2020 Maryland and District of Columbia State Infrastructure Report
(January 1, 2020 – December 31, 2020)

April 2021
1. Planning
   • Generation Portfolio Analysis
   • Transmission Analysis
   • Load Forecast

2. Markets
   • Market Analysis
   • Net Energy Import/Export Trend

3. Operations
   • Emissions Data
Executing Capacity: Natural gas represents approximately 41.6 percent of the total installed capacity in the Maryland service territory while coal represents approximately 28 percent. Comparatively, across PJM natural gas and coal are at 43.4 and 27.5 percent of total installed capacity.

Interconnection Requests: Solar represents 75.2 percent of new interconnection requests in Maryland, while storage represents approximately 15.6 percent of new requests.

Deactivations: 1,210.8 MW in Maryland provided notification of deactivation in 2020.

RTEP 2020: Maryland’s 2020 RTEP projects total approximately $152.9 million in investment, which is slightly down from the 2019 total. Approximately 90.2 percent of that represents supplemental projects. These investment figures only represent RTEP projects that cost at least $5 million.
• **Load Forecast:** Maryland and Washington, D.C.’s projected summer peak load growth is relatively flat, averaging between -1.2 and 0.3 percent annually over the next 10 years depending on the service territory. Comparatively, the overall PJM RTO projected load growth rate is 0.3 percent.

• **2022/23 Capacity Market:** No Base Residual Auction was conducted in 2020. For the most recent auction results, please see the 2018 Maryland & District of Columbia State Infrastructure Report.

• **1/1/20 – 12/31/20 Market Performance:** Maryland and D.C.’s average hourly LMPs were slightly higher than the PJM average hourly LMP.

• **Emissions:** 2020 carbon dioxide, sulfur dioxide, and nitrogen oxide emissions in Maryland decreased from 2019 levels.
PJM Service Area – Maryland & D.C.
Planning
Generation Portfolio Analysis
PJM – Existing Installed Capacity
(CIRs – as of Dec. 31, 2020)

- Wind, 2,184 MW
- Hydro, 8,275 MW
- Solar, 1,015 MW
- Nuclear, 32,640 MW
- Oil, 8,629 MW
- Waste, 849 MW
- Coal, 50,689 MW
- Natural Gas, 80,115 MW

*Note: Nameplate capacity represents a generator’s rated full power output capability.*
Maryland – Existing Installed Capacity
(CIRs – as of Dec. 31, 2020)

MD
13,079 MW

- Coal, 3,657 MW
- Natural Gas, 5,438 MW
- Nuclear, 1,708 MW
- Waste, 102 MW
- Oil, 1,444 MW
- Solar, 80 MW
- Hydro, 592 MW
- Wind, 59 MW
PJM – Queued Capacity (MW) by Fuel Type
(Requested CIRs – as of Dec. 31, 2020)

PJM
104,837 MW

Solar, 58,845 MW

Storage, 10,877 MW

Wind, 6,560 MW

Coal, 76 MW

Hydro, 559 MW

Diesel, 4 MW

Natural Gas, 27,804 MW

Nuclear, 81 MW

Oil, 31 MW
Maryland – Queued Capacity (MW) by Fuel Type
(Requested CIRs – as of Dec. 31, 2020)

Because Maryland’s offshore wind projects are proposed to interconnect into Delaware, they are captured as Delaware’s queued capacity in PJM’s RTEP.

*Note: Nameplate capacity represents a generator’s rated full power output capability.
## Maryland – Interconnection Requests by Fuel Type

(Unforced Capacity – as of Dec. 31, 2020)

<table>
<thead>
<tr>
<th></th>
<th>Active</th>
<th>Suspected</th>
<th>Under Construction</th>
<th>In Service</th>
<th>Withdrawn</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Projects</td>
<td>Capacity (MW)</td>
<td>Projects</td>
<td>Capacity (MW)</td>
<td>Projects</td>
<td>Capacity (MW)</td>
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<tr>
<td><strong>Non-Renewable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>Diesel</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>8</td>
<td>172.6</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>0.0</td>
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<tr>
<td>Nuclear</td>
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<td>37.4</td>
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<td>0.0</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>Oil</td>
<td>3</td>
<td>18.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>Other</td>
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<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>Storage</td>
<td>14</td>
<td>388.2</td>
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<td>0.0</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td><strong>Renewable</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Hydro</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Methane</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Solar</td>
<td>47</td>
<td>1,585.1</td>
<td>7</td>
<td>72.8</td>
<td>22</td>
<td>209.8</td>
</tr>
<tr>
<td>Wind</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>76</td>
<td>2,201.3</td>
<td>7</td>
<td>72.8</td>
<td>23</td>
<td>209.8</td>
</tr>
</tbody>
</table>

