EXHIBIT A-2
Scope of Work EMS

Contents

1.0 General

1.1 Definitions

1. **"AC"** shall mean alternating electrical current.
2. **"Ancillary Services"** shall mean services, defined in Section 2.4.1 Applications, capable of being made available to the Grid System by the Facility from time to time, including automatic generation control (AGC), synchronous condenser mode, reactive power support, operating reserve, frequency control, ramp rate control, voltage control, black start capability, voltage support, emergency stand-by support, or others, as applicable.
3. **"Battery System"** shall mean a set of battery racks, containing battery modules, within an enclosure integrated with onboard thermal management, Battery Management System (BMS), Fire Protection System (FPS), internal protection, monitoring and other systems as needed within the ESS enclosure(s), certified with applicable codes and standards in Exhibit A-1 Scope of Work BESS Section 6.0 Codes and Standards, connected to a single Power Conversion System (PCS) or inverter.
4. **"Battery System Supplier"** shall mean the party responsible for the supply of the Battery System or Power Unit(s) if a different party than the Contractor.
5. **"BESS Equipment"** shall mean the Battery System including without limitation, the PCS and Medium Voltage Transformer (MVT).
6. "**BESS Facility**" shall mean all the equipment and services to produce a fully operational Battery Energy Storage System (BESS) from the medium voltage (MV) AC connection point at the Substation, through the Power Conversion System (PCS) and to the DC/Battery energy storage system.

7. **"BESS Facility EMS"** shall mean the control system including but not limited to the Energy Management System (EMS) control hardware, software, communication, networking and cybersecurity utilized to send power commands to, monitor and store data for the Project.
8. **"Control Mode"** shall mean the programmed control setting of the EMS as defined in Section 2.4.2 BESS Control Modes.
9. **"Commercial Operation Date" or "COD"** shall mean the date the on which BESS Facility first achieves Commercial Operation. Commercial Operations shall mean satisfaction of performance test requirements set forth Exhibit F-5 Substantial Completion Testing and, in a certificate, issued by the Owner in Exhibit U-3 Commercial Operation Certificate.
10. **"DC"** shall mean direct electrical current.
11. **"EMS Control Hardware"** shall mean all the hardware including but not limited to EMS controllers, network switches, field network enclosure (FNE), communications and networking infrastructure, power supplies, uninterruptable power supplies (UPS) required for the EMS system design.
12. **"EMS Provider"** shall mean the EMS vendor if a different party than the Contractor.
13. **"EMS Service Agreement"** shall mean the software and services agreement from the EMS Provider, if it is a different party than the Contractor, and the Contractor's respective Service Level Agreement (SLA).
14. **"HMI" or "Human Machine Interface"** shall mean the EMS Web User Interface that shall be used by Supervisory Control and Data Acquisition (SCADA), Owner or PREPA to interface with EMS.
15. **"MTR" or "Minimum Technical Requirements"** shall mean the application / functionality requirements of the EMS as defined in Section 2.4.1 Applications.
16. **"Owner"** shall mean Barceloneta Solar LLC, Pattern Santa Isabel Storage 1 LLC and Santa Isabel Storage 2 LLC.
17. **"Owner-Supplied Equipment"** shall mean MV Switchgear, 115 kV GSU Transformer, MV and HV Engineering, Procurement and Construction (EPC) for all Projects. Owner-Supplied Equipment for the Barceloneta Solar + Storage (MTR) Project shall also include Solar PV modules, racking, trackers, Solar PV controls.
18. **"POI" or "Point of Interconnection"** shall mean the meter located on the primary side of the 115 kV GSU Transformer inside the PREPA Project substation as shown in the SLD in Exhibit D-1 Single Line Diagram.
19. **"Power Unit"** shall mean a single PCS (bi-directional grid-connected power electronic converter) connected to a Battery System and associated control system. A Power Unit is able to charge and discharge independently.
20. **"Project"** shall mean the BESS Facility and all the equipment and services to produce a fully operational BESS up to the POI, capable of meeting technical specifications in Exhibit A-1 Scope of Work BESS Section 2.0 and Substation equipment. "Project" for the Barceloneta Solar + Storage (MTR) site shall mean the BESS Facility and Solar PV, and all and services to produce a fully operational Solar + Storage facility up to the POI.
21. **"Project Data"** shall mean the data made available to the EMS from the BESS Facility and Substation equipment that is captured and stored according to requirements in Section 2.5.2 Data Capture and Retention.
22. **"Site Controller"** shall mean the BESS Facility EMS controller that monitors the Unit Controller health and capability and distributes proportional P/Q commands.
23. **"State of Charge"** or **"SOC"** means for any time of determination the amount of Stored Energy at such time expressed as a percent of the Maximum Storage Energy.

24. **"Unit Commissioning Test Procedures"** shall mean the performance test procedures in Exhibit F-4 Unit Commissioning Testing Plan.

25. **"Unit Controller"** shall mean the EMS controller that interfaces with both the Battery System and PCS, together known as a "Power Unit," reads the charge/discharge limits from each BMS and passes them to the PCS, ensures PCS adheres to the BMS current and power limits, and sequences the turn ON/OFF of Power Units.

26. Abbreviations listed in the Table below.

1.2 Abbreviations

Table 1 - Abbreviations

AC	Alternating Current
AGC	Automatic Governor Controls
AHJ	Authority Having Jurisdiction
BESS	Battery Energy Storage System
BMS	Battery Management System
BOS	Balance of System
CVE	Common Vulnerability and Exposures
DC	Direct Current
DSM	Dynamic System Monitoring Equipment
EMS	Energy Management System
FAT	Factory Acceptance Testing
FACP	Fire Alarm Control Panel
FNE	Field Network Enclosure
FPS	Fire Protection System
FRT	Frequency Ride Through
GPS	Global Positioning System
HMI	Human Machine Interface
IA	Interconnection Agreement
IFC	Issued for Construction
I/O	Input and Output
LOTO	Lock Out / Tag Out
LTC	Load Tap Changers
LVRT	Low Voltage Ride-Through Requirement
MTR	Minimum Technical Requirements
MV	Medium Voltage
MVT	Medium Voltage Transformer
NIST	National Institute of Standards and Technology
NTP	Network Time Protocol
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
PCS	Power Conversion System
PF	Power Factor
POI	Point of Interconnection
POD	Plan of the Day
POM	Point of Measurement
PPA	Power Purchase Agreement

PREPA	Puerto Rico Electric Power Authority (aka Utility)
RTAC	Real Time Automation Controller –SEL 3530 device or equivalent
RTE	Roundtrip Efficiency
SCADA	Supervisory Control and Data Acquisition
SLA	Service Level Agreement
SOC	State of Charge
SOH	State of Health
TSP	Transmission Service Provider (aka Luma Energy)
UPS	Uninterrupted Power Supply
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
VRS	Voltage Regulation System

1.3 Referenced Documents

#	Document Name	Version
1	Exhibit A-1 Scope of Work BESS	1
2	Exhibit A-3 Division of Responsibilities	1
3	Exhibit C-1 Site Description	1
4	Exhibit D-1 Single Line Diagram	1
5	Exhibit F-4 Unit Commissioning Test Plan	1
6	Exhibit F-5 Substantial Completion Test Plan	1
7	Exhibit M-1 Contractor Deliverables	1

2.0 Scope of Work EMS

2.1 Scope Overview

This section provides a summary of the minimum standards for **the EMS and BESS Facility Integration**.

