Boiler MACT: Energy Assessments

Conference on the Environment
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Alex Mentzer, EIT
Consultant
Overview

- Boiler Rules - Brief Recap
- Energy Assessments
  - Requirements
  - Qualified Energy Assessor
  - Assessment Preparation
  - Assessment Day
  - Report
Boiler Rules: Background

> Final rules released Dec 20, 2012 (reconsidered)
  - Major Source Boiler MACT
    - 40 CFR 63 Subpart DDDDD
  - Area Source Boiler GACT
    - 40 CFR 63 Subpart JJJJJJJ

> Major Source
  - >25 TPY total HAP
  - >10 TPY single HAP

> Area Source
  - <25 TPY total HAP
  - <10 TPY single HAP
Boiler Rules: Applicability

> Major Source Boiler MACT
  ❖ Industrial, commercial and institutional boilers & **process heaters** (*major sources only*)
  ❖ 19 subcategories of boilers

> Area Source Boiler GACT
  ❖ Industrial, commercial and institutional boilers
  ❖ 7 subcategories of boilers
Boiler Rules: Important Dates

> Major Source Boiler MACT
  ✷ Existing
    ♦ **Initial notification:** May 31, 2013
    ♦ **Compliance date:** January 31, 2016*

> Area Source Boiler GACT
  ✷ Existing
    ♦ **Initial notification:** January 20, 2014
    ♦ **Compliance date:** March 21, 2014*

> Units installed after compliance date must notify within 15 days of startup

* 1 year compliance extension possible
Boiler Rules: Requirements

˃ Emission limits
   ♦ Major Source BMACT
     ♦ Units ≥ 10 MMBtu/hr
     ♦ Gas 1 units & units < 10 MMBtu/hr: Work practices only
   ♦ Area Source BGACT
     ♦ Units ≥ 10 MMBtu/hr (solid/liquid fuel)
     ♦ Units < 10 MMBtu/hr: Work practices only

˃ Work practice standards (cont.)
   ♦ Energy Assessment
     ♦ Major sources: One-time for ALL existing units
       – Only exemption is limited-use units
     ♦ Area sources: Existing coal, biomass or oil ≥ 10 MMBtu/hr

˃ Work practice standards
   ♦ Tune-ups
     ♦ Major sources (§63.7540(a)(10-12)):
       – Annual, Biennial, Every 5 years
     ♦ Area sources (§63.11223):
       – Biennial, Every 5 years
     ♦ Timing depends on size, fuel, operating characteristics
   ♦ Performance testing
   ♦ Monitoring
   ♦ Recordkeeping/Reporting
Energy Assessment?

> Evaluation to identify energy savings opportunities
  ❖ In this case, to boiler systems
> New to NESHAPs
> Similar assessments have been showing up:
  ❖ PSD and Title V Permitting Guidance for Greenhouse Gases - March 2011 guidance
  ❖ Energy Management Systems
    ♦ ISO 50001, Energy Star, Superior Energy Performance
  ❖ Energy Auditing
    ♦ Energy assessment is scaled back version
Energy Assessment: Affected Units

What sources are required to conduct EA?

- **Major sources:**
  - ALL existing units
  - Compliance date - January 31, 2016

- **Area sources:**
  - Existing coal, biomass or oil $\geq 10$ MMBtu/hr
  - Compliance date - March 21, 2014
Steam Loops Can Be Complicated!
Energy Assessment: Scope

> **Boiler system** means the boiler and associated components, such as, the feed water, combustion air, fuel, blowdown, combustion control, steam, and condensate return systems.
Energy Assessment: Scope

- *Energy use systems* are only those systems using energy clearly produced by affected boilers and process heaters.
Energy Assessment: Scope

> Boiler Systems
> Energy Use Systems

Which are included?

Pre-planning the scope is essential to conducting an efficient site visit!

<table>
<thead>
<tr>
<th>Annual Heat Input Capacity of Affected Boilers (TBtu/year)</th>
<th>Maximum On-site Technical Labor Hours</th>
<th>Evaluate boiler system(s) and energy use systems accounting for X% of affected boiler(s) energy production</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.3</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>0.3 - 1.0</td>
<td>24</td>
<td>33%</td>
</tr>
<tr>
<td>≥ 1.0</td>
<td>24 (18 hours for each additional 1.0 TBtu/yr (not to exceed 160 hours))</td>
<td>20%</td>
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Energy Assessment: Requirements

