Current Status of MATS Implementation and Consideration of MATS controls on other Environmental Drivers

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• Compliance Dates
• Concerns with Existing MATS compliance
• What types of Projects are On-Going
• Key Drivers for Determining MATS Controls
• Strategic Considerations of MATS Compliance with other regulatory drivers
Compliance Dates

• Clean Air Act allows states to grant one year extension to compliance
• EPA adding an additional year under certain circumstances (but legal risks exist)
• Many utilities have requested one year extensions (Most have been granted)
• With one year extension, compliance date is April 2016
Concerns with MATS

- Even with April 2016 compliance date, larger fleets and units requiring high capital cost controls have significant compliance schedule risks
- **Startup/shutdown definition not consistent with AQCS design/current operations**
- Permit modifications and other regulatory approvals requirements
- Impacts on other air/water/ash issues
- Monitoring
- Boiler tuning
Uncontrolled Emissions included in permit limits

- MATS 30 day rolling average includes startup/shutdown emissions
  - Many opting to stack test for compliance
  - Different averaging methodology can give different results
- AQCS may not operate during part of time
  - Hg: No startup until sufficient gas flow/temperature
  - NOx: SCR needs minimum temperature
  - SO₂: DFGD needs minimum temperature
  - PM: ESP typically doesn’t operate during SSM
Uncontrolled Emissions included in permit limits

- New Controls such as DSI/ACI may have periods of uncontrolled PM emissions requiring permit modifications
- Change in startup procedures
- New Controls may require additional cost items
  - DFGD: DSI
  - WFGD: Upgrades/eliminate bypass-new stack?
- Existing controls upgrades:
  - ESP to Fabric Filter conversion
  - New Fabric Filter
  - Increase ESP plate area, spacing, T-R upgrades, control modifications
• Dependent on coal characteristics, expected operations, economics and consideration of future regulations

• Coal characteristics
  – Maintain fuel flexibility for cost and operating considerations
  – However, different fuels may require different controls

• Operations
  – Unit dispatch can impact control effectiveness
# Consideration of Other Regulations

## Wide Range of Compliance Controls & Costs

<table>
<thead>
<tr>
<th>Item of Concern</th>
<th>Regulations</th>
<th>Lower Capital &amp; Higher O&amp;M Cost Option</th>
<th>Higher Capital &amp; Lower O&amp;M Cost Option</th>
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<tbody>
<tr>
<td>Hg</td>
<td>MATS</td>
<td>Additive</td>
<td>Additive/Baghouse</td>
</tr>
<tr>
<td>PM</td>
<td>MATS/Regional Haze</td>
<td>ESP upgrades</td>
<td>New Baghouse</td>
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<td>Acid Gases</td>
<td>MATS/CSAPR/RH</td>
<td>Sorbent</td>
<td>FGD</td>
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<tr>
<td>NOx</td>
<td>CSAPR/Regional Haze</td>
<td>SNCR</td>
<td>SCR</td>
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<tr>
<td>PM/SO2/NOx</td>
<td>NAAQS</td>
<td>Fugitive dust control</td>
<td>New stack, FGD, SCR</td>
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<tr>
<td>GHG</td>
<td>NSPS, NSR</td>
<td>Efficiency</td>
<td>Carbon capture/storage</td>
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<td>Ash</td>
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<td>New landfill liner</td>
<td>New liner, convert wet to dry ash, close ash pond, ZLD</td>
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<td>Water</td>
<td>316a/b</td>
<td>Intake Modification</td>
<td>Cooling tower</td>
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<tr>
<td>Water</td>
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<td>Physical Treatment</td>
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</table>
How Does a Low Capital Retrofit Compete in Market versus New Combined Cycle?

Retrofit capital cost is much lower cost than building replacement units.
Variable Costs may Curtail Dispatch

Dispatch Costs (Fuel + Variable O&M, $/MWh)

- Fuel: $22.00
- DSI: $5.00
- SNCR: $3.00
- ACI: $0.50
- CCR: $0.00
- 316b: $0.00
- Total Retrofits: $30.50
- New CCGT: $26.00

Lower capital cost may come at a penalty of higher dispatch costs.

Consumables can drive energy cost greater than CCGT energy cost.

If capacity is main driver, this may be the lower cost option...however dispatch may be significantly reduced.
How Does a High Capital Retrofit Compete in Market versus New Combined Cycle?

Retrofit cost for flagship units

Flagship units may already have these

Retrofit cost for older units may be higher than new CC

Capital Cost ($/kW)

<table>
<thead>
<tr>
<th></th>
<th>Retrofits</th>
<th>New CCGT</th>
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<tr>
<td>FGD</td>
<td>$580</td>
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<tr>
<td>SCR</td>
<td>$230</td>
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<td>BH</td>
<td>$190</td>
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Retrofit cost for flagship units

Flagship units may already have these

Retrofit cost for older units may be higher than new CC
Dispatch Costs are Less Impacted with Higher Capital Investment

Higher capital cost options have lower dispatch cost and will be more competitive in the market against new CCGT.
Summary

• MATS controls currently being tested, permitted and implemented
• Low Capital Cost AQCS likely to meet schedule
• High Capital Cost AQCS and large fleets could need additional timeframe
• Type of controls implemented is highly fuel, unit, system and regulation specific
• Make Decision Defensible: Expect interveners on any and all fossil fuel related public meetings (End game: no GHG)
Questions/Discussion

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