



DATE: September 8, 2017

TO: Jason Pause, Electric Distribution Systems,
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Department of Public Service
3 Empire State Plaza, Albany, NY 12223

FROM: Joint Utilities of New York – Interconnection Technical Working Group

RE: 07/19/17 ITWG Meeting Follow-Ups – Interconnection Application Requirements for Energy Storage Systems (ESS)

Pursuant to your request, here is the response from the Joint Utilities of New York (“JU”) regarding interconnection application requirements for Energy Storage Systems (ESS) to distribution systems. This response reflects the position of all of the utilities identified on this letterhead, although it does not necessarily apply to network systems. This information is preliminary for discussion purposes and is not intended to represent a final position on any issues.

I. Purpose

The purpose of this document is to highlight additional questions to be asked of the Developer regarding the interconnection of battery or energy storage systems (ESS) within the distribution system, beyond what is already required through the New York State Standardized Interconnection Requirements, Interconnection Technical Working Group documentation, and individual utility interconnection requirements. This information shall be required as a part of a complete application package.

II. Scope

In-scope is behind-the-meter (BTM) mass market residential or commercial; BTM commercial and industrial; and remote net metered or community distributed generation ESS assets that are coupled with distributed generation (DG). Standalone ESS assets directly connected to the distribution system are also in-scope. This scope covers:

- (1) Technology: electricity battery storage¹
- (2) Nameplate Rating: total aggregate nameplate rating of the DG and coupled ESS that is less than or equal to 5 MW.
- (3) Charging: ESS may be charged from DG only, a combination of DG and distribution system supply, or from distribution system supply only.
- (4) Dispatch/discharge: dispatch or discharge of ESS and DG may be limited to no net export of energy or nameplate of DG only, or may have no limitations.

Community microgrids and other multiple-tenant or individual facility islanding applications are out of scope.

III. System Equipment Characteristics

- a. Indicate the type of DG and energy storage technologies to be used. For example, common types of anticipated DG could be photovoltaic (PV) and the energy storage technologies to include NaS, Dry Cell, PB-acid, Li-ion, vanadium flow, etc.
- b. If the intended use case for the ESS includes BTM backup services, please provide a description and documentation illustrating how the entire system disconnects from utility during an outage (e.g. mechanical or electronic, coordination, etc.).
- c. Provide the model, capacity (kWh), and manufacturer of the *battery portion* of the energy storage equipment.
- d. Indicate any impacts of ambient temperatures on charging and discharging capabilities, specifically noting any restrictions on available capacity as a function of temperature and listed on the system facility's nameplate.
- e. Provide details on cycling (anticipated maximum cycles before replacement), depth of discharge restrictions, and overall expected lifetime regarding the energy storage components.

¹ Note: This is the prevalent type of energy storage marketed to the JU at present; consequently this is the JU's current focus.

- f. Provide proposed inverter(s) power factor operating range and whether inverter(s) are single quadrant, two-quadrant, or four-quadrant operation.
- g. Provide specification data/rating sheets including the manufacturer, model, and nameplate ratings (kW) of the inverter(s)/converters(s) for the energy storage and/or DG system², and to include required ancillary equipment demand levels such as battery heating and cooling requirements (HVAC), pump loading, etc.
- h. Provide details on whether the inverter(s)/converter(s) have any intrinsic grid support functions, such as California Rule 21 Phase 1, Phase 2, and/or Phase 3 capabilities for autonomous or interactive voltage and frequency support. If they do, please describe these functions and default settings.
- i. Indicate whether the energy storage and DG system inverter(s)/converter(s) are DC-coupled or AC-coupled.
- j. Indicate whether the system inverter(s)/converter(s) is/are listed on the NY DPS “Certified Interconnection Equipment List”³ (yes, it is on the list or else no, it is not on the list) and/or whether the components are UL 1741 SA certified.
 - a. If the interconnected inverter(s)/converter(s) are not listed on the “Certified Interconnection Equipment List” but are certified, provide a copy of the certificate of compliance.
 - b. If the interconnected inverter(s)/converter(s) are not listed on the “Certified Interconnection Equipment List” or otherwise UL 1741 SA certified, please detail the use of utility grade relays used in interconnection protection, including AC and DC control schematics and relay logic.
 - c. If the interconnected inverter(s)/converter(s) are not listed on the “Certified Interconnection Equipment List”, please detail the verification of protection operation in equivalent deployments of the equipment configuration. For example, if this exact configuration has been previously deployed, please describe the project and reference the commissioning/test report.
 - d. Identify if inverter analytical models are available for use in the utility’s power flow analysis program.
- k. Indicate whether the interconnected inverters inverter(s)/converter(s) is/are compliant to the latest versions of the following additional standards. If partially compliant to subsections of the latest standards, please list those subsections:
 1. IEEE 1547a
 2. IEEE 519
 3. UL 1741-SA

