Baron Winds Project

Case No. 15-F-0122

1001.8 Exhibit 8

Electric System Production Modeling

EXHIBIT 8 ELECTRIC SYSTEM PRODUCTION MODELING

(a) Computer-based Modeling Tool

The analyses presented in this section of the Application were developed using GE Multi-Area Production Simulation (MAPS). The Applicant consulted with the New York State Department of Public Service (DPS) to develop an acceptable input data set to be used in the simulation analyses, including modeling for the Applicant's proposed Facility and inputs for the emissions analysis. Portions of the input data set are proprietary and/or Critical Energy Infrastructure Information (CEII) and will be filed under a protective agreement. The data that is proprietary, which are typically retained as trade secrets, will be provided to DPS under separate cover. The Applicant will seek the requisite trade secret protection for this information pursuant to New York Public Officers Law § 87(2)(d) and 16 NYCRR § 6-1.3.

(1) Estimated Statewide Levels of Sulfur Dioxide (SO2), Nitrogen Oxide (NOx) and Carbon Dioxide (CO2) Emissions

Table 8-1 below lists the estimated statewide levels of SO2, NOx, and CO2 emissions, in short tons, with and without the Baron Winds Facility for the 2021 study year.

Table 8-1. Statewide Emissions With and Without the Facility

Emissions (Short Tons)	Without Baron Winds Facility	With Baron Winds Facility	Difference with Baron Winds Facility
SO2	2,572.82	2,596.03	23.21
NOx	10,501.28	10,547.04	45.76
CO2	27,732,828.59	27,558,573.61	-174,254.98

While CO2 emissions have significantly decreased, SO2 and NOx emissions appear to have increased. However, the addition of Baron Winds has not actually increased overall emissions of these pollutants. The results depicted are for New York State only. Due to the geographic location of the Baron Winds Facility (relatively near the Pennsylvania border), the location of other generation resources (i.e., emissions sources) on the transmission system, and the power exchange between the New York Independent System Operator (NYISO) and PJM, the emissions of SO2 and NOx have decreased in PJM territory even more significantly than they have increased in NYISO territory.

(2) Estimated Prices Representative of all NYISO Zones

Table 8-2 lists the estimated minimum, maximum, and average annual spot prices representative of all NYISO Zones within the New York Control Area, both with and without the proposed Facility for the 2021 study year.

Table 8-2. Estimated Annual Spot Prices Representative of NYISO Zones within the New York Control Area

NYISO Zone	Without Baron Winds Facility			With Baron Winds Facility			
	Minimum Spot Prices	Maximum Spot Prices	Average Annual Spot Prices	Minimum Spot Prices	Maximum Spot Prices	Maximum Spot Prices (Excluding single hour)	Average Annual Spot Prices
NYZAA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZBA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZCA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZDA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZEA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZFA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZGA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZHA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZIA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZJA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
NYZKA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

The average annual spot prices in the NYISO zones have all decreased, with the exception of a slight increase in Zone K, which is very remote to the Baron Winds Facility. When analyzing the change in spot pricing in conjunction with the load demand in each zone, the resultant impact is an approximately $17.5 million reduction in energy costs in New York. It should also be noted that the maximum spot pricing appears to have increased significantly in many of the NYISO zones. However, this increase only occurs for one hour over the modeled year and the overall impact depicted by the average spot prices shows the more significant decreases discussed above. The maximum spot pricing in each zone excluding that one hour has also been presented.

(3) Estimated Capacity Factor

An 8,760 hourly generation profile will be developed using on-site met tower measurements. For the purposes of this and other analyses presented in this Section, the Gamesa 2.625 MW turbine was used to create the generation

profile.[1] Typical assumptions for availability, environmental, curtailment and any other potential sources of energy losses are then taken from the gross production to yield a long-term net energy yield and capacity factor of [redacted]%.

(4) Estimated Annual and Monthly Output Capability Factors

Table 8-3 below provides the monthly as well as the 2021 annual on-peak and off-peak megawatt hour (MWh) output capability factors for the proposed Facility.

Table 8-3. Monthly and Annual On-Peak and Off-Peak Output Capability Factors for the Proposed Facility

Month	On Peak		Off-Peak	
	MWh Output	Capacity Factor (%)	MWh Output	Capacity Factor (%)
1	[redacted]	[redacted]	[redacted]	[redacted]
2	[redacted]	[redacted]	[redacted]	[redacted]
3	[redacted]	[redacted]	[redacted]	[redacted]
4	[redacted]	[redacted]	[redacted]	[redacted]
5	[redacted]	[redacted]	[redacted]	[redacted]
6	[redacted]	[redacted]	[redacted]	[redacted]
7	[redacted]	[redacted]	[redacted]	[redacted]
8	[redacted]	[redacted]	[redacted]	[redacted]
9	[redacted]	[redacted]	[redacted]	[redacted]
10	[redacted]	[redacted]	[redacted]	[redacted]
11	[redacted]	[redacted]	[redacted]	[redacted]
12	[redacted]	[redacted]	[redacted]	[redacted]
Annual	[redacted]	[redacted]%	[redacted]	[redacted]%[2]

[1] The Applicant is aware that the total megawatts for the Facility would not achieve the proposed 300 MW of nameplate capacity if Gamesa 2.625 MW turbines were installed at the 76 turbine locations proposed for the Facility. However, the Applicant scaled the 8,760 generation profile data up to represent a project capacity of 300 MW using the Gamesa 2.625 MW turbine because the Applicant is familiar with modeling this particular turbine. Further, the Applicant notes that the turbine model used in the analysis does not affect the accuracy of the results, and only affects slight differences in the production curve.

