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

May 2018

This report reflects information for the portion of Virginia within the PJM service territory.
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 45.0 percent of the total installed capacity in Virginia while coal represents approximately 15.2 percent. This differs from PJM where natural gas and coal are at 37 and 32 percent of total installed capacity.

• **Interconnection Requests:** Natural gas represents approximately 60 percent of new interconnection requests in Virginia.

• **Deactivations:** Virginia did not have any generation deactivations in 2017.

• **RTEP 2017:** Virginia RTEP 2017 projects total more than $791 million in investment. Approximately 22 percent of that represents supplemental projects.

• **Load Forecast:** Virginia load growth is nearly flat, averaging between .2 and .9 percent per year over the next 10 years. This aligns with PJM RTO load growth projections.
• **2021/22 Capacity Market:** Virginia cleared 920 MW more Demand Response and Energy Efficient resources than in the prior auction.

• **6/1/15 – 12/31/17 Performance:** Virginia’s average daily locational marginal prices were consistently at or above PJM average daily LMPs. Natural gas resources represented 30.9 percent of generation produced in Virginia while nuclear averaged 26.1 percent.

• **Emissions:** 2017 carbon dioxide, sulfur dioxide, and nitrogen oxide emissions are all down from 2016.
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>Type</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>66,836.3 MW</td>
</tr>
<tr>
<td>Other Gas</td>
<td>443.8 MW</td>
</tr>
</tbody>
</table>

Coal, 57,692 MW

Nuclear, 33,992 MW

Gas, 67,280 MW

Waste, 962 MW

Wind, 1,130 MW

Solar, 373 MW

Hydro, 8,371 MW

Oil, 9,734 MW
Summary:

Natural gas represents approximately 45.0 percent of the total installed capacity in the Virginia territory while coal represents approximately 15.2 percent.

Overall in PJM, natural gas represents approximately 37 percent of installed capacity while coal represents 32 percent.

<table>
<thead>
<tr>
<th>*Gas Contains</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>11,788.7 MW</td>
</tr>
<tr>
<td>Other Gas</td>
<td>121.6 MW</td>
</tr>
</tbody>
</table>

*Gas, 11,910 MW

Coal, 3,989 MW

Oil, 2,195 MW

Nuclear, 3,576 MW

Waste, 391 MW

Solar, 35 MW

Note: Capacity from generating units owned by Virginia jurisdictional utilities and included in regulated rates charged to Virginia customers, but physically located outside of Virginia, is not included in the above chart.
Natural gas represents approximately 60 percent of new interconnection requests in Virginia.

**Total MW Capacity by Fuel Type**

- **Natural Gas**, 59.5%
- **Solar**, 39.3%
- **Wind**, 0.6%
- **Coal**, 0.1%
- **Methane**, 0.1%
- **Diesel**, 0.0%

**Fuel as a Percentage of Projects in Queue**

<table>
<thead>
<tr>
<th>Fuel Source</th>
<th>Capacity, MW</th>
<th>Nameplate Capability, MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>6,597.1</td>
<td>6,649.6</td>
</tr>
<tr>
<td>Solar</td>
<td>4,356.4</td>
<td>7,242.2</td>
</tr>
<tr>
<td>Wind</td>
<td>63.8</td>
<td>475.2</td>
</tr>
<tr>
<td>Hydro</td>
<td>39.5</td>
<td>39.5</td>
</tr>
<tr>
<td>Coal</td>
<td>13.2</td>
<td>14.0</td>
</tr>
<tr>
<td>Storage</td>
<td>12.5</td>
<td>22.0</td>
</tr>
<tr>
<td>Methane</td>
<td>10.2</td>
<td>8.0</td>
</tr>
<tr>
<td>Diesel</td>
<td>1.9</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11,094.6</td>
<td>14,450.5</td>
</tr>
</tbody>
</table>
# Virginia – Interconnection Requests

(As of December 31, 2017)

