2021 North Carolina State Infrastructure Report
(January 1, 2021 – December 31, 2021)

May 2022

This report reflects information for the portion of North Carolina within the PJM service territory.
1. Planning
   • Generation Portfolio Analysis
   • Transmission Analysis
   • Load Forecast

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

3. Operations
   • Generator Production
   • Emissions Data
- **Existing Capacity**: Solar represents approximately 55.6 percent of the total installed capacity in the North Carolina service territory while hydro represents approximately 27.2 percent.

- **Interconnection Requests**: Solar represents 87.2 percent of new interconnection requests in North Carolina.

- **Deactivations**: No generation in North Carolina gave notification of deactivation in 2021.

- **RTEP 2021**: North Carolina’s 2021 RTEP projects total approximately $51.1 million. This total is comprised entirely of supplemental projects in the Dominion zone.
• **Load Forecast:** North Carolina’s peak load within the PJM footprint is projected to grow 0.7 percent annually over the next ten years. Comparatively, the overall PJM RTO projected load growth rate is 0.4 percent in the summer and 0.7 percent in the winter.

• **2022/23 Capacity Market:** The portion of North Carolina within the PJM footprint cleared at the RTO price of $50/MW-day in the 2022/2023 Base Residual Auction.

• **1/1/21 – 12/31/21 Market Performance:** North Carolina’s average hourly LMPs were slightly above the PJM average hourly LMP, except during mid-day hours.
The PJM service area in North Carolina is the Dominion zone and is represented by the shaded portion of the map.

PJM operates transmission lines that extend beyond the service territory.
Planning
Generation Portfolio Analysis
PJM – Existing Installed Capacity
(CIRs – as of Dec. 31, 2021)

PJM
186,868 MW

Coal,
49,670 MW

Natural Gas,
82,510 MW

Nuclear, 32,656 MW

Oil, 8,558 MW

Waste, 804 MW

Solar, 1,824 MW

Hydro, 8,249 MW

Wind, 2,597 MW
North Carolina – Existing Installed Capacity
(CIRs – as of Dec. 31, 2021)

NC
Total
1,160 MW

Solar, 645 MW
Hydro, 315 MW
Wind, 27 MW
Natural Gas, 155 MW
Oil, 18 MW
PJM – Queued Capacity (MW) by Fuel Type
(Requested CIRs – as of Dec. 31, 2021)

PJM 161,681 MW

- Storage, 34,131 MW
- Wind, 8,800 MW
- Hydro, 596 MW
- Coal, 76 MW
- Methane, 6 MW
- Natural Gas, 23,887 MW
- Nuclear, 81 MW
- Other, 331 MW
- Oil, 17 MW

Note: Nameplate capacity represents a generator’s rated full power output capability.

Nameplate Capacity, 150,953 MW

Solar, 93,756 MW
North Carolina – Queued Capacity (MW) by Fuel Type
(Requested CIRs – as of Dec. 31, 2021)

Solar, 3,391 MW
Nameplate Capacity, 5,288 MW

Storage, 458 MW

Wind, 39 MW
Nameplate Capacity, 300 MW

NC
Total
3,888 MW

Note: Nameplate capacity represents a generator’s rated full power output capability.
## North Carolina – Historical Interconnection Requests by Fuel Type
(as of Dec. 31, 2021)

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Non-Renewable</th>
<th>Renewable</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Projects</td>
<td>Capacity (MW)</td>
<td>Projects</td>
</tr>
<tr>
<td><strong>In Queue</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>12</td>
<td>458.0</td>
<td>0</td>
</tr>
<tr>
<td>Suspended</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Under Construction</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>In Service</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>168</td>
<td>7,346.2</td>
<td>199</td>
</tr>
</tbody>
</table>

### Table Notes:
- **Note**: The "Under Construction" column includes both “Engineering and Procurement” and “Under Construction” project statuses.
## North Carolina – Progression History of Interconnection Requests

<table>
<thead>
<tr>
<th>Applications Received by PJM</th>
<th>Feasibility Studies Issued</th>
<th>Impact Studies Issued</th>
<th>Facilities Studies Issued</th>
<th>Facilities Constructed</th>
<th>ISA/WMPA Executed</th>
<th>In Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,844 MW</td>
<td>3,359 MW</td>
<td>2,636 MW</td>
<td>1,707 MW</td>
<td>1,116 MW</td>
<td>774 MW</td>
<td></td>
</tr>
</tbody>
</table>

### Projects withdrawn after final agreement
- **7** Interconnection Service Agreements: 234 MW, 743 MW
- **5** Wholesale Market Participation Agreements: 44 MW, 65 MW

### Percentage of planned capacity and projects that have reached commercial operation
- **16.0%** Requested capacity megawatts
- **18.1%** Requested projects

This graphic shows the final state of generation submitted to the PJM queue that completed the study phase as of Dec. 31, 2021, 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, 2021.
North Carolina had no generators give notice of deactivation in 2021.
Planning
Transmission Infrastructure Analysis
Please note that PJM is now listing all transmission projects in its Annual RTEP and state infrastructure reports, beginning with this year’s 2021 Annual RTEP. In previous years only projects above a $10 million threshold were listed in the Annual RTEP Report and projects above a $5 million threshold were listed in the state infrastructure reports. This change may increase the amount of projects listed in these reports going forward now that smaller projects below the previous $5 million cutoff are being included.