[2] The reported capacity factor of [redacted]% will be rounded to [redacted]% for use throughout the Application.

(5) Estimated Annual and Monthly Production Output

Monthly energy yield averages will be determined from the observed wind production profile data for each month and long-term adjustments will be made to the monthly data set. Based on the long-term adjusted average energy yield for each month, a gross monthly energy distribution for the year can be determined. Monthly specific loss assumptions for availability, environmental and curtailment will be subtracted from the gross monthly production distribution to yield the estimated production in MWh for each month. The annual production output will be determined from the sum of all monthly net energy yields in MWh.

Table 8-4 provides the monthly net production output, in MWh, of the proposed Facility as well as the total annual MWh production.

Table 8-4. Anticipated Monthly and Annual Production Output of the Proposed Facility

Months	Production Output (MWh)
1	[redacted]
2	[redacted]
3	[redacted]
4	[redacted]
5	[redacted]
6	[redacted]
7	[redacted]
8	[redacted]
9	[redacted]
10	[redacted]
11	[redacted]
12	[redacted]
Annual	[redacted]

(6) Estimated Production Curve Over an Average Year

Hourly production of the Facility was calculated using GE MAPS and 8,760 hours of wind production profile data provided by the Applicant. Estimates of hourly production and scheduled hourly production in tabular and graphical

formats are included in Appendix L of this Application. This information will be filed separately under confidential cover.

(7) Estimated Production Duration Curve Over an Average Year

Tables in Appendix L show the hourly production of the Facility as well as the hours count for milestones production (production duration only). Also included is a graph showing the production duration curve for the Facility.

(8) Effect of the Facility on the Energy Dispatch of Existing Must-run Resources

In order to assess the estimated effects of the proposed Facility on the energy dispatch of existing must-run resources (which includes existing wind, hydroelectric, and nuclear facilities, as well as co-generation facilities to the extent they are obligated to output their available energy because of their steam hosts), a Generation Dispatch Forecasting Analysis was prepared by Electric Power Engineers, Inc. (EPE), which is included as Appendix L to this Application. This analysis will be filed separately under confidential cover.

To conduct the analysis, EPE modeled and ran the NYISO 2021 system to the extent that information is available, with and without the proposed Facility, and compared the generation dispatch of must-run resources between the two scenarios within the NYISO service territory. This comparison was performed using GE MAPS and PowerWorld Corp. Simulator software, which is heavily utilized for market studies within the NYISO service territory. The first step in the analysis was to complete a powerflow study to identify any critical constraints in the vicinity of the proposed Facility. EPE then conducted a generation and transmission nodal market study based on an 8,760 hours-per-year simulation for the 2021 study year, while taking into consideration system constraints including the critical constraints identified in the powerflow calculations. The analysis simulated the effect of energy schedules from energy resources on must-run resources redispatching to reliably serve the grid and avoid curtailment.

Table 8-5 below presents the annual MWh dispatch of the must-run resources for the 2021 study year in the two scenarios (with and without the proposed Facility) that EPE evaluated as part of this study.

Table 8-5. Annual Dispatch of Must-Run Resources With and Without the Proposed Facility

Study Year	Scenario	Cogeneration Must Run (MWh)	Quick Startup Units* (MWh)	Nuclear (MWh)	Hydroelectric (MWh)	Wind (MWh)	
						Other Wind (Excluding Baron)	Baron
2021	Without Proposed Facility	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	--
	With Proposed Facility	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

* Quick startup units are flagged as "must run" in the GE MAPS database. Although these units do not satisfy the definition of "must run" as defined in 16 NYCRR 1001.8 and the scope of work and as detailed in this report, their generation production is reported.

From Table 8-5 above, it is apparent that the addition of the proposed Facility to the system would have an insignificant impact on the dispatch of the must-run generation as defined in Section 1001.8(a)(8). The quick startup units, flagged as must-run units in GE MAPS, are also insignificantly redispatched after the addition of the proposed Facility. There is no decrease in nuclear, hydroelectric, or wind generation production. There is a slight decrease in cogeneration output, but not as much as the increase in wind from adding the Facility. The overall net increase due to the Facility must be offset by reduction on generators that are not required to be itemized in this analysis (e.g., coal, gas-fired, etc.).

(b) Digital Copies of Inputs Used in the Above Simulations

Digital copies of all inputs used in the simulations required in subdivision (a) above are confidential, and will be provided to DPS under separate cover.