EPA's Final Rules to Reduce Air Toxics from Industrial Boilers
Topics

- Overview of actions
  - Who is covered
  - Why we issued the rules
  - Benefits, costs, and impact on jobs
  - Reconsideration
  - Technical assistance for compliance

- Specific requirements and key changes from proposal to final
  - Major source boiler rule
  - Area source boiler rule
Overview of EPA Actions

- EPA issued four rules that will reduce emissions of air pollutants from:
  - Boilers at large sources of air toxics (“major sources”)
  - Boilers at small sources of air toxics (“area sources”)
  - Incinerators that burn solid waste at industrial and commercial facilities (CISWI)
  - Incinerators that burn sewage sludge at wastewater treatment facilities (SSI)
- EPA also issued a final rule that defines “solid waste”
  - Necessary to determine whether a facility has to meet a boiler standard or an incinerator standard
- A Federal court required EPA to issue these standards no later than February 21.
  - Prior Administration’s standards were overturned in court.
  - Final standards signed on February 21, 2011.
- EPA made significant changes to the proposed standards based on our review of additional data and 4,800 public comments received during comment period.
  - Final standards achieve significant health benefits while being more practical and less costly to implement.
- EPA is initiating a reconsideration process for the two boiler rules and the Commercial, Industrial Solid Waste Incinerator (CISWI) rule.
Two Rules Cover Boilers & Process Heaters

- **Boilers** burn fuel to produce steam that is used for heat or electricity
- **Process heaters** heat raw or intermediate materials during an industrial process
- EPA has issued two standards covering:
  - **Boilers and process heaters at major sources of air toxics**
    - A major source is a facility that emits or has the potential to emit 10 or more tons per year (tpy) of any single air toxic or 25 tpy or more of any combination of air toxics.
    - Expected to apply to about 13,800 boilers located at 1,600 facilities, primarily larger industrial sources such as refineries, chemical and manufacturing plants, pulp and paper mills
      - Also includes boilers at some larger commercial and institutional facilities, such as shopping malls and universities
    - More than 80% of large boilers are gas-fired and will only have to conduct an annual tune-up rather than meet an emission standard.
    - 15 subcategories identified based on design; specific requirements for each subcategory
    - Standards vary slightly for existing units vs. new units
  - **Boilers at area sources of air toxics**
    - An area source facility emits or has the potential to emit less than 10 tons per year (tpy) of any single air toxic and less than 25 tpy of any combination of air toxics.
    - Expected to apply to about 187,000 boilers located primarily at commercial facilities (e.g., hotels, office buildings, restaurants) and institutional facilities (e.g., schools, hospitals, prisons)
    - Rule does NOT apply to boilers that are gas-fired (approximately 1.3 million units, or 87% of all area source boilers).
    - Most units that are covered by this rule will be required to conduct a tune-up every other year and will not have to install pollution control equipment.
    - Subcategories based on boiler type
    - Standards vary slightly for existing units vs. new units
EPA is Initiating a Reconsideration Process for the Two Boiler Rules and CISWI Rule

- EPA is announcing that we are reconsidering certain aspects of both boiler rules and the solid waste incinerator rule.
- While these final rules reflect reasonable approaches consistent with the requirements of the Clean Air Act, some of the issues identified in the public comments raised difficult technical issues that we believe would benefit from additional public involvement.
- Following the reconsideration process set forth in the Clean Air Act, EPA is developing a proposed rule that will request comment on:
  - Specific elements of the final rules
  - Any provisions we propose to modify or add after more fully evaluating the data and comments already received
- We will also fully evaluate any stakeholder petitions for reconsideration.
- Existing sources will not have to comply with the standards for at least three years.
  - As part of the reconsideration of the rules, stakeholders who make a compelling case may request an extension of that deadline.
Establishing MACT Standards: Setting Air Toxics Emission Limits

