The Electricity Industry Transition and its Implications for Ohio’s Retail Market

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Changes in Ohio’s Electricity Market – Prospects for 2014
Ohio University Voinovich School Webinar
March 25, 2014
<table>
<thead>
<tr>
<th>Key Statistics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member companies</td>
<td>875+</td>
</tr>
<tr>
<td>Millions of people served</td>
<td>60</td>
</tr>
<tr>
<td>Peak load in megawatts</td>
<td>163,848</td>
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<tr>
<td>MWs of generating capacity</td>
<td>185,600</td>
</tr>
<tr>
<td>Miles of transmission lines</td>
<td>59,750</td>
</tr>
<tr>
<td>GWh of annual energy</td>
<td>832,331</td>
</tr>
<tr>
<td>Generation sources</td>
<td>1,365</td>
</tr>
<tr>
<td>Square miles of territory</td>
<td>214,000</td>
</tr>
<tr>
<td>States served</td>
<td>13 + DC</td>
</tr>
</tbody>
</table>

21% of U.S. GDP produced in PJM

As of 1/1/2014
• Reliability Pricing Model (RPM) is the PJM resource adequacy construct
• RPM is part of an integrated approach to ensuring long-term resource adequacy and competitively priced delivered energy
• RPM aligns the price paid for generation capacity with overall system reliability requirements
• RPM provides forward investment signals
• PJM invites resource-specific sell offers for planning each year, three years in advance.

• Products that may be offered include: existing and planned generation; planned transmission upgrades; and existing and planned demand resources

• New generation, new demand response alternatives, and new transmission solutions can compete directly with existing resources
Challenges Over the Next Few Years

- Electricity Demand Trends
- World’s Largest Fuel Switch
- Narrowing Reserve Margins
- Power Market / Natural Gas Interoperability
- Integration of Intermittent, Distributed and Demand Side Resources
New Generation by Fuel Type
Since RPM Implementation in 2007

28,178 MW Total

Dependable Capacity (MW)

- Combined Cycle
- CT/GT
- Coal
- Nuclear
- Wind
- Hydro
- Diesel
- Solar
- Fuel Cell
2007 PJM installed capacity

- **Coal, 66,286**
- **Petroleum, 10,640**
- **Renewable, 65**
- **Solid Waste, 713**
- **Hydroelectric, 7,311**

- **Gas, 47,599**
- **Nuclear, 30,884**

Capacity cleared market for 2016/2017 delivery year

- **Coal, 45,148**
- **Petroleum, 8,419**
- **Renewable, 961**
- **Solid Waste, 829**
- **Hydroelectric, 7,535**

- **Gas, 61,888**
- **Nuclear, 30,801**
Transitioning from Coal to Gas

2009 to Date: 26,000 MW in Retirement Notices
Forward Capacity Commitment for PJM Generation in Service as of June 1, 2013

- 11,300 MW of existing coal-fired / oil-fired steam did not clear in the 2016/17 auction
- 4,875 MW of these units did not clear in 2015/16 auction
- 3,603 MW of these units did not clear in 2014/15 auction
PJM Queued Generation (Nameplate Energy) – Active and Under Construction

- Natural Gas, 45,432 MW, 62%
- Wind MW, 19,351, 26%
- Nuclear, 2,726 MW, 4%
- Solar, 2,192 MW, 3%
- Storage, 162 MW, 0%
- Biomass, 381 MW, 1%
- Methane, 118 MW, 0%
- Hydro, 283 MW, 0%
- Coal, 2,972 MW, 4%
- Oil, 45 MW, 0%
- Other, 232 MW, 0%
- Wood, 63 MW, 0%

As of 03/2013
Increasing Demand Resources

New Capacity Market (RPM)

- Energy Efficiency
- Demand Response Offered
- Committed/Cleared DR

MW
Generation Retirements, Additions and Net Generation Supply Change Over the Next Three Years

Megawatts

-14,000
-12,000
-10,000
-8,000
-6,000
-4,000
-2,000
0
2,000
4,000
6,000

2014/2015
2015/2016
2016/2017

Retirements
Expected New Generation*
Cumulative Change

PJM©2014
• Information Sharing / Coordination
  – FERC Order 787 Emergency Waivers
  – Daily communication of generation commitment to Pipelines
  – Implemented joint status calls

• Gas Pricing Issues January 22 – 28, 2014
  – Gas units variable cost > $1000/MWh offer cap
  – PJM emergency waiver filings
  – Long term solution required

• Scheduling and Commercial Issues
Trend in Forward Energy Prices

NYMEX Forward Curves for PJM Western Hub Monthly Peak Contract

Forward Price ($/MWH)

Contract Month


As of March 28, 2013
As of June 28, 2013
As of September 12, 2013
As of November 11, 2013
As of January 24, 2014