2017 Tennessee State Infrastructure Report
(January 1, 2017 – December 31, 2017)

May 2018

This report reflects information for the portion of Tennessee within the PJM service territory.
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   • Generation Portfolio Analysis
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• **Existing Capacity**: There is no installed capacity in the part of Tennessee served by PJM.

• **Interconnection Requests**: There are no interconnection requests in Tennessee.

• **Deactivations**: Tennessee had no generation deactivations or deactivation notifications in 2017.

• **RTEP 2017**: Tennessee RTEP 2017 projects total $13 million in investment. There were no supplemental projects in Tennessee in 2017.

• **Load Forecast**: Tennessee load growth is nearly flat, averaging .5 percent per year over the next 10 years. This aligns with PJM RTO load growth projections.
• **2021/22 Capacity Market:** Compared to the RTO footprint, Tennessee’s distribution of generation is less than PJM, demand response is higher, and energy efficiency is similar to PJM.

• **6/1/14 – 5/31/17 Performance:** Tennessee’s average daily locational marginal prices were consistently at or below PJM average daily LMPs. Imported resources represent 84.6 percent of generation produced in the PJM region of Tennessee.
Planning
Generation Portfolio Analysis
In PJM, natural gas and coal make up nearly 70 percent total installed capacity. Nuclear represents another 18.9 percent.

* Gas Contains

<table>
<thead>
<tr>
<th>Source</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>66,836.3</td>
</tr>
<tr>
<td>Other Gas</td>
<td>443.8</td>
</tr>
</tbody>
</table>

*Gas, 67,280 MW

Coal, 57,692 MW

Nuclear, 33,992 MW

Waste, 962 MW

Solar, 373 MW

Oil, 9,734 MW

Hydro, 8,371 MW

Wind, 1,130 MW

Waste, 962 MW

Solar, 373 MW

Oil, 9,734 MW

Hydro, 8,371 MW

Wind, 1,130 MW

Coal, 57,692 MW

Nuclear, 33,992 MW

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Summary:

There is no installed capacity in the part of Tennessee served by PJM.

Overall in PJM, natural gas represents approximately 37 percent of installed capacity while coal represents 32 percent.
There are no interconnection requests in the queue in the part of Tennessee served by PJM.
Tennessee – Progression History Interconnection Requests
Projects under construction, suspended, in service, or withdrawn – As of December 31, 2017

Projects that withdrew after a final agreement
None

54.5% of requested capacity megawatt and 66.7% of projects reaches commercial operation
Tennessee had no generation deactivations or deactivation notifications in 2017.
Planning
Transmission Infrastructure Analysis
Tennessee – RTEP Baseline Projects
(Greater than $5 million)

Note: Baseline upgrades are those that resolve a system reliability criteria violation.
# Tennessee – RTEP Baseline Projects

(Greater than $5 million)

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Project Description</th>
<th>Project Driver</th>
<th>Required In Service Date</th>
<th>Project Cost ($M)</th>
<th>TO Zone(s)</th>
<th>2017 TEAC Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>b2884</td>
<td>Install a second transformer at Nagel station, comprised of 3 single phase 250MVA 500/138kV transformers. Presently, TVA operates their end of the Boone Dam – Holston 138 kV interconnection as normally open preemptively for the loss of the existing Nagel</td>
<td>TO Criteria Violation</td>
<td>6/1/2021</td>
<td>$ 13.0</td>
<td>AEP</td>
<td>5/31/2017</td>
</tr>
</tbody>
</table>
Planning
Load Forecast
PJM RTO Summer Peak Demand Forecast

Year:
- 2014 to 2033

Load (MW):
- 120,000 to 190,000

Lines represent:
- 2013 Load Forecast
- 2014 Load Forecast
- 2015 Load Forecast
- 2016 Load Forecast
- 2017 Load Forecast
- 2018 Load Forecast
<table>
<thead>
<tr>
<th>Transmission Owner</th>
<th>Summer Peak (MW)</th>
<th>Winter Peak (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018</td>
<td>2028</td>
</tr>
<tr>
<td>American Electric Power Company *</td>
<td>344</td>
<td>361</td>
</tr>
<tr>
<td>PJM RTO</td>
<td>152,108</td>
<td>157,635</td>
</tr>
</tbody>
</table>