<table>
<thead>
<tr>
<th>MW # of Projects</th>
<th>Complete</th>
<th>In Service</th>
<th>Withdrawn*</th>
<th>Active</th>
<th>Suspended**</th>
<th>Under Construction**</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW</td>
<td>MW # of Projects</td>
<td>MW # of Projects</td>
<td>MW # of Projects</td>
<td>MW # of Projects</td>
<td>MW # of Projects</td>
<td>MW # of Projects</td>
<td>MW # of Projects</td>
</tr>
<tr>
<td>Non-Renewable</td>
<td>6,461</td>
<td>60</td>
<td>15,594</td>
<td>41</td>
<td>4,543</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>Coal</td>
<td>706</td>
<td>8</td>
<td>35</td>
<td>2</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Diesel</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>5,083</td>
<td>36</td>
<td>13,812</td>
<td>30</td>
<td>4,517</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td>350</td>
<td>8</td>
<td>1,570</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Oil</td>
<td>322</td>
<td>6</td>
<td>40</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>136</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td>-</td>
<td>3</td>
<td>13</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Renewable</td>
<td>814</td>
<td>47</td>
<td>2,102</td>
<td>110</td>
<td>4,323</td>
<td>119</td>
<td>17</td>
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<tr>
<td>Biomass</td>
<td>147</td>
<td>5</td>
<td>70</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro</td>
<td>382</td>
<td>6</td>
<td>254</td>
<td>2</td>
<td>40</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Methane</td>
<td>97</td>
<td>14</td>
<td>82</td>
<td>11</td>
<td></td>
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<td></td>
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<tr>
<td>Solar</td>
<td>185</td>
<td>21</td>
<td>1,244</td>
<td>65</td>
<td>4,248</td>
<td>115</td>
<td>7</td>
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<tr>
<td>Wind</td>
<td>396</td>
<td>26</td>
<td>35</td>
<td>2</td>
<td>35</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Wood</td>
<td>4</td>
<td>1</td>
<td>57</td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>Grand Total</td>
<td>7,275</td>
<td>107</td>
<td>17,696</td>
<td>151</td>
<td>8,865</td>
<td>137</td>
<td>17</td>
</tr>
</tbody>
</table>

*May have executed final agreement
** Executed final agreement (ISA / WMPA)
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.

Virginia – Future Capacity Mix

Coal, 3,597 MW
Gas, 14,374 MW
Waste, 391 MW
Nuclear, 3,576 MW
Oil, 2,195 MW
Solar, 341 MW
Wind, 19 MW
Hydro, 4,102 MW

Existing

Future
Virginia – Progression History Interconnection Requests
Projects under construction, suspended, in service, or withdrawn – As of December 31, 2017

Projects that withdrew after a final agreement

<table>
<thead>
<tr>
<th></th>
<th>Number of Projects</th>
<th>Capacity, MW</th>
<th>Nameplate Capability, MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA</td>
<td>15</td>
<td>1,934</td>
<td>2,275</td>
</tr>
<tr>
<td>WMPA</td>
<td>3</td>
<td>30</td>
<td>60</td>
</tr>
</tbody>
</table>

27.1% of requested capacity megawatt and 39.0% of projects reaches commercial operation
Virginia – Deactivation Notifications Received in 2017
Virginia – Deactivation Notifications Received in 2017

<table>
<thead>
<tr>
<th>Unit</th>
<th>MW Capacity</th>
<th>TO Zone</th>
<th>Age</th>
<th>Projected Deactivation Date</th>
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</thead>
<tbody>
<tr>
<td>Spruance NUG 1</td>
<td>116</td>
<td>Dominion</td>
<td>25</td>
<td>1/12/2019</td>
</tr>
<tr>
<td>Spruance NUG 2</td>
<td>86</td>
<td>Dominion</td>
<td>25</td>
<td>1/12/2019</td>
</tr>
</tbody>
</table>

Summary:

- In 2017, two generating units in Virginia announced their intention to deactivate.
- In 2017 there were a total of 12 PJM generating units that announced their intent to deactivate, ranging in date from 2018 - 2020.
- Virginia did not have any generation deactivations in 2017.
Planning
Transmission Infrastructure Analysis
Virginia – RTEP Baseline Projects
(Greater than $5 million)