The complete list of all RTEP projects in PJM, including those from prior years, can be found at the “RTEP Upgrades & Status – Transmission Construction Status” page on pjm.com.

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

North Carolina had no baseline project upgrades in 2021.

Note: Baseline upgrades are those that resolve a system reliability criteria violation.
North Carolina had no network project upgrades in 2021.

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. The costs of network projects are borne by the interconnection customer.
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.
# North Carolina – TO Supplemental Projects

<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>S2501</td>
<td>Rebuild 114kV Line No. 1001 (Battleboro – Chestnut) to current 115kV standards with a minimum summer rating of 261 MVA.</td>
<td>12/15/2024</td>
<td>$14.00</td>
<td>Dominion</td>
<td>10/18/2020</td>
</tr>
<tr>
<td>2</td>
<td>S2502</td>
<td>Rebuild 115kV Line No. 1024 (Chestnut –South Justice Branch) to current 115kV standards with a minimum summer rating of 261 MVA.</td>
<td>12/31/2023</td>
<td>$5.10</td>
<td>Dominion</td>
<td>10/18/2020</td>
</tr>
<tr>
<td>3</td>
<td>S2612</td>
<td>Rebuild ~1.8 miles single circuit segment of 230kV Line #239 Lakeview-Hornertown to current 230kV standards. The normal summer rating of this line segment will be 1047MVA. Rebuild approximately 0.9 mile double circuit segment of 230kV Line #239 and 230kV Line No. 2141 Carolina-Lakeview to current 230kV standards. The normal summer rating of the line segments will be 1047MVA.</td>
<td>12/31/2022</td>
<td>$5.00</td>
<td>Dominion</td>
<td>6/8/2021</td>
</tr>
<tr>
<td>4</td>
<td>S2618</td>
<td>Rebuild ~12.4 miles of the Everetts-Parmele 115 kV line. New conductor with a minimum normal summer rating of 262 MVA will be used.</td>
<td>12/31/2022</td>
<td>$27.00</td>
<td>Dominion</td>
<td>3/18/2021</td>
</tr>
</tbody>
</table>
Planning
Load Forecast
PJM notes that Dominion Virginia Power serves load other than in North Carolina. The Summer Peak and Winter Peak MW values in this table each reflect the estimated amount of forecasted load to be served by Dominion Virginia Power solely in North Carolina and excludes impacts of datacenter loads. Estimated amounts were calculated based on the average share of Dominion Virginia Power’s real-time summer and winter peak load located in North Carolina over the past five years excluding datacenter load estimates.
Markets
Capacity Market Results
2022/2023 Base Residual Auction Clearing Prices ($/MW-Day)

ComEd: $68.96
DEO&K: $71.69
RTO: $50
BGE: $126.50
MAAC: $95.79
EMAAC: $97.86
### PJM – 2022/2023 Cleared MW (UCAP) by Resource Type

<table>
<thead>
<tr>
<th></th>
<th>ANNUAL (MW)</th>
<th>SUMMER (MW)</th>
<th>WINTER (MW)</th>
<th>Total (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>130,844.9</td>
<td>9.9</td>
<td>686.8</td>
<td>131,541.6</td>
</tr>
<tr>
<td>DR</td>
<td>8,369.9</td>
<td>442.0</td>
<td>0.0</td>
<td>8,811.9</td>
</tr>
<tr>
<td>EE</td>
<td>4,575.7</td>
<td>234.9</td>
<td>0.0</td>
<td>4,810.6</td>
</tr>
<tr>
<td>Total (MW)</td>
<td>143,790.5</td>
<td>686.8</td>
<td>686.8</td>
<td>131,541.6</td>
</tr>
</tbody>
</table>
Markets
Market Analysis
North Carolina had negative average daily LMPs on March 30, April 16, and April 30.
North Carolina’s average hourly LMPs were slightly above the PJM average hourly LMP, except during mid-day hours.

<table>
<thead>
<tr>
<th>LMP ($/MWh)</th>
<th>Load (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Carolina's average hourly LMPs were slightly above the PJM average hourly LMP, except during mid-day hours.</td>
<td></td>
</tr>
</tbody>
</table>
This chart reflects the portion of North Carolina that PJM operates. Positive values represent exports and negative values represent imports.
Operations
The data in this chart comes from EIA Form 923 (2021) and represents only generators within the PJM portion of NC.
2005 – 2021 PJM Average Emissions

- **CO₂** (lbs/MWh)
- **SO₂ and NOₓ** (lbs/MWh)

**Graph Details:**
- **X-axis:** Years from 2005 to 2021
- **Y-axis:** Emissions in lbs/MWh
- **Data Points:**
  - **CO₂:** Blue bars
  - **SO₂ and NOₓ:** Green line
  - **Nitrogen Oxides:** Orange line

**Emission Trends:**
- CO₂ emissions have decreased significantly from 2005 to 2021.
- SO₂ and NOₓ emissions show a gradual decrease over the period.