Utility PM and Precursor Emissions and Multi Pollutant Control Options: Regulatory Landscape, Technologies, and Costs

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What is NESCAUM?

- Northeast States for Coordinated Air Use Management
- Association of air quality divisions of state departments of environmental protection
- Provides Scientific, Technical and Policy Support
- Assists states in complying with Federal regulation and in developing regionally consistent strategies
Overview

• Regulatory landscape: Federal and states in the Northeast
• Role of smart environmental regulation in driving technology innovation and application
• A look back at seasonal NOx controls
• Multi-p federal legislative proposals/Hg MACT/state initiatives
Sources of Fine Particles

- **SULFATE** from SO2 (Power Plants and Coal & Oil-fired Boilers)
- **NITRATE** from NOx (Cars, Trucks, Power Plants & Heavy Equipment)
- **CRUSTAL MATERIAL** (Roads, Construction & Field Dust)
- **ELEMENTAL CARBON** (Diesel Engines, Heavy Equipment, Highway Vehicles)
- **ORGANICS** (Wild Land Fires, Waste Burning, Heavy Equipment Engines, Cars & Trucks)

*Typical Western City* vs. *Typical Eastern City*
There are 129 counties nationwide (114 counties in the East) that are likely to exceed the annual fine particle standard of 15 μg/m³.

65 million people (43 million people in the East) live in counties that would not meet this standard.

PM2.5 standard = 15 μg/m³
Environmental Regulation and Technology Innovation: Controlling Mercury Emissions from Coal-Fired Boilers

September 2000
NESCAUM Report:
Environmental Regulation & Technology Innovation

• Evaluated historical relationships over 50 years between environmental regulatory drivers and development, implementation, and innovation in control technologies and strategies

• Three case studies: SO2 from power plants; NOx from power plants; & Automobiles (controls/fuels/engines)
NESCAUM Report: Key Findings

• “Where strong regulatory drivers exist, substantial technological improvements & steady reductions in control costs follow.”

• “Dynamic occurs even when control options were limited or untested at the time regulations were introduced.”
Acid Rain/\( \text{SO}_2 \)

- First SO2 scrubber was installed at a power plant in London in 1930s
- First US installation in 1968
- Initially high capital & operational costs
- Weak environmental driver: 1990 CAAA; only 50% reduction required; 90 to 95% very doable and extremely cost-effective
- As of 2001, only 180 scrubbers for about 1,100 boilers (only 30 scrubbers after the 1990 CAAA !)
Coal Capacity (in MW) Equipped with Scrubbers (only 1/3 of the US coal-based MW capacity!)

<table>
<thead>
<tr>
<th>Technology</th>
<th>United States</th>
<th>Abroad</th>
<th>World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet</td>
<td>82,092</td>
<td>114,800</td>
<td>196,892</td>
</tr>
<tr>
<td>Dry</td>
<td>14,081</td>
<td>10,654</td>
<td>24,735</td>
</tr>
<tr>
<td>Regenerable</td>
<td>2,798</td>
<td>2,394</td>
<td>5,192</td>
</tr>
<tr>
<td>Total FGD</td>
<td>98,971</td>
<td>127,848</td>
<td>226,819</td>
</tr>
</tbody>
</table>

Source: ORD, EPA
History (1989 - 1997) of Cost Projections:
Federal Acid Rain Program (Phase II)

Annual Costs in Billions (1995 $)

- 6.0-8.5 (without trading)
- 4.7-6.6 (with trading)
- 1.6-5.3
- 1.5-2.9
- 2.3
- 1.5-2.1


History of Improving FGD Performance

Source: ORD, EPA
Acid Rain Scrubbers: Regulation Drives Cost Down by 25%
NOx From Power Plants

• Technologies in use outside US (Germany and Japan) in late seventies and mid eighties

• Resistance in US (concern about costs and “NOx disbenefits”)

• Weak regulatory drivers prior to 1990 CAAA
The Relationship Between Regulations and Implementation of NO\textsubscript{x} Control

