Multi-Stage Generating Unit Modeling

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Stakeholder Conference Call

November 14, 2008
Background

- Multi-stage generating units
  - Multiple units under one resource id
  - Combined Cycle units (gas / gas x steam)
  - Pump storage hydro units (off-line / generating / pumping)

- Forbidden Operating Regions
  - Must be dispatched through ranges
  - Functionality does not optimize with respect to embedded generators or associated constraints or costs
Additional Background

- Forbidden Region functionality led to stability and performance issues in Market Simulation
- Suspended per October 2008 BOG meeting
- FERC mandated implementation of combined cycle modeling within three years of MRTU go live
- Highly ranked in the Market Initiatives Roadmap
- Timeline for implementation is being shortened
The benefits of multi-stage unit modeling

- Helps ensure a feasible dispatch
- Reduces costs
- Utilizes unit flexibility
- Enables more tailored bids
- Other benefits?
## Forbidden Regions *versus* Multi-Stage Modeling

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<thead>
<tr>
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<th>Forbidden Regions</th>
<th>Multi-Stage Modeling</th>
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<tbody>
<tr>
<td>Restricts dispatch within certain ranges</td>
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<td>Optimizes dispatch for embedded generators</td>
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<td>Uses additional bid in information</td>
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<td>Captures transition times and costs</td>
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Potential issues

- Bid Cost Recovery
- Implications for Resource Adequacy
- Other issues?
Types of Multi-Stage Models

- **Pseudo-unit model (NYISO)**
  - Divides composite resource and models each segment as a separate unit
    - e.g., a 3x1 CC model would be three pseudo-units
  - Works well in taking advantage of unit flexibility
  - Renders realistic dispatch instructions
  - Cannot accommodate pseudo-unit varying costs

- **Pseudo-plant model**
  - Models each configuration (or stage) as a separate unit
    - e.g., a 3x1 CC model would be ten pseudo-plants
  - Has above strengths, and can accommodate pseudo-unit varying costs
Next steps…

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<tr>
<th>Date</th>
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<tr>
<td>November 7</td>
<td>Post Issues Paper</td>
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<td>November 21</td>
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<td>December 5</td>
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<td>December 19</td>
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<tr>
<td>January 26-27, 2009</td>
<td>Presentation to ISO Board of Governors</td>
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Questions, comments and concerns…

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