Note: Baseline upgrades are those that resolve a system reliability criteria violation.
<table>
<thead>
<tr>
<th>Project ID</th>
<th>Project</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>b2871</td>
<td>Rebuild 230kV line #247 from Swamp to Suffolk (31 miles) to current standards with a summer emergency rating of 1047 MVA at 230kV.</td>
<td>TO Criteria Violation</td>
<td>12/30/2022</td>
<td>$31.0</td>
<td>Dominion</td>
<td>5/4/2017</td>
</tr>
<tr>
<td>b2815</td>
<td>Build a new Pinewood 115kV switching station at the tap serving North Doswell DP with a 115kV four breaker ring bus</td>
<td>TO Criteria Violation</td>
<td>6/1/2017</td>
<td>$12.8</td>
<td>Dominion</td>
<td>12/1/2016</td>
</tr>
<tr>
<td>b2758</td>
<td>Rebuild Line #549 Dooms – Valley 500kV</td>
<td>TO Criteria Violation</td>
<td>6/1/2016</td>
<td>$58.2</td>
<td>Dominion</td>
<td>10/6/2016</td>
</tr>
<tr>
<td>b2759</td>
<td>Rebuild Line #550 Mt. Storm – Valley 500kV</td>
<td>TO Criteria Violation</td>
<td>6/1/2016</td>
<td>$225.0</td>
<td>Dominion</td>
<td>10/6/2016</td>
</tr>
<tr>
<td>b2800</td>
<td>The 7 mile section from Dozier to Thompsons Corner of line #120 will be rebuilt to current standards using 768.2 ACSS conductor with a summer emergency rating of 346 MVA at 115kV. Line is proposed to be rebuilt on single circuit steel monopole structure</td>
<td>TO Criteria Violation</td>
<td>6/1/2017</td>
<td>$6.5</td>
<td>Dominion</td>
<td>6/9/2017</td>
</tr>
<tr>
<td>b2649</td>
<td>Rebuild of 1.7 mile tap to Metcalf and Belfield DP (MEC) due to poor condition. The existing summer rating of the tap is 48 MVA and existing conductor is 4/0 ACSR on wood H-frames. The proposed new rating is 176 MVA using 636 ACSR conductor.</td>
<td>TO Criteria Violation</td>
<td>12/31/2019</td>
<td>$38.8</td>
<td>Dominion</td>
<td>6/9/2017</td>
</tr>
<tr>
<td>b2877</td>
<td>Rebuild Line #112 from Fudge Hollow - Lowmoor 138 kV (5.16 miles) to current standards with a summer emergency rating of 314 MVA at 138kV.</td>
<td>TO Criteria Violation</td>
<td>10/31/2020</td>
<td>$8.0</td>
<td>Dominion</td>
<td>6/9/2017</td>
</tr>
<tr>
<td>b2801</td>
<td>Line #76 and #79 will be rebuilt to current standard using 768.2 ACSS conductor with a summer emergency rating of 346 MVA at 115kV. Proposed structure for rebuild is double circuit steel monopole structure</td>
<td>TO Criteria Violation</td>
<td>12/30/2020</td>
<td>$22.0</td>
<td>Dominion</td>
<td>6/9/2017</td>
</tr>
<tr>
<td>Project ID</td>
<td>Project Description</td>
<td>Project Driver</td>
<td>Required In Service Date</td>
<td>Project Cost ($M)</td>
<td>TO Zone(s)</td>
<td>2017 TEAC Review</td>
</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td>b2922</td>
<td>Rebuild 8 of 11 miles of 230kV Lines #211 and #228 to current standard with a summer emergency rating of 1046 MVA for rebuilt section. Proposed conductor is 2-636 ACSR.</td>
<td>TO Criteria Violation</td>
<td>12/1/2020</td>
<td>$28.1</td>
<td>Dominion</td>
<td>8/10/2017</td>
</tr>
<tr>
<td>b2928</td>
<td>Rebuild four structures of 500kV Line #567 from Chickahominy to Surry using galvanized steel and replace the river crossing conductor with 3-1534 ACSR. This will increase the Line #567 Line Rating from 1954 MVA to 2600 MVA.</td>
<td>TO Criteria Violation</td>
<td>12/30/2017</td>
<td>$41.0</td>
<td>Dominion</td>
<td>9/14/2017</td>
</tr>
<tr>
<td>b2889</td>
<td>Bylesby – Wythe 69kV: Retire all 13.77 miles (1/0 CU) of this circuit (~4 miles currently in national forest) Galax – Wythe 69kV: Retire 13.53 miles (1/0 CU section) of line from Lee Highway down to Bylesby. This section is currently double circuited with Bylesby – Wythe 69kV. Terminate the southern 3/0 ACSR section into the newly opened position at Bylesby</td>
<td>TO Criteria Violation</td>
<td>6/1/2021</td>
<td>$30.0</td>
<td>AEP</td>
<td>5/31/2017</td>
</tr>
<tr>
<td>b2960</td>
<td>Replace fixed series capacitors on 500kV Line #547 at Lexington and on 500kV Line #548 at Valley</td>
<td>TO Criteria Violation</td>
<td>4/1/2020</td>
<td>$28.9</td>
<td>Dominion</td>
<td>11/2/2017</td>
</tr>
<tr>
<td>b2961</td>
<td>Rebuild approximately 3 miles of Line #205 &amp; Line #2003 from Chesterfield to Locks &amp; Poe respectively.</td>
<td>TO Criteria Violation</td>
<td>12/31/2022</td>
<td>$9.5</td>
<td>Dominion</td>
<td>11/2/2017</td>
</tr>
</tbody>
</table>
Virginia – RTEP Network Projects
(Greater than $5 million)