The Scope of Work shall include all work required to design, furnish, install, test, and commission a complete EMS for the BESS Facility and Project to include EMS controllers, SCADA, networking, communications, HMI, historian, cybersecurity, design engineering, installation, integration, testing, and commissioning, Puerto Rico Electric Power Authority (PREPA) performance tests, project management and coordination:

Contractors should also refer to Exhibit A-3 Division of Responsibilities for a detailed matrix providing supplemental detail with regards to scope of work delineation. Contractors are encouraged to issue Requests for Information, if needed, prior to bidding to clarify any details or expectations.

2.2 EMS

The Contractor shall procure, install, integrate, commission, and test the EMS system so that it shall be a fully functioning and integrated EMS system.

2.2.1 Functional Description and Requirements

The EMS system shall:

1. Dispatch real and reactive power from the Project based on signals or schedules issued by the system operators, PREPA, Transmission Service Provider (TSP) or Site Controller. The EMS shall be designed to provide for automatic, unattended operation of the BESS Facility equipment as well as manual controls of the BESS Facility equipment.
2. Provide automatic operation, remote operation, and dispatch of the BESS equipment from local HMI and web portal. All modes of operation and associated setpoints can be remotely adjustable. Interfaces shall allow changes in settings and control modes and shall provide access to necessary Battery System and PCS data.
3. Communicate directly with the battery containers and PCS. The EMS shall receive signals from the site SCADA systems, including Substation Real Time Automation Controller (RTAC), TSP equipment, a dedicated control meter, Owner-Provided Equipment, PREPA and shall monitor and send control signals as necessary to operation the BESS Facility and Project.

2.2.2 Engineering Design

The EMS engineering and design shall:

1. Be designed to operate the resources and shall receive control setpoints from the Site Controller, TSP, Owner or PREPA SCADA for plant output.
2. Compliance with all necessary TSP and PREPA requirements, as applicable.
3. Be designed to manage and control the Project voltage, real and reactive power, and respond to local measurements.
4. Receive all AGC commands for each resource through the RTAC.
5. Be designed to provide for automatic, unattended operation of the BESS Facility.
6. Be designed to provide remote manual operation or automatic operation.
7. Have control modes of operation and associated setting and setpoints to be remotely adjustable.
8. Be integrated with Owner, TSP and PREPA SCADA via RTAC that require control for command signals to the BESS Facility equipment via the EMS.
9. Manage system operation including issuing commands to the individual Power Units.
10. Be integrated with the substation RTAC, Dynamic System Monitoring Equipment (DSM) and all devices listed in Section 2.3.1 Device Integration to digest all relevant device information, as defined by the Owner, for visualization into a single HMI within the EMS for monitoring and control.
11. Aggregate and record all necessary data points from the equipment listed in Section 2.3.1 Device Integration within the project historian at 1 second sampling rates. Provide on-premises storage of aggregated data at the time interval as defined by Project Owner.

12. Provide system controls for the Battery System charging, discharging, and management of SOC. The ramp rate of charging/discharging and maintaining a specific state of charge of the Battery System shall be programmable via manual entry into the EMS HMI.
13. Include a Power Unit-Level and Site Level "Fast stop" function operable via the EMS HMI that issues 0 kW and 0 kVar power commands to the inverter prior to opening the Owner defined breakers. This fast stop function is not equivalent to an emergency stop (E-stop) or related to a safety stop of the system.
14. Control the requested MW value at the Main Meter at the POI to within 2% after a 4 second settlement period.
15. Include network topology design, networking infrastructure design and specifications, network protections, communication requirements and interactions of devices on the network, and designation of a project IP schema with associated subnetting / VLANs that adhere to best practices for network security and segregation where applicable.
16. Produce document deliverables detailed in Section 2.10 Document Deliverables.
17. Provide redundancy options for any equipment where applicable for consideration. Examples of this equipment include (but not limited to) controllers, servers, network switches, RTACs and firewall.

2.2.3 Contracting / Access

1. The Contractor shall have access rights to Project data (SCADA/EMS) upon request to the Owner, on a case-by-case basis which shall not be unreasonably withheld through the Warranty Period.
2. Owner-Specified SCADA manufacturer, if applicable, shall have access rights to Project Data (SCADA/EMS) through Warranty Period.

2.3 Integration

2.3.1 Device Integration

The Contractor shall:

1. Interface with the devices listed in Table (below). All device communication shall typically occur over Ethernet or Serial via CanBus, DNP3, or Modbus TCP/IP (preferred).

Table 1: Device Integration

Device	Contractor	Description
Batteries and container	[X]	Enclosure housing batteries and all the associated subcomponents.
Power Conversation Skids	[X]	PCS acts as a bidirectional AC/DC converter that allows the batteries to charge and discharge from the grid.
Substation RTAC	[X]	Substation RTAC acts as the interface for the substation equipment including MVT, load tap changers (LTC), capacitor banks, breakers, meters, relays, etc.
Meters	[X]	Meters in the substation. Used for metering settlement, and EMS controls.

Utility/Grid Operator RTAC	[X]	TSP remote terminal unit for monitoring and logging data.
Fire Alarm Control Panel (FACP)	[X]	Aggregate monitoring and reporting system that reports to the local AHJ.
Genset(s)	[X]	Used to supplement PREPA MTRs.

2. Provide any necessary support to ensure completion of telemetry testing with PREPA, Owner, TSP, and any other necessary parties per the PPA and IA.
3. Provide a camera monitoring system which has adequate coverage of the Project substation and BESS Facility yard. The camera monitoring system shall have a minimum of 30 days of historical video feed archiving for reviewing past events.
4. Provide a physical security badge access system for access control and monitoring of the substation and BESS Facility yard.

2.3.2 Coordination

The Contractor shall:

1. Cooperate and coordinate with the device manufacturers/vendors:
   A. Receive and troubleshoot device documentation including points lists, manuals, and spec sheets to properly work through the integration process (Owner to provide documents in a timely fashion).
   B. Ensure that the device integration shall allow the EMS to control the BESS Facility such that it meets the system performance requirements set forth in this Scope of Work, PPA and IA.
   C. Ensure that the telemetry (points list) between BESS and Substation devices is comprehensive and accurate for proper monitoring and operations of the Facility.
2. Cooperate and coordinate with the Owner and BESS Supplier, as applicable:
   A. Notify the Owner and BESS Supplier, as applicable, of any specific device issues it identifies that may impede the ability to meet performance requirements or timeline. In which case, the Owner shall intervene to require the device vendor/manufacturer to make changes to their device(s) to meet the requirement or shall remove the requirement from the Contractor's scope of work.
   B. Attend a coordination meeting on a weekly basis to discuss engineering progress, design deliverables, project schedule, and any other items relative to the project subject to a predetermine time cap. As it pertains to Scope of Work, additional meetings may be necessary to coordinate with other project design teams, suppliers, or trouble shoot issues through the course of the project, and the Contractor is expected to participate in these meetings.

2.3.3 Software Engineering and Development

1. The Contractor shall be responsible for the software engineering, development, and integration services of the following items:
   A. Network configuration and communication, including:
      i. EMS and Project networking equipment to EMS field level network equipment

ii. EMS and Project equipment to all devices listed in Table 1

B. On-Site EMS equipment installation and integration

C. Cloud configuration and setup

D. HMI for EMS controls and operation

E. Utility/ISO RTAC configuration, development, and integration

F. Data Historian implementation

2.3.4 Protection and Isolation

1. Each party providing equipment for the project is responsible for the design and implementation of the necessary protection coordination schemes and systems for their respective equipment.

