NCSL Webinar
Briefing on Renewable Integration

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Director Market Operations
1/28/16
Outline

- Who we are: renewable integration leader
- Our renewable integration experience
- Legislative & policy examples
- Thoughts on the future
Who We Are…

- 26,000+ MW of Generation
- Operating in 8 states
- No. 1 wind energy provider
- ~6,570 MW of wind
- Top 10 solar provider

Customers:
3.4 million electric
1.9 million gas
### Xcel Energy Renewable Integration

<table>
<thead>
<tr>
<th></th>
<th>NSP</th>
<th>PSCo</th>
<th>SPS</th>
<th>XCEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name Plate Capacity (MW)</td>
<td>2,217</td>
<td>2,567</td>
<td>1,586</td>
<td>6,370</td>
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<tr>
<td>Max Hourly Generation (MW)</td>
<td>1,899</td>
<td>2,424</td>
<td>1,468</td>
<td>5,060</td>
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<td>Date/Time Occurred</td>
<td>10/28/15 9:00 PM</td>
<td>11/11/15 3:00 AM</td>
<td>11/10/15 11:00 PM</td>
<td>11/3/15 9:00 PM</td>
</tr>
<tr>
<td>Max Hourly % Load</td>
<td>53.38%</td>
<td>66.42%</td>
<td>60.29%</td>
<td>51.77%</td>
</tr>
<tr>
<td>Date/Time Occurred</td>
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<td>11/11/15 3:00 AM</td>
<td>11/11/15 1:00 AM</td>
<td>11/4/15 12:00 AM</td>
</tr>
<tr>
<td>Max Daily % Load</td>
<td>41.28%</td>
<td>54.30%</td>
<td>50.83%</td>
<td>39.01%</td>
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<td>Date/Time Occurred</td>
<td>November 8, 2015</td>
<td>October 2, 2015</td>
<td>November 15, 2015</td>
<td>November 8, 2015</td>
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<td>Max Monthly % Load</td>
<td>21.40%</td>
<td>26.40%</td>
<td>26.70%</td>
<td>23.18%</td>
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<td>Month/Year</td>
<td>November, 2015</td>
<td>April, 2014</td>
<td>November, 2015</td>
<td>Nov-15</td>
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Renewable Integration Experience

- Reduce renewable curtailments
- Improve wind forecasts
- Improve wholesale electricity markets
- Strengthen the electric grid
- Manage coal and gas generator cycling
- Address backup supply issues
Legislative & Policy Examples

- Legislative and public policy influence on electricity portfolio evolution
  - State-level Renewable Portfolio Standards
    - MN 30% annual energy for NSP
    - CO 30% annual energy for PSCo
  - Conversion of coal-fired plants to natural gas fuel
    - Colorado “Clean Air, Clean Jobs”
    - Minnesota “Metro Emissions Reduction Program”
- Regional wholesale electricity markets
- Regional grid developments
Thoughts on the future

- Going beyond 30% annual energy creates new challenges and economic signals:
  - Renewable curtailment issues
  - Cycling of fossil thermal plants
  - Grid congestion & uncertainty
  - Technical changes to grid reliability performance

- These impacts must be properly considered to make good public policy that addresses the environment, reliability and efficiency