

Large Generating Facility - Interconnection System Reliability Impact Study Scope

Queue #1202: Bethpage Large Battery Energy Storage Project

1. Purpose

The purpose of this Interconnection System Reliability Impact Study (“SRIS” or “Study”) is to evaluate the impact of the proposed interconnection of Bethpage Large Battery Energy Storage Project (“Project”), which is being developed by Calpine Mid-Atlantic Development, LLC (“Developer”), on the reliability of the New York State Transmission System (“NYSTS”). The Study will be performed in accordance with Attachment X of the NYISO Open Access Transmission Tariff (“OATT”).

The Project will be located in Nassau County, New York. The proposed Point of Interconnection (“POI”) will be at the Grumman 69 kV substation between breaker #6630 and breaker #6670. The Connecting Transmission Owner (“CTO”) is Long Island Power Authority (“LIPA”).

The Project is a battery energy storage plant. The Project, as proposed, will consist of eleven (11) GE RIU 2750-MV inverters. It is expected to have a maximum potential discharging capacity and withdrawal capacity of 24 MW. The minimum duration for full discharge is four (4) hours (*i.e.*, 96 MWh) and for full charge is four (4) hours (*i.e.*, 96 MWh) during summer and winter periods.¹

The Project proposes an In-Service Date of ~~May-December~~ 2025, an Initial Synchronization Date of ~~May-December~~ 2025, and a Commercial Operation Date of ~~June 2025~~ January 2026.

The Study will assess the impact of the Project on the base case power system including potentially Affected Systems. It will provide a list of the facilities (CTO Attachment Facilities and System Upgrade Facilities) required to reliably interconnect the Project, and non-binding good faith estimates of cost and time to construct those facilities.

The Study will be conducted in accordance with the Applicable Reliability Standards.

2. Interconnection Plan

¹ For temperature sensitive output projects, the MW values represent the Maximum Summer Peak Net Output that can be achieved between 85 and 95° F, and the Maximum Winter Peak Net Output that can be achieved between 10 and 35° F.

The Study will include a description of the proposed facilities and the conceptual design of the interconnection to the system representation. The description will include a breaker one-line diagram depicting the proposed facilities and their integration with the existing facilities. The Study will also identify potential issues with the feasibility/constructability of the conceptual design of the proposed interconnection to the extent known based on the Study assumptions.

3. Study Period

~~The Study will be based on NYISO Class Year 2021 ATBA base cases (“Base Cases”) that have the 2021 FERC 715 2026 system representation. The Study will be conducted using the steady state, stability, and short circuit Base Cases provided by the NYISO, and will include the representation of proposed projects that have already been cost allocated, up to and including Class Year 2019 (as listed in Appendix A of this scope).~~ The Study will be based on NYISO Class Year 2021 ATBA base cases that have the 2021 FERC 715 2026 system representation, or the Class Year 2023 ATBA base cases that have the 2023 FERC 715 2028 system representation if available prior to the start of the analyses identified in this scope (“Base Cases”). The Study will be conducted using the steady state, stability, and short circuit Base Cases provided by the NYISO, and will include the representation of proposed projects that have already been cost allocated, up to and including Class Year 2021 (as listed in Appendix A of this scope).

4. Study Area

The Study will identify and evaluate the impact of the Project on the 138 kV and above portions of the NYSTS in the following New York load zone: Zone **K** (LIPA) that is most likely to be affected by the Project. The Study will also evaluate the impact of the Project on the local 138 kV and below system in the electrical proximity to the POI.

5. Base Case Conditions

The impact of the proposed Project will be evaluated for **summer peak** and **light** load cases for the following base case conditions, and as specified under the subsequent sections of this Scope:²

Case 1 - Base Case without the Project. The Base Cases will include the baseline system and the proposed projects listed in Appendix A of this scope. The short circuit Base Case will model all the projects as in-service. The steady state Base Case will normally model all projects in-service and at full output, but may model some projects as out-of-service or less than full output as necessary to establish a feasible base dispatch. Generation will be dispatched in accordance with the NYISO Minimum Interconnection Standard.

² As defined in the NYISO Transmission Expansion and Interconnection Manual (NYISO TEI Manual).

Case 2 - Case 1 with the Project modeled as in-service and in discharging mode at full output of 24 MW at the POI. Unit and facility reactive resources for the Project will be represented. Generation will be re-dispatched in the steady state case, as needed, in accordance with the NYISO Minimum Interconnection Standard.

Case 3 - Case 1 with the Project modeled in-service in charging mode at a withdrawal of 24 MW from the POI. Unit and facility reactive resources for the Project will be represented. Generation will be re-dispatched in the steady state case, as needed, in accordance with the NYISO Minimum Interconnection Standard.