2.4 Controller Operation

2.4.1 Applications

The EMS shall include the following Applications (operating modes) as minimum technical requirements specified by PREPA. All modes of operation and associated setpoints to be remotely configurable via the HMI.

1. Frequency Control and Regulation

   A. Fast active power (P) source capable of continuously injecting or absorbing energy from the grid as a function of system frequency deviations to help manage and maintain frequency at 60 Hz.

   B. Instantaneous and immediate active power (P) response of BESS Facility proportional to frequency deviations from scheduled frequency as deployed via AGC.

   C. The rate of active power (P) response of BESS Facility to frequency deviations shall be established based on configurable PREPA selected droop characteristic (*i.e.* 5% droop characteristic or more responsive as PREPA requires SCADA). PREPA shall be able to program and configure the droop via SCADA from 1% to 5% in steps of 0.5% (*i.e.* 3.0%, 3.5%, 4.0%, 4.5%, 5%).

   D. Frequency regulation deadband shall be available. PREPA shall be able to configure and program the deadband via SCADA. The configurable deadband range shall be at least from 0.02% to 0.5%.

   E. BESS Facility frequency control and regulation mode time response (full frequency response) shall be less than 1.0 second.

   F. PREPA shall be able to configure and select frequency regulation range (upper injection/lower absorption limits) via SCADA up to a maximum of its nominal capacity (*i.e.* +/- 15 MW, +/- 20 MW). Asymmetrical frequency regulation ranges should be allowed (*i.e.* +15 MW/-5 MW, +10 MW/-20 MW).

G. Capability to operate in the frequency control and regulation mode and simultaneously control the voltage by the injection or absorption of up to the required nominal reactive power at the Interconnection Point: (i) the frequency regulation control shall operate decoupled from the voltage regulation control mode and shall not limit the required reactive power capability of the BESS Facility at the POI, and (ii) the voltage regulation control shall not limit the required active power capability of the Project at the POI.

2. SOC Balancing

A. Return Battery System to a target SOC if the SOC exceeds specified limits.

B. Can also be set to enable and disable on a 24-hour clock cycle.

3. Rapid Spinning Reserve and Fast Frequency Response

A. Instantaneous injection of reserve energy as a function of the rate of change and/or deviations of the system frequency in the event of a sudden loss of generation or unexpected ramp-up in demand.

B. Energy capability and power capacity to inject nominal active power output (at the Interconnection Point) in a range within the Discharge Duration, or such longer period as is possible based on the State of Charge and the discharge rate of Energy delivered from the Facility.

C. Injection of active power (P) within the first three (3) cycles of a specific frequency deviation trigger and/or a frequency rate of change trigger (PREPA shall be able to configure and select triggers).

i. Total configurability for PREPA selection of the active power output, response time and response slope.

ii. Total configurability for PREPA selection of triggers: frequency, rate of change of frequency and instantaneous/time delay combinations.

iii. For example, the rapid reserve might be selected to trigger if frequency decays to 59.6 Hz at a rate > 0.25 Hz/sec or drops and stays between 59.0 Hz and 59.2 Hz for > thirty (30) seconds or drops below 59 Hz.

iv. Total configurability for multiple sets of triggering combinations capable of being simultaneously active. The rapid reserve mode might be selected to trigger with Boolean or logical operators that combine active power output, response time, response slope, frequency limits, frequency rate of change and time delay.

D. The rapid spinning reserve mode shall provide a full output response time (95% of its final output value) of 100 milliseconds or faster, measured at the EMS level. PREPA shall also have the flexibility of selecting a limited rapid spinning reserve sub-mode from SCADA. In limited rapid spinning reserve sub-mode, the

active power output, response time and response slope shall be configurable and programmable from SCADA in accordance with the triggering combinations and options previously discussed.

E. Capability to ramp down active power output at PREPA's pre-selected and configurable slope (MW/min or % of active power output/min) after system frequency is normalized and triggers pre-selected and configurable frequency window for a certain amount of time. BESS shall ramp down to PREPA's pre-selected and configurable active power output (10 MW, 5 MW, 0 MW, *etc*.) and be able to automatically make the transition and continue operating in frequency control and regulation mode in accordance with previously selected and configurable parameters. The active power automatic ramp down should have the capability of being manually interrupted and ramped down from SCADA.

v. Total configurability of ramp down slope in MW/minute or % of active power output/minute.

vi. Total configurability of active power output target to which BESS shall ramp down before making the transition to operate in frequency control and regulation mode.

vii. Total configurability for PREPA selection of frequency triggers that initiate rapid reserve ramp down process: frequency limits of window range and time delay combinations that initiate ramp down.

viii. For example, rapid reserve ramp down might be triggered if frequency returns to 60 Hz +/- 0.1 Hz and stays in this range for at least twenty (20) seconds or returns to 60 Hz +/- 0.2 Hz and stays in this range for at least thirty (30) seconds.

F. Capability to ramp down active power output at PREPA's pre-selected and configurable slope (MW/min or % of active power output/min) after SCADA command is received from PREPA's Energy Control Center System Operator to automatically make the transition and continue operating in frequency control and regulation mode in accordance with previously selected and configurable parameters.

ix. Total configurability of ramp down slope in MW/minute or % of active power output/minute.

x. Total configurability of active power output target to which BESS shall ramp down before making the transition to operate in frequency control and regulation mode.

G. Capability to inject nominal active power output for 1.0 hour and simultaneously inject or absorb nominal reactive power at the Interconnection Point.

4. <u>Dispatchable Generation Source</u>

A. Injection of active power at the Interconnection Point for a limited period of time to cover temporary generation deficits or start-up fast generating units.

B. PREPA shall be able to select from SCADA the constant power output mode, active power (P) magnitude and time period.

C. Capability to automatically make the transition from dispatchable mode to frequency control and regulation mode in accordance with previously selected and configurable parameters after SCADA command is received from PREPA's Energy Control Center System Operator.

D. Capability to ramp down active power output at PREPA's pre-selected and configurable slope (MW/min or % of active power output/min) after SCADA command is received from PREPA's Energy Control Center System Operator to automatically make the transition from dispatchable mode to frequency control and regulation mode in accordance with previously selected and configurable parameters.

   i. Total configurability of ramp down slope in MW/minute or % of active power output/minute

   ii. Total configurability of active power output target to which BESS shall ramp down before making the transition to operate in frequency control and regulation mode

E. Capability to operate in the dispatchable generation source mode and simultaneously control the voltage by the injection or absorption of up to nominal reactive power at the Interconnection Point.

5. Voltage Regulation and Control

A. Dynamic reactive power compensation source capable of continuously injecting or absorbing reactive power (up to +/- nominal MVAR at Interconnection Point) as a function of system voltage deviations.

B. Voltage regulation strategy based 100% on power electronics technology (no passive components like capacitors or reactors, neither thyristor controlled or switched capacitors or reactors allowed to complement reactive power capability).

C. Constant voltage control is required (voltage set point control mode).

D. PREPA shall be able to adjust from SCADA the voltage regulation set points shall between 95% and 105% rated voltage at the Interconnection Point. Because the previous voltage regulation range could be expanded (for example up to 106%) if PREPA's internal analyses indicate that additional dynamic compensation is required for specific multi-contingency scenarios, the upper voltage set point limits should be totally configurable and adjusted from SCADA beyond the typical voltage regulation range.

