

# Boiler MACT Energy Assessment Compliance



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Burns & McDonnell

**Moderator:** Laxmi Rao,  
International District Energy Association







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**Don Wolf**

Mr. Wolf is a Principal with Burns & McDonnell Engineering Company with expertise in air pollution control regulations and technologies for the industrial and electric utility sectors.

Don has 21 years of experience and serves as a project manager on a variety of utility and industrial coal-fired boiler air pollution control projects.

He also manages the Energy Global Practice group in the St. Louis Regional Office.

Don has a bachelor and master's degree in mechanical engineering from the University of Missouri – Columbia.





**Jarrold McMains**

Mr. McMains is a Senior Energy Engineer with Burns & McDonnell Engineering Company with expertise in commercial and industrial energy efficiency.

Jarrold has 8 years of experience and serves as project manager and lead energy engineer for demand side management in district energy systems.

He leads the energy efficiency and demand side management work for the Onsite Energy & Power practice.

Jarrold has a bachelors degree in mathematics and physics and a masters degree in mechanical engineering from the University of Arkansas.



# AGENDA



- ▶ What is the Boiler MACT Ruling?
- ▶ What is the Energy Assessment Requirement?
- ▶ Assessment Outcomes & Benefits

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# Boiler MACT Overview

- ▶ Section 112 of Clean Air Act requires **major and area** sources of hazardous air pollutants (HAPs) to meet emissions reflecting maximum achievable control technology (MACT)
- ▶ National Emission Standards for Hazardous Air Pollutants (NESHAP) by source category, including
  - Industrial, Commercial, and Institutional Boilers and Process Heaters at
    - ▶ Major Sources – a.k.a. **Industrial Boiler MACT Rule**
    - ▶ Area Sources – a.k.a. **Area Source Rule**





# Boiler MACT Overview

## ▶ Major sources of HAPs

- Potential to Emit (PTE): Greater than 10 tons per year (tpy) of any single HAP or 25 tpy of total HAPs
- Rule impacts **boilers and process heaters**:
  - ▶ Boiler – enclosed device using combustion for purpose of recovering thermal energy in form of steam or hot water
  - ▶ Process Heater – an enclosed device using combustion to heat raw material or intermediate materials during an industrial process

## ▶ Area Sources of HAPs

- PTE less than 10 tpy of any single HAP or 25 tpy of total HAPs
- If you're not a major source boiler, you are an area source boiler
- Gas boilers at Area Source facilities are **not** affected by this rule



# Boiler MACT Overview



- ▶ Boiler MACT Rule has a long development history
  - ▶ First Rule in 2004... vacated in 2007
  - ▶ New Rule in 2011... stayed the rule while reconsidering portions of the rule
  - ▶ Final Rule – January, 31 2013 → Compliance required by **January 31, 2016**
- ▶ Rule requires
  - Emissions limits to be met
  - Work Practice Standards to be followed
    - ▶ One Time Energy Assessment of the facility
      - EPA's thought process... make a facility more efficient, →  
burn less fuel, →  
emit less HAP



# Boiler MACT Overview – Energy Assessment

- ▶ Must conduct a one-time energy assessment by a qualified energy assessor
  - Does not have to be a 3<sup>rd</sup> party, but must be someone *who has demonstrated capabilities to evaluate energy savings opportunities*
- ▶ What's being assessed?
  - Boilers/Process Heaters
  - Energy Use Systems – the systems that use the energy produced by the boilers/process heaters





# Boiler MACT Overview – Energy Assessment

- ▶ What must be done:
  1. Conduct a visual inspection of the boiler
  2. Evaluate the boiler and process heater operating characteristics
  3. Inventory the major energy use systems
  4. Review engineering plans, O&M procedures, fuel usage
  5. Review of facilities energy management practices
  6. Identify cost effective energy conservation measures
  7. Determine the energy savings potential
  8. Create a summary report



# Boiler MACT Overview – Energy Assessment

**Table 1 - Energy Assessment Duration Requirements**

<b>If your facility has Boiler Annual Heat Input, as measured in Trillion Btu/yr (Tbtu/yr), of...</b>	<b>Then the length of the energy assessment, in on-site technical labor hours, need not exceed<sup>a</sup>...</b>	<b>And should include any on-site energy use systems that account for this percent of the energy production from these affected boilers...</b>
Less than 0.3	8 hours	At least 50%
0.3 to 1	24 hours	At least 33%
Greater than 1.0	24 hours for the first TBtu/yr plus 8 hours for every additional TBtu/yr, not to exceed 160 hours	At least 20%

<sup>a</sup> The length may be longer at the discretion of the owner or operator of the affected source.



