APPENDIX J

Appendix J – Energy Storage System (ESS) Application Requirements

Energy Storage System (ESS) Application Requirements / System Operating Characteristics / Market Participation

Application Requirements:

a. Provide a general overview / description and associated scope of work for the proposed project. Is the new ESS project associated with a new or existing DG facility?

b. Identify whether this is a Stand-Alone or Hybrid ESS proposal or a change to the operating characteristics of an existing system. If Hybrid ESS, please select the configuration option:

1. Hybrid Option A - ESS is charged exclusively by the DG

2. Hybrid Option B - ESS will not export to the grid, only DG will.

    a. Hybrid Option C - ESS may charge/discharge unrestricted, but grid consumption by ESS is netted out of grid exports[1].

3. Hybrid Option D - ESS may charge/discharge unrestricted, but any consumption on the account is netted out of grid exports

4. N/A - not Value Stack

c. Market participation[2]

1. Compensated under the LIPA Electric Service Tariff If yes, please specify. Identify any associated use case stacking (*i.e*., parallel standby, net meter, VDER, import only, export only, peak shaving, generator firming, demand response, etc.) if applicable.

2. NYISO markets? If yes, has the NYISO process been initiated? Please specify which anticipated NYISO market(s).

3. As part of an NWA? If yes, please specify which associated NWA.

4. Program or market not listed? If yes, please describe.

d. Indicate whether the ESS and DG system inverter(s)/converter(s) are DC-coupled or AC-coupled and provide the following:

1. DER Nameplate Ratings:

    i. Storage inverter rating (kW) for AC-coupled or stand-alone systems;

[1] ESS may have restricted charge/discharge to be defined in Question 2e

[2] Market participation information is non-binding but may be used to verify operating characteristics and metering configuration. Participation in NYISO markets and NWA programs may influence the technical study.

ii. DG inverter rating (kW) for AC-coupled systems (if DG present); or

iii. DG + ESS inverter rating (kW) for DC-coupled systems.

2. Storage capacity (kWh)[3]

e. Provide specification data/rating sheets for both the AC and/or DC components including the manufacturer, model, and nameplate ratings (kW) of the inverter(s)/converters(s) and controllers for the ESS and/or DG system, and capacity of ESS unit(s) (kWh).

f. Indicate the type of Energy Storage (ES) technology to be used. For example, NaS, Dry Cell, PB-acid, Li-ion, vanadium flow, etc.

g. Will the proposed project provide both real power and reactive power (PQ injection)?

h. Will the proposed project provide reactive power control, either via volt/VAR mod or specific power factor?

i. 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-2018
   2. UL 1741 and its supplement SA

j. List the system's maximum import in kW AC, including any equipment and ancillary loads (i.e., HVAC) to be installed to facilitate the ESS installation.

k. Indicate desired ramp rates in kW/second during charging and discharging (worst case will be assumed if not provided). Please attach a charge and discharge data/curve.

l. Is the ESS symmetrical or asymmetrical (e.g., charge magnitude equivalent to discharge magnitude)? Provide proposed inverter(s) power factor operating range and anticipated operational setpoints4 in the context of the expected two-quadrant or four-quadrant operation

m. Indicate the maximum potential change in power magnitude expressed in equipment limitations such as per-second, minute, hour, or day and kW or % of kW as applicable.

n. Indicate any specific operational limitations that will be imposed (e.g., will not charge or discharge across PCC between 2-7 pm on weekdays; ESS will not charge at any time that would increase customers peak demand, etc.). Charge/discharge at any time (24 hours) will be assumed by LIPA if not provided.

o. Provide a summary of protection and control scheme functionality and provide details of any integrated protection of control schematics and default settings within controllers.

p. Submit control schemes, electrical configurations, and sufficient details for PSEG Long Island to review and confirm acceptance of proposal. Detail any integrated control scheme(s) that are included in the interconnected inverter(s)/converters including a sequence of operations for expected events, energy flows, or power restrictions. For example, provide details 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, or if a control scheme is proposed to prohibit power flow directionality or peak values. Provide details on grounding of the interconnected ESS and/or DG system to meet LIPA's effective grounding requirements.

q. Provide short circuit current capabilities and harmonic output from the hybrid ESS project or

[3] Kilowatt hour rating values are typically not utilized for impact review outside of a utility performance requirement under and NWA solution. However, kWh is required for utility reporting and is a mandatory date field.
[4] Final setpoints are subject to change per utility's direction

stand-alone ESS.

r. If the intended use case for the ESS includes behind-the-meter backup services, please provide a description and documentation illustrating how the entire system disconnects from the LIPA System during an outage (e.g., mechanical or electronic, coordination, etc.).

Optional Questions:

Questions in this section are not required for a complete application, although any responses provided may support PSEG Long Island's decision to review the project performance in a manner that could result in less impact to the customer interconnection.

a. 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: a. SunSpec Common Smart Inverter Profile (CSIP) v2.103-15-2018

b. Any other recognized standard or practice. Indicate the maximum frequency of change in operating modes (*i.e.*, charging to discharging and vice-versa) that will be allowed based upon control system configurations.

c. Provide details on standard communication as follows:
   a. Hardware interfaces that are available, *e.g.*, TCP/IP, serial, etc.
   b. Protocols that are available, *e.g.*, MODBUS, DNP-3, 2030.5, etc.
   c. Data models that are available, *e.g.*, 61850-90-7, SunSpec, MESA, 2030.5, OpenADR, etc.

d. Provide details on whether the inverter(s)/converter(s) have any intrinsic grid support functions, such as autonomous or interactive voltage and frequency support. If so, please describe these functions and default settings.