GARNET ENERGY CENTER

Case No. 20-F-0043

1001.8 Exhibit 8

Electric System Production Modeling

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Appendix 8-1   Production Modeling Analysis

Exhibit 8: Electric System Production Modeling

This Exhibit will track the requirements of Final Stipulation 8, dated March 5, 2021, and therefore, the requirements of 16 New York Codes, Rules and Regulations (NYCRR) § 1001.8.

8(a)   Computer-Based Modeling Tool

The analyses presented in this section of the Application were developed using a computer-based modeling tool, PROMOD IV. The Applicant consulted with the New York Department of Public Service (DPS) on acceptable inputs for the modeling. Public sources such as the New York Independent System Operator's (NYISO's) 2020 Load & Capacity Data "Gold Book", 2018 NYISO Reliability Planning Process Manual, NYISO Summer 2019 and Winter 2019-20 Operating Studies, 2020 Congestion Assessment and Resource Integration Study (CARIS), Phase 2 Assumptions, United States Environmental Protection Agency (USEPA) Continuous Emissions Monitoring System (CEMS) data, and ABB PROMOD Eastern Interconnect database were used to develop acceptable input data for the simulation analyses. This data includes modeling for the proposed Garnet Energy Center (Project) output that were utilized in calculating the projected emissions predicted to be displaced by the Project from other operating generating facilities.

ICF Resources, LLC (ICF) studied the impact of the Project on the NYISO electric power system by performing a nodal simulation with and without the Project in PROMOD IV. PROMOD is an industry standard production cost modeling software and is permitted for use for Exhibit 8 support. The Project is located in Zone B of the NYISO power market. Base Case and Change Case scenarios were considered for the simulation. Base Case represents market conditions without the proposed Project and Change Case represents market conditions with the inclusion of the Project. Based upon consultations with DPS, PROMOD IV was used to simulate its impacts in calendar year 2023. The study assessed the impact of the Facility's operation on statewide and regional emission levels, the NYISO zonal power market, and dispatch of existing must-run resources.

ICF's full Garnet electric system production model report is included as Appendix 8-1 and contains confidential information. Therefore, the Applicant is seeking the requisite trade secret and confidential commercial information protection for this information pursuant to Public Officers Law (POL) Sections 89(5) and 87(2)(d), 16 NYCRR § 6-1.3, other applicable laws, and/or a protective order as necessary.

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(1) Estimated Statewide and Regional Levels of SO_2, CO_2, and NO_x

The Project is expected to reduce emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon dioxide (CO_2) from the power sector in New York in 2023. Table 8-1 below represents the estimated reduction in emissions.

Table 8-1.   Statewide Emissions With and Without Garnet Energy Center

Item	Without Project (Tons)	With Project (Tons)	Reduction in Emission (Tons)
SO_2	449	441	8
NO_x	7,255	7,214	41
CO_2	27,720,035	27,648,356	71,680

(2) Estimated Prices for NYISO Zones

In NYISO Zone B, the average annual price in the Change Case (with Project) is expected to be $30.3/Megawatt Hour (MWh) and in the Base Case (without Project), it is expected to be $30.8/ MWh. The Project is therefore expected to decrease the annual average zonal prices by approximately $0.5/MWh, or 1.8%, in 2023. Modeling showed that production costs in New York State were reduced by $5.5 million, or 0.2%, with the Project.