# Typical MACT Energy Assessment

- ▶ Typically \$20-50K for 3<sup>rd</sup> party qualified energy assessment team
  - Based on boiler capacities; depends on energy end use(s) evaluated
- ▶ One month allowed for internal data collection (energy data, asset list, drawings, permits, etc.)
- ▶ Data analysis and familiarization
- ▶ Site assessment lasts 2-4 days, ~3 people
  - Typically energy engineer, boiler specialist, turbine/other specialist
- ▶ One month for calculations and report



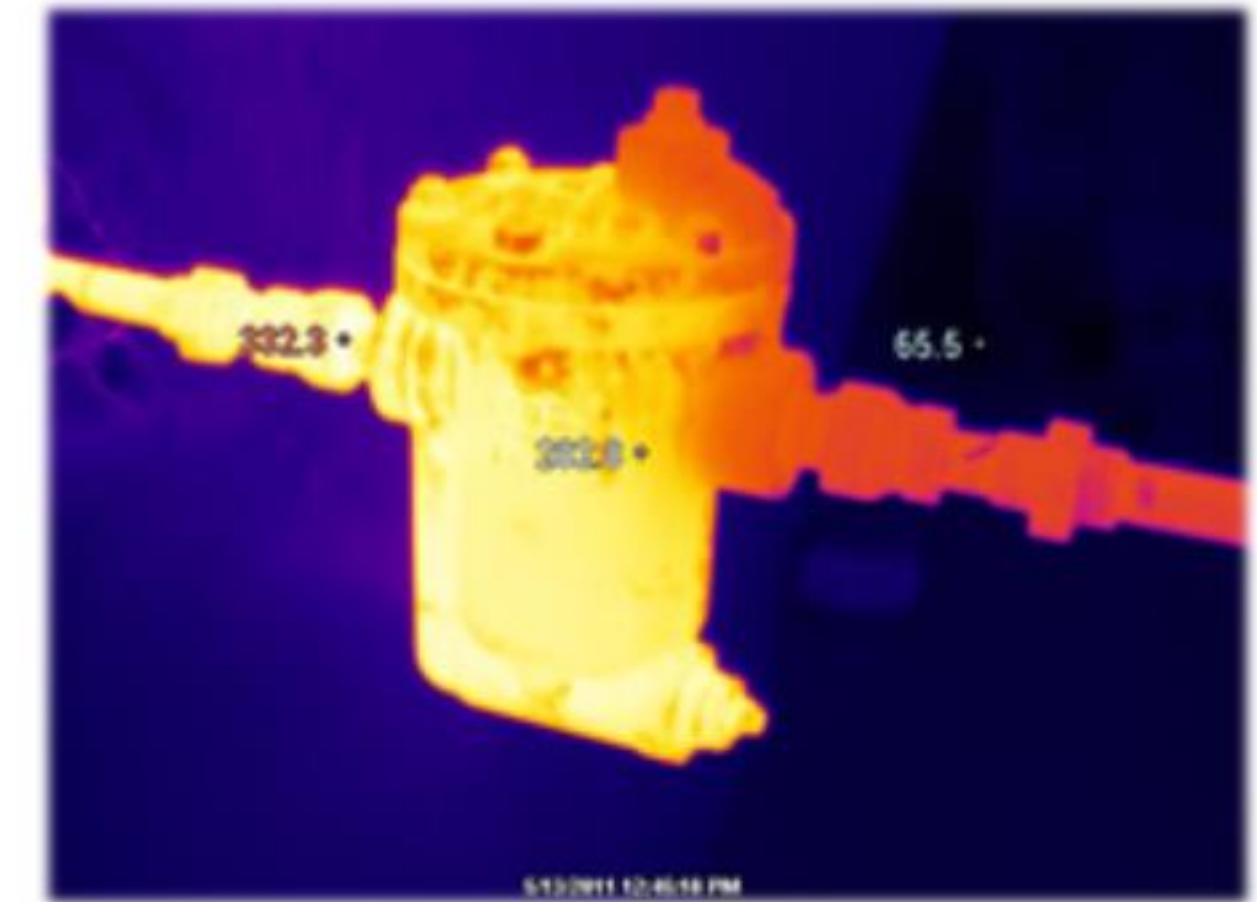
# Typical Deliverable

- ▶ Summary level report (10-20 pages)
  - Facility and equipment descriptions, energy analysis
  - Recommended Energy Conservation Measures (ECM)s
  - High-level estimates for implementation cost, energy savings, and resulting simple payback for ECMs
  - Narrative description and scope of work for each
  - Guidance on potential permitting changes due to implementing ECMs
  - Boiler MACT energy assessment checklist and description of compliance
- ▶ Appendices of additional information
  - Cost estimates, energy calculations, proposed equipment cut sheets