- The 1990 Clean Air Act Amendments established the Maximum Achievable Control Technology (“MACT”) program in section 112 of the Act, which is quite prescriptive in its directions to the EPA Administrator.
  - Reflected concern that insufficient air toxic reductions had been achieved under the 1970 Act provisions.
- Section 112 required MACT standards to be issued for relevant source categories no later than 2000.
  - In 2007, the standards were vacated and remanded by the U.S. Court of Appeals for the District of Columbia Circuit.
- Section 112 specifies the 187 pollutants that must be addressed in setting a MACT standard.
  - EPA may address multiple pollutants by setting a standard for one pollutant, provided there is adequate technical justification.
- Section 112 requires that a MACT standard be:
  - For existing sources, at least as stringent as the average of the best performing 12 percent of sources in the category (or sub-category).
  - For new sources, at least as stringent as the emission control achieved by the best controlled similar source.
- Section 112 allows the Administrator to set work practice standards (such as an annual tune-up requirement) in certain limited situations.
- Section 112 allows the Administrator to subcategorize, which allows similar equipment to be treated similarly.
- Existing sources must comply with MACT requirements within 3 years of the effective date of the rule, although in certain circumstances a year extension may be granted.
Boiler MACT – Final Subcategories

- **Fifteen subcategories based on design type:**
  - Solid fuel
  - Pulverized coal units
  - Coal-fired stokers
  - Coal-fired fluidized bed combustion units
  - Biomass-fired stokers
  - Biomass-fired fluidized bed combustion units
  - Biomass-fired Dutch Ovens/Suspension burners
  - Biomass-fired fuel cells
  - Biomass-fired hybrid suspension/grate units
  - Liquid fuel-fired units
  - Liquid fuel-fired units located in non-continental States and territories
  - Gas 1 (Natural gas/refinery gas)
  - Gas 2 (other gases)
  - Metal processing furnaces (natural gas-fired)
  - Limited Use
Major Source Boiler Rule: Compliance Requirements

Summary of requirements for boilers at major sources (i.e., those sources that emit or have the potential to emit more than 10 tons per year (tpy) of any single air toxic or more than 25 tpy of any combination of air toxics)

- **Existing large boilers** (>=10mm/BTU)
  - **Clean gas** (*natural gas, refinery gas, or process gas as clean as natural gas*)
    - Annual tune-up
    - No numeric emission limits
    - 1-time energy assessment
  - **Solid fuel (coal or biomass)**
    - Numeric emission limits for 5 pollutants
      - *mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)*
    - 1-time energy assessment
  - **Oil**
    - Numeric emission limits for 5 pollutants
      - *mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)*
    - 1-time energy assessment
  - **Process gas that is not “clean” gas**
    - Numeric emission limits for 5 pollutants
      - *mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)*
    - 1-time energy assessment
  - **Limited Use**
    - Tune-up every other year
    - 1-time energy assessment
    - No numeric emission limits
Major Source Boiler Rule: Compliance Requirements (cont)

- **New large boilers** (>=10mm/BTU)
  - **Clean gas** (*natural gas, refinery gas, or process gas as clean as natural gas*)
    - Annual tune-up
    - No numeric emission limits
  - **Solid fuel** (coal or biomass)
    - Numeric emission limits for 5 pollutants:
      - mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
  - **Oil**
    - Numeric emission limits for 5 pollutants:
      - mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
  - **Process gas that is not “clean” gas**
    - Numeric emission limits for 5 pollutants:
      - mercury, dioxin, particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO)
  - **Limited Use**
    - Tune-up every other year
    - No numeric emission limits
Major Source Boiler Rule: Compliance Requirements (cont)

- **Existing small boilers** (<10mm/BTU)
  - **Gas, solid fuel, oil, or limited use**
    - Tune-up every other year
    - 1-time energy assessment
    - No numeric emission limits

- **New small boilers** (<10mm/BTU)
  - **Gas, solid fuel, oil, or limited use**
    - Tune-up every other year
    - No numeric emission limits
Benefits of Major Source Boiler Rule