6. Analysis

Thermal, voltage, stability and short circuit analyses will be conducted to assess the performance of the base system conditions within the Study Area, with and without the Project, in accordance with Applicable Reliability Standards, guidelines and study practices. Modifications to Base Cases, during analyses, will be documented in the Study Report.

6.1 Steady State Analyses: N-0 and N-1

Thermal and voltage steady state analyses, using PSS/E or a comparable load flow program, will be conducted for **summer peak** and **light load** cases, pre-contingency and also for relevant Design Criteria Contingencies conditions, and will be limited to the Study Area.

Thermal limits will be assessed under both Normal Criteria and Emergency Criteria, using normal ratings pre-contingency and applicable post-contingency ratings (*e.g.*, Long-Term-Emergency, LTE, ratings or Short-Term-Emergency, STE, ratings).

Voltage limits will be assessed, pre- and post-contingency, using the applicable voltage limits.

6.2 Steady State Analyses: N-1-1

The Study will evaluate a limited selection of N-1-1 contingencies around the POI. Steady state analyses (**summer peak**) will be performed based on the N-1-1 contingency descriptions provided by the CTO(s) and/or the NYISO.

6.3 Short Circuit Analysis

Short circuit analysis will be performed, using ASPEN, to evaluate the impact of the Project on system protection and adequacy of existing circuit breakers, other fault current

interrupting devices, and related equipment. All Project impacts of 100 A or more will be identified.

This analysis will be performed in accordance with the NYISO Guideline for Fault Current Assessment (Attachment I of the NYISO Transmission Expansion and Interconnection Manual), and in accordance with Connecting Transmission Owner and Affected System(s) criteria, to the extent such criteria are recognized as Applicable Reliability Standards.

6.4 Stability Analysis

Stability analysis, using PSS/E v34, will be performed for **summer peak** and **light load** conditions to determine the impact of the Project on system performance within the Study Area. This analysis will evaluate the performance of the system for Design Criteria Contingencies and will address issues including, but not limited to, transient stability, dynamic stability (*i.e.*, damping), critical clearing time, coordination of protection and control systems, and performance of any Special Protection Systems that may be affected. These analyses will explicitly consider the voltage and frequency ride-through capabilities of the facility.

6.5 Reactive Power Capabilities

The reactive power capability of the Project will be verified to ensure it meets or exceeds the CTO's requirements over the full range of active power output and for the full range of POI bus voltage (0.90 - 1.10 p.u.). This verification shall be based on documentation which shall be provided by the Developer, and shall consider the reactive gains and losses of all relevant plant equipment, including transformers, collector system cables, and interconnection cables, and shunt capacitor/reactors.

6.6 Minimum Short Circuit Ratio

Short circuit ratio will be calculated to determine the grid strength at the terminals of the equivalent inverter under normal and contingency conditions. The Developer shall confirm that the project can reliably operate, without any form of instability, during the minimum short circuit system conditions identified in the study.

6.7 Preliminary Non-Binding Deliverability Analysis

The Study will include a preliminary non-binding deliverability analysis performed under the NYISO Deliverability Interconnection Standard.

7. Modeling Assumptions

7.1 Phase angle regulators (“PARs”), switched shunts, and LTC transformers will be modeled as regulating pre-contingency and non-regulating post-contingency. The Study will use PAR schedules established by the NYISO in coordination with the neighboring ISOs through the NERC and NPCC base case development processes. PARs may be adjusted as necessary to relieve pre-contingency overloads.

7.2 SVC and FACTS devices will be set to zero pre-contingency and allowed to operate to full range post-contingency.

7.3 For evaluating projects located in Long Island (Zone K), the dynamic devices within Long Island area will be offline in both pre- and post-contingency conditions in steady state analysis, while set to zero at dynamic initialization.

8. Evaluation and Identification of Upgrades

If the Study results indicate that the Project, as proposed, would result in violations of Applicable Reliability Standards, analyses will be performed to identify any System Upgrade Facilities or Distribution Upgrades (if applicable) that would be required to meet the NYISO Minimum Interconnection Standard. When such upgrades are identified, sufficient re-assessments (among those identified in this scope) should be performed in order to assure that the upgrades do not cause any adverse reliability impact on the Study Area.

9. Cost Estimates of Facilities and Time to Construct

A description of facilities (*i.e.*, CTO Attachment Facilities and System Upgrade Facilities, if any) required to interconnect the Project to the NYSTS, or the Distribution System (if applicable), and non-binding good faith estimates of cost and time to construct those facilities, will be provided.