# Typical Findings: (Just Do It's)

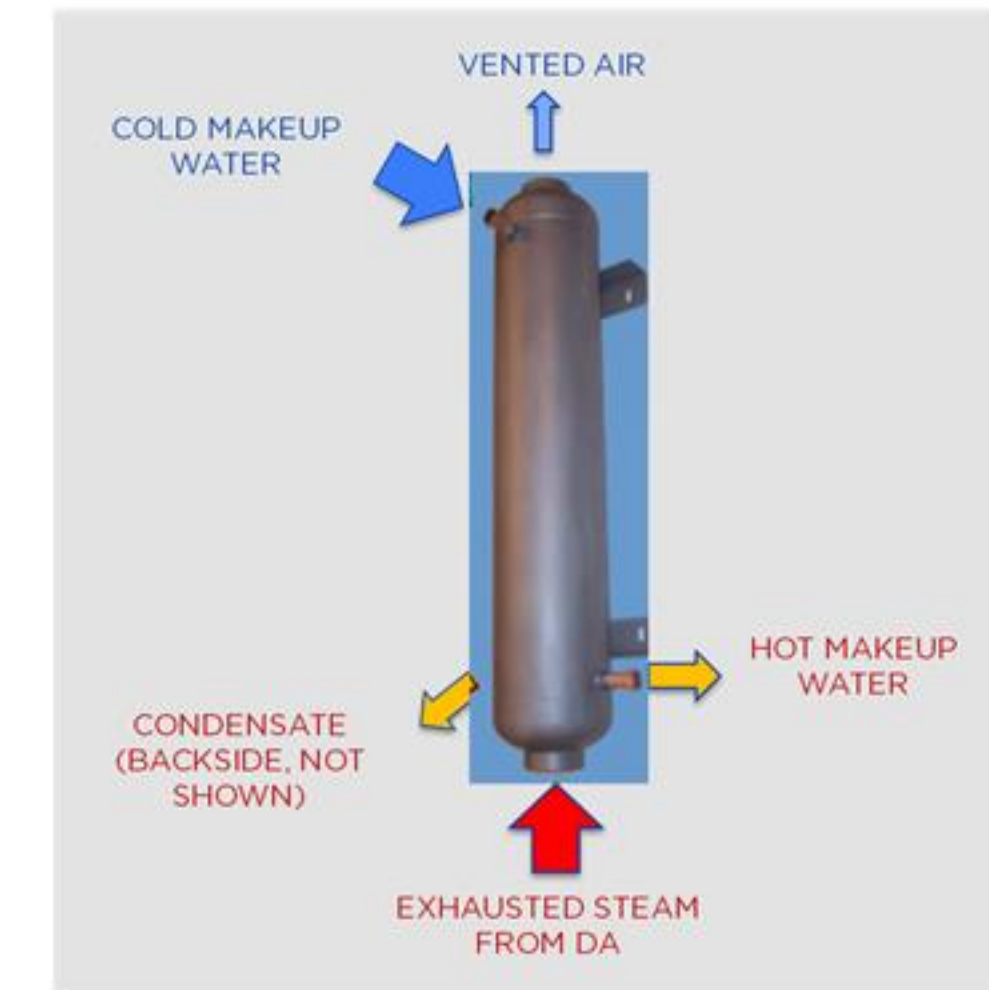
- ▶ Steam Trap Maintenance
- ▶ Boiler Dispatching
- ▶ Steam Turbine Equipment Dispatching
- ▶ Boiler Combustion Tuning (burners, linkages, O<sub>2</sub> trim)
- ▶ Eliminate False Loads
  - Simultaneous HVAC Heating and Cooling
  - Steam Vent Reduction
- ▶ Heating Coil Optimization