Table 8-2.   Annual NYISO Zonal Energy Prices

NYISO Zone	Annual Prices With Project ($/MWh)			Annual Prices Without Project ($/MWh)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
A	-43.9	190.0	26.1	-42.1	191.0	26.1
B	-45.6	120.6	30.3	-44.9	146.8	30.8
C	-45.6	116.0	34.7	-44.8	137.9	34.8
D	-43.6	105.0	34.5	-42.9	126.2	34.6
E	-45.6	111.8	35.5	-44.8	133.6	35.5
F	-46.6	114.4	37.9	-45.9	135.6	38.0
G	-48.8	128.6	40.0	-47.9	140.0	40.0
H	-49.1	135.0	40.6	-48.2	138.9	40.6

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NYISO Zone	Annual Prices With Project ($/MWh)			Annual Prices Without Project ($/MWh)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
I	-49.1	133.0	40.7	-48.3	138.7	40.7
J	-49.6	133.7	41.4	-48.7	139.4	41.4
K	-38.4	134.8	43.9	-48.4	140.6	43.9

(3) Estimated Capacity Factor

The Project is expected to operate at an annual capacity factor of approximately ▇, with an off-peak annual capacity factor of ▇ and an on-peak annual capacity factor of ▇. Annual on-peak and off-peak generation and capability factors are shown in Table 8-3. A detailed generation summary by month can be seen in Table III-6 of the ICF Assessment Report in Appendix 8-1.

(4) Estimated Megawatt (MW) Output Capacity Factors

The Project is expected to generate approximately 376,302 MWh/year, with an annual capacity factor of approximately ▇. Monthly generation is expected to be approximately ▇ MW during the off-peak period and approximately ▇ MW during the on-peak period. Monthly on-peak and off-peak generation and capacity factor are shown in Table 8-3.

Table 8-3.   Monthly Peak, Shoulder, and Off-Peak Generation and Capacity Factors for the Garnet Energy Center – 2023

Month	On-Peak Dispatch		Off-Peak Dispatch	
	Energy (MWh)	Capacity Factor (%)	Energy (MWh)	Capacity Factor (%)
January	▇	▇	▇	▇
February	▇	▇	▇	▇
March	▇	▇	▇	▇
April	▇	▇	▇	▇
May	▇	▇	▇	▇
June	▇	▇	▇	▇
July	▇	▇	▇	▇

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Month	On-Peak Dispatch		Off-Peak Dispatch	
	Energy (MWh)	Capacity Factor (%)	Energy (MWh)	Capacity Factor (%)
August	■	■	■	■
September	■	■	■	■
October	■	■	■	■
November	■	■	■	■
December	■	■	■	■
Annual	■	■	■	■

Note: Peak hours are the hours between 7:00am – 11:00pm Eastern Time (Mon – Fri). The remaining hours are categorized as off-peak (including holidays and weekends).

(5) Estimated Average Annual and Monthly Production Output

Refer to Table 8-3, above, for the estimated average annual and monthly production output for the Project.

(6) Estimated Production Curve over an Average Year

The estimated production curve for the Project over an average year is shown in Figure III-1 of the ICF Assessment Report in Appendix 8-1. Trade secret and confidential commercial information protection will be sought for the data and it will also be provided confidentially to the DPS under separate cover.

(7) Estimated Production Duration Curve over an Average Year

The estimated production duration curve for the Project over an average year is shown in Figure III-2 of the ICF Assessment Report in Appendix 8-1. Trade secret and confidential commercial information protection will be sought for the data and it will also be provided confidentially to DPS under separate cover.

(8) Estimated Effects on Energy Dispatch of Existing Must-Run Resources

The Project is estimated to have minimal or no impact on existing must-run generating resources in New York, including existing wind, hydroelectric and nuclear facilities.

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Table 8-4. Dispatch of Must-Run Resources With and Without Garnet Energy Center-Statewide Generation (NY)

Generation Type	Base Case (GWh)	Change Case with Project (GWh)
Thermal	9,941.6	9,927.3
Hydroelectric	26,701.0	26.701.0
Wind	10,649.7	10,654.2
Nuclear	27,123.4	27,123.4

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

Digital copies of all inputs and outputs used in the simulations required in 16 NYCRR § 1001.8(a) are confidential and will be provided confidentially to DPS under separate cover and trade secret. Confidential commercial information protection will be sought as well. The Applicant has coordinated with the DPS to discuss production modeling parameters and assumptions.

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