EXHIBIT A.7
BESS ENERGY MANAGEMENT SYSTEM (EMS) SCOPE OF WORK

The Work shall include the following:

1. All Work required to design, furnish, install, test, and commission a complete Energy Management System (EMS) for the battery energy storage plant in compliance with the Authorities Having Jurisdiction (AHJ), MISO, Public Utilities Commission, all relevant LGIAs and off-taker agreements.

2. Functional Description and Requirements:

   The primary function of the EMS will be to dispatch real and reactive power from the Battery Energy Storage System (BESS) based on signals or schedules issued by the system operators or the Main Plant Controller (MPC). The EMS will be designed to provide for automatic, unattended operation of the BESS equipment.

   The system will 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 will allow changes in settings and control modes and will provide access to necessary BESS system data.

   The EMS will communicate directly with the battery containers and Power Conversion System (PCS). The EMS will receive signals from the site SCADA systems, including Substation RTAC, TSO Equipment, MISO Meters Equipment, Owner provided equipment, MPC, and will monitor and send control signals as necessary to operate the BESS equipment.

3. Engineering and Design
   A. Engineering and Design will incorporate the following features:
      i. The EMS will be designed to operate the resource and will receive control setpoints from the MPC for plant output.
      ii. Compliance with all necessary MISO/NERC/Transmission Operator/Scheduling Coordinator/off-taker requirements.
      iii. Contractor shall follow all applicable NERC CIP cybersecurity standards and ensure all equipment and systems provided comply with the NERC CIP requirements.
      iv. The EMS shall be designed to manage and control the plant voltage, real & reactive power, and respond to local measurements to ensure plant output matches the MPC setpoints.
      v. EMS will receive all AGC (Area Generation Control) commands for each resource through the MPC.
      vi. Designed to provide for automatic, unattended operation of the BESS.
      vii. Designed to provide remote manual operation or automatic operation.
      viii. All modes of operation and associated setpoints to be remotely adjustable.
      ix. Integration with any necessary entities that require control for command signals to the BESS equipment via the EMS.
      x. Allow changes in settings and control modes and have access to all necessary BESS system data and have the ability to be the block controller for the real and reactive power commands.

xi. Manage system operation including issuing commands to the individual PCS & BMS units.
xii. Aggregate and record all necessary data points from the equipment listed in "Table 1: Device Integration" within the project historian at 1 second sampling rates
xiii. System controls for battery charging, discharging, and managing a state of charge. The ramp rate of charging/discharging and maintaining a specific state of charge of the BESS will be programmable via manual entry into the BESS HMI.
xiv. Contractor shall be responsible to design a unit and site level fast stop function.. This fast stop function is not equivalent to an emergency stop.
xv. The plant should control to the request MW value at the Meter Point to within 2% after a 4 second settlement period.

B. Engineering & Design deliverables include the following items. Contractor to provide design deliverables in PDF format, and will provide applicable design deliverables in CAD format upon request:

i. Control Narrative
ii. Network System Architectural Diagram, including all relevant IP addresses, corresponding IP Address site map, and VLAN infrastructure
iii. Equipment Bill of Material and equipment outline drawings
    i. Product data sheets must be provided for all Contractor provided equipment
iv. Electrical One Line diagrams (for the EMS system/equipment).
v. Communication Block Diagram
    i. Support and coordinate with all necessary parties to ensure the EMS is integrated with the system wide diagrams/design.
vi. Communication Connection Diagrams
vii. EMS Points List, incorporating and consolidating necessary data points pulled from the devices listed in "Table 1: Device Integration".
viii. EMS RTAC Points List – Develop the points list and necessary configuration files for the EMS RTAC
ix. Factory Acceptance Testing for site and unit controller equipment
x. Commissioning plans, including the following:
    i. EMS Unit Commissioning Test Plan
    ii. EMS Site Acceptance Test Plan

C. Integration Process

i. The EMS shall interface with the devices listed in Table 1. All device communication shall typically occur over Ethernet, CanBus or Serial, using DNP3 or Modbus.

Table 1: Device Integration

Device	Supplier	Description
Batteries and container	OEM Name	Enclosure housing batteries and all the associated subcomponents (BMS, HVAC Controller, FSS, etc)

Power Conversation Skids	OEM Name	PCS acts as a bidirectional AC/DC converter the allow the batteries to charge and discharge from the grid.
Substation RTAC	OEM Name	Substation RTAC acts as the interface for the substation equipment including MPT, LTC, Cap Banks, breakers, etc.
Meters	OEM Name	Meters in the substation. Used for metering settlement, EMS controls, and MPC controls
RTU	OEM Name	Transmission Operators remote terminal unit for monitoring and logging data.
MPC	OEM Name	Utilized for monitoring and controlling the site MW/MVAR setpoints between the separate resources to maintain POI MW/MVAR requirements from MISO.
Fire Alarm Aggregate Panel	OEM Name	Aggregate monitoring and reporting system that reports to the local AHJ.

ii. Contractor is responsible for integrating the EMS with the devices listed in "Table 1: Device Integration", Contractor will require cooperation from the device manufacturers/vendors. Contractor will require device documentation including points lists, manuals, and spec sheets to properly work through the integration process and will need Owner or Owner representatives to provide support for acquiring these in a timely fashion.

iii. Contractor will work with the vendors to ensure that the device integration will allow the EMS to control the ESS such that it meets the system performance requirements set forth in this Scope of Work. While it is not in Contractor's scope to ensure vendor compliance with performance requirements, Contractor will notify Owner of any specific device issues it identifies that may impede Contractor's ability to meet performance requirements. Owner will either require the device vendor/manufacturer to make changes to their device to meet the requirement or will remove the requirement from the Contractor's Scope of Work.