**Note:** The "Under Construction" column includes both “Engineering and Procurement” and “Under Construction” project statuses.
Maryland – Progression History of Interconnection Requests

Projects withdrawn after final agreement

<table>
<thead>
<tr>
<th>Projects withdrawn after final agreement</th>
<th>Nameplate Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interconnection Service Agreements</td>
<td>5,627 MW</td>
</tr>
<tr>
<td>Wholesale Market Participation Agreements</td>
<td>93 MW</td>
</tr>
</tbody>
</table>

Percentage of planned capacity and projects that have reached commercial operation: 9%
Requested capacity megawatts: 17%

This graphic shows the final state of generation submitted to the PJM queue that completed the study phase as of Dec. 31, 2020, meaning the generation reached in-service operation, began construction, or was suspended or withdrawn. It does not include projects considered active in the queue as of Dec. 31, 2020.
Maryland – Generation Deactivation Notifications Received in 2020
# Maryland – Generation Deactivation Notifications Received in 2020

<table>
<thead>
<tr>
<th>Unit</th>
<th>TO Zone</th>
<th>Fuel Type</th>
<th>Request Submittal Date</th>
<th>Actual Deactivation Date</th>
<th>Age (Years)</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dickerson Station Unit 1</td>
<td>PEPCO</td>
<td>Coal</td>
<td>5/15/2020</td>
<td>8/13/2020</td>
<td>61</td>
<td>182.0</td>
</tr>
<tr>
<td>Dickerson Station Unit 2</td>
<td></td>
<td></td>
<td>5/15/2020</td>
<td>8/13/2020</td>
<td>60</td>
<td>180.0</td>
</tr>
<tr>
<td>Dickerson Station Unit 3</td>
<td></td>
<td></td>
<td>5/15/2020</td>
<td>8/13/2020</td>
<td>58</td>
<td>180.5</td>
</tr>
<tr>
<td>Chalk Point Unit 1</td>
<td></td>
<td></td>
<td>8/10/2020</td>
<td>6/1/2021</td>
<td>56</td>
<td>333.1</td>
</tr>
<tr>
<td>Chalk Point Unit 2</td>
<td></td>
<td></td>
<td>8/10/2020</td>
<td>6/1/2021</td>
<td>55</td>
<td>337.2</td>
</tr>
</tbody>
</table>
Planning
Transmission Infrastructure Analysis
Please note that PJM 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 included in this state report. However, only projects that are $10 million and above are displayed on the project maps.

For a complete list of all RTEP projects, please visit the “RTEP Upgrades & Status – Transmission Construction Status” page on pjm.com.

https://www.pjm.com/planning/project-construction
Maryland – RTEP Baseline Projects

(No baseline projects were planned in Washington, D.C. in the 2020 RTEP; Projects greater than $10 million)

Note: Baseline upgrades are those that resolve a system reliability criteria violation.
Maryland – RTEP Baseline Projects
(No baseline projects were planned in Washington, D.C. in the 2020 RTEP; Projects greater than $5 million)

<table>
<thead>
<tr>
<th>Map ID</th>
<th>Project</th>
<th>Description</th>
<th>Required In-Service Date</th>
<th>Project Cost ($M)</th>
<th>TO Zone</th>
<th>TEAC Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>b3155</td>
<td>Rebuild approximately 12 miles of Wye Mills - Stevensville line to achieve needed ampacity.</td>
<td>12/1/2023</td>
<td>$15.00</td>
<td>DP&amp;L</td>
<td>12/16/2019</td>
</tr>
</tbody>
</table>
Maryland and Washington, D.C. had no network project upgrades in 2020.