# Typical Findings: Capital Cost

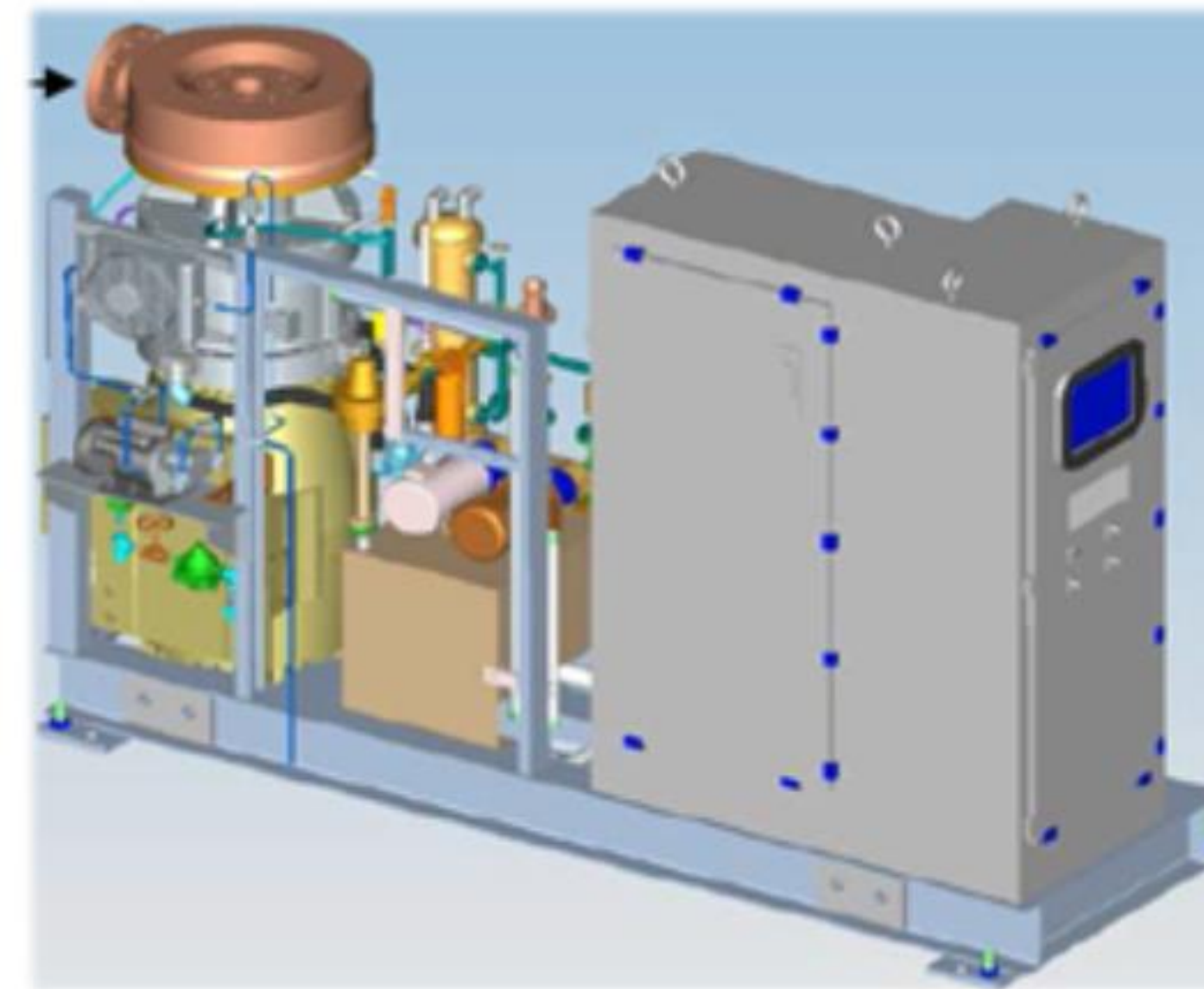
- ▶ Mud Drum Heaters for Hot Standby
- ▶ Vent Condensers for Water Preheat
- ▶ Boiler Combustion Tuning (burners, linkages, O<sub>2</sub> trim)
- ▶ Increase Condensate Return
- ▶ Flue Gas Economizers (air-to-air tubes, wheels, air-to-water packages)
- ▶ Blowdown Heat Recovery
- ▶ Forced and Induced Draft Fan VFDs
- ▶ Steam to Hot Water Conversion