<table>
<thead>
<tr>
<th>Year</th>
<th>Regulation</th>
<th>NO\textsubscript{x} LB/MBTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>CAAA NSPS -71</td>
<td>1.20</td>
</tr>
<tr>
<td>1975</td>
<td>CAAA NSPS -78</td>
<td>1.10</td>
</tr>
<tr>
<td>1977</td>
<td>CAAA NSPS -97</td>
<td>1.00</td>
</tr>
<tr>
<td>1980</td>
<td>CAAA NSPS -97</td>
<td>0.90</td>
</tr>
<tr>
<td>1985</td>
<td>CAAA NSPS -78</td>
<td>0.80</td>
</tr>
<tr>
<td>1990</td>
<td>CAAA NSPS -97</td>
<td>0.70</td>
</tr>
<tr>
<td>1995</td>
<td>CAAA NSPS -78</td>
<td>0.60</td>
</tr>
<tr>
<td>2000</td>
<td>CAAA NSPS -78</td>
<td>0.50</td>
</tr>
<tr>
<td>2005</td>
<td>CAAA NSPS -78</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Legend:
- NSPS - 71
- NSPS - 78
- NSPS - 97
- Acid Rain GRP II (PH I or II)
- Acid Rain GRP I, Phase I
- Acid Rain GRP I, Phase II
- RACT - Ozone NAA
- LA 0.015 lb/mmBtu standard
- Ozone Compliance
## Cost of NOx Controls

**Selective Catalytic Reduction**

<table>
<thead>
<tr>
<th>Study</th>
<th>Capital Costs ($/kW)</th>
<th>% Decrease</th>
<th>$ Per Ton</th>
<th>% Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPRI 1985</td>
<td>90-155</td>
<td>--</td>
<td>2,800 - 11,290</td>
<td>--</td>
</tr>
<tr>
<td>EPRI 1989</td>
<td>125</td>
<td>0</td>
<td>2,500 – 5,000</td>
<td>4 - 55</td>
</tr>
<tr>
<td>NESCAUM 1998</td>
<td>50-75</td>
<td>40-60</td>
<td>1,000 – 1,100</td>
<td>64 - 90</td>
</tr>
</tbody>
</table>
Emerging Issue: Control Technologies for Hg, Other HAPs, Primary Fine PM, and Multi-p

Are we ready to learn from the past?
NESCAUM and MARAMA
1998 Status Report on NOx:
Control Technologies and Cost Effectiveness for Utility Boilers

A look back at a “bad” policy call on “ozone-season only” NOx controls
SCR Group 1 Boilers -
Impact of Seasonal Controls

Effect of Seasonal Controls for retrofit SCR

- $60/KW capital cost, 330 MW boiler
- 0.45 to 0.15 lb/MMBTU reduction
- Capacity Factor = 0.65
- Seasonal controls limited to 5 months
- No SCR bypass

- Annual Cost ($1,000s)
- Tons Removed
- $/ton removed
- mills/MW-hr
## SCR Cost Summary

### Summary of Approximate Retrofit NOx Control Costs - SCR

<table>
<thead>
<tr>
<th>Technology</th>
<th>Reduction</th>
<th>Cap. Cost</th>
<th>Capacity Factor</th>
<th>Annual Control</th>
<th>Seasonal Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From: lb/MMBTU</td>
<td>To: lb/MMBTU</td>
<td>% Red'n</td>
<td>$/KW</td>
<td>%</td>
</tr>
<tr>
<td>SCR Coal-Grp 1</td>
<td>0.45</td>
<td>0.15</td>
<td>67%</td>
<td>50-70</td>
<td>50-80</td>
</tr>
<tr>
<td>SCR Coal-Grp 1</td>
<td>0.45</td>
<td>0.07</td>
<td>85%</td>
<td>70-90</td>
<td>50-80</td>
</tr>
<tr>
<td>SCR Coal-Grp 2</td>
<td>1.50</td>
<td>0.35</td>
<td>75%</td>
<td>50-70</td>
<td>50-80</td>
</tr>
<tr>
<td>SCR Coal-Grp 2</td>
<td>1.50</td>
<td>0.15</td>
<td>90%</td>
<td>70-90</td>
<td>50-80</td>
</tr>
<tr>
<td>SCR Gas</td>
<td>0.20</td>
<td>0.03</td>
<td>85%</td>
<td>~35</td>
<td>50-80*</td>
</tr>
<tr>
<td>SCR Gas</td>
<td>0.20</td>
<td>0.03</td>
<td>85%</td>
<td>~35</td>
<td>10-20</td>
</tr>
</tbody>
</table>