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, as well as certain direct connection facilities required to interconnect proposed generation projects.
Note: Supplemental projects are transmission expansions or enhancements that are not required for compliance with PJM criteria and are not state public policy projects according to the PJM Operating Agreement. These projects are used as inputs to RTEP models, but are not required for reliability, economic efficiency or operational performance criteria, as determined by PJM.
Maryland – TO Supplemental Projects
(No supplemental projects were planned in Washington, D.C. in the 2020 RTEP; Projects greater than $5 million)

<table>
<thead>
<tr>
<th>Map ID</th>
<th>Project</th>
<th>Description</th>
<th>Projected In-Service Date</th>
<th>Project Cost ($M)</th>
<th>TO Zone</th>
<th>TEAC Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>s2209</td>
<td>Rebuild two single-circuit 115 kV wood H-frame circuits (110617/110618) as one double-circuit steel-pole line.</td>
<td>12/31/2021</td>
<td>$21.40</td>
<td>BGE</td>
<td>3/20/2020</td>
</tr>
<tr>
<td>2</td>
<td>s2356</td>
<td>Rebuild 10 miles of existing Talbert-Oak Grove 230 kV double-circuit lattice tower transmission lines 23067 and 23087 with new steel monopole structures along the existing route.</td>
<td>12/1/2024</td>
<td>$38.00</td>
<td>PEPCO</td>
<td>9/1/2020</td>
</tr>
<tr>
<td>3</td>
<td>s2378</td>
<td>Construct two 69 kV substations along the existing Wye Mills to Stevensville circuit and retire existing Grasonville substation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construct new five-breaker ring bus substation west of existing Grasonville substation (w/30 MVAR Capacitor Bank).</td>
<td>6/1/2023</td>
<td>$18.50</td>
<td>DP&amp;L</td>
<td>10/15/2020</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construct new five-breaker ring bus substation west of existing Wye Mills substation (w/30 MVAR Capacitor Bank).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>s2386</td>
<td>Rebuild and reconductor the FE portion of the Doubs-Goose Creek 500 kV line (~14.8 miles of steel lattice tower construction) utilizing existing right-of-way. Replace breaker disconnect switches, line metering and relaying, substation conductor and breakers at Doubs 500 kV station.</td>
<td>6/1/2025</td>
<td>$60.00</td>
<td>AP</td>
<td>10/6/2020</td>
</tr>
</tbody>
</table>
Planning
Load Forecast
PJM Annual Load Forecasts

(Jan. 2021)

PJM RTO Summer Peak Demand Forecast

Load (MW)
The summer and winter peak megawatt values reflect the estimated amount of forecasted load to be served by each transmission owner in the noted state/district. Estimated amounts were calculated based on the average share of each transmission owner's real-time summer and winter peak load in those areas over the past five years.

**Serve load outside MD; *serves load outside D.C.**
Markets
Market Analysis
Maryland – Average Daily LMP and Load

<table>
<thead>
<tr>
<th>Date</th>
<th>Load (MW)</th>
<th>LMP ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mar 1</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>May 1</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Jul 1</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Sep 1</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Nov 1</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Jan 1</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>

- **PJM Average RT Daily LMP**
- **MD Average RT Daily LMP**
- **MD Average RT Daily Load**
Maryland’s average hourly LMPs were slightly higher than the PJM average hourly LMP.
Maryland – Net Energy Import/Export Trend

Positive values represent exports and negative values represent imports.
Washington, D.C. – Average Daily LMP and Load


<table>
<thead>
<tr>
<th>Load (MW)</th>
<th>Jan 1</th>
<th>Mar 1</th>
<th>May 1</th>
<th>Jul 1</th>
<th>Sep 1</th>
<th>Nov 1</th>
<th>Jan 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMP ($/MWh)</td>
<td>0</td>
<td>15</td>
<td>30</td>
<td>45</td>
<td>60</td>
<td>75</td>
<td>90</td>
</tr>
</tbody>
</table>

- PJM Average RT Daily LMP
- DC Average RT Daily LMP
- DC Average RT Daily Load
Washington, D.C. – Average Hourly LMP and Load


Washington, D.C.’s average hourly LMPs were slightly higher than the PJM average hourly LMP.
Washington, D.C. – Net Energy Import/Export Trend

Positive values represent exports and negative values represent imports.
Operations
Emissions Data
2005 – 2020 PJM Average Emissions

**CO₂ (lbs/MWh)**

- 1,300
- 1,200
- 1,100
- 1,000
- 900
- 800
- 700

**SO₂ and NOₓ (lbs/MWh)**

- 9.0
- 7.5
- 6.0
- 4.5
- 3.0
- 1.5
- 0.0

- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

- Carbon Dioxide
- Sulfur Dioxide
- Nitrogen Oxides
Maryland – Average Emissions (lbs/MWh)
(Feb. 2021)

SO₂ and NOₓ (lbs/MWh)

Carbon Dioxide
Sulfur Dioxide
Nitrogen Oxides

CO₂ (lbs/MWh)