2020 Michigan State Infrastructure Report
(January 1, 2020 – December 31, 2020)

April 2021

This report reflects information for the portion of Michigan within the PJM service territory.
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• **Existing Capacity:** Nuclear represents approximately 66.8 percent of the total installed capacity in the Michigan service territory while natural gas represents approximately 32.9 percent. This differs from PJM where natural gas and nuclear are 43.4 and 17.7 percent of total installed capacity.

• **Interconnection Requests:** Natural gas represents 61.6 percent of new interconnection requests in Michigan, while solar represents approximately 34.3 percent of new requests.

• **Deactivations:** No generation in Michigan gave a notification of deactivation in 2020.

• **RTEP 2020:** Michigan’s 2020 RTEP projects total approximately $52.8 million in investment. Approximately 31.4 percent of that represents supplemental projects. These investment figures only represent RTEP projects that cost at least $5 million.
• **Load Forecast:** Michigan’s load served within the AEP portion of PJM’s footprint is projected to grow at about 0.4 annually over the next ten years. 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 Michigan State Infrastructure Report.

• **1/1/20 – 12/31/20 Market Performance:** Michigan’s average hourly LMPs were higher than the PJM average hourly LMP during peak hours.
The PJM service area in Michigan is the AEP 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, 2020)

Nameplate Capacity, 10,367 MW
- Wind, 2,184 MW
- Hydro, 8,275 MW
- Solar, 1,015 MW

Nameplate Capacity, 3,700 MW
- Oil, 8,629 MW

- Nuclear, 32,640 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.
Michigan – Existing Installed Capacity
(CIRs – as of Dec. 31, 2020)

MI
3,225 MW

Nuclear, 2,154 MW
Solar, 2 MW
Hydro, 6 MW
Natural Gas, 1,062 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
Michigan – Queued Capacity (MW) by Fuel Type

(Requested CIRs – as of Dec. 31, 2020)

**Natural Gas, 1,230 MW**

**Solar, 685 MW**

**Storage, 81 MW**

**MI**

1,996 MW

*Note: Nameplate capacity represents a generator's rated full power output capability.*
Michigan – Interconnection Requests by Fuel Type
(Unforced Capacity – as of Dec. 31, 2020)

<table>
<thead>
<tr>
<th></th>
<th>Active</th>
<th>Under Construction</th>
<th>Complete</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>
</tr>
<tr>
<td>Non-Renewable</td>
<td>Natural Gas</td>
<td>1</td>
<td>145.0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Nuclear</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
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<tr>
<td></td>
<td>Other</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
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<tr>
<td></td>
<td>Storage</td>
<td>3</td>
<td>81.3</td>
<td>0</td>
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<tr>
<td>Renewable</td>
<td>Methane</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
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<tr>
<td></td>
<td>Solar</td>
<td>7</td>
<td>684.8</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Wind</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>11</td>
<td>911.1</td>
<td>2</td>
</tr>
</tbody>
</table>

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

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.
Michigan had no generation deactivation notifications in 2020.
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
Michigan – RTEP Baseline Projects
(Greater than $10 million)

Note: Baseline upgrades are those that resolve a system reliability criteria violation.
<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>b3160</td>
<td>Construct a ~2.4 mile double-circuit 138 kV extension using 1033 ACSR to connect Lake Head to the 138 kV network.</td>
<td>6/1/2024</td>
<td>$36.20</td>
<td>AEP</td>
<td>12/7/2019</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Retire the ~2.5 mile 34.5 kV Niles-Simplicity tap line.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Retire the ~4.6 mile Lakehead 69 kV tap.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Build a new 138/69 kV drop down station to feed Lakehead with a 138 kV breaker, 138 kV switcher, 138/69 kV transformer and a 138 kV MOAB.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rebuild the ~1.2 mile Buchanan South 69 kV radial tap using 795 ACSR.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rebuild the ~8.4 mile 69 kV Pletcher-Buchanan Hydro line as the ~9 mile Pletcher-Buchanan South 69 kV line using 795 ACSR.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Install a phase-over-phase switch at Buchanan South station with two-line MOABs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Michigan 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.
### Map ID | Project | Description | Projected In-Service Date | Project Cost ($M) | TO Zone | TEAC Date
--- | --- | --- | --- | --- | --- | ---
1 | s2345 | **Main St.-Riverside 34.5 kV line:** Rebuild on center line ~4.1 miles of Main St.-Riverside 34.5 kV line with DOVE 556.5 ACSR 26/7. **Riverside Station:** Replace two 138 kV breakers and two 34.5 kV breakers at Riverside. While at the station and taking advantage of the outage, AEP will install a new 34.5 kV breaker to bring Whirlpool customer, whose delivery point is currently one tower outside of the station, into Riverside station. Install high-side circuit switcher to 138/69/34.5 kV transformer. | 2/14/2024 | $16.60 | AEP | 7/17/2020
Planning
Load Forecast
PJM Annual Load Forecasts

(PJM RTO Summer Peak Demand Forecast)

Load (MW)


2014 2016 2018 2020

2015 2017 2019

2016 2018 2020

2017 2019

2018 2020

2019

2020

2021
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.
Markets
Market Analysis
Michigan – Average Daily LMP and Load


- PJM Average RT Daily LMP
- MI Average RT Daily LMP
- MI Average RT Daily Load
Michigan’s average hourly LMPs were higher than the PJM average hourly LMP during peak hours.
This chart reflects the portion of Michigan that PJM operates. Positive values represent exports and negative values represent imports.
Operations
Emissions Data
2005 – 2020 PJM Average Emissions

<table>
<thead>
<tr>
<th>CO₂ (lbs/MWh)</th>
<th>SO₂ and NOₓ (lbs/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>700</td>
</tr>
<tr>
<td>2006</td>
<td>800</td>
</tr>
<tr>
<td>2007</td>
<td>910</td>
</tr>
<tr>
<td>2008</td>
<td>1,080</td>
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<td>2018</td>
<td>620</td>
</tr>
<tr>
<td>2019</td>
<td>580</td>
</tr>
<tr>
<td>2020</td>
<td>540</td>
</tr>
</tbody>
</table>

Carbon Dioxide
Sulfur Dioxide
Nitrogen Oxides