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.
# Virginia – RTEP Network Projects

(Greater than $5 million)

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Description</th>
<th>Project Driver</th>
<th>Queue</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>n3666</td>
<td>Install 138 kV Revenue Metering at the new Iron Ridge 138kV substation</td>
<td>Generation</td>
<td>Y1-006</td>
<td>10/31/2019</td>
<td>$7.5</td>
<td>AEP</td>
<td>10/12/2017</td>
</tr>
<tr>
<td></td>
<td>Install ADSS Fiber at the new Iron Ridge 138kV substation</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Construct Jubal Early – Auvinsville 138kV T-Line Cut In</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construct a new Iron Ridge 138kV Switching Station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n5212</td>
<td>Add three new 500 kV breakers and associated equipment to the exiting Chickahominy 500 kV Substation</td>
<td>Generation</td>
<td>AB2-068</td>
<td>3/31/2020</td>
<td>$6.5</td>
<td>Dominion</td>
<td>10/12/2017</td>
</tr>
<tr>
<td>n5409</td>
<td>Build New AB2-158 Switching Substation (interconnection substation)</td>
<td>Generation</td>
<td>AB2-158</td>
<td>10/1/2018</td>
<td>$6.3</td>
<td>Dominion</td>
<td>10/12/2017</td>
</tr>
<tr>
<td>n5460</td>
<td>Wreck and rebuild the Penniman-Waller 230 kV line. New Rating 1047 MVA</td>
<td>Generation</td>
<td>AC1-159</td>
<td>6/1/2020</td>
<td>$13.0</td>
<td>Dominion</td>
<td>10/12/2017</td>
</tr>
<tr>
<td>n5461</td>
<td>Wreck and rebuild the Kings Mill-Penniman 230 kV line. New Rating 1047 MVA</td>
<td>Generation</td>
<td>AC1-159</td>
<td>6/1/2020</td>
<td>$6.8</td>
<td>Dominion</td>
<td>10/12/2017</td>
</tr>
<tr>
<td>n5462</td>
<td>Add a third Chesapeake 230/115 kV transformer</td>
<td>Generation</td>
<td>AC1-159</td>
<td>6/1/2020</td>
<td>$7.0</td>
<td>Dominion</td>
<td>10/12/2017</td>
</tr>
<tr>
<td>n5463</td>
<td>Wreck and rebuild 11 miles Chesapeake-Greenwich 230 kV line</td>
<td>Generation</td>
<td>AC1-159</td>
<td>6/1/2020</td>
<td>$21.2</td>
<td>Dominion</td>
<td>10/12/2017</td>
</tr>
<tr>
<td>n5465</td>
<td>Wreck and rebuild the Skiff Creek-Kings Mill 230 kV line. New Rating 1047 MVA</td>
<td>Generation</td>
<td>AC1-107</td>
<td>6/1/2020</td>
<td>$8.4</td>
<td>Dominion</td>
<td>10/12/2017</td>
</tr>
</tbody>
</table>
Note: Supplemental projects are transmission expansions or enhancements that are used as inputs to RTEP models, but are not required for reliability, economic efficiency or operational performance criteria, as determined by PJM.
### Virginia – TO Supplemental Projects

