2018 Delaware State Infrastructure Report
(January 1, 2018 – December 31, 2018)

May 2019
1. Planning
   • Generation Portfolio Analysis
   • Transmission Analysis
   • Load Forecast

2. Markets
   • Capacity Market Results
   • Market Analysis

3. Operations
   • Emissions Data
• **Existing Capacity:** Natural gas represents approximately 63.2 percent of the total installed capacity in Delaware, while oil represents approximately 24.1 percent and coal 12.7 percent. This differs from PJM where natural gas and coal are at 40.2 and 30.7 percent of total installed capacity.

• **Interconnection Requests:** Natural gas represents approximately 55.7 percent of new interconnection requests in Delaware.

• **Deactivations:** Delaware had no generation deactivations or deactivation notifications in 2018.

• **RTEP 2018:** Delaware had no RTEP projects in 2018. There were also no supplemental projects in Delaware in 2018.

• **Load Forecast:** Delaware’s load growth is nearly flat, averaging between 0.1 and 0.4 percent per year over the next 10 years. This aligns with PJM RTO load growth projections.
• **2021/22 Capacity Market**: Compared to the PJM footprint, Delaware’s distribution of cleared generation, demand response and energy efficiency is similar.

• **1/1/18 – 12/31/18 Performance**: Delaware’s average locational marginal prices were generally above the PJM average during daytime hours and below the PJM average at night. Natural gas resources represented 38.1 percent of generation produced in Delaware while imports averaged 44.7 percent.

• **Emissions**: 2018 carbon dioxide emissions are slightly up from 2017; sulfur dioxides and nitrogen oxides continue to hold flat from 2014.
Planning
Generation Portfolio Analysis
PJM Existing Installed Capacity
(CIRs, December 31, 2018)

- Coal, 56,653 MW
- Natural Gas, 74,194 MW
- Nuclear, 33,362 MW
- Oil, 9,499 MW
- Solar, 640 MW
- Hydro, 8,346 MW
- Wind, 1,165 MW
- Waste, 865 MW
Summary:

Natural gas represents approximately 63.2 percent of the total installed capacity in the Delaware territory while coal represents approximately 12.7 percent.

Overall in PJM, natural gas represents approximately 40.2 percent of installed capacity while coal represents 30.7 percent.
Delaware – Queued Capacity (MW) by Fuel Type
(as of December 31, 2018)

Natural gas represents approximately 55.7 percent of new interconnection requests in Delaware.

- Wind, 160 MW (Nameplate Capacity, 600 MW)
- Storage, 0.2 MW (Nameplate Capacity, 1 MW)
- Solar, 198 MW (Nameplate Capacity, 418 MW)

Natural Gas, 451 MW

* Note: Nameplate Capacity represents a generator’s rated full power output capability.
# Delaware – Interconnection Requests

(Unforced Capacity, As of December 31, 2018)

<table>
<thead>
<tr>
<th></th>
<th>Complete</th>
<th></th>
<th>In Queue</th>
<th></th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In Service</td>
<td>Withdrawn</td>
<td>Active</td>
<td>Suspended</td>
<td>Under Construction</td>
</tr>
<tr>
<td>No. of Projects</td>
<td>No. of Projects</td>
<td>Capacity, MW</td>
<td>No. of Projects</td>
<td>Capacity, MW</td>
<td>No. of Projects</td>
</tr>
<tr>
<td>Non-Renewable</td>
<td>28</td>
<td>25</td>
<td>6,326.4</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Coal</td>
<td>2</td>
<td>1</td>
<td>630.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>19</td>
<td>19</td>
<td>5,556.4</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Oil</td>
<td>5</td>
<td>1</td>
<td>1.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Storage</td>
<td>0</td>
<td>4</td>
<td>45.0</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Renewable</td>
<td>5</td>
<td>27</td>
<td>586.9</td>
<td>18</td>
<td>293.6</td>
</tr>
<tr>
<td>Biomass</td>
<td>1</td>
<td>4</td>
<td>24.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Methane</td>
<td>4</td>
<td>3</td>
<td>28.8</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Solar</td>
<td>0</td>
<td>16</td>
<td>178.7</td>
<td>16</td>
<td>197.6</td>
</tr>
<tr>
<td>Wind</td>
<td>0</td>
<td>4</td>
<td>355.4</td>
<td>2</td>
<td>96.0</td>
</tr>
<tr>
<td>Grand Total</td>
<td>33</td>
<td>52</td>
<td>6,819.3</td>
<td>19</td>
<td>293.8</td>
</tr>
</tbody>
</table>
Based on known queued interconnection requests and deactivation notices through December 31, 2022, adjusted to reflect the probability of commercialization as indicated by historical trends specific to an interconnection request’s state/zonal location and fuel type.