E. The voltage regulation shall be based on direct measurement by means of new BESS dedicated potential transformers (that Resource Provider shall install) at the Interconnection Point.

F. The voltage regulation system strategy shall be based on proportional plus integral (PI) control actions with parallel reactive droop compensation. The voltage regulation droop shall be adjustable from 0 to 10% in steps not greater than 0.5%.

G. At zero percent (0%) droop, the voltage regulation system shall achieve a steady-state voltage accuracy of +/- 0.3% of the controlled voltage at the Interconnection Point. For voltage regulation droops between 0 and 2.5%, the voltage regulation system shall be calibrated such that a change in reactive power shall achieve 95% of its final value no later than one (1) second following a step change in voltage. The change in reactive power should not cause excessive voltage excursions or overshoot. If a voltage overshoot is generated, it should be less than 1%.

H. For voltage regulation droops between 2.5% and 5.0%, the voltage regulation system shall be calibrated such that a change in reactive power shall achieve 95% of its final value no later than 500 msec following a step change in voltage. The change in reactive power should not cause excessive voltage excursions or overshoot. If a voltage overshoot is generated, it should be less than 1%.

I. For voltage regulation droops between 5% and 10%, the voltage regulation system shall be calibrated such that a change in reactive power shall achieve 95% of its final value no later than 100 msec following a step change in voltage. The change in reactive power should not cause excessive voltage excursions or overshoot. If a voltage overshoot is generated, it should be less than 1%.

J. The voltage regulation system dead band shall not exceed 0.1%.

K. The voltage regulation system shall be programmed to control and coordinate with local power transformers tap changers and local reactive power sources physically located in the switchyard.

6. Fast Dynamic Reactive Power Reserve and Voltage Support

A. Instantaneous or slope controlled (MVAR/sec) injection or absorption of reactive power triggered by and as a function of the rate of change and/or deviations of the system voltage.

B. Injection of reactive power (Q) within the first three (3) cycles of a specific voltage deviation trigger and/or a voltage rate of change trigger. PREPA shall be able to configure and select triggers.

i. PREPA shall be able to configure and select from SCADA the maximum final reactive power output value for fast dynamic reactive power reserve up to the nominal reactive power capacity.

ii. Total configurability for PREPA selection of triggers: voltage magnitude, rate of change of voltage and instantaneous/time delay combinations.

iii. For example, fast dynamic reactive power reserve might be selected to trigger if voltage decays to 0.95pu kV at a rate > 2.0 kV/sec or drops below 0.9pu.

iv. For example, a different value of fast dynamic reactive power reserve might be selected to trigger if voltage decays to 0.95pu at a rate > 1.0 kV/sec or drops below 0.93pu.

C. A full output response time (95% of its final output value) of 100 msecs. or faster is required. The maximum overshoot should not exceed 5% of the ordered change and the settling time should not exceed 150 msec, measured at the EMS level.

i. Capability to inject 120% of nominal reactive power output for three (3) seconds at required 100 msec. response time.

ii. Absorption of reactive power (Q) within the first three (3) cycles of a specific voltage deviation trigger and/or a voltage rate of change. PREPA shall be able to configure and select triggers.

iii. PREPA shall be able to configure and select from SCADA the minimum final reactive power output value for fast dynamic reactive power absorption, up to the nominal reactive power capacity of BESS.

iv. Total configurability for PREPA selection of triggers: voltage magnitude, rate of change of voltage and instantaneous/time delay combinations.

v. For example, fast dynamic reactive power might be selected to trigger if voltage increases to 1.1pu of the nominal voltage at a rate > 3.0 kV/sec or increases above 1.2pu of the nominal voltage.

D. A different fast dynamic reactive power might be selected to trigger if voltage increases to 1.1pu of nominal voltage at a rate > 2.0 kV/sec or increases above 1.15pu of nominal voltage.

E. Capability to inject nominal fast dynamic reactive power reserve or operate in voltage regulation mode depending on the system voltage conditions, and simultaneously inject nominal active power output for 1.0 hour at the Interconnection Point.

7. <u>Reactive Power Capability and Minimum Power Factor Requirements:</u>

A. The total power factor range shall be from 0.85 lagging to 0.85 leading in both maximum charging and discharging modes at the Interconnection Facilities (connection to T&D OPERATOR TC or sectionalizer). The reactive power requirements are necessary to provide support to the system operation based on the voltage profile and reactive power needs. The Facility shall ramp the reactive power from 0.85 lagging to 0.85 leading in a smooth continuous fashion at the Interconnection Facilities (connection to T&D OPERATOR TC or sectionalizer). The BESS should be capable of producing and absorbing reactive power up to, but without exceeding, the entire MVA rating of the Facility.

B. The +/- 0.85 power factor range should be dynamic and continuous in both charging and discharging modes at the Interconnection Facilities (connection to T&D OPERATOR TC or sectionalizer). The Facility shall respond to power system voltage fluctuations by continuously varying the reactive output within the specified limits. The power factor dynamic range herein specified could be expanded if studies indicate that additional continuous, dynamic compensation is required. The Facility must have a reactive capability that

meets +/- 0.85 Power Factor (PF) range based on the Facility Aggregated MW Output in both charging and discharging modes, which is the maximum MVAr capability corresponding to maximum MW Output. Positive (+) PF means the Facility is producing MVAr, and negative (-) PF means the Facility is absorbing MVAr.

C. The MVAr capability at maximum output shall be sustained throughout the complete range of operation of the Facility in both charging and discharging modes as established in the Figure below. The MVAr capability shall also be sustained throughout the complete Interconnection Facilities (connection to T&D OPERATOR TC or sectionalizer) voltage regulation range (95% to 105% of rated voltage at the Interconnection Facilities).

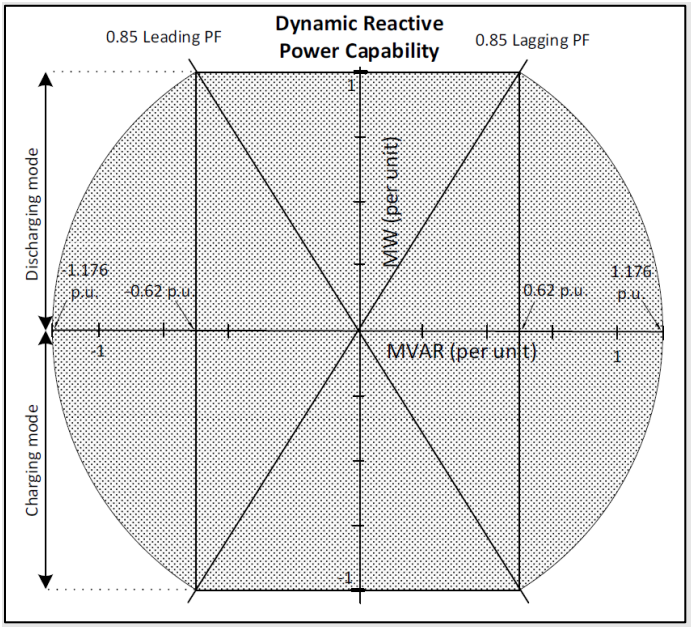

Figure 1 - Reactive Power Capability Curve

8. Black Start Capability

A. The Facility shall provide for BESS start-up capability and full functionality during system blackouts.

B. The Facility shall provide for BESS start-up capability and full functionality during unavailability of external system generation sources.

