Summary of EPA Power Sector Regulation: Air Toxics Standards

JENNIFER MACEDONIA
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Upcoming Power Sector EPA Regulations

**Air:** Clean Air Act 1990
- Utility Air Toxics (MATS/MACT) (Final 12/11)
- Cross State Air Pollution Rule (Final 7/11, reconsidered, stay)
- GHG New Source Performance Standards (proposal expected soon)

**Water:** Clean Water Act 1970s
- Cooling Water Intake 316(b) (proposed 3/11, Final expected 7/12)

**Waste:** Resource Conservation and Recovery Act 1970-84
- Coal Ash (proposed 6/10, Notice of Data Availability 10/11, Final TBD)
Air Toxics Rule

MATS: Mercury and Air Toxics Standards for Power Plants
MACT: Maximum Achievable Control Technology
What is MATS?  Mercury and Air Toxics Standards for Power Plants

— First ever national emission standards for power plant air toxics
  — New and existing facilities
  — Coal & oil-fired electric generating units
  — Reduces air toxics linked to human health issues
    • cancer, IQ loss, neurological damage, heart & lung disease, premature death
  — Hazardous air pollutants (HAP)/air toxics:
    • metals (e.g., mercury, arsenic, chromium, nickel)
    • acid gases (e.g., hydrochloric acid (HCl), hydrogen flouride)
    • organic air toxics (dioxin, furans)
1990 Clean Air Act required studies & EPA finding on power plant toxics

- Determine if “appropriate and necessary” to regulate
- In 2000, EPA determined: yes

Thus, Act requires MACT emission limits

- 2008: First EPA attempt (2005 CAMR) overturned by court
- Court disagreed w/EPA “delisting” power sector from toxic provisions

Mandated deadlines for power plant MACT Standards

- Proposed Rule by March 2011
- Final Rule by December 2011
What is required?

— Clean Air Action §112 requires
  — MACT: maximum achievable control technology
  — Standards at least as stringent as top 12% of existing units
— Emission rate (lb/mmBtu) standards for listed pollutants
  — Mercury
  — Non-mercury metallic toxics (measured as particulate matter: PM)
  — Acid gases (measured as HCl or SO2 surrogate standard)
— Limits established by subcategory
  — New vs. existing units
  — 2 coal-fired subcategories: minemouth lignite, other coal
  — 3 oil-fired subcategories: limited use, non-continental, other oil
  — Averaging allowed with units in same category at same facility
— Work practice standards for:
  — Organic air toxins (dioxin, furans)
  — All pollutants during startup and shutdown conditions
Changes since EPA’s March 2011 Proposed Rule

— Technical changes ease compliance burden:
  
  — **New units**: standards for newly built coal plants better represent plants likely to be built
  
  — **Metals/particulate limit**: measuring compliance with only filterable PM will allow more plants to comply with less expensive upgrades or existing controls
  
  — **Start-up/Shutdown**: relaxed requirements during start-up & shutdown conditions, when emissions are often higher
  
  — **Limited use oil-fired units**: work practice standards for units infrequently burning oil (e.g., during gas curtailments)
  
  — **Measurement/reporting**: reduced requirements & alternatives

PM: Particulate Matter
Compliance Time

- CAA §112 requires compliance within 3 years (by March 2015)

- Pathways that may provide additional time:
  - State permitting agency may grant 4th year (comply by 2016)
    • if needed to add controls, build replacement power, upgrade transmission
  - EPA Administrative Order would allow 5th yr (comply by 2017), free of penalties, for reliability critical units
  - EPA may negotiate consent decrees on case-by-case basis

CAA: Clean Air Act
Compliance Options

- Many existing units already have compliant controls
- Change fuels: blend/switch coal or oil, repower to or co-fire gas
- Some may retire b/c not economic to operate in compliance
- Install/upgrade pollution control technologies, such as:
  - Mercury
    - Activated carbon injection (ACI) + particulate controls, OR
    - Wet scrubber + SCR or scrubber additives
  - Acid gases (HCl or SO₂ surrogate limit)
    - Wet Scrubber,
    - Dry Scrubber + particulate controls, OR
    - Dry Sorbent Injection (DSI) + particulate controls
  - Metallic toxics (particulate matter (PM) surrogate limit)
    - Upgrade existing electrostatic precipitator (ESP), OR
    - Baghouse/fabric filter
Activated Carbon Injection (ACI):
• Commercially available technology in use at 100s of units for state mercury limits
• Inject activated carbon into flue gas duct & collect particles downstream
• 12-18 months design, construction, testing; no outage

Dry Sorbent Injection (DSI):
• Commercially available technology in use at 90 units, primarily for $\text{SO}_2/\text{SO}_3$
• Inject sorbent (hydrated lime, trona, sodium carbonate) & collect particles downstream
• Shown to reduce acid gases w/particulate controls & some coal types
• Limited public data on HCl performance; not yet required to measure/report
• Some companies question efficacy for HCl MACT limit
• Others installed, testing, or announced plans to install for MACT compliance
• Testing shows some Powder River Basin coal meets HCl limit without any control
• 9-12 months design → construction, no outage

EPA projects no new WET scrubbers, instead DRY scrubbers, scrubber upgrades, and DSI.