# Typical Findings: Further Investigation

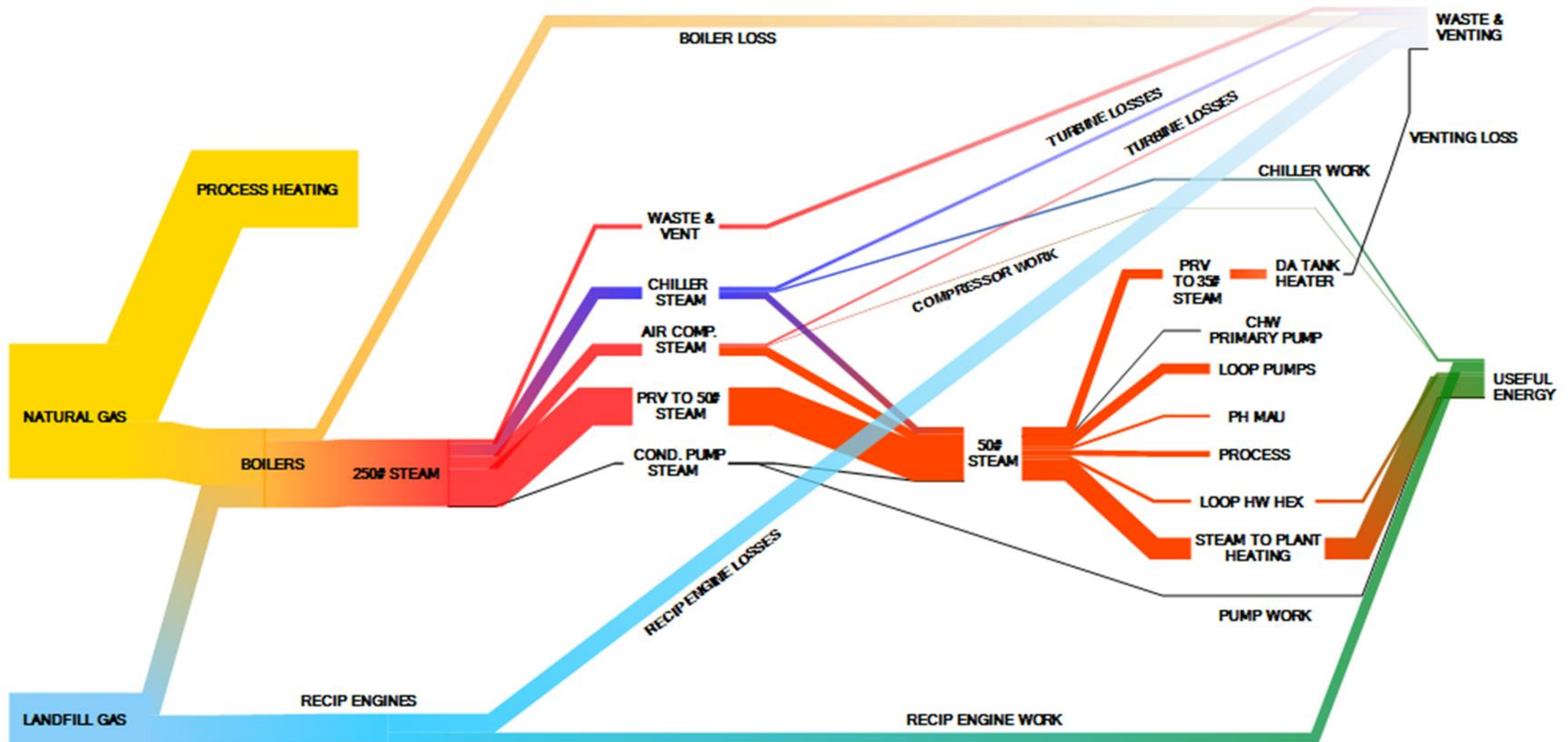
- ▶ Steam to Hot Water Conversion
- ▶ Condensing Steam Turbines to Backpressure Steam Turbines
- ▶ Pressure Reducing Valves (PRV) to Backpressure Steam Turbines)
- ▶ Combined Heat & Power (CHP)