9. BESS Full Functional Voltage and Frequency Operational Range and Ride-Through Capability

A. Low Voltage Operation Range:

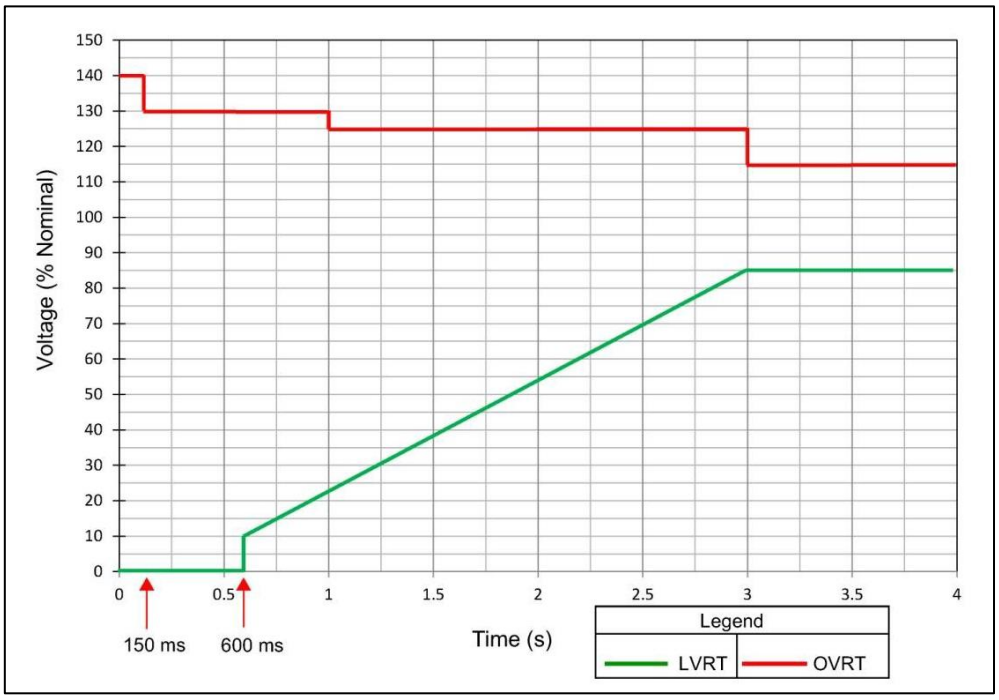

Figure 2 - BESS Voltage Operational Range and Ride-Through Requirements

i. From Figure (above), PREPA requires BESS to remain totally functional and online during three (3) phase and single phase faults down to 0.0 per-unit (measured at the POI), for up to 600 msec.

ii. BESS shall remain online and continue operating during and after normally cleared faults on the Interconnection Point.

iii. BESS shall remain online and continue operating during and after backup-cleared faults.

B. <u>High Voltage Operational Range</u>:

i. PREPA requires BESS to remain totally functional and online during symmetrical and asymmetrical overvoltage conditions as specified by the following values (illustrated in Figure above):

Overvoltage (pu)	Minimum time
1.4 – 1.3	150 ms
1.3 – 1.25	1 s
1.25 – 1.15	3 s
1.15 or lower	Indefinitely

C. <u>Frequency Ride Through (FRT)</u>:

56.0 – 63.0 Hz	No tripping (continuous)

55.5 – 56.0 Hz	20 sec time delay
< 55.5 or > 63.0 Hz	Instantaneous trip

2.4.2 BESS Control Modes

1. To safely coordinate control of the system, the EMS shall provide three control modes (remotely adjustable) to safety coordinate control of the system:
   A. Manual Control: Enables operators to command local active and reactive power control of the system in response to conditions in the larger electrical network. This includes placing equipment in a manual stop that prevents remote control/operation of the equipment during operation's maintenance of the equipment, manual start of equipment, unit level controls and power commands, and site level controls and power commands.
   B. Automatic Control: Enables the EMS to following commands from the RTAC.
   C. Remote Control: Ability to receive active and reactive power commands from HMI, Owner SCADA or PREPA SCADA system.

2.4.3 Response Time

1. The EMS shall have a total response time of less than 100 milliseconds.
2. The EMS shall meet the specified response time as directed by PREPA through the agreed PPA and IA.
3. The EMS response time shall be measured from the time of a control trigger is issued to the EMS until the time the Power Unit Controller(s) deliver the command to the Power Unit.
4. The control trigger is any mechanism which drives the EMS to dispatch commands to the Power Unit Controller(s) and may be a setpoint issued to the Site Controller, locally measured deviation which prompts a change, a user change to local operating mode setpoint, or others.

2.5 HMI

2.5.1 User Access

1. The HMI shall have four levels of user access: "Read Only", "Operations", "Engineer" and "User Administrator" (or similar construct) that limit the control and data available to specific users. The authorization to the HMI is managed by an Owner's representative.

2.5.2 Data Capture and Retention

1. Under the EMS Service Agreement, relevant Project Data shall be stored via Cloud Storage for the life of the project, while there is an EMS Service Agreement in place, and accessible to the Owner via the EMS HMI.
2. The EMS shall store Project Data in the following format:
   A. Timestamp field with all times in UTC, with devices synced to 1ms resolution using Network Time Protocol (NTP) or a Global Positioning System (GPS) clock (by others)

B. Time stamping standard formatting shall consist of HH:MM:SS

C. Description of the object (e.g., Site Controller, Power Unit, Battery String, etc.)

D. Power Unit number with the device's unique ID

E. Parameter value

3. Project Data is stored in one (1) second intervals and includes:

A. Device metrics for PREPA and IA telemetry

B. Grid measurement and metering devices

C. EMS operating mode and application history

D. Current and historical alarm information

E. PCS information including, but not limited to, inverter alarms and fault codes, AC & DC current, and AC and DC voltages

F. All necessary control and warranty data from the battery vendor

4. Project Data shall be stored either on-site in a local database or off-site in the cloud-based service systems that can be downloaded via the HMI.

5. The EMS on-site Project Data storage shall provide means to store at least 90 days of operational Project Data locally assuming 1s logging interval for all data. The EMS on site Project Data storage shall also be used in the case of a communications outage to the project site, and when communications are restored to site all local Project Data shall be uploaded into the cloud-based storage systems.

6. Provide cloud based storage for the camera and physical security measures.

2.5.3 Alarms

1. The EMS shall provide a means of displaying, searching, and providing details on active alarms that identify out-of-specification conditions and malfunctions in the Project equipment, and any available internal software alarms, as well as historic alarms.
2. Project level, system level and vendor-specific alarms shall be displayed. Alarms shall be displayed visually in the EMS HMI and shall be made available externally via SCADA. Alarm notifications shall include alarm priority (i.e., Warning/Fault/Status/Fire, etc.), description of alarm conditions, and location of alarm in the BESS Facility. Alarms can be configured to take automatic action in the BESS Facility based on safety conditions or be informational only.

2.6 Hardware Installation and Integration

1. The EMS Control Hardware and enclosures shall be designed for the maximum and minimum temperature conditions in Exhibit A-1 Scope of Work BESS.
2. The Contractor is responsible for receiving, unloading, storage, and protection of the EMS Control Hardware when it arrives at their facilities prior to shipping to the Project Site. When the Contractor's equipment is shipped to the Project, it shall be responsible for receiving, unloading, storing, and providing adequate protection for the EMS Control Hardware.

