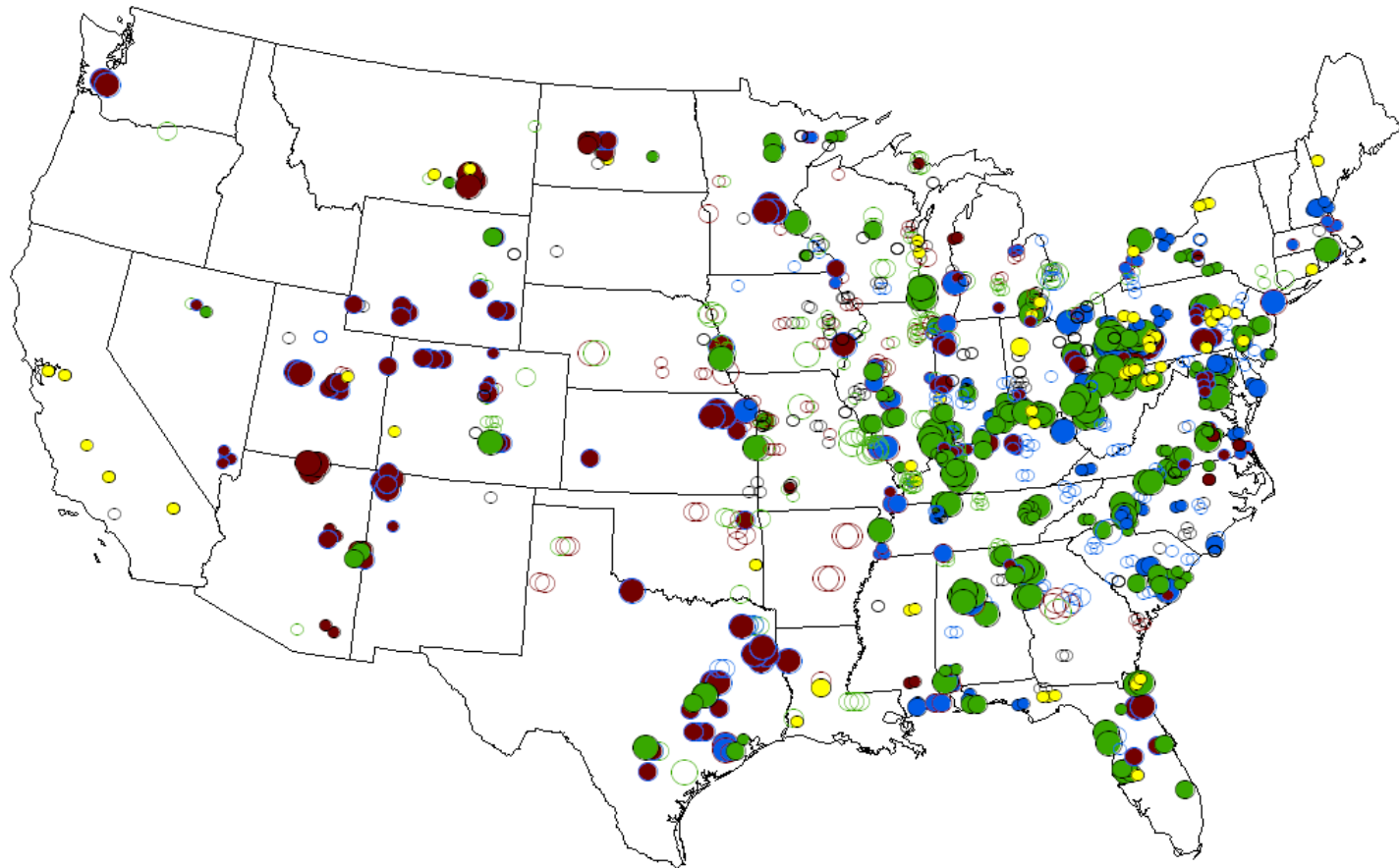
**None**

- Under 300 MW
- 300 MW to 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: Updated NEEDS and Data & Maps, EPA, 2009**