- For every $1 this rule will cost society, the public will receive at least $15 to $36 in health and other benefits.
  - EPA monetizes the benefits of the standards’ reduction of ozone and fine particle pollution, but is unable to monetize the standards’ other benefits, including the benefits of reduced exposure to air toxics.
- These standards will reduce ozone and fine particles, which will protect public health by avoiding each year:
  - 2,500 to 6,500 premature deaths
  - 1,600 cases of chronic bronchitis
  - 4,000 nonfatal heart attacks
  - 4,300 hospital and emergency room visits
  - 3,700 cases of acute bronchitis
  - 78,000 cases of respiratory symptoms
  - 310,000 days when people miss work or school
  - 41,000 cases of aggravated asthma
  - 1.9 million days when people must restrict their activities
- These standards will also reduce exposure to air toxics, including pollutants of particular concern for the health of our children. For example, it will reduce mercury and lead, which adversely affect developing brains, including having adverse effects on IQ, learning and memory.
Major Source Boiler Rule: Key Changes Between Proposal and Final

- Based on public comment and additional data provided during the comment period, EPA made significant changes, including changes to the requirements for:

- **Large Boilers:**
  - EPA established solid fuel subcategory
    - This ensures all solid fuel-burning units are appropriately regulated, and recognizes there is no clear technical distinction between units that burn coal and biomass
  - Biomass-fired units
    - EPA provided additional flexibility in how units comply, through increased CO emission limits for several subcategories, solid fuel subcategory, establishment of work practice standards for startup and shutdown.
      - Lowers costs, encourages coal-fired units to co-fire or switch to biomass.
Major Source Boiler Rule Changes (cont)

- **Small Boilers** (heat input capacity less than 10 million Btus/hr)
  - New data identified difficulties with small units design that preclude the use of emissions testing for new and existing small boilers.
  - EPA did not set specific numerical emission limits; instead, rules require tune-up every other year for efficiency.

- **Limited Use Boilers** (operated less than 10% of year as emergency and backup boilers to supplement process power needs)
  - EPA established a tune-up requirement instead of numeric emission limits for all new and existing limited use boilers; operator will be required to perform tune-up every two years.

- **Clean Gas Units** (natural gas or other gaseous fuels from refineries, landfills, etc. that meet specifications for mercury and hydrogen sulfide similar to natural gas)
  - Subject to tune-up requirements in lieu of numeric emissions limits.

- **Energy audits** continue to be required; Agency clarified audit provisions to minimize costs.
Major Source Boiler Rule Changes (cont)

- Adjusted **compliance testing requirements for carbon monoxide** (CO) based on comments
  - Rather than continuous monitoring, units are required to measure CO once a year at full load, while conducting routine parametric testing to track oxygen levels that indicate combustion efficiency
  - Will lower compliance costs

- Adjusted **compliance testing requirements for dioxin/furan** (D/F) based on comments
  - Rather than annual testing, units are required to measure D/F one time and to monitor oxygen levels to ensure good combustion
  - Will lower compliance costs

- Did not develop a health-based emissions limit for acid gases
  - Did not receive information sufficient to form a basis for this type of limit

- Boiler MACT costs now projected at $5.1 billion capital cost and $1.8 billion annualized cost ($1.4 billion considering fuel savings)
  - Proposal was $2.9 B annualized cost
Area Source Boiler Rule: Compliance Requirements

Summary of requirements for boilers at area sources (i.e., those sources that emit or have the potential to emit less than 10 tons per year (tpy) of any single air toxic and less than 25 tpy of any combination of air toxics)

- **Existing large boilers** (>=10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal**
    - Numeric emission limits for 2 pollutants: mercury, carbon monoxide (CO)
    - 1-time energy assessment
- **Biomass, Oil**
  - Tune-up every other year
  - 1-time energy assessment
  - No numeric emission limits