Source: US EPA, MATS Regulatory Impact Analysis p3-15

Base case includes existing regulations and Cross State Air Pollution Rule.
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Base case includes existing regulations and Cross State Air Pollution Rule, but does not include state mercury requirements, not federally enforceable. Thus, 1/3 of this ACI is already installed.
EPA Projected MATS Compliance

- EPA projects, out of 310 GW of coal capacity:
  - <2% retires (<5 GW)
  - To meet mercury limit: ≈1/3 installs ACI (99 GW)
  - To meet HCl limit: ≈20% upgrades existing scrubbers (63 GW)
    ≈20% installs either dry scrubber (20 GW) or DSI (44 GW)
  - To meet PM and other limits:
    <45% installs fabric filter (102 GW) or upgrades ESP (34 GW)
  - Note: these % and GW values don’t add up to total capacity needing retrofits b/c they double count when the same unit installs multiple controls to meet three emission limits.
    - E.g., many uncontrolled units will add ACI, dry scrubber + fabric filter.
**MATS ACID GAS COMPLIANCE**

### EPA Projected Retrofits for Acid Gases*

<table>
<thead>
<tr>
<th>MATS Retrofits</th>
<th>GW</th>
<th>Design + construction¹ (not permit)</th>
<th>Install Outage¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSI</td>
<td>44</td>
<td>9-12 months</td>
<td>none</td>
</tr>
<tr>
<td>Dry FGD</td>
<td>20</td>
<td>24-36 months</td>
<td></td>
</tr>
<tr>
<td>FGD upgrade</td>
<td>63</td>
<td>12-36 months</td>
<td>4-8 wks</td>
</tr>
</tbody>
</table>


*In some cases, particulate control upgrades/retrofits, and mercury controls also required to meet the MATS standards.*

**Source:** Data in EPA’s MATS Regulatory Impact Analysis

**DSI:** Dry Sorbent Injection  
**FGD:** Flue gas desulfurization (scrubber)  
**MATS:** Mercury and Air Toxic Standards
Electric Reliability

- Congressional Research Service: “it is unlikely that electric reliability will be harmed by the rule.”


- Changes since EPA’s proposed rule generally ease the compliance burden and reduce reliability impacts.

- EPA: “although any closure of a large generation facility will need to be studied to determine potential local reliability concerns, EPA analysis suggests ... little to no overall impact on electric reliability” because retirements are limited in scope and there is substantial excess capacity in the power sector. (EPA MATS RIA p 3-19.)
Electricity price

EPA projects national average 3.1% increase from MATS rule.

Electricity prices have declined >20% in real terms since 1980.

CRS: “impact of price changes would be relatively small compared to this downward trend, and well within the normal range of historical price fluctuations.”

Sources: EPA MATS RIA graphs project MATS price increase against EIA historical/projected price

MATS: Mercury and Air Toxics Standards
CRS: Congressional Research Service
RIA: Regulatory Impact Analysis
EIA: Energy Information Agency
EPA PROJECTED COSTS AND BENEFITS

Costs

↑ retail electricity and natural gas prices

$9.6 Billion/yr

Health Benefits

fewer premature deaths

less neurological damage, cancer, lung/heart disease

$37-90 Billion/yr

Benefits are primarily from co-benefit particle reductions

Source: EPA projected costs and benefits
Potential Challenges

- Congress
  - Congressional Review Act
  - Legislation delaying compliance with standards

- Litigation
  - Was EPA correct in regulating utility toxics under CAA §112?
    - EPA’s 2000 finding of “appropriate and necessary” to list electric generating units for air toxic regulation
    - EPA must defend against utility arguments as well as EPA 2005 arguments to reverse their determination that it was appropriate to regulate
To Delist HAP Source Category (e.g., electric generating units)

− In 2000, EPA listed electric generating units as a source category for CAA §112 regulation/MACT standards

− Under CAA, to delist source category, EPA must demonstrate:
  − No source w/in listed category poses a lifetime cancer risk > 1 in 1 million to individual most exposed
  − Emissions from no source in category exceeds level adequate to protect public health w/margin of safety; and
  − No adverse environmental effects will result from the emissions of any source
Cross State Air Pollution Rule

Proposed as Transport Rule to replace Clean Air Interstate Rule (CAIR)
Status

- **December 2011**: Stay granted by DC Court of Appeals
  - Pause in implementation while court hears arguments & decides on merits
  - Court set aggressive schedule: 4/12 hearing, expect mid-2012 decision
  - Judge indicated if industry wants more time for hearing, should move to lift stay
- **CAIR in place during the stay**
  - Clean Air Interstate Rule: 2005 EPA rule for air pollution crossing state lines
  - Overturned by court in 2008, but remained in place until CSAPR in effect
- **Possible outcomes**
  - If CSAPR upheld, implementation likely delayed until 2013
  - If CSAPR not upheld, court may remand to EPA to issue a new proposal

- **July 2011**: Final CSAPR issued
- **October 2011**: Proposed technical amendments
- **January 2012**: Compliance period was to begin

CAIR: Clean Air Interstate Rule
CSAPR: Cross State Air Pollution Rule
Cross State Air Pollution Rule requires:

- A total of 28 states to reduce
  - annual SO$_2$ and NO$_X$ emissions (23 states),
  - ozone season NO$_X$ emissions (25 states)
- To help downwind states meet 1997 ozone and 1997/2006 fine particle National Ambient Air Quality Standards (NAAQS)
- State emissions caps for coal & oil-fired power plant SO$_2$ and/or NO$_X$
  - Emissions trading allowed within states & between some states
- Phase I limits were set to begin in 2012, but are now on hold
- Phase II tighter SO$_2$ limits for Group 1 states in 2014

NAAQS: National Ambient Air Quality Standards
COVERAGE OF CROSS STATE AIR POLLUTION RULE

Source: U.S. Environmental Protection Agency

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GHG Performance Standards
GHG Regulation of Power Plants

- Large new sources & major modifications currently subject to pre-construction permitting
  - Case-by-case evaluation & BACT determination

- Category-wide emission standards expected soon
  - New Source Performance Standard (NSPS)
  - Modified source standard

- Expected at later date:
  - Existing source standards (by states under EPA guidance)