² If the inverter is packaged together with the battery system, or packaged with other system components as a unique assembly, then the overall assembly (inverter and all components) must be examined. Supplemental documentation to submit should include:

- Shop drawings illustrating the physical product.
- Single line diagrams showing equipment layout.
- Three-line schematics showing protective device and monitoring equipment.
- DC schematic showing control logic.
- Operating procedure including scheduled times of charging and dispatch.

³[http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/dcf68efca391ad6085257687006f396b/\\$FILE/06598086.docx/Current%20SIR%20Devices%207-31-2017.docx](http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/dcf68efca391ad6085257687006f396b/$FILE/06598086.docx/Current%20SIR%20Devices%207-31-2017.docx)

4. ANSI C37.2 (Over/Under Voltage/Frequency – Functions 27/59/81O/81U, Overcurrent – Functions 50P/50G/51P/51G, Anti-Islanding).
 - l. If the interconnected inverter(s)/converters are not compliant with the previously listed additional standards, please describe your future intentions going forward to comply with these standards.
 - m. Detail any integrated protection that is included in the interconnected inverter(s)/converters. For example, describing over/under-voltage/current frequency behavior and reconnection behavior would comply, such as solid state transfer switching or other.

IV. System Electrical Characteristics

- a. Provide detailed operating philosophy for the proposed system. For example, please provide details on what the project intent, anticipated operating schedule, and/or a description of the plant management system.
- b. Provide a typical 24-hour profile, with a data file, of the energy storage and/or DG system and description of the use case(s) and anticipated exceptions to the use case. Use cases should describe the basic function (e.g. Peak Shaving, Frequency Regulation, Demand Charge Reduction, Power Quality Improvement, etc.) and should provide details of operation sequence within each use case. The x-axis should be time and the y-axis should be typical output capacity.⁴
- c. Indicate the charging configuration and ramp rate:
 1. Charged via interconnected DG (e.g. PV panels tied to the storage system)?
 2. Charged via distribution supply through a converter (built in or separate)?
- d. Provide details on grounding of the interconnected energy storage and/or DG system to meet utility effective grounding requirements.
- e. Provide short circuit current capabilities and harmonic output from the energy storage and/or DG system.
- f. Provide a summary of protection and control scheme functionality and provide details of any integrated protection of control schematics and default settings within controllers.
- g. Provide descriptions of any software functionality that enables intelligent charging and discharging of the ESS using interconnected DG, such as PV. For example, if the ESS can be charged only through the DG input, or if the ESS can be switched to be charged from the line input, provide those details.
- h. Provide details on standard communication hardware interfaces that are available, e.g., TCP/IP, serial, etc.⁵
- i. Provide details on standard communication protocols that are available, e.g., MODBUS, DNP-3, 2030.5, etc.⁵

⁴ If the DG and the battery are able to export simultaneously, both must be considered when evaluating the maximum potential output from the site. The maximum output of the site will be equal to the maximum rated output of the DG plus the maximum rated output of the battery.

If the DG and the battery are not capable of simultaneous exports, the maximum output of the site will be the DG output or the battery output, whichever is greater.

⁵ This information will be required for all communicating devices and is not exclusive to storage. This information will need to be part of the updated SIR.

- j. Provide details on standard communication data models that are available, e.g., 61850-90-7, SunSpec, MESA, etc.⁵

V. Market Participation

- a. Are the assets intended to operate in the NYISO market?
- b. If market participatory, what are the intended markets?
- c. If market participatory, please provide a typical 24-hour profile(s) of the energy storage and/or DG system, as well as a typical 24-hour profile(s) of the energy storage demand/generation (without DG) impact, for each of the intended markets.
- d. What compensation is the facility seeking under the VDER Order?

DRAFT FOR DISCUSSION