10. Report

The Study Report will document the summary of the results relevant to the project impacts, project description, project modeling, study assumptions, criteria and methodology, mitigation solutions and their impact assessment, and conclusions, for each of the analyses identified in this scope.

Appendix A

List of Other Proposed Projects to be Modeled in the Base Case

Queue #1202: *Bethpage Large Battery Energy Storage Project*

Queue Pos.	Owner / Project Name	MW (S W)
276	EDF Renewables Development, Inc./Homer Solar Energy Center	90.0 90.0
495	Mohawk Solar LLC / Mohawk Solar	90.5 90.5
519	Canistee Wind Energy LLC/Canistee Wind	290.7 290.7
531	Invenergy Wind Development LLC / Number 3 Wind Energy	105.8 105.8
535	sPower Development Company, LLC / Riverhead Expansion	36.0 36.0
546	Atlantic Wind, LLC / Roaring Brook Wind	79.7 79.7
579	Bluestone Wind, LLC / Bluestone Wind	124.2 124.2
596	Invenergy Wind Development LLC / Alle Catt II Wind	339.1 339.1
612	Deepwater Wind South Fork, LLC / South Fork Wind Farm	96.0 96.0
617	North Park Energy, LLC / Watkins Glen Solar	50.0 50.0
618	North Park Energy, LLC / High River Solar	90 90
619	North Park Energy, LLC / East Point Solar	50 50
620	North Park Energy, LLC / North Side Solar	180.0 180.0
637	Flint Mine Solar LLC / Flint Mine Solar	100.0 100.0
644	Hecate Energy Columbia County 1, LLC / Columbia County 1	60.0 60.0
678	LI Solar Generation, LLC / Calverton Solar Energy Center	22.9 22.9
683	KCE NY 2, LLC / KCE NY 2	200.0 200.0
695	Deepwater Wind, LLC / South Fork Wind Farm II	40.0 40.0
704	Bear Ridge Solar, LLC / Bear Ridge Solar	100.0 100.0
706	High Bridge Wind, LLC / High Bridge Wind	100.8 100.8
720	North Light Energy Center, LLC / North Light Energy Center	80.0 80.0
721	Excelsior Energy Center, LLC / Excelsior Energy Center	280.0 280.0
737	Empire Offshore Wind LLC / El Sunset Park	816.0 816.1
746	Energy Storage Resources, LLC / Peconic River Energy Storage	150.0 150.0
791	Danskammer Energy LLC / Danskammer Energy Center	595.5 600.0

<u>Queue Pos.</u>	<u>Owner / Project Name</u>	<u>MW (SAW)</u>
521	Bull Run Energy LLC / Bull Run II Wind	449 449
571	Heritage Renewables, LLC / Heritage Wind	200.1 200.1
629	Silver Lake Solar, LLC / Silver Lake Solar	24.9 24.9
631	CHPE LLC / NS Power Express	1000 1000
710	Horseshoe Solar Energy LLC/ Horseshoe Solar	180 180
717	EDF Renewables Development, Inc. / Morris Ridge Solar Energy Center	177 177
758	Sithe/Independence Power Partners, LP / Sithe Independence	9 27
766	Sunrise Wind LLC / Sunrise Wind	880 880
783	ConnectGen Chautauqua County LLC / South Ripley Solar and BESS	270 270
787	Levy Grid, LLC / Levy Grid, LLC	150 150
801	Prattsburgh Wind, LLC / Prattsburgh Wind Farm	147 147
805	Oxbow Hill Solar, LLC / Oxbow Hill Solar	140 140
811	Hecate Energy Cider Solar LLC / Cider Solar	500 500
815	Bayonne Energy Center / Bayonne Energy Center III	49.8 49.8
835	Astoria Generating Company, LP / Luyster Creek Energy Storage 1	56 56
840	Hecate Energy LLC / Swiftsure Energy Storage	650 650
864	Greens Corners Solar LLC / NY38 Solar	120 120
883	Garnet Energy Center, LLC / Garnet Energy Center	200 200
887	CHPE LLC / CH Uprate	250 250
907	Harlem River ESS, LLC / Harlem River Yard	100 100
929	EDF Renewables Development, Inc. / Morris Ridge Battery Storage	83 83
931	East River ESS, LLC / Astoria Energy Storage	100 100
956	Holtsville 138 kV Energy Storage	110 110
959	Empire Offshore Wind LLC / El Oceanside 2	1260 1260
965	Yaphank Energy Storage, LLC /Yaphank Energy Storage	76.8 77.6
987	Sunrise Wind LLC / Sunrise Wind 2	44 44