# 2010 Coal Controls for SO<sub>2</sub> and NO<sub>x</sub>



**Scrubber and SCR/SNCR Scrubber**

- |                    |                    |
|--------------------|--------------------|
| ● Under 300 MW     | ● Under 300 MW     |
| ● 300 MW to 600 MW | ● 300 MW to 600 MW |
| ● Over 600 MW      | ● Over 600 MW      |

**SCR/SNCR**

- |                    |
|--------------------|
| ● Under 300 MW     |
| ● 300 MW to 600 MW |
| ● Over 600 MW      |

**FBC/IGCC**

- |                    |
|--------------------|
| ● Under 300 MW     |
| ● 300 MW to 600 MW |
| ● Over 600 MW      |

**LNB and Under 1.0 lb SO<sub>2</sub>/mmBtu Under 1.0 lb SO<sub>2</sub>/mmBtu**

- |                    |                    |
|--------------------|--------------------|
| ○ Under 300 MW     | ○ Under 300 MW     |
| ○ 300 MW to 600 MW | ○ 300 MW to 600 MW |
| ○ Over 600 MW      | ○ Over 600 MW      |

**LNB**

- |                    |
|--------------------|
| ○ Under 300 MW     |
| ○ 300 MW to 600 MW |
| ○ Over 600 MW      |