# Example Reporting – Useful Information

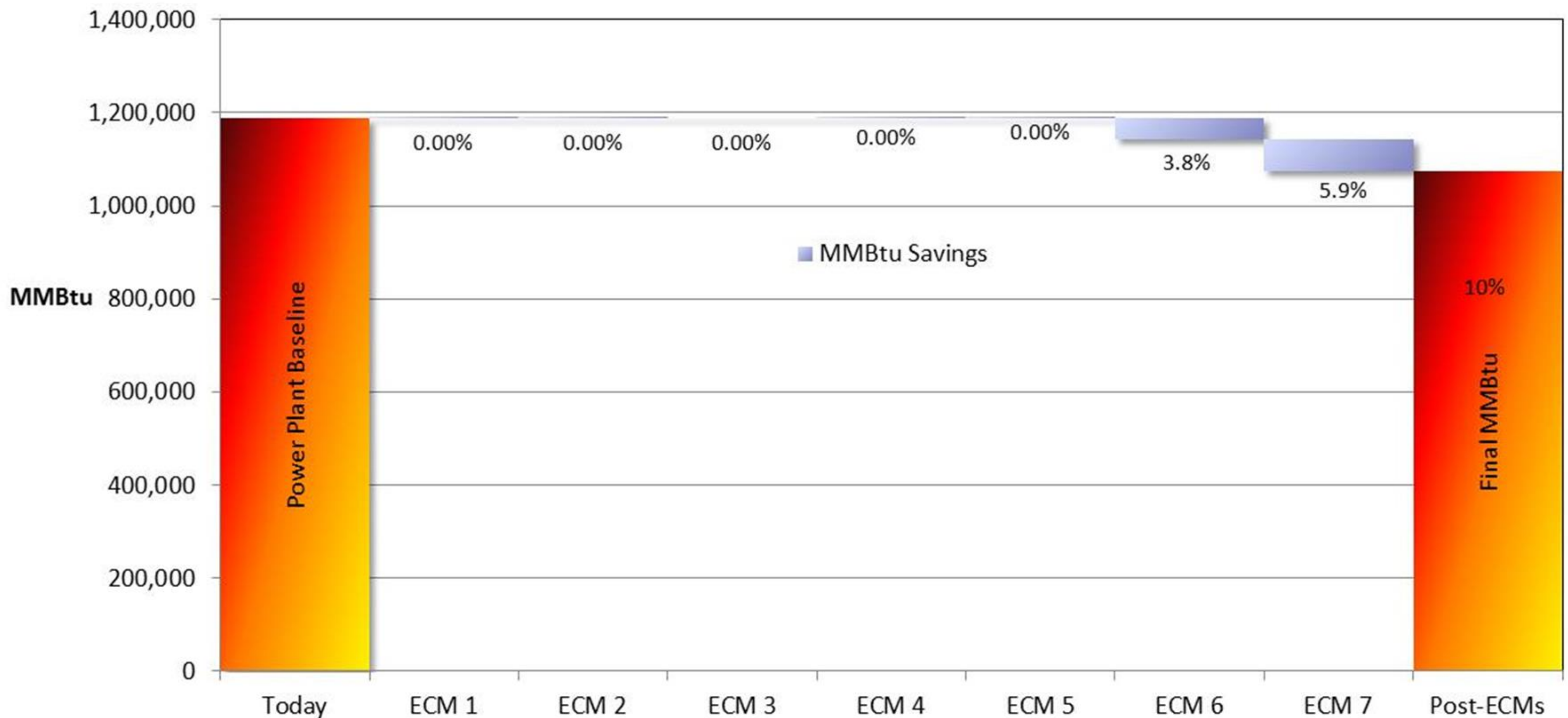
How do the affected Boilers fit in the overall steam/utility usage?





