Clean Power Plan Modeling Update

Transmission Expansion Advisory Committee
February 11, 2016
What Are we Being Asked

What will be the economic and reliability impacts to states

What is my state's bottom line due to trading versus not using a trading option

What happens to resource diversity and what does it mean for baseload resources

What is the difference between an emissions market trading seam and an electric market seam

What happens if my plan diverges from what most of the other PJM states submit in their compliance plans

Alright, trading makes sense but rate or mass
How is PJM Identifying Answers

Phase 1: Long-Term Analysis
- 20-year Economic Entry/Exit
  - Long-Term Emissions Constraints
  - Limited Transmission Constraints
- Reliability Analysis
- Reactive Analysis
- Limited Transmission Screening

Phase 2: Medium-Term Analysis
- Develop emissions shadow prices/quantities with assumed retirements and new entrants.
- More detailed transmission, generation and load modeling

Phase 3: Short-Term Analysis
- Solve hourly chronological Energy Market model with full transmission constraints, emissions and reserve and energy constraints
- More detailed reliability evaluation as needed

Medium and Short-Term Analysis
- Will initially be studied for 2023, 2026, 2028 and 2030
- Rate and Mass Based Compliance Scenarios
- Interstate and Intra-state Trading
### What Information will Answer these Questions

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<th>Reliability</th>
<th>Electric Market</th>
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<td>Capacity added /retired by LDA and RTO region</td>
<td>Locational marginal prices and energy market load payments</td>
<td>Carbon dioxide prices, total allowance supply/demand</td>
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<td>Transfer capability for reactive interfaces</td>
<td>Facility level transmission congestion</td>
<td>Resource entry capital costs</td>
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<td>Generation and Load Deliverability tests results</td>
<td>Percentage of generation by prime mover and fuel type</td>
<td>Emission rate credit production and consumption</td>
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When does PJM Plan to Answer these Questions

March
- Present Reference Model Results
- Discussions with OPSI, stakeholders and air regulators

April 30
- Complete Compliance Analysis Assessment including high priority sensitivities

May 31
- Publish compliance pathways report

Through Q3
- Additional Reliability Analysis
- Coordination work with MISO
- Additional Economic Sensitivities