2015 New Orleans IRP - Draft

Modeling Overview

February 26, 2015

Note: All IRP materials are preliminary & subject to change prior to the final report filing.
The following topics will be discussed:

- Resource Actions from 2012 IRP
- Market Modeling
- Demand-Side Resource Optimization
- Supply-Side Resource Evaluation
2012 IRP

- Supply Side Existing Resources
  1. Decision to deactivate Michoud 2 and 3
  2. Market opportunity for Union CCGT partially addresses near-term need

- Supply Side New Resources
  3. Ninemile 6 addition in 2015
  4. Planned Amite South CCGT in 2020

2015 IRP

- Identify resources to fill remaining needs
  5. Evaluate DSM and Supply-Side alternatives

Industrial Renaissance Scenario
The AURORA model is used to develop a projection of the future power market for each of the four scenarios.

The AURORA model as configured for IRP analysis uses a zonal representation of MISO and 1st Tier markets.

Results of MISO Market Modeling (MISO North and South, excluding New Orleans)

<table>
<thead>
<tr>
<th></th>
<th>Industrial Renaissance (Ref. Case)</th>
<th>Business Boom</th>
<th>Distributed Disruption</th>
<th>Generation Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCGT</td>
<td>46%</td>
<td>81%</td>
<td>98%</td>
<td>62%</td>
</tr>
<tr>
<td>CT</td>
<td>55%</td>
<td>19%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Wind</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>12%</td>
</tr>
<tr>
<td>Solar</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>24%</td>
</tr>
<tr>
<td>Year of First Addition</td>
<td>2017</td>
<td>2017</td>
<td>2017</td>
<td>2017</td>
</tr>
<tr>
<td>Total GWs Added (through 2034)</td>
<td>59</td>
<td>65</td>
<td>39</td>
<td>101</td>
</tr>
</tbody>
</table>
PROJECTED MISO MARKET ADDITIONS BY YEAR

IR Non-ENO MISO Annual Resource Additions (GW)

BB Non-ENO MISO Annual Resource Additions (GW)

DD Non-ENO MISO Annual Resource Additions (GW)

GS Non-ENO MISO Annual Resource Additions (GW)
ICF conducted a DSM Potential Study to develop high-level, long run achievable DSM program potential estimates for ENO over the 20-year planning horizon (2015-2034).

- In total, 24 DSM programs were considered cost effective with a Total Resources Cost (“TRC”) ratio of 1.0 or better. ICF developed hourly loadshapes and program cost projections representing three levels – low, reference, and high – of achievable DSM program savings. These load shapes and costs are the demand-side management inputs in the IRP analysis.

**ENO Cumulative Net MW Savings Potential, by Scenario**
The AURORA Capacity Expansion Model was used to develop a DSM portfolio for each of the scenarios. The result of this process was an optimal DSM portfolio for each scenario.

<table>
<thead>
<tr>
<th>Portfolio Design Mix</th>
<th>IR Portfolio</th>
<th>BB Portfolio</th>
<th>DD Portfolio</th>
<th>GS Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSM</td>
<td>14 Programs</td>
<td>12 Programs</td>
<td>16 Programs</td>
<td>17 Programs</td>
</tr>
<tr>
<td>DSM Maximum (MW)</td>
<td>41</td>
<td>26</td>
<td>40</td>
<td>43</td>
</tr>
</tbody>
</table>

DSM Annual Peak Load Reductions by Scenario (MW)
LOAD REQUIREMENTS FOR EACH SCENARIO

Industrial Renaissance Scenario (MW)

Business Boom Scenario (MW)

Distributed Disruption Scenario (MW)

Generation Shift Scenario (MW)
AURORA CAPACITY EXPANSION - SUPPLY SIDE PORTFOLIOS

Industrial Renaissance, Business Boom, and Distributed Disruption Portfolio

*Resources listed in blue are existing and planned resources. Resources additions listed in brown are the resources to be evaluated in the IRP.

Preliminary – Work in Progress
**Supply Side Portfolio Design**

**AURORA Capacity Expansion - Supply Side Portfolios**

**Generation Shift Portfolio**

<table>
<thead>
<tr>
<th>Resource Addition</th>
<th>Capacity (MW)</th>
<th>Effective Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019 Solar</td>
<td>800</td>
<td>200</td>
</tr>
<tr>
<td>2023 Solar</td>
<td>50</td>
<td>12.5</td>
</tr>
<tr>
<td>2025 Solar</td>
<td>50</td>
<td>12.5</td>
</tr>
<tr>
<td>2027 Solar</td>
<td>50</td>
<td>12.5</td>
</tr>
<tr>
<td>2029 Solar</td>
<td>50</td>
<td>12.5</td>
</tr>
<tr>
<td>2030 Wind</td>
<td>50</td>
<td>7</td>
</tr>
<tr>
<td>2031 Solar</td>
<td>50</td>
<td>12.5</td>
</tr>
<tr>
<td>2033 Solar</td>
<td>50</td>
<td>12.5</td>
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<tr>
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<td>50</td>
<td>12.5</td>
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Industrial Renaissance – CT/Solar Portfolio

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<th>Effective Capacity (MW)</th>
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<tbody>
<tr>
<td>2019 CT</td>
<td>194</td>
<td>194</td>
</tr>
<tr>
<td>2020 Solar</td>
<td>100</td>
<td>25</td>
</tr>
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<td>2020 Wind</td>
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Preliminary – Work in Progress
**Industrial Renaissance – CT/Wind-Solar Portfolio**

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Installed Capacity Mix of Each Portfolio in 2034

Supply Side Portfolio Design

Resource Type
- Renewables
- Peaking
- Base Load and Load Following

Resource
- Wind
- Solar
- CT
- CCGT
- Nuclear
- Coal

Capacity Expansion - IR, Expansion - GS BB, DD
CT
CT/Solar
CT/Wind
CT/Solar-Wind

0%
20%
40%
60%
80%
100%
The variable cost results will be combined with the fixed costs of the incremental resource additions to yield the total forward revenue requirements excluding sunk costs of the portfolio.

Evaluate portfolio performance based on ranking and range of outcomes.

Assess portfolios based on their ability to balance planning objectives of reliability, cost, and risk.

Develop portfolios for final reference plan based on performance and ability to meet planning objectives.
The following activities are planned:

- Perform production cost simulations using Aurora for each of the portfolios
- Estimate total forward revenue requirements excluding sunk costs for each portfolio
- Assess sensitivity of key uncertainties
- Identify reference portfolio plan and action plan
- Draft IRP Report is due in June 2015