3. The Contractor shall supply a site-level FNE or structure to house the Site Controller, power supplies, UPSs, networking, SEL Relays, power distribution, fiber patch panels, and remote Input and Output (IO) devices, if an adequate space and available power within a climate-controlled substation house or control building is not available.
4. The Contractor shall supply unit-level FNEs to house the Power Unit Controller, power supplies, UPSs, networking, SEL Relays, power distribution, fiber patch panels, and remote IO devices. For smaller projects with few PCS, the Contractor may elect to consolidate Unit Controls into the site-level FNE, but default to EPC specifications.
5. The EMS FNE(s) shall be shipped with all terminal blocks, fuses, fuse holders, power supplies, AC/DC converters, internal power cables, internal communication cables, and mounting hardware assembled and mounted within the FNE. The remaining components, including the Power Unit Controller(s), networking, and UPS may be shipped to the Project Site separately. The Contractor shall install the components that were shipped separately in the FNE after the FNE(s) have been mounted at the Project Site.
6. The EMS FNE(s) shall include a 30-min UPS to power the Power Unit Controllers and Unit Network Switches in their respective enclosures.
7. The Contractor shall install an H-Frame structure (or equivalent) to mount the EMS unit-level and site-level FNE(s), as applicable.
8. Contractor shall mount the EMS unit-level and site-level FNE, install the below ground conduit into the enclosure using appropriate fittings, and pull all necessary external fiber, ethernet, IO, and power cables to support the functionality of the EMS equipment.
9. The Contractor shall install the EMS Site Controller equipment at the project site as required to ensure the cabinet is functional and can communicate with all the necessary external devices. Contractor shall provide external power to each of the EMS Site Controller racks as required per the design to power the equipment.
10. The Contractor shall specify, procure, run, install, and terminate all associated field / home run fiber cables and associated termination.
11. The EMS Contractor shall specify, procure, and install the fiber patch panel within the FNE and associated EMS Site SCADA rack / enclosure and provide only the specified patch cables from the patch panel to the EMS networking equipment and switches.
12. Provide an equipment list of recommended spares to the Owner for a separate purchase order.

2.7 Factory Acceptance Testing

2.7.1 General

The Contractor shall:

1. Submit a Factory Acceptance Test (FAT) plan to the Owner and representatives(s) for approval.
2. Complete a FAT of [EMS Equip, Power Unit, etc.] at a facility of the Contractor's choosing before any equipment is shipped. The tests must be designed to prove compliance with all the specifications described herein. A detailed FAT report must be provided to the Owner. The Owner or their representative may elect to witness the FAT.

2.8 Commissioning

2.8.1 General

The Contractor shall:

1. Supply commissioning plans and procedures, for review / comment / acceptance by the Owner. Plans shall be customized and specific for the actual project and equipment provided to that Project and incorporate the PREPA and TSP checklist and Authority Having Jurisdiction (AHJ) witness testing as applicable.
2. Provide any necessary on-site support for initial energizations and participate in the energization procedure specific to this scope. This includes but is not limited to any necessary Lock Out / Tag Out (LOTO) of the BESS Facility equipment, operation of the EMS system, and troubleshooting.
3. Coordinate with BESS Supplier while controlling, operating, and commissioning any equipment at the project site to ensure proper coordination with any site activities, and that all work is performed in compliance with all site safety requirements.
4. Provide off-site commissioning test support and equipment operation required for the Work, with 24/7 availability during the entire duration of the commissioning process.
5. Provide on-site commissioning and troubleshooting support if required to ensure the project schedule is maintained.
6. Provide engineering and technical services after business hours and weekends, provided that it coordinates and schedules the work in advance with the BESS Supplier.
7. Closely monitor, troubleshoot as needed, and maintain system visibility and communication of Contractor's Work through project Substantial Completion.
8. Be responsible for programming, configuration, and functionally verification all EMS networking equipment, including switches, firewalls, and cradle points, to ensure the EMS networking is functional and ready for commissioning activities.
9. Coordinate with the BESS Supplier to perform the startup and commissioning of the EMS network during the installation of the communication cables to ensure the network is functional, communicating, and ready for commissioning of the PCS and Battery System. This support shall be provided remotely but if required the Contractor shall provide on-site support to ensure the network functionality and connectivity.
10. Remotely attend the daily Plan of the Day (POD) meetings during commissioning to ensure the site team and Contractor commissioning support staff are aligned on the daily commissioning activities.

2.8.2 BESS Unit Commissioning Testing

1. The Contractor shall coordinate with the BESS Supplier and collectively facilitate the Unit Commissioning Testing. See Exhibit F-4 Unit Commissioning Test Plan.

2.8.3 Substantial Completion Testing

1. The Contractor shall coordinate with the BESS Supplier and collectively facilitate the Substantial Completion Testing See Exhibit F-5 BESS Substantial Completion Test Plan.

2.8.4 Turnover

The Contractor shall:

1. Provide electronic copies of EMS documentation (see Section 2.8 Document Deliverables).
2. Provide up to 15 hours of operational training to the Owner's operational team members.
3. Record and document as-built conditions on the design documents and drawings on a weekly basis during execution of the Work. These documents must be a form acceptable to Owner and shall only need to be provided if requested by Owner or at the end of the project during the project turnover.

2.9 Cybersecurity

2.9.1 General

The Contractor shall:

1. Be responsible to collaborate and integrate the Owner's security requirements for the project equipment, including Virtual Private Network (VPN) access, monitor parameters and tools, and security checks.
2. Use best practices that adhere to the NIST 800-53 and ISO 27000 cybersecurity standard and compliance frameworks.
3. Comply with cybersecurity codes, standards, regulations and executive order(s) specified in Section 3.1.4,
4. Require secure (e.g., 2-factor security authentication) access and communications, using industry standard protocols.
5. Have segmenting of devices including endpoints, firewalls, and intrusion detection systems. Equipment must be siloed, and OEM equipment providers shall not have access to subnets unless approved by the Owner / Owner.
6. Have consistent monitoring of appliances, operating systems, configuration, firmware, and Common Vulnerability and Exposures (CVE).
7. Maintain all project firewalls and provide continual VPN access into the project network for the duration of the agreement between supplier and PREPA.

The Owner shall:

8. Provide, specify, and implement the project ISP connection to the plant and ensure that any redundancy, data transmission rates (both up and down) as required by the plant control system are met. If additional routers, WAN interfaces, or other ISP requirements are needed, the associated design and implementation is to be completed by the Owner.
9. Specify if backup cellular connection in case of an ISP failure is required and if so, the Owner is to determine best course of action as to implementation of the backup cellular connection.

2.9.2 Data Security

1. Encryption. The Contractor shall:
   A. Use an Industry Standard encryption that has no known active exploits for protection of the Owner's Confidential Information in transmission and on all storage media.
   B. Maintain a logical and physical data segregation to ensure the Owner's Confidential Information is not viewable by unauthorized users.

2. Unauthorized Use Monitoring and Incident Notification. The Contractor shall maintain a no less than industry standard process to monitor and detect unauthorized access to, misuse or misappropriation of, or fraudulent activity involving the Owner's Confidential Information.
3. Disposal of Information. Ther Contractor shall ensure that all computing devices or data storage media used by the Contractor to store or transmit Owner Information are either physically destroyed or overwritten using Industry Standard techniques to make the original information unrecoverable (e.g., "wiped" or degaussed) prior to disposing, redeploying or otherwise reusing such media or any equipment that contains such media, or, at the Owner's request, the Contractor shall have reasonable controls in place to prevent any employee or contractor (or those of any subcontractor) (collectively, "Personnel") to store or leave printed Owner Confidential Information (in any form) in areas where unauthorized individuals could gain access to it.