* PJM notes that American Electric Power Company serves load other than in Tennessee. The Summer Peak and Winter Peak MW values in this table each reflect the estimated amount of forecasted load to be served by American Electric Power Company solely in Tennessee. Estimated amounts were calculated based on the average share of American Electric Power Company’s real-time summer and winter peak load located in Tennessee over the past five years.
Markets
Capacity Market Results
2021/22 Base Residual Auction Clearing Prices ($/MW-Day)

- ComEd: $196
- ATSI: $171
- RTO: $140
- BGE: $200
- EMAAC: $166
- PSE&G: $204

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## Tennessee - Cleared Resources in 2021/22 Auction
(May 23, 2018)

<table>
<thead>
<tr>
<th></th>
<th>Cleared MW (Unforced Capacity)</th>
<th>Change from 2020/21 Auction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>43</td>
<td>0</td>
</tr>
<tr>
<td>Demand Response</td>
<td>27</td>
<td>14</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>73</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**RTO Locational Clearing Price**

$140

*NOTE: Demand Response and Energy Efficiency are reported to PJM by Transmission Zone. The numbers above reflect the state’s pro-rata share of cross-state zones for illustrative purposes.*
## PJM - 2021/2022 Cleared MW (UCAP) by Resource Type

<table>
<thead>
<tr>
<th></th>
<th>Annual</th>
<th>Summer</th>
<th>Winter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation</strong></td>
<td>149,616 MW</td>
<td>54 MW</td>
<td>716 MW</td>
<td>150,385 MW</td>
</tr>
<tr>
<td><strong>DR</strong></td>
<td>10,674 MW</td>
<td>452 MW</td>
<td>- MW</td>
<td>11,126 MW</td>
</tr>
<tr>
<td><strong>EE</strong></td>
<td>2,623 MW</td>
<td>209 MW</td>
<td>- MW</td>
<td>2,832 MW</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>162,912 MW</td>
<td>716 MW</td>
<td>716 MW</td>
<td>164,343 MW</td>
</tr>
</tbody>
</table>
### Tennessee – Offered and Cleared Resources in 2021/22 Auction

(May 23, 2018)

<table>
<thead>
<tr>
<th>Generation</th>
<th>Offered MW</th>
<th>Cleared MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unforced Capacity</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Demand Response</th>
<th>Offered MW</th>
<th>Cleared MW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29</td>
<td>27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Efficiency</th>
<th>Offered MW</th>
<th>Cleared MW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

| Total Offered MW  | 76         |
| Total Cleared MW  | 73         |

**NOTE:** Demand Response and Energy Efficiency are reported to PJM by Transmission Zone. The numbers above reflect the state’s pro-rata share of cross-state zones for illustrative purposes.
Markets
Market Analysis
Tennessee’s average daily LMPs generally align with the PJM average daily LMP.

Note: The price spike on 9/21/2017 reflects the PJM shortage pricing event. The price spike starting 12/28/2017 reflects the beginning of the Cold Snap.
Tennessee’s average hourly LMPs are generally equal to or lower than the PJM average.
Tennessee – Energy Production
(June 1, 2015 – December 31, 2017)

Amount of energy produced by Tennessee generation

- Imports, 84.6%
- Misc., 13.1%
- Hydro, 2.3%
Operations
Emissions Data
PJM Average Emissions (lbs/MWh)

- Carbon Dioxide
- Nitrogen Oxides
- Sulfur Dioxides

SO₂ and NOₓ (lbs/MWh)


Emission Levels:
- CO₂:
  - 2005: 1,350 lbs/MWh
  - 2017: 900 lbs/MWh
- SO₂ and NOₓ:
  - 2005: 9 lbs/MWh
  - 2017: 1 lbs/MWh

CO₂ (lbs/MWh) vs. SO₂ and NOₓ (lbs/MWh)