EPA Regulations: Balancing Reliability, Affordability, and Environmental Protection

Monday, March 12, 2012
Overview of Impacts

- 12.6 GW of coal capacity Identified as at-risk
  - Expected retirement dates to be in the 2014/2015 calendar years
  - 12.6 GW of retirement would erode MISO projected reserve margins by 12 percentage points, dropping system resources 6 to 7 percentage points below required targets.

- Capital investment of $33.0 Billion will be required to retrofit and/or replace units

- Average energy prices may increase by $5/MWh

<table>
<thead>
<tr>
<th>Technology</th>
<th>Impacted Capacity (MW)</th>
<th>Average Costs ($/kW)</th>
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</thead>
<tbody>
<tr>
<td>No Action Required</td>
<td>9,569</td>
<td>0</td>
</tr>
<tr>
<td>Require Fabric Filters (Baghouse)</td>
<td>27,921</td>
<td>150</td>
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<tr>
<td>Require DSI and ACI or FGD</td>
<td>20,427</td>
<td>478</td>
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<tr>
<td>Replacement Greenfield Combustion Turbine Capacity for Retirement</td>
<td>12,652</td>
<td>663</td>
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Expected Level of Retirements is a Function of Cost of Alternatives

- Coal Retirements (MW)
  - MISO Projected 12.6 GW of coal retirements

- Natural Gas Costs
  - High
  - Low

- Regulatory Compliance Costs
  - Low
  - High
Some Key Questions to be Answered

• How much capacity can be in simultaneous outage and maintain current loss of load risk?
• Will supply chain issues affect actual compliance schedules?
• What tariff revisions must be made to ensure system reliability while allowing asset owners to comply with the rules?
• Is the natural gas infrastructure sufficient to meet fuel switching for energy or replacement capacity?
• What will the market effects of the compliance period turbulence be?
MISO Region Gas-Electric Infrastructure Analysis

- Wellhead Gas supply is not expected to be an issue
- Additional gas pipeline infrastructure is needed to accommodate fuel switching
- Timing for development of new pipeline infrastructure is the main issue
- Cost and development issues are complex
  - Increased use of pipeline capacity for existing gas-fired capacity in MISO (35,000 MW) was not addressed
  - To ensure generator availability gas storage may be required
  - Regional coordination of MISO members will produce a better solution than each stakeholder acting alone.