

## **Large Generating Facility - Interconnection System Reliability Impact Study Scope**

### **Queue #1306: Opal 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 Opal Storage Project (“Project”), which is being developed by Hanwha Q CELLS USA (“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 Orange County, New York. The proposed Point of Interconnection (“POI”) will be at East Walden 115 kV substation. The Connecting Transmission Owner (“CTO”) is Central Hudson Gas and Electric Corporation (“Central Hudson”).

The Project is an energy storage plant. The Project, as proposed, will consist of fifty-eight (58) Power Electronics HEM FP4105M 4.105 MVA inverters. It is expected to have a maximum potential discharging capacity of 200 MW and charging capacity of 200 MW. The minimum duration for full discharge is four (4) hours (*i.e.*, 800 MWh) and for charge is four (4) hours (*i.e.*, 800 MWh) during summer and winter periods.<sup>1</sup>

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

The Study will assess the impact of the Project on the base case power system including New York State Electric and Gas Corporation (“NYSEG”) and New York Transco (“NY Transco”) as 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**

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

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<sup>1</sup> 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.

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 the 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 115 kV and above portions of the NYSTS in the following New York load zones: Zone G (Hudson Valley) that is most likely to be affected by the Project. The Study will also evaluate the impact of the Project on the local 115 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, winter peak, and light** load cases for the following base case conditions, and as specified under the subsequent sections of this Scope:

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<sup>2</sup>.

Case 2 - Case 1 with the Project modeled as in-service and in generating mode at full output injecting 200 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 200 MW at the POI. Unit and facility reactive resources for the Project will be represented. Generation will

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<sup>2</sup> As defined in the NYISO Transmission Expansion and Interconnection Manual (NYISO TEI Manual).

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 **winter peak** 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 Transfer Assessments**

The transfer assessment will determine the incremental impact of the Project on the Normal and Emergency transfer limits of the UPNY-Coned interface (opened and closed definitions, as applicable) in accordance with Applicable Reliability Standards, Guidelines and NYISO study practices. The transfer limits will be evaluated in the predominant north-to-south direction, unless otherwise specified. Sufficient analyses will be conducted to determine the most limiting of the thermal, voltage, or stability limits under **summer peak** load conditions.

## 6.4 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.

## 6.5 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.

## 6.6 Islanding Analysis

Analysis will be performed to determine the impacts on area voltage and frequency associated with the islanding of the Project with area distribution load during **light load** conditions. Methods (e.g., Special Protection Systems, generator operating limits, etc.) will be indicated to preclude excessive voltages (*i.e.*, voltages exceeding 1.05 pu) and abnormal frequencies during islanding conditions, in the Study report.

## 6.7 Local Distribution System Analysis

Cases 1 & 2 will be used for the local distribution system analysis.

### Steady State Voltage Fluctuations

The maximum and minimum voltage fluctuations on the distribution system in the vicinity of the POI will be evaluated when all area PV output changes and prior to any LTC action. Voltage fluctuations shall be below the IEEE 519 borderline of irritability curve (limit of 2% voltage change based on 1 fluctuation/minute). For this analysis, all area PV is reduced from full output to no output for the area peak and minimum daytime load conditions with

LTC transformers modeled as regulating pre-change and non-regulating post-change. Analysis will be repeated with all area PV increasing from no output to full output.

#### LTC / Voltage Regulator Tap Movement

LTC / Voltage Regulator Tap position will be monitored with all area PV at full output and no output for the area peak and minimum daytime load conditions. From full output to no output and from no output to full output, LTC tap movement shall not exceed 1 tap position

The Local Distribution System Analysis will be performed by the CTO.

## **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.

## **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#1306: *Opal Storage Project Project*

Queue Pos.	Owner / Project Name	MW (S W)
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