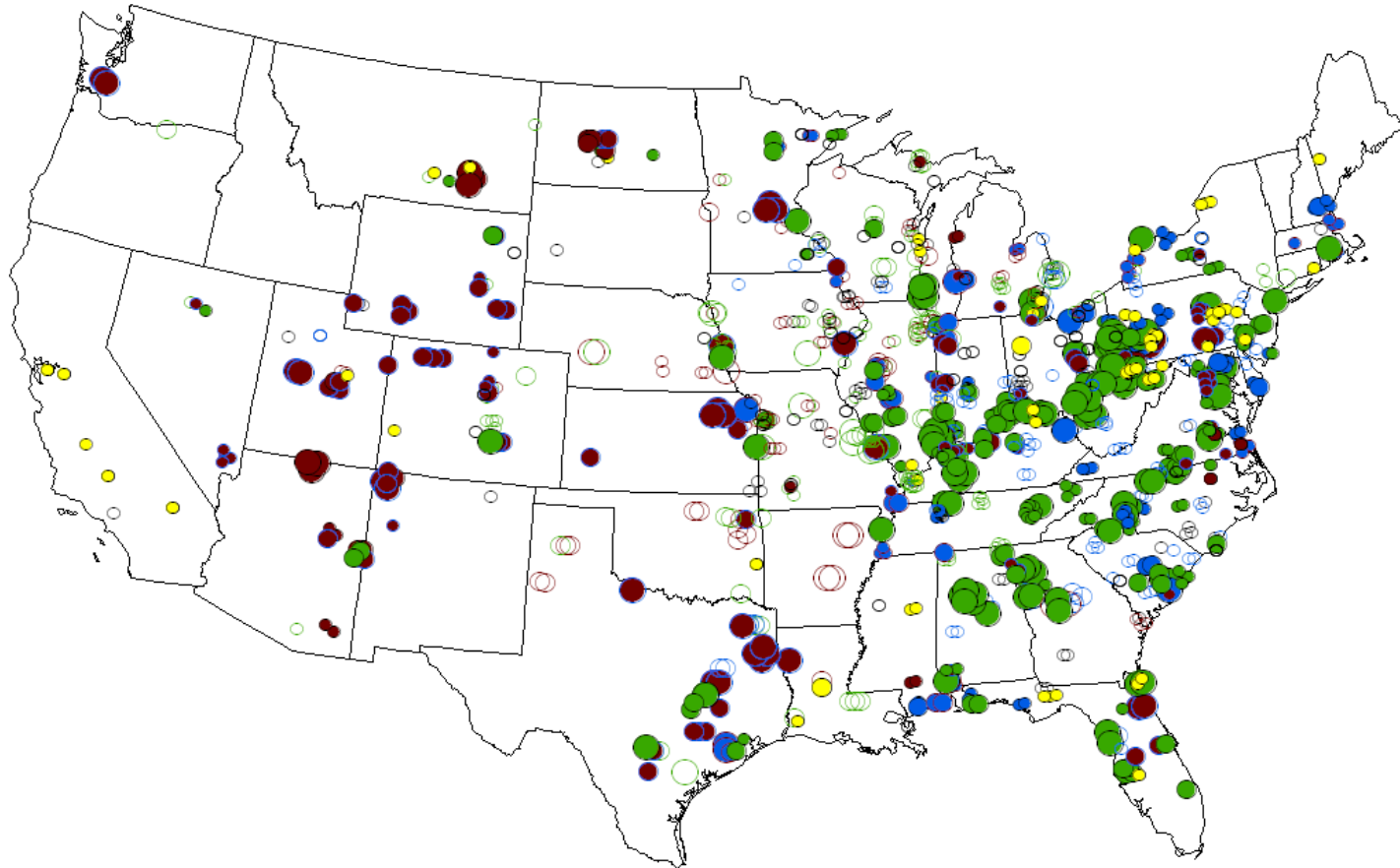
**None**

- |                    |
|--------------------|
| ○ Under 300 MW     |
| ○ 300 MW to 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: Updated NEEDS and Data & Maps, EPA, 2009**

# 2012 Coal Controls for SO<sub>2</sub> and NO<sub>x</sub>



**Scrubber and SCR/SNCR Scrubber**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW
- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**SCR/SNCR**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**FBC/IGCC**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB and Under 1.0 lb SO<sub>2</sub>/mmBtu Under 1.0 lb SO<sub>2</sub>/mmBtu**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW
- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