*In 1996 only 8 of the 123 oil/gas fired units (~4% of the total capacity) in the OTR had a Capacity Factor (CF) of 50% or more
Seasonal versus Annual Emission Reductions for Nitrogen Oxides

Analysis by

Resources for the Future

2001
Question asked by RFF

- What is the most cost-effective way to achieve NO\textsubscript{x} reductions with existing generating capital, given full set of NO\textsubscript{x} related problems?
Main Findings of RFF Study

- Annual policy yields $450 million to $770 million per year in additional net benefits.
- Finding is robust to omitted benefits.
- Annual policy has small effect on politically sensitive measure of electricity price.
Existing NOx Regulations
Utility Sources of NOx

- Coal: 4,573,000 tons, 87%
- Gas: 353,000 tons, 7%
- Internal Combustion: 170,000 tons, 3%
- Oil: 154,000 tons, 3%
Title IV NOx Program, Phase I

- Affected sources nationwide, starting January 1, 1996
- Emission limits for Group 1 boilers
  - Dry bottom, wall-fired: 0.50 lb/10^6 Btu
  - Tangentially fired: 0.45 lb/10^6 Btu
  - Basis: low NO_x burners
- NOx reduction: 340,000 tons/yr
Title IV NOx Program, Phase II

- Affected sources nationwide, starting January 1, 2000
- Revised limits for Group 1 boilers
  - Dry bottom, wall-fired: 0.46 lb/10^6 Btu
  - Tangentially fired: 0.40 lb/10^6 Btu
  - Basis: low NOₓ burners
- Emission limits for Group 2 boilers
  - Cyclone (>155 MWe): 0.86 lb/10^6 Btu
  - Cell burner: 0.68 lb/10^6 Btu
  - Wet bottom (>65 MWe): 0.84 lb/10^6 Btu
  - Vertically fired: 0.80 lb/10^6 Btu
  - Basis: Comb. Controls, SCR, NGR
- NOx reduction: About 2 million tons/yr
NOx SIP Call

- NOx budgets for 19 States & DC, starting May 2003-4
- Assumes reductions primarily from large sources in a cap and trade program
  - EGUs (average rate): 0.15 lb/10^6 Btu
  - Non-EGU: 60% control level
- Basis: A variety of NOx controls
- NOx reduction: 1 million tons by 2007
Section 126 Rules

- NO\textsubscript{x} budgets for 12 States & DC, starting May 31, 2004
- Assumes reductions from large boilers/turbines in a cap and trade program
  - EGUs (average rate): 0.15 lb/10\textsuperscript{6} Btu
  - Non-EGU: 60% decrease
- Basis: A variety of NO\textsubscript{x} controls
- Requirements do not apply if area has approved NO\textsubscript{x} SIP Call rules in place
Existing SO2 Regulations

• Title IV of the Clean Air Act Amendments of 1990 required SO$_2$ reductions to address acid rain (deposition)

• SO2 reduction via a cap-and-trade program
  – Phase I, 1995-2000: 445 units,
  – Phase II, 2000-+: >2000 units,
Sources of SO2

- Electric utilities: 10,821,000 tons (68.5%)
- Industrial processes: 1,447,000 tons (9.2%)
- Mobile sources: 701,000 tons (4.4%)
- Industrial and other combustion: 2,811,000 tons (17.8%)
- Miscellaneous area and point: 10,000 tons (0.1%)
Title IV SO2 Program

- Phase I Sources
- Phase II Sources
- All Affected Sources, 2000

Million tons SO2

1980: 9.40
1985: 9.30
1990: 8.70
1995: 4.45
1996: 4.77
1997: 4.77
1998: 4.66
1999: 4.35
2000: 11.20

1995-1999: Allowances issued for 263 Phase I units;
2000: Allowances issued for all (Phase I and II) affected sources.