2.3.3 Desktop, Server and System Security

1. System Administration. The Contractor shall maintain no less than Industry Standard system administration procedures including but not limited to system hardening, and system and software maintenance, including patching change management.

2.3.4 System Access Management Procedures

1. The Contractor shall:
   A. Maintain procedures that only allows authorized access to Owner Data on a need-to-know basis
   B. Ensure that all user accounts used to access any system containing Owner Data are unique and clearly associated with an individual user
   C. Review authorization privileges assigned to its employees and other staff on a monthly basis to ensure that access is appropriate for each user's then current role
   D. Ensure procedures exist for prompt modification or termination of access rights in response to organizational and other changes
   E. With respect to Owner-managed systems, immediately notify the Owner in writing (and include the name and User ID of the applicable accounts or systems) if any personnel with access to any Owner Data via a named account that is provided by the Owner: terminates, no longer requires access to the Owner account, or the user account otherwise requires changes.
2. Maintain a system access provisioning process for all IT Assets that ensures the appropriate segregation of duties and shall conduct periodic management review and a procedure for terminating accounts.
3. If applicable, maintain procedures for Privileged User accounts with elevated or super admin access to systems that access or process Owner Confidential Information. A "Privileged User" is defined as a user who, by virtue of function, and/or seniority, has been allocated powers within the computer system, which are significantly greater than those available to the majority of users.

2.9.5 User Authentication Management

The Contractor shall:

1. Ensure systems that have any access to Contractor's systems enforce a user authentication policy that complies with the National Institute of Standards and Technology (NIST) Special Publication 800-63B, as amended from time to time.
2. Encrypt authentication credentials during storage and transmission.
3. Prohibit its users from sharing passwords.
4. Change passwords immediately for accounts suspected of compromise.
5. Maintain no less than industry standard user authentication and account management processes, including but not limited to tracking access throughout the entire user lifecycle and reviews for appropriate user access validation.
6. Ensure that end user accounts are strictly managed throughout the account lifecycle from provisioning and ongoing monitoring to termination or role changes, with periodic reviews to validate that access is warranted.

2.9.6 Information Security Policy and Governance

1. Incident Management. The Contractor shall:
   A. Maintain industry standard procedures that ensure appropriate response to security incidents and that address monitoring, investigation, response, and notification.
   B. Maintain an operational incident detection capability and a clearly documented incident response program for responding to suspected or known violations of information security policy or system breaches. Such incident response plans must include methods to protect evidence of activity from modification or tampering and allow for the establishment of a proper chain of custody for evidence.
   C. Immediately notify the Owner of any known or suspected: compromise of information security, misconduct involving system abuse, and/or violations of information security policy.
   D. Notify Owner, within twenty-four (24) hours, after initial detection of any actual or suspected unauthorized access, use or modification of any Confidential Information. The Contractor shall notify the Owner by email at <email>and by phone at <phone>.
2. Information Security Program. The Contractor shall maintain a no less than an industry standard enterprise information security program that includes, but is not limited to, appropriate policies, governance structures, staffing, monitoring and incident handling procedures that has been approved by Contractor's board of directors, or similar governing body and that is, at a minimum, updated annually.

2.9.7 Network Security

1. Network Security Program. The Contractor shall:
   A. Maintain no less than industry standard internal and external network security policies and procedures including, where appropriate, denial of service attack procedures.
   B. Actively monitor all systems for suspicious activity.
   C. Restrict access to only those IP addresses that are permitted to access the system, for Contractor application(s) being provided to the Owner over the public internet.
2. System Event Logging. The Contractor shall:

A. Maintain no less than industry standard security and system event logging procedures designed to detect, facilitate investigation of, and respond to suspicious activity.

B. Configure all systems used to gain access, process, or store Owner's Confidential Information to ensure relevant information about actions performed by users, or processes performed by the system for users, sufficiently log activity to provide accountability.

C. Configure logging such that it does not capture and record sensitive data elements, such as credit card data or authentication credentials (e.g., passwords).

D. Retain logs for the systems that store or transport Owner Data.

3. Network Assessments and Ongoing Testing. The Contractor shall:

A. Maintain a network security assessment program, which shall be performed by a third party, to identify and remedy any identified vulnerabilities.

B. Scan the environment for security vulnerabilities: (i) at least annually, and (ii) after major hardware or software changes related to any services provided to the Owner.

C. Upon the Owner's request, provide a generalized summary report of any assessment findings and their remediation strategy that affect the delivery of any services to the Owner.

D. Engage qualified security representatives to perform penetration testing on at least on annual basis.

4. Remote Access Policy. The Contractor shall:

A. Provide an SSLVPN ZTNA/EPP/APT client to internal personnel. This access shall remain in place for all customer, client, partners ICS, DCS, remote network access.

B. Not allow a third-party VPN client installed on Remote Operations Center team members devices, servers, mobile units.

C. Maintain no less than industry standard remote access policies and procedures for Personnel who require remote access to a network or system that protects, processes, or stores the Owner's Confidential Information.

2.9.8 Human Resource Governance

1. HR Policies. The Contractor shall:

A. Maintain document policies and procedures, which have been approved by its management and change from time to time, to support the hiring, termination, code of conduct, ethics and background screening of all Personnel.

B. Maintain a security awareness program for all Personnel which provides initial education, on-going awareness, and individual Contractor acknowledgment of intent to comply with Contractor's corporate security policies.

2. Access Termination. The Contractor shall ensure that all Personnel's physical and electronic access is revoked immediately upon termination or when access is no longer required, whichever occurs first.

3. Employee Background Screening. The Contractor shall:

A. Ensure that all Personnel are screened, to the extent permitted under law, in accordance with industry best practices, which change from time to time.

B. Not assign any person to perform any services for the Owner or access any of Owner's Confidential Information who was convicted of a felony crime or a crime involving dishonesty or deceit without Owner's written consent. The Owner may, require the Contractor to provide written attestation of successful background checks on any such Personnel at any time.

2.9.9 Application Security and Software Development

1. Software Development Program. The Contractor shall:
   A. Maintain a no less than industry standard software development lifecycle program for all software that accesses or process Owner Confidential Information, defined as a ("Sensitive Application") for the purposes of this agreement.
   B. Shall build a risk-based application security feature into the program that includes, but is not limited to, appropriate policies, governance structures, staffing, and monitoring to protect the confidentiality, integrity and availability of Owner Confidential Information.
2. Application Assessment. The Contractor shall:
   A. Maintain a formal dynamic testing capability using a risk-based approach.
   B. Engage qualified security representatives to perform penetration testing of Sensitive Applications. Owner security professionals shall be permitted to perform dynamic testing where mutually agreed.
   C. Perform dynamic testing prior to the Sensitive Application being made available in production and thereafter prior to any significant Sensitive Application upgrade or modification.
3. Issue Management. The Contractor shall:
   A. Maintain a formal sensitive application security issue management process.
   B. Track all identified Sensitive Application security issues discovered throughout the software development lifecycle (SDLC).
   C. Not disclose any information regarding the Sensitive Application security vulnerability to anyone except for its Personnel with a need to know.
   D. Evaluate and document the risk of each Sensitive Application security issue identified.
   E. Remediate identified sensitive application security issues utilizing a risk based approach within a reasonable timeframe in accordance with industry best practices.
   F. Prior to formal closure of each Sensitive Application security issue, re-test each issue to confirm remediation.