(Greater than $5 million)

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Description</th>
<th>Required Date</th>
<th>Project Cost ($M)</th>
<th>TO Zone(s)</th>
<th>2017 TEAC Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>s1187</td>
<td>Construct McConville station to serve distribution load on the Brookville-Graves Mill 138 kV line.</td>
<td>6/30/2017</td>
<td>$7.4</td>
<td>AEP</td>
<td>1/5/2017</td>
</tr>
<tr>
<td>s1238</td>
<td>Interconnect new Roundtable substation by cutting and extending both Line #2149 (Enterprise-Waxpool) and Line #2137 (Brambleton-BECO). Terminate the lines into a six-breaker 230kV ring bus. Install a 230kV circuit switcher, high side switches and nectess</td>
<td>11/30/2018</td>
<td>$9.4</td>
<td>Dominion</td>
<td>1/5/2017</td>
</tr>
<tr>
<td>s1271</td>
<td>New Reeves Ave 230kV configuration: Install three 230kV breakers to form a 4-breaker ring bus</td>
<td>1/31/2018</td>
<td>$11.7</td>
<td>Dominion</td>
<td>5/4/2017</td>
</tr>
<tr>
<td>s1272</td>
<td>Replace TX#4 and TX#5 with new 168MVA (nameplate rating) transformers.</td>
<td>1/26/2018</td>
<td>$8.7</td>
<td>Dominion</td>
<td>5/4/2017</td>
</tr>
<tr>
<td>s1291</td>
<td>Rebuild Peakland – Dearington 69 kV circuit (approximately 4.4 miles) utilizing 795 26/7 ACSR conductor. A portion of this line shares a common tower with the Dearington – Blackwater 34.5 kV circuit. This line is currently comprised of 4/0 Copper, 1/0 Co</td>
<td>12/1/2018</td>
<td>$12.7</td>
<td>AEP</td>
<td>5/31/2017</td>
</tr>
<tr>
<td>s1295</td>
<td>Pipers Gap: Install five 138kV CBs (40kA 3000A). Jacksons Ferry: Install one 138kV CB New Jacksons Ferry-Pipers Gap line Jacksons Ferry – Pipers Gap 138kV: Construct a new 138kV line (~10 miles) from Jacksons Ferry – Pipers Gap utilizing 1033.5 ACSR conductor.</td>
<td>6/1/2021</td>
<td>$35.0</td>
<td>AEP</td>
<td>5/31/2017</td>
</tr>
<tr>
<td>Project ID</td>
<td>Description</td>
<td>Required Date</td>
<td>Project Cost ($M)</td>
<td>TO Zone(s)</td>
<td>2017 TEAC Date</td>
</tr>
<tr>
<td>------------</td>
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</tbody>
</table>
| s1313      | Glen Lyn 138kV Station: Replace two 138kV CBs with 3000 A 40 kA breakers  
Catawba 138kV Station: Install two 3000 A 40 kA 138kV CBs, two 138kV switchers on the transformers, and three 3000 A 40 kA 69kV CBs  
North Blacksburg Station: Install 3000 A 40 kA 138kV CBs and switchers on the transformers  
Update relay and communication at various sites. Replace circuit breakers  
North Blacksburg – Matt Funk 138kV line relaying/fiber  
Glen Lyn – Catawba – Cloverdale 138kV line relaying/fiber  
Glen Lyn – Peters MT. 138kV relaying/fiber  
North Blacksburg – Celanese 138kV line relaying  
Merrimac 69kV Station: Replace two 69kV CBs with 3000 A 40 kA breakers  
North Blacksburg – Lane 69kV relaying/fiber  
North Blacksburg – Blacksburg 69kV relaying/fiber  
Lane – Merrimac 69kV relaying/fiber  
Merrimac – North Blacksburg 69kV relaying/fiber | 6/1/2018 | $ 37.5 | AEP | 5/31/2017 |
| s1374      | Replace Bremo 138-115kV transformer #8 with a 225 MVA transformer | 7/31/2018 | $ 7.0 | Dominion | 10/30/2017 |
| s1389      | Rebuild Beechwood (MEC), 115kV Line #90 (to be #1004), 4.51 miles | 12/1/2018 | $ 7.0 | Dominion | 6/9/2017 |
| s1390      | Rebuild Columbia (CVEC), 115kV Line #4, 4.00 miles | 12/1/2019 | $ 5.0 | Dominion | 6/9/2017 |
| s1391      | Rebuild Hickory Grove (MEC), 115kV Line #31 (to be #1022), 8.25 miles | 12/1/2020 | $ 12.3 | Dominion | 6/9/2017 |
| s1399      | Rebuild Mt. Jackson (SVEC), 115kV Line #128, 0.05 mile | 12/1/2021 | $ 10.0 | Dominion | 6/9/2017 |
| s1452      | Install a 230kV switching station and delivery point by tapping the 230kV Line #2091 (Chickahominy – White Oak) in and out of the proposed customer site. | 10/25/2018 | $ 11.0 | Dominion | 12/14/2017 |
Planning
Load Forecast
# Virginia – 2018 Load Forecast Report