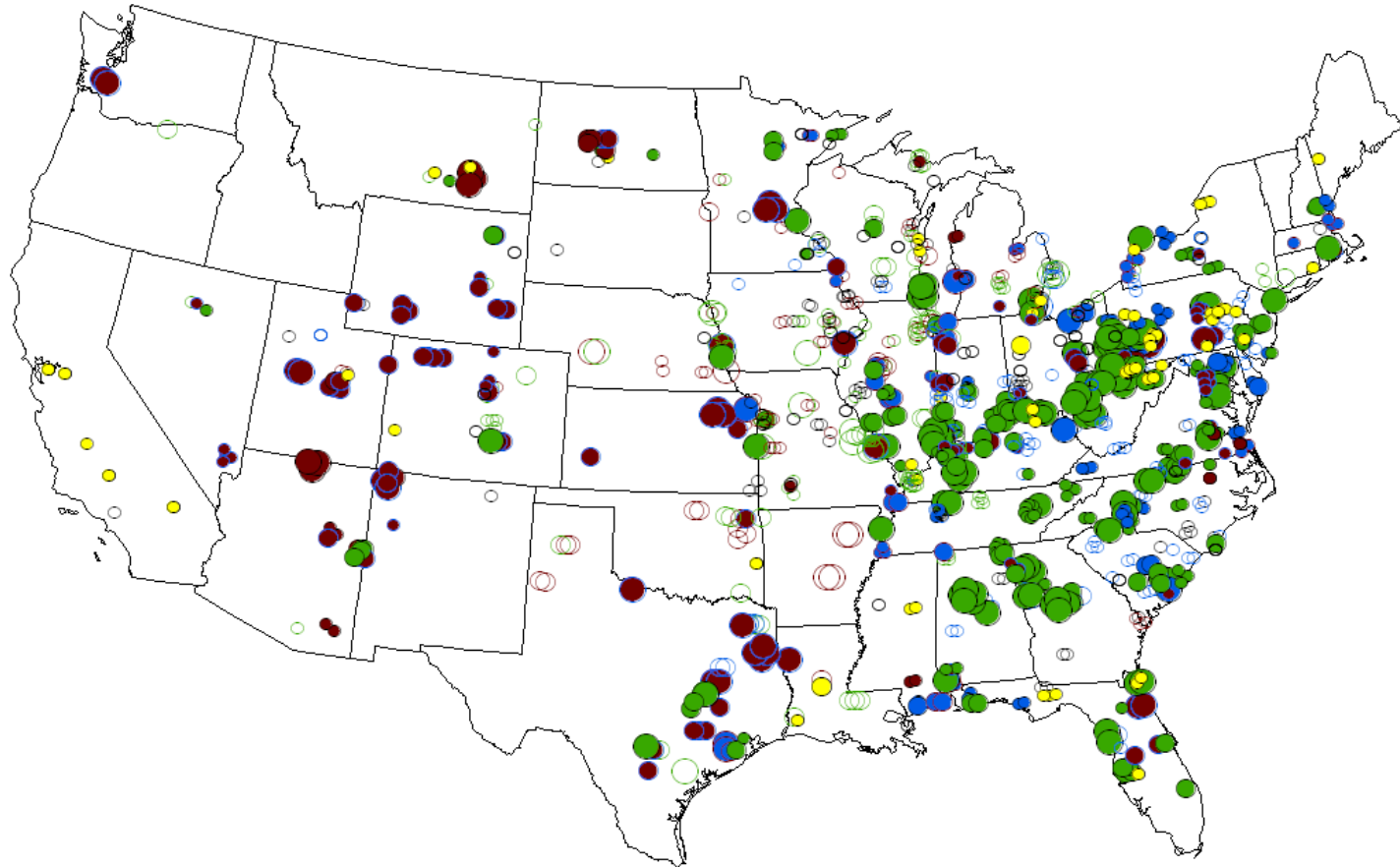
**None**

- Under 300 MW
- 300 MW to 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: Updated NEEDS and Data & Maps, EPA, 2009**

# 2014 Coal Controls for SO<sub>2</sub> and NO<sub>x</sub>



**Scrubber and SCR/SNCR Scrubber**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW
- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**SCR/SNCR**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**FBC/IGCC**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB and Under 1.0 lb SO<sub>2</sub>/mmBtu Under 1.0 lb SO<sub>2</sub>/mmBtu**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW
- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