D. Contractor will be responsible for the software engineering, development, and integration services of the following items:

i. Network configuration and communication, including:
    i. EMS site level networking equipment to EMS field level network equipment
    ii. EMS Equipment to all devices listed in Table 1: Device Integration
ii. On-Site EMS equipment installation and integration
iii. Cloud configuration and setup
iv. Web Based User Interface (WebUI) for EMS controls and operation
v. EMS RTAC configuration, development and integration

E. Contractor to provide any necessary support to ensure completion of telemetry testing with Owner, MISO, Qualified Scheduling Entities, Transmission Service Operations, and any other necessary parties per the project PPAs and LGIAs

F. Contractor will be required to attend a coordination meeting on a weekly basis to discuss engineering progress, design deliverables, project schedule, and any other items relative to the project. As it pertains to Contractor's 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.

4. EMS Data Retention

EMS WebUI is a hybrid local and cloud-based service that stores telemetry from devices in the field and/or in the cloud. The design of the EMS Web HMI has built-in security measures. Under a separate services agreement, relevant data will be stored for the life of the project, while there is a services agreement in place, and accessible to the Owner via Contractor supplied Web HMI. The HMI will have four levels of user access: "Read Only", "Operations", "Engineer" and "User Administrator". Under a separate services agreement, Contractor will provide an HMI with embedded reporting for viewing of key performance indicators (the data can also be download to a csv file). The authorization to the HMI is managed by an Owner's representative.

The EMS will store data in the following format:

A. Timestamp field with all times in UTC, with devices synced to 1ms resolution using NTP or a GPS clock (by others)
B. Description of the object (e.g., Site Controller, unit, battery string, etc.)
C. Unit number with the device's unique ID
D. Parameter value

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

A. Device metrics for MISO and LGIA telemetry
B. Grid measurement and metering devices
C. EMS operating mode 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 & DC voltage
F. All necessary control and warranty data from the battery vendor

Data will be stored either on-site or off-site in the cloud-based service systems that can be downloaded via the EMS WebUI.

The Contractor's on-site data storage will provide means to store at least 30 days of operational data locally assuming 1s logging interval for all data. The Contractor's on-site data storage will also be used in the case of a communications outage to the project site, and when communications are restored to site all local data will be uploaded into the cloud-based storage systems.

5. Controller Operation

A. Operating modes

i. The EMS shall include the operating modes as described in Table 2. These modes will be configurable via the HMI.

Table 2. EMS Operating Modes

Mode	Behavior
Real Power	Sets the real power output of the ESS to meet a specified target within 2% after a 4 second settlement period.
Reactive Power	Sets the reactive power output of the ESS to meet a specified target.
Automatic Generation Control (AGC)	Charges or discharges the ESS at a real power level received from the MPC.
SOC Management	Returns batteries to a target state of charge (SOC) if the SOC exceeds specified limits. Can also be set to enable and disable on a 24-hour clock cycle.
Add specific ancillary services, energy, capacity or other applications and definitions	

B. Control Modes

i. To safely coordinate control of the system, the EMS will provide two control modes: Manual and Automatic.
   i. Manual Control enables operators to control 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.
   ii. Automatic Control enables the EMS to following commands from the MPC.

C. Response Time

i. The EMS shall have a total response time of less than 100 ms. The EMS response time will be measured from the time of a control trigger is issued to the EMS until the time the unit controllers deliver the command to the PCS/BMS. The control trigger is any mechanism which drives the EMS to dispatch commands to the unit controllers and may be a setpoint issued to the EMS Site Controller, locally measured deviation which prompts a change, a user change to local operating mode setpoint, or others.

D. Alarms

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

E. HMI/User Interface EMS HMI

i. An HMI or WebUI will provide local or remote interaction with the BESS. Through the HMI, operators will be able to change operating modes, change system settings, review and clear alarms, and review system data. User logins can be created for the HMI that limit the control and data available to specific operators.
ii. The HMI shall show Unit Authority Status and MISO Reg Set Point (4-second market), AGC set points and current selected market: Reg or ADS

6. Security Framework

The Contractor will be responsible to collaborate and integrate the Owner's security requirements for the project equipment, including VPN access, monitor parameters & tools, and security checks.