NESCAUM
Northeast States for Coordinated Air Use Management
Clean Air Act Section 112 Rule for Hg and other HAPs

- “Best of the best” for new sources
- Average of the top performing 12 percent for existing sources defines the floor emission limit
- Allows for determining the floor based on subcategories (based on what ?)
- Emissions standard applicable to each source
- Section 112 does not allow trading between facilities to meet the standard
Sources of Mercury

- Top five anthropogenic sources (1999)
  - Utility coal - 48 tons (40%)
  - Industrial boilers - 12 tons (10%)
  - HWI - 6.6 tons (5.5%)
  - Chlorine production - 6.5 tons (5.4%)
  - MWC - 5 tons (4.0%): THE GREAT SUCCESS STORY
Mercury MACT Plans/ Schedule

• Under settlement agreement, proposal of MACT rule on or before December 15, 2003 UNLESS multipollutant legislation enacted before then that amends CAA and eliminates MACT requirement
• Promulgation on or before December 15, 2004
• Litigation expected
• Compliance by December 15, 2007 (extensions?)
Fine PM (and Hg/HAPs) Control

• An emerging issue: Most (84%) of the US coal utility infrastructure has ESPs; only 14%, the more efficient baghouses

• Though both do well (99%+) for total PM mass, baghouses do much better (99%+) than ESPs (80 to 95%) for fine PM mass

• Has serious implications for control of hazardous air pollutants (HAPs) including mercury; cost of retrofitting existing infrastructure with baghouses? $20-$40/KW?
PM$_{2.5}$ Sources

- Industrial and other combustion: 751,000 tons (10.2%)
- Electric utilities: 568,000 tons (7.7%)
- Industrial processes: 999,000 tons (13.5%)
- Mobile sources: 452,000 tons (6.1%)
- Miscellaneous area and point: 4,609,000 tons (62.5%)
# PM Regulatory Schedules

## 8-hr Ozone Standards
- **2003** States recommend nonattainment designations
- **2005-09** New NOx Rule/NAAQS Review
- **2007-08** States develop/submit SIPs
- **2007-08** EPA approves SIPs
- **2007-19** Attainment deadlines vary

## PM$_{2.5}$ Standards (fine particles)
- **2003** States recommend nonattainment designations
- **2004-05** EPA makes nonattainment designations, complete NAAQS review
- **2005** EPA Issues SOx/NOx transport rule
- **2004-08** States develop/submit SIPs
- **2008-09** EPA approves SIPs
- **2010-14** Attainment deadlines

## Regional Haze Program
- **2007-08** States submit regional haze SIPs
- **2008-09** EPA approves SIPs
- **2013-18** Plants must install BART or comply with backstop trading program

## Mobile Source Program
- **2003** Non-road diesel proposal
- **2003--** Other non-road categories
- **2004** Tier 2 becomes effective
- **•** HD diesel rules effective
Clean Air Act is a Complex Set of Requirements Covering the Power Sector

**NSR Permits** for new sources & modifications that increase emissions

**Ozone**
- 1-hr Serious Area Attainment Date
- NOx SIPs Due
- NOx Trading
- OTC
- Designate areas for 8-hr Ozone NAAQS
- Section 126 NOx Controls
- 1-hr Severe Area Attainment Date
- NOx SIP Call Reductions
- Marginal 8-hr Ozone NAAQS Attainment Date
- 8-hr Ozone Attainment Demonstration SIPs due
- Assess Effectiveness of Regional Ozone Strategies
- Possible Regional NOx Reductions? (SIP call II)
- Moderate 8-hr Ozone NAAQS Attainment Date
- Serious 8-hr Ozone NAAQS attainment Date
- Latest attainment date for Fine PM NAAQS
- Compliance with Utility MACT
- Phase II Acid Rain Compliance
- Acid Rain, PM$_{2.5}$, Haze, Toxics
- Interstate Transport Rule to Address SO$_2$/NOx Emissions for Fine PM NAAQS and Regional Haze
- Compliance for BART Sources
- Compliance for BART sources under the Trading Program
- Second Regional Haze SIPs due
- Proposed Utility MACT
- Final Utility MACT
- Designate Areas for Fine PM NAAQS
- New Fine PM NAAQS Implementation Plans
- Regional Haze SIPs due

**Note:** Dotted lines indicate a range of possible dates.

1 The D.C. Circuit Court has delayed the May 1, 2003 EGU compliance date for the section 126 final rule.
2 Further action on ozone would be considered based on the 2007 assessment.
3 The SIP-submittal and attainment dates are keyed off the date of designation; for example, if PM or ozone are designated in 2004, the first attainment date is 2009.