- Visually inspect the *boiler or process heater system*
- Evaluate operating characteristics
- Review specs of *energy use systems*
- Assess facility O&M procedures and unusual operating constraints
- Inventory all major *energy use systems* consuming energy from affected boilers and process heaters and which are under control of the boiler/process heater owner or operator
- Document minor energy use systems
- Review available architectural and engineering plans, facility operation and fuel usage records
Energy Assessment: Analysis Requirements

➢ List major energy conservation measures that are within the facility’s control
➢ Record energy savings potential of the energy conservation measures identified
➢ Provide a comprehensive report detailing:
   ❖ Efficiency improvements
   ❖ Improvement costs
   ❖ Improvement benefits
   ❖ Payback period (i.e., the time frame for recouping those investments)
## Energy Assessment: Duration

### Duration/Scope

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Energy Assessment: QEA

> “Qualified energy assessor”

- Someone who has demonstrated capabilities to evaluate energy savings opportunities for steam generation and major energy using systems, including, but not limited to:
  - Boiler combustion management
  - Boiler thermal energy recovery, including
    - Conventional feed water economizer,
    - Conventional combustion air preheater, and
    - Condensing economizer.
  - Boiler blowdown thermal energy recovery
  - Primary energy resource selection, including
    - Fuel (primary energy source) switching, and
    - Applied steam energy versus direct-fired energy versus electricity
  - Insulation issues
  - Steam trap and steam leak management
  - Condensate recovery
  - Steam end-use management

- Capabilities and knowledge includes, but is not limited to:
  - Background, experience, and recognized abilities to perform the assessment activities, data analysis, and report preparation
  - Familiarity with operating and maintenance practices for process heating systems
  - Additional potential steam system improvement opportunities including improving steam turbine operations and reducing steam demand
  - Additional process heating system opportunities including effective utilization of waste heat and use of proper heating methods
  - Boiler-steam turbine cogeneration systems
  - Industry specific steam end-use systems
What does it really mean?

> No formula for a “perfect” EA
> Every site is different
> Energy assessors are learning the process too!
> What do we do
  > Visit prep-data request
  > Visit day on-site activities
  > Writing the report
Energy Assessment: Initial Activities

> Assemble site visit data request
  - Facility A/E drawings for footprint and heating envelope analysis
  - Fuel use records by unit
  - O&M plans
    - Inspection/Tune up schedules
  - Stack data (CEMS, performance testing, etc.)
  - Current air permit

> Review inventory of affected sources

> Coordinate visit with availability of most knowledgeable staff
Energy Assessment: Initial Activities

> Lessons learned

- Effective planning can save valuable on-site hours
- Information may not be in one place/Under one person
Energy Assessment: On-site Activities

- Visual inspections
  - Boiler
  - Piping
  - Insulation
  - Steam-traps
  - Energy use systems

- Measurements
  - Standard
    - Losses, Feedwater temperature, Combustion info (CO₂, O₂, CO)
  - Case-by-Case
    - Load/Power Factors (motors, drives, at least for feedwater pump and fan motors), Lighting efficiency, Relative humidity, Ventilation, Facility use
Energy Assessment: On-site Activities

> Lessons learned

- BMACT EA requires lots of information related to operations
- Talk to the people that DO the operation
  - Operational staff is a VERY valuable resource
  - O&M “plans” are often unwritten
  - “If it ain’t broke” mentality is common
Energy Assessment: Identify Energy Conservation Measures

> Equipment upgrades
  ❖ Boilers/Burners, HVAC, Lighting, etc.
> Efficiency improvements
  ❖ Related to O&M
> Load reduction
> Waste Heat Recovery
  ❖ Economizers
> Other
Energy Assessment: Cost & Payback

> Simple payback
  - The time required to recover the capital investment from the annual savings
  
  \[\text{Simple Payback} = \frac{\text{Costs}}{\text{Annual Energy Savings}}\]

> Consider
  - Reduction in energy consumption
  - Capital costs
  - Facility improvement
    - Emissions reductions, reliability improvements, etc.
Energy Assessment: Report

> Evaluate and provide list of major energy conservation measures identified
  ❖ Cost of improvements
  ❖ Potential cost savings & payback period

> Implementation of ECM’s is encouraged, but not required
Summary

> EA requirement for some area and all major source boilers

  ✤ 3/21/2014 Compliance for Area sources
  ✤ 1/31/2016 Compliance for Major sources

> Qualified Energy Assessor

> Pre-visit activities

> On-site activities

> Information analysis & report
Questions?

Alex Mentzer
amentzer@trinityconsultants.com
(651) 251-9900