7. Hardware Installation and Integration

Contractor will be responsible to furnish, install, program, configure, and integrate the following hardware:

A. EMS site controller equipment – Contractor to provide the following:
i. EMS Site Controller
ii. Industrial Managed Ethernet Switches (EMS Site Switches)
iii. Project Local Server & Historian – Dell server or equivalent
iv. SEL 3530-4 RTAC
v. Rack Mount UPS (3000VA)
vi. 19' Server Rack to mount/house the EMS site controller equipment
vii. All necessary terminal blocks, fuses, fuse holders, power supplies, AC/DC converters, power cables, communication cables, and mounting hardware required to assemble all the EMS site controller equipment as a functional system.

B. EMS unit controller equipment – Contractor to provide the following:
viii. (xx) - Outdoor unit controller enclosures
ix. (xx) - Unit network switches (Hirschmann BOBCAT BRS40-20TX/4SFP-EEC or equivalent) & all necessary SFP modules to connect the site communications fiber (one per outdoor unit enclosure)
x. (xx) - 30-minutes enclosure mountable Uninterruptable Power Supply (UPS) (one per outdoor unit enclosure)
xi. (xx) – EMS unit controllers (one per PCS)

xii. All necessary terminal blocks, fuses, fuse holders, power supplies, AC/DC converters, power cables, communication cables, and mounting hardware (internal to the cabinet and to the H-frame structure) required to ensure the EMS unit controller equipment's functionality.

C. The EMS unit controller equipment shall meet 50-year ASHRE temperature conditions.

D. Contractor provided Uninterruptable Power Supplies within the EMS unit controller enclosures shall power the EMS unit controllers and unit network switches in their respective enclosures.

E. Contractor provided equipment must be UL compliant. Contractor is responsible for receiving, unloading, storage, and protection the hardware when it arrives at their facilities prior to shipping to the project site. When the Contractor equipment is shipped to the Project, it will be CONTRACTOR's responsibilities to receive, unload, store, and provide adequate protection for the equipment. If damage is found from the shipment of the Contractor equipment, CONTRACTOR must notify the Contractor of the damage. Any damage to the work while in CONTRACTOR's custody is not the responsibilities of the Contractor given all the equipment has been shipped with adequate protection.

F. Contractor provided EMS unit controller enclosures will 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 enclosure. The remaining components, including the EMS unit controller, unit network switch, and 2-hour UPS will be shipped to the project site separately. Contractor shall install the components that were shipped separately in the Unit controller enclosures after the enclosures have been mounted at the project site.

G. Contractor shall install an H-Frame structure to mount the EMS unit controller enclosures.

H. Contractor shall mount the EMS unit controller enclosures, install the below ground conduit into the enclosure using appropriate fittings, and pull all necessary external fiber and power cable to support the functionality of the EMS equipment.

I. 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 the external power to each of the EMS site controller racks as required per the design to power the equipment.

8. Commissioning

A. Contractor will provide any necessary on-site support for initial energizations and participate in the energization procedure specific to Contractor scope. This includes but is not limited to any necessary LOTO of the BESS equipment, operation of the EMS system, and troubleshooting.

B. Contractor shall coordinate with Owner 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.

C. Contractor shall 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. The Contractor shall provide on-site commissioning and troubleshooting support if required to ensure the project schedule is maintained.

D. Contractor shall provide engineering and technical services after business hours and weekends.

E. Contractor shall closely monitor, troubleshoot as needed, and maintain system visibility and communication of Contractor's Work through project Final Completion.

F. Contractor is responsible to program, configure, and functionally verify all EMS networking equipment, including switches, firewalls, and cradle points, to ensure the EMS networking is functional and ready for commissioning activities.

G. Contractor to shall coordinate with Owner to perform the startup & 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 & battery equipment. This support will be provided remotely but if required the Contractor will provide on-site support to ensure the network functionality and connectivity.

H. Contractor to remotely attend the daily POD meetings during commissioning to ensure the site team and Contractor commissioning support staff are aligned on the daily commissioning activities.

9. Unit Commissioning

See Appendix A for the Unit Commissioning Test Plan. The Unit Commissioning must be completed for all operable Units, but EMS Site Commissioning may begin before all Units have completed Unit Commissioning.

10. Substantial Completion

See Appendix B for the Site Acceptance Test Plan

11. Turnover

A. Contractor to provide electronic copies of the manuals for all EMS equipment and software.

B. Contractor to provide up to 16 hours of operational training to the Owner's operational team members.

C. Contractor shall 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 will only need to be provided if requested by Owner, or at the end of the project during the project turnover. If CONTRACTOR is responsible for the changes the relevant redlines and updates must be conveyed to ensure it is incorporated into the as-built documents.

Appendix A

Unit Commissioning Test Plan

Definitions/Acronyms

Battery System	Set of Battery Racks connected to a single PCS
BMS	Battery Management System
RBMS	Rack level BMS – for each Battery Rack
BBMS	Bank level BMS – System level BMS for Battery System
BOP	Balance of Plant
CT	Current Transformer
CPR	Cardio Pulmonary Resuscitation
MV-01	Switchboard 480 volts
ESS	Energy Storage System
JHA	Job Hazard Analysis
LOTO	Lock Out / Tag Out
Owner	Buyer
PCS	Power Conversion System, i.e., bi-directional grid connected power converter
Plant Controller	Master controller for the ESS
PPE	Personal Protective Equipment
PTP	Performance Test Procedure