EPA is required to update the new source performance standards (NSPS) for boilers and turbines every 8 years.
## Overview of the Proposals

<table>
<thead>
<tr>
<th>Clean Power Act (S. 366)</th>
<th>NOx Cap</th>
<th>SO₂ Cap</th>
<th>CO₂ Cap</th>
<th>Hg Cap</th>
<th>Emission Trading</th>
<th>NSR &amp; Other Regulatory Reform</th>
<th>Allocation Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Sponsor: Jeffords</td>
<td>1.51 MT by 2009</td>
<td>2.25 MT by 2009; with 0.28 MT in west (WRAP + MT, WA, CA) and 1.98 MT in eastern region.</td>
<td>2.05 BT by 2009 (roughly 1990 levels) plus flexibility mechanisms.</td>
<td>5 T by 2009</td>
<td>Trading allowed for NOx, SO₂ and CO₂. No trading for mercury.</td>
<td>Retains NSR. Contains “birthday” provision: 40 years after commencing operation, each facility subject to BACT.</td>
<td>Declining share of total cap (starting at 10%) allocated to EGUAs based on output basis. All other allowances auctioned with $$ going to consumers, electricity-intensive industries, renewables &amp; EE &amp; carbon sequestration.</td>
</tr>
<tr>
<td>Clean Air Planning Act (S. 843)</td>
<td>1.87 MT by 2009</td>
<td>4.5 MT by 2009</td>
<td>Stabilize at 2006 levels (approx. 2.57 BT) plus flexibility measures in 2009. 2001 levels (approx. 2.47 BT) plus specified flexibility measures in 2013.</td>
<td>24 T by 2009</td>
<td>Cap-and-trade for NOx, SO₂, CO₂ and mercury, w. facility-specific mercury requirements as noted.</td>
<td>NSR restricted to new units (incl. replacement of existing boiler) and to activities that result in increase in maximum hourly rate of emissions of air pollutants regulated under NSR, as measured in lbs/MWh. BACT to be defined biennially.</td>
<td>For NOx, Hg and CO₂ allocation is output-based using average annual net generation from most recent 3-year period. For SO₂ allocation is based on existing Acid Rain Program, with some modifications.</td>
</tr>
<tr>
<td>Main Sponsors: Carper, Chaffee, Gregg</td>
<td>1.7 MT by 2013</td>
<td>3.5 MT by 2013</td>
<td>2.25 MT by 2016</td>
<td>2009 &amp; 2013, respectively.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Skies Act (S. 485; H.R. 999)</td>
<td>2.1 MT cap in 2008. 3.0 MT cap in 2018</td>
<td>4.5 MT cap in 2010</td>
<td>Does not include CO₂. Administration has advocated voluntary program for reducing GHG intensity of economy.</td>
<td>26 T cap in 2010. 15 T cap in 2018.</td>
<td>Trading allowed for NOx, SO₂ and mercury.</td>
<td>New or modified sources exempt from NSR and BART so long as they meet new national emissions limits or (1) achieve PM controls of 0.03 lb/mmBtu within 8 years and (2) use good combustion practices to minimize CO. In addition, bill would (1) restrict federal action on Section 126 petitions w. respect to power plants until after 2012 and subject to new cost-benefit requirements; (2) remove EPA authority to regulate non-Hg HAPs; (3) restrict visibility protections to sources located within 50 km of Class I area; (4) remove offset requirements (provided no interference w. attainment); (5) create new “transitional” designation for areas that can model attainment under future EGU reductions plus local measures. Effective attainment deadlines delayed until as late as 2020 for these areas.</td>
<td>Input-based allocations with auctions for a portion of the allowances each year. Portion of total budget that is auctioned starts at 1% and increases very gradually over time.</td>
</tr>
<tr>
<td>Sponsors: Inhofe &amp; Voinovich in Senate; Barton &amp; Tauzin in House.</td>
<td>1.7 MT cap in 2018</td>
<td>3.0 MT cap in 2018</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Three Key Questions to ask of each multi-p initiative

• Is it comprehensive?
• Is it sufficient to address the significant public and environmental challenges we face?
• Does it strengthen our clean-air efforts not only at the national level, but also at the local/state/regional levels?
Other equally important questions to ask of each multi-p initiative

• Does it recognize and incorporate the historic and well-proven relationship between environmental regulatory drivers and technology innovation?