- **Existing small boilers** (<10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal, Biomass, Oil**
    - Tune-up every other year
    - No numeric emission limits
Area Source Boiler Rule: Compliance Requirements (cont)

- **New large boilers** (>=10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal**
    - Numeric emission limits for 3 pollutants  
      *mercury, carbon monoxide (CO), particulate matter (PM)*
  - **Biomass, Oil**
    - Numeric emission limit for 1 pollutant  
      *particulate matter (PM)*
    - Tune-up every other year

- **New small boilers** (<10mm/BTU)
  - **Gas** (all types)
    - No requirements
    - Not covered by rule
  - **Coal, Biomass, Oil**
    - Tune-up every other year
    - No numeric emission limits
Area Source Boiler Rule: Key Changes Between Proposal and Final

- Based on public comment and additional data provided during the comment period, EPA made significant changes, such as:
  - Changed requirements for new small boilers (less than 10 MMBtu/hr) to tune-ups instead of numeric emission limits
  - Changed from MACT-based CO limits for new and existing biomass and oil-fired area source boilers to GACT-based management practices of tune-ups
  - **Energy audits** continue to be required for large boilers; Agency clarified audit provisions to minimize costs.
Appendix
<table>
<thead>
<tr>
<th>Subcategory</th>
<th>Proposed limits, lb/MMBtu unless noted</th>
<th>Final limits, lb/MMBtu unless noted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hg, lb/TBtu</td>
<td>HCl</td>
</tr>
<tr>
<td>New coal stoker</td>
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<td>Solid fuel subcat.</td>
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<td>Solid fuel subcat.</td>
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<tr>
<td>New coal PC</td>
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<td>0.002</td>
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<tr>
<td>New biomass stoker</td>
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<td>Solid fuel subcat.</td>
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<td>Solid fuel subcat.</td>
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<td>New biomass dutch oven</td>
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<tr>
<td>New biomass sus./grate</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>New liquid</td>
<td>0.3</td>
<td>0.0004</td>
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<tr>
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<td>0.000003</td>
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<tr>
<td>New non-cont. liquid</td>
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<td>--</td>
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<tr>
<td>Exist. coal fluid. Bed</td>
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<td>0.002</td>
</tr>
<tr>
<td>Exist. coal PC</td>
<td>90</td>
<td>0.004</td>
</tr>
<tr>
<td>Exist. biomass stoker</td>
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<td>0.006</td>
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<tr>
<td>Exist. biomass fuel cell</td>
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<td>0.02</td>
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<tr>
<td>Exist. biomass fluid. bed</td>
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<td>0.03</td>
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<td>Exist. biomass sus./grate</td>
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<td>--</td>
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<tr>
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<td>0.0009</td>
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<td>0.000003</td>
</tr>
<tr>
<td>Exist. non-cont. liquid</td>
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<td>--</td>
</tr>
</tbody>
</table>

New and existing small (<10 MMBtu/hr) units, natural gas-fired units, metal process furnaces, units combusting other clean gases, and limited use units will be subject to work practice standards.
### Emission Limits for Area Source Boilers

<table>
<thead>
<tr>
<th>Subcategory</th>
<th>Proposed Emission Limits</th>
<th>Final Emission Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hg, lb/TBtu</td>
<td>CO, ppm</td>
</tr>
<tr>
<td>New Coal</td>
<td>3.0</td>
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<tr>
<td>New Biomass</td>
<td>-</td>
<td>100</td>
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<tr>
<td>New Oil</td>
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<td>1</td>
</tr>
<tr>
<td>Existing Coal</td>
<td>3.0</td>
<td>310</td>
</tr>
<tr>
<td>Existing Biomass</td>
<td>-</td>
<td>160</td>
</tr>
<tr>
<td>Existing Oil</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

New and existing small (<10 MMBtu/hr) boiler, existing and new biomass-fired boilers, and new and existing oil-fired boilers are subject to a biennial tune-up requirement.