2.9.10 Physical Security

1. Physical Security Policy and Visitor Management. The Contractor shall maintain no less than industry standard physical security policies and procedures for all Contractor facilities that contain IT Assets or Personnel that provide any services to the Owner that include a process for managing, tracking, and logging visitors to and within the Contractor's facility(s) and environment(s) where the Services are performed.
2. Physical Security for Data. The Contractor shall maintain a documented process for managing, tracking, and logging the protection, retention, and destruction (for example, shredding) of Owner Confidential Information, regardless of media or format.

2.9.11 Business Continuity

1. Business Continuity Governance. The Contractor shall:
   A. Maintain a no less than industry standard business continuity program (including disaster recovery functionality for all IT Assets) that provides a formal framework and methodology, including but not

limited to, a business impact analysis and risk assessment process to identify and prioritize critical business functions.

B. Utilize internal and/or independent auditors to perform an audit every twelve (12) months, which shall include, but is not be limited to, a review of the business continuity program, governance structure, business documentation requirements, recovery strategies, testing strategy and frequency, etc.

C. Provide Owner with reasonable information necessary to enable Owner's business continuity program to work in concert with Contractor's programs.

2. Business Continuity Timeframe. The Contractor shall notify the Owner within twenty-four (24) hours of an event requiring implementation of the Contractor's business continuity plan in a manner that affects the Owner and shall implement its business continuity plan as required to ensure the Contractor continues to function through an operational interruption and continues to provide all services to the Owner within twenty-four (24) hours.

2.9.12 Cloud Utilization

1. Service Locations. The Contractor shall notify the Owner of all physical locations where technology shall be utilized to provide services to the Owner. Unless the Contractor obtains the Owner's prior written permission, the Contractor shall maintain all Owner's Confidential Information in the country in which such information originates and shall maintain controls to always track the location of all Owner Confidential Information, at all times.
2. Service Management. The Contractor shall:
   A. Not perform any services for the Owner in a hosted or cloud-based environment without the prior written approval of the Owner. If the Agreement is for a hosted or cloud-based service, such environment shall be deemed approved for the scope of services described therein and no further approval is necessary except as set forth in 2 (B) below.
   B. Provide the Owner with thirty (30) days prior written notice of Contractor's intent to migrate Owner's Confidential Information to any cloud-based environment not previously approved by Owner (each a "New Cloud").
   C. Obtain the Owner's prior written approval before migrating any of the Owner's Confidential Information to a New Cloud. For clarity, if the Contractor desires to change hosting providers, the new host is considered a New Cloud and the Contractor is required to obtain the Owner's prior written approval before migrating any Owner Confidential Information to the New Cloud. Upon receiving Contractor's New Cloud notice, Owner shall have thirty (30) days to either provide written approval of the New Cloud or terminate the Agreement without penalty upon written notice; if the Owner elects to terminate the Agreement, the Owner shall have one hundred and eighty (180) days from the date of the termination notice to transition to a new services provider and during such period the Contractor shall maintain the Owner's Confidential Information in the original environment and continue to provide the services to the Owner without degradation.
3. Data Segregation. The Contractor shall:
   A. Logically segregate Owner's Confidential Information from all other data in any cloud environment used by Contractor. Any Owner Confidential Information shall be encrypted during storage and transmission in the cloud environment.
   B. Ensure that the encryption key management service (used to encrypt and decrypt information) does not reside within the same public cloud environment that contains Owner's Confidential Information.

4. Service Providers. The Contractor shall:
   A. Maintain a formal program to track and report end users with access to systems that support the services being provided to Owner.
   B. Obtain reasonable audit and assessment rights at any utilized cloud service provider, regardless of usage for primary or backup services that are sufficient to allow both Contractor and Owner to audit Contractor's and subcontractor's obligations to Owner.
   C. Complete a risk-based assessment to ensure that the use of such subcontractor complies with the obligations of the Agreement prior to utilizing such subcontractor.

2.10 Document Deliverables

The Contractor shall provide the following deliverables as shown in Exhibit M-1 Contractor Deliverables.

1. FAT Report
2. 60%-90%-IFC Drawing Package
   A. Equipment Bill of Materials (BOM)
   B. Equipment Outline Drawings
   C. Product Data Sheets for all Contractor Provided Equipment
   D. Network Diagram of Controllers and BESS Facility
   E. Electrical Diagram of FNEs, Controllers and BESS Facility
   F. Mechanical Layout of Controllers
   G. Load Schedule of Controllers
   H. Control Narrative
   I. IP Schema
   J. Network Architecture Drawings
   K. Communication Block Diagram
3. EMS/SCADA Consolidated points list including RTAC points list, commissioning, and test plans, including the following:
   A. EMS Site Controller, Unit Controller FAT Plans
   B. EMS Unit Commissioning Test Plan
   C. EMS Substantial Acceptance Test Plan
4. EMS Manuals, including the following:
   A. Installation manual
   B. Communication manual
   C. O&M manual
   D. Software / HMI manual

5. SLA / Software License
6. Warranty

3.0 Codes and Standards

3.1 Overview

The Contractor shall:

1. Design and manufacture all equipment and perform all work in accordance with any codes, standards, or requirements set forth in any Applicable Law, including any applicable federal, state or local code, the latest standards of the Institute of Electrical and Electronic Engineers (IEEE), National Electrical Manufacturer's Association (NEMA), American Concrete Institute (ACI), American National Standards Institute (ANSI), International Code Council Code (ICC), National Fire Protection Association and the North American Electric Reliability Corporation (NERC), as well as the latest editions of the National Electrical Code and the National Electrical Safety Code (NESC), to the extent not inconsistent with the foregoing, in each case as modified from time to time.
2. Follow codes, standards, regulations and test plans listed below based on adopted versions at Notice to Proceed (NTP). The following list is not exhaustive, and the Contractor is responsible for following all state, local, federal and AHJ requirements and best practices at all times.

3.1.1 General

NESC	National Electrical Safety Code
ANSI Z535	Product Safety Signs and Labels
IEEE C37	Surges withstand capabilities, whenever applicable
IEEE C57	Transformer Standards, whenever applicable
NFPA 70	US National Electrical Code

3.1.2 Control Equipment and Communications

ANSI/IPC D30OG	Printed Board Dimensions and Tolerances
ANSI/IPC A610B	Acceptability of Printed Boards
IEEE P2688	Recommended Practice for Energy Storage Management Systems in Energy Storage Applications
NECA/BICSI 607	Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
UL 1778	Uninterruptible Power Systems (UPS) for up to 600V A.C.

3.1.3 Instrument Transformers

IEEE C57.13	IEEE Standard Requirements for Instrument Transformers
IEEE C57.13.2	IEEE Standard Conformance Test Procedures for Instrument Transformers

3.1.4 Cybersecurity

E.O. 13920	Department of Energy Executive Order Securing the United States Bulk-Power System, May 2020
ISO/IEC 27001	Information Security Management
NIST 800-82	Guide to Industrial Control Systems (ICS) Security
NIST 800-53	Security and Privacy Controls for Federal Information Systems and Organization

3.1.5 PREPA

PREPA Protection and Control Design Criteria
PREPA Substation Design Criteria
PREPA Transmission Design Criteria
PREPA Distribution Design Criteria
PREPA Drawings and Specifications Design Criteria
PREPA Telecommunication Design Criteria