<table>
<thead>
<tr>
<th>Transmission Owner</th>
<th>Summer Peak (MW)</th>
<th>Winter Peak (MW)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018</td>
<td>2028</td>
<td>Growth Rate (%)</td>
<td>2017/18</td>
<td>2027/28</td>
</tr>
<tr>
<td>American Electric Power Company *</td>
<td>3,367</td>
<td>3,535</td>
<td>0.5%</td>
<td>4,070</td>
<td>4,279</td>
</tr>
<tr>
<td>Allegheny Power *</td>
<td>665</td>
<td>712</td>
<td>0.7%</td>
<td>697</td>
<td>757</td>
</tr>
<tr>
<td>Delmarva Power and Light *</td>
<td>143</td>
<td>146</td>
<td>0.2%</td>
<td>145</td>
<td>150</td>
</tr>
<tr>
<td>Dominion Virginia Power *</td>
<td>18,569</td>
<td>20,052</td>
<td>0.8%</td>
<td>17,091</td>
<td>18,672</td>
</tr>
<tr>
<td>PJM RTO</td>
<td>152,108</td>
<td>157,635</td>
<td>0.4%</td>
<td>131,463</td>
<td>136,702</td>
</tr>
</tbody>
</table>

* PJM notes that American Electric Power Company, Delmarva Power and Light, Allegheny Power and Dominion Virginia Power serve load other than in Virginia. The Summer peak and Winter Peak MW values in this table each reflect the estimated amount of forecasted load to be served by each of those transmission owners solely in Virginia. Estimated amounts were calculated based on the average share of each transmission owner's real-time summer and winter peak load located in Virginia over the past five years.
Markets
Capacity Market Results
Virginia - Cleared Resources in 2021/22 Auction
(May 23, 2018)

Cleared MW
(Unforced Capacity) | Change from 2019/20 Auction
--- | ---
Generation | 23,727 | (1,144)
Demand Response | 1,407 | 549
Energy Efficiency | 565 | 371
Total | 25,699 | (223)

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>
<tr>
<td></td>
<td>Offered MW</td>
<td>Cleared MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>------------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Generation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unforced Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offered MW</td>
<td>25,297</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleared MW</td>
<td>24,871</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Demand Response</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offered MW</td>
<td>968</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleared MW</td>
<td>858</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Energy Efficiency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offered MW</td>
<td>294</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleared MW</td>
<td>193</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Offered MW</strong></td>
<td>26,558</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Cleared MW</strong></td>
<td>25,922</td>
<td></td>
<td></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
Virginia'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.
Virginia – Hourly Average LMP and Load
(June 1, 2015 – December 31, 2017)

Virginia's average hourly LMPs are higher than the PJM average.
Virginia - Average Emissions (lbs/MWh)
(February 1, 2018)

Virginia Average Emissions (lbs/MWh)

- Carbon Dioxide
- Nitrogen Oxides
- Sulfur Dioxides

CO₂ (lbs/MWh)
SG₂ and Noₓ (lbs/MWh)


Emissions Trends:
- CO₂ emissions have significantly decreased from 1,400 lbs/MWh in 2005 to 600 lbs/MWh in 2017.
- SO₂ and NOₓ emissions have also decreased, with SO₂ emissions reducing from 8.0 to 0.8 lbs/MWh and NOₓ emissions from 7.0 to 0.8 lbs/MWh.

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