- Coal: 410 MW
- Gas: 2063.4 MW
- Oil: 780.3 MW
- Solar: 22.2 MW
- Wind: 3.9 MW

Delaware – Future Capacity Mix

Existing

Future
Delaware – Progression History Interconnection Requests
Projects under construction, suspended, in service, or withdrawn (as of December 31, 2018)

- **Projects withdrawn after final agreement**
  - 3 Interconnection Service Agreements – 420 MW < Nameplate Capacity, 46.9 MW
  - 4 Wholesale Market Participation Agreements – 13.3 MW < Nameplate Capacity, 780 MW

- **Percentage of planned capacity and projects reached commercial operation**
  - 15.3 % requested capacity megawatt
  - 37.9 % requested projects
Delaware had no generation deactivations or deactivation notifications in 2018.
Planning
Transmission Infrastructure Analysis
Delaware – RTEP Baseline Projects

(Greater than $5 million)

Delaware had no baseline project upgrades in 2018.

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

(Greater than $5 million)

Delaware had no network project upgrades in 2018.

Note: Network upgrades are new or upgraded facilities required primarily to eliminate reliability criteria violations caused by proposed generation, merchant transmission or long term firm transmission service requests.
Delaware had no supplemental project upgrades in 2018.

Note: Supplemental projects are transmission expansions or enhancements that are not required for compliance with the following PJM criteria: system reliability, operational performance or economic criteria, pursuant to a determination by the Office of the Interconnection and is not a state public policy project.
Planning
Load Forecast
PJM Annual Load Forecasts

(January 2019)

PJM RTO Summer Peak Demand Forecast

Load (MW)

190,000
180,000
170,000
160,000
150,000
140,000
130,000

2014 2016 2018 2020 2022 2024 2026 2028 2030 2032 2034

Load Forecast
- 2013
- 2017
- 2014
- 2018
- 2015
- 2019
- 2016
### Delaware – 2019 Load Forecast Report

<table>
<thead>
<tr>
<th>Transmission Owner</th>
<th>Summer Peak (MW)</th>
<th>Winter Peak (MW)</th>
<th>Growth Rate (%)</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2019</td>
<td>2029</td>
<td>2018/19</td>
<td>2028/29</td>
</tr>
<tr>
<td>Delmarva Power and Light *</td>
<td>2,623</td>
<td>2,642</td>
<td>0.1%</td>
<td>2,109</td>
</tr>
<tr>
<td>PJM RTO</td>
<td>151,358</td>
<td>156,689</td>
<td>0.3%</td>
<td>131,082</td>
</tr>
</tbody>
</table>

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

(May 23, 2018)

### Cleared MW (Unforced Capacity) vs. Change from 2020/21 Auction

<table>
<thead>
<tr>
<th>Category</th>
<th>Cleared MW</th>
<th>Change from 2020/21 Auction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>2,944</td>
<td>(136)</td>
</tr>
<tr>
<td>Demand Response</td>
<td>162</td>
<td>2</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>29</td>
<td>(6)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,135</strong></td>
<td><strong>(141)</strong></td>
</tr>
</tbody>
</table>

### EMMAC Locational Clearing Price

- $166
### PJM – 2021/2022 Cleared MW (UCAP) by Resource Type

<table>
<thead>
<tr>
<th>Resource Type</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>DR</td>
<td>10,674 MW</td>
<td>452 MW</td>
<td>- MW</td>
<td>11,126 MW</td>
</tr>
<tr>
<td>EE</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>
## Delaware – Offered and Cleared Resources in 2021/22 Auction
(May 23, 2018)

### Unforced Capacity

<table>
<thead>
<tr>
<th>Generation</th>
<th>Offered MW</th>
<th>Cleared MW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation</strong></td>
<td>3,058</td>
<td>2,944</td>
</tr>
<tr>
<td><strong>Demand Response</strong></td>
<td>195</td>
<td>162</td>
</tr>
<tr>
<td><strong>Energy Efficiency</strong></td>
<td>31</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total Offered MW</strong></td>
<td>3,284</td>
<td></td>
</tr>
<tr>
<td><strong>Total Cleared MW</strong></td>
<td>3,135</td>
<td></td>
</tr>
</tbody>
</table>

**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
Delaware's average daily LMPs tended to be higher than the PJM average daily LMP.

Note: The price spike in January reflects the Cold Snap that lasted from 12/28/17 to 1/7/2018.
Delaware’s hourly LMPs were higher than the PJM average during peak hours.
Delaware – Energy Production
(January 1, 2018 – December 31, 2018)

Amount of energy produced by Delaware generation in 2018.

Note: More than 12.3 million megawatt hours of energy, including imports, served Delaware in 2018.
Operations
Emissions Data
2005-2018 PJM Average Emissions

CO₂ lbs/MWh

SO₂ and NOₓ lbs/MWh

- Carbon Dioxide
- Sulfur Dioxides
- Nitrogen Oxides
Delaware – Average Emissions (lbs/MWh)

February 4, 2019

Delaware Average Emissions (lbs/MWh)

- Carbon Dioxide
- Nitrogen Oxides
- Sulfur Dioxides

Year:
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
Please note that PJM has historically used $5 million as the threshold for listing projects in the RTEP report. Beginning in 2018, it was decided to increase this cutoff to $10 million. All RTEP projects with costs totaling at least $5 million are still included in this state report. Going forward, the inclusion of RTEP projects in the State Infrastructure reports will be consistent with the RTEP listing cutoff of $10 million.

For a complete list of all RTEP projects, including those below the RTEP threshold of $10 million, please visit the “RTEP Upgrades & Status – Transmission Construction Status” page on pjm.com.