The Energy Industry and PJM

Stu Bresler
Sr. Vice President – Market Services
PJM Interconnection

West Virginia Public Energy Authority
Sept. 28, 2022
<table>
<thead>
<tr>
<th>Key Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Member companies</td>
<td>1,060+</td>
</tr>
<tr>
<td>Millions of people served</td>
<td>65</td>
</tr>
<tr>
<td>Peak load in megawatts</td>
<td>165,563</td>
</tr>
<tr>
<td>Megawatts of generating capacity</td>
<td>185,442</td>
</tr>
<tr>
<td>Miles of transmission lines</td>
<td>85,103</td>
</tr>
<tr>
<td>2020 gigawatt hours of annual energy</td>
<td>782,683</td>
</tr>
<tr>
<td>Generation sources</td>
<td>1,436</td>
</tr>
<tr>
<td>Square miles of territory</td>
<td>368,906</td>
</tr>
<tr>
<td>States served</td>
<td>13 + DC</td>
</tr>
</tbody>
</table>

21% of U.S. GDP Produced in PJM

As of 2/2021
PJMs Role as a Regional Transmission Organization

**PLANNING**

Planning for the future like...

- Urban Planning

**OPERATIONS**

Matches supply with demand like...

- Air Traffic Control

**MARKETS**

Energy Market Pricing like...

- RFP Process
Growth in Services

Long-Term

Day-Ahead

Real-Time

PJM Grid Operations | PJM Markets |
Value Proposition

Total Annual PJM Value

$3.2-4 B

$1.2-1.8 B SAVINGS

$600 M SAVINGS

$300 M SAVINGS

$1.1-1.3 B SAVINGS

10+ M fewer tons of emissions (annual avg.)

Generation Investment

Energy Production Costs

Reliability

Emissions

Integrating More Efficient Resources

All numbers are estimates.
How Load is Served

1 | Submit their supply resources to PJM for economic dispatch
2 | Self-schedule their own supply resources to meet their load obligations
3 | Purchase energy from other market participants
4 | Import energy from outside PJM
5 | Purchase from the spot market
PJM – Existing Installed Capacity
(CIRs – as of Dec. 31, 2021)

- Coal, 49,670 MW
- Natural Gas, 82,510 MW
- PJM 186,868 MW
- Nuclear, 32,656 MW
- Oil, 8,558 MW
- Hydro, 8,249 MW
- Solar, 1,824 MW
- Wind, 2,597 MW
- Waste, 804 MW
West Virginia – Existing Installed Capacity
(CIRs – as of Dec. 31, 2021)

- Wind, 249 MW
- Hydro, 224 MW
- Oil, 11 MW
- Natural Gas, 1,112 MW
- Coal, 12,536 MW

Total: 14,132 MW
West Virginia – Queued Capacity (MW) by Fuel Type

(Requested CIRs – as of Dec. 31, 2021)

Nameplate Capacity, 7,263 MW

- Solar, 4,049 MW
- Wind, 108 MW (Nameplate Capacity, 695 MW)
- Hydro, 30 MW
- Coal, 36 MW
- Natural Gas, 3,935 MW

WV Total: 9,114 MW

Note: Nameplate capacity represents a generator’s rated full power output capability.
Unprecedented Number of Changes in the Power Industry

- Storage and renewables
- Distributed energy resources
- Energy efficiency
- Alternative technologies
- Fuel swap
- Customer behavior and choice
Current Interconnection Queue
As of Sept. 20, 2022

- Solar, 114,557 MW
- Storage, 53,762 MW
- Other, 1,390 MW
- Natural Gas, 7,240 MW
- Hybrid, 39,693 MW

Total Proposed Generation Capability: 260,883 MW

Projects Under Study: 2,755

As of Sept. 20, 2022
State Renewable Portfolio Standards (RPS) require suppliers to utilize renewable resources to serve an increasing percentage of total demand.

<table>
<thead>
<tr>
<th>State RPS Targets*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NJ:</strong> 50% by 2030**</td>
<td><strong>VA:</strong> 100% by 2045/2050 (IOUs)</td>
</tr>
<tr>
<td><strong>MD:</strong> 50% by 2030**</td>
<td><strong>NC:</strong> 12.5% by 2021 (IOUs)</td>
</tr>
<tr>
<td><strong>DE:</strong> 40% by 2035</td>
<td><strong>OH:</strong> 8.5% by 2026</td>
</tr>
<tr>
<td><strong>DC:</strong> 100% by 2032</td>
<td><strong>MI:</strong> 15% by 2021</td>
</tr>
<tr>
<td><strong>PA:</strong> 18% by 2021***</td>
<td><strong>IN:</strong> 10% by 2025***</td>
</tr>
<tr>
<td><strong>IL:</strong> 50% by 2040</td>
<td></td>
</tr>
</tbody>
</table>

* Targets may change over time; these are recent representative snapshot values
** Includes an additional 2.5% of Class II resources each year
*** Includes non-renewable “alternative” energy resources
“Living study” to identify gaps and opportunities; the initial findings should not be regarded as expected outcomes, but as bookends to be refined as the study progresses.

Renewable Scenarios (Annual Energy)

- BASE 10%
- POLICY 22%
- ACCELERATED 50%
  - 130% Instantaneous peak
  - 70% Carbon-Free

Note: Policies and Market rules “as-is” April 2020.
Facilitate Decarbonization  Grid of the Future  Innovation

RELIABILITY