# Example Reporting – Compliance/Results

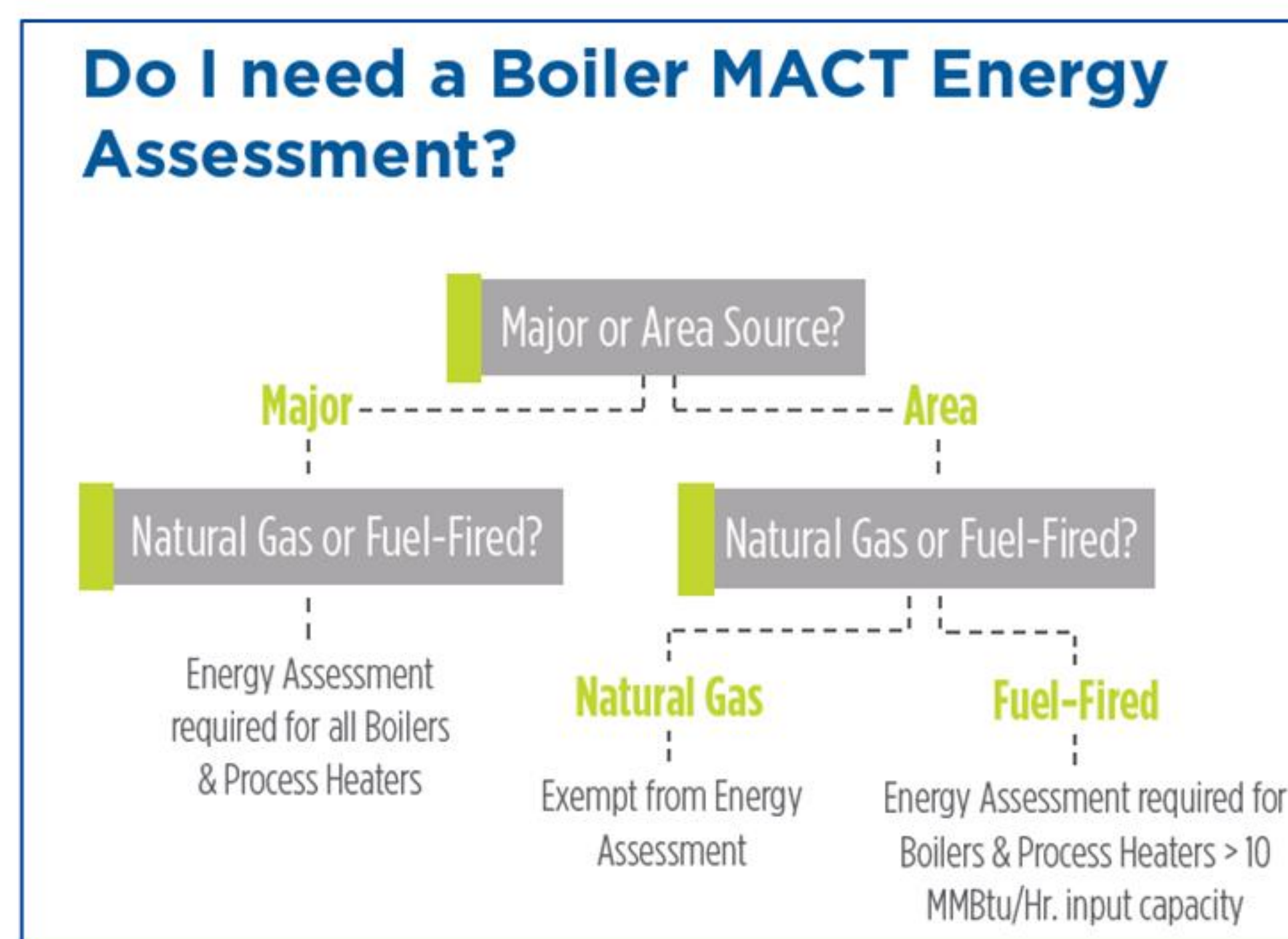
## Boiler Plant Energy Conservation Waterfall





# Conclusions

- ▶ Decide if you have boilers or process heaters that need the assessment
- ▶ If so, January 31<sup>st</sup>, 2016 is the deadline to complete the assessment
- ▶ “Checking the Box” can and should still provide value to the facility
- ▶ Energy Use Systems are included in the assessment
- ▶ Owner has the flexibility to choose what energy systems are assessed to provide the most value
- ▶ 3<sup>rd</sup> party assessment can identify immediate savings measures as well as holistic system opportunities





# Boiler MACT Overview Resources

- ▶ EPA Boiler MACT Page  
<http://www.epa.gov/ttn/atw/boiler/boilerpg.html>
- ▶ BMcD Boiler MACT Page  
<http://www.burnsmcd.com/Services/Detail/Boiler-MACT>
- ▶ EPA Rule  
[http://www.burnsmcd.com/Resource\\_/PageResource/Boiler-MACT/2013-01-31\\_Boiler\\_MACT\\_Rule.pdf](http://www.burnsmcd.com/Resource_/PageResource/Boiler-MACT/2013-01-31_Boiler_MACT_Rule.pdf)
- ▶ Frequently Asked Questions  
<http://www.burnsmcd.com/Services/Detail/Boiler-MACT-FAQ>



# QUESTIONS?

**Please answer survey prior to logging off.**



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