**LNB**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

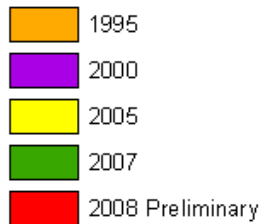
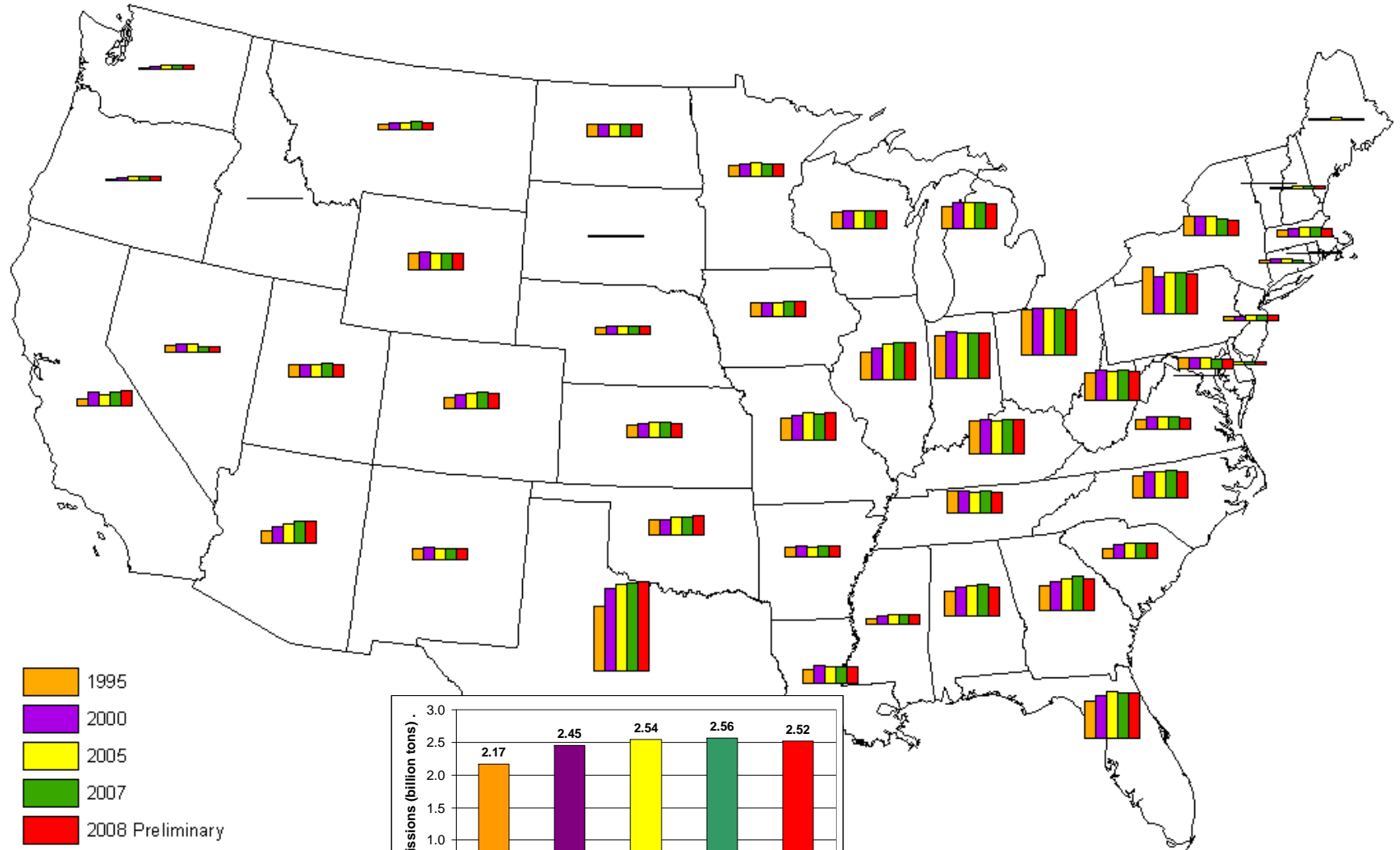
**None**

- Under 300 MW
- 300 MW to 600 MW
- Over 600 MW

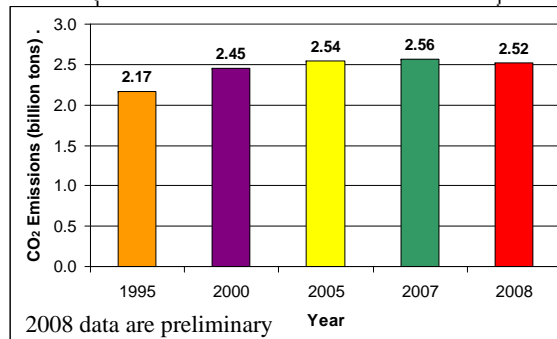
Virtually all coal-fired units have electrostatic precipitators, baghouses, or other advanced controls for high levels of particulate removal.

**Source: Updated NEEDS and Data & Maps, EPA, 2009**

# State-by-State Annual CO<sub>2</sub> Emission Levels for Acid Rain Program Sources, 1995-2008



**Scale: Largest bar equals 261 million tons of CO<sub>2</sub> emissions in Texas, 2008**  
Source: EPA, 2009



2008 data are preliminary

Emissions from over 3,500 electric generation units that use fossil fuels that are in the Acid Rain Program (ARP).