• Does it recognize that current cost estimates are almost always much higher than actual future costs? And then buy the right amount of environmental protection we can afford now.
**Sulfur Dioxide - SO$_2$**

**What’s on the table:**
- 3.5-4.5 million ton *interim* cap
- 2.25-3.0 million ton *final* cap
- Dates: 2009-2018

**What’s at stake:**
- PM$_{fine}$ attainment, acid rain recovery, regional haze progress, SO$_2$ NAAQS attainment (in some areas), public health.

**‘Status quo’ alternative:**
- Rely on PM attainment needs, future 126 petitions, cont’d acid rain concerns and regional haze SIPs to drive further reductions.

**Other considerations:**
- Interaction of existing CAA programs with current Title IV cap of 8.9 million tons.
Nitrogen Oxides - NO$_x$

What’s on the table:
- 1.87-2.1 million ton *interim* cap
- 1.51-1.7 million ton *final* cap
- Dates: 2009-2018

What’s at stake:
- Water quality & nitrogen deposition, acid rain recovery, PM$_{fine}$ attainment, ozone attainment (to the extent tighter caps provide additional summertime reductions), public health.

‘Status quo’ alternative:
- Rely on water quality/acid rain concerns and PM/regional haze SIPs to drive annual controls. Rely on all of the above, plus ozone attainment needs to drive add’tl overall cuts.

Other considerations:
- 1st phase reductions in all proposals essentially annualize NO$_x$ SIP call, hence little further ozone attainment benefit in eastern states. Question about inclusion of industrial boilers now in SIP call.
Mercury

What’s on the table:
- 24-26 ton *interim* cap
- 5-15 ton *final* cap
- Dates: 2009-2018
- Full trading (CSI), no trading (Jeffords), minimum plant-by-plant requirement (Carper)

What’s at stake:
- Public health concerns (esp. for fetus and young children); impacts on wildlife.

‘Status quo’ alternative:
- Rely on mercury MACT process to yield rulemaking by end of 2004 and implementation of plant-specific control requirements by end of 2007.

Other considerations:
- Current Clean Air Act requires controls at level of “Maximum Achievable Control Technology”
Carbon Dioxide – CO$_2$

What’s on the table:

- No action (CSI)
- 2006 levels by 2009 and 2001 levels by 2013 (Carper)
- 1990 levels by 2009 (Jeffords)
States
Initiatives/Legislation/Regulation

• New York
  – SO2 and NOx (reg. approved March 2003)
  – SO2: 50% below Title IV (phase II), statewide cap
  – NOx: Year round statewide cap (based on 0.15 lbs/MMBtu)
  – Governor’s Task Force on carbon
  – No action on Hg yet
States
Initiatives/Legislation/Regulation

• Massachusetts:
  – NOx, SO2, C, and Hg (facility specific reductions)
  – Output based standards (1.5 lbs/MWhr for NOx by 2004/2006; 3.0 lbs/MWhr for SO2 by 2006/2008); 1800 lbs/MWhr for CO2 by 2006/2008
  – Hg: regulation proposed September 19, 2003
State Initiatives/Legislation/Regulation

- Connecticut:
  - NOx, SO2 (reg. passed in 2000) and Hg
  - Statewide annual NOx cap (based on 0.15 lbs/MMBtu)
  - Two-phase approach; 0.3% S or 0.33 lbs/MMBtu by 2003 in Phase II
  - June 2003 state leg. to control Hg by 90% by 2008
  - Developing CO2 plan to meet NEG/ECP goals
State
Initiatives/Legislation/Regulation

• New Hampshire:
  – NH’s Clean Power Act (2002) for NOx, SO2, CO2, and “future” Hg
  – 90% reduction from 1990 emissions for NOx
  – 87% reductions from 1999 emissions for SO2
  – Return to 1990 levels for CO2 by 2006
  – Cap for Hg to be proposed by 3/2004
The Northeast is Moving Forward in Controlling Mercury

• On September 19, 2003, Massachusetts announced its proposed regulations for power plants (http://www.state.ma.us/dep/bwp/daqc/daqcpubs.htm#regs)

• Public hearings in November 2003

• In simple terms: 85% removal by 2006; 95% removal by 2012 (reduction of over 130 pounds per year)
Northeast States Mercury Initiatives

• Connecticut passed state legislation in June 2003 requiring 90% reduction in power plant mercury emissions by 2008
• New Hampshire’s “Clean Power Act” of 2002 requires a statewide cap on mercury emissions (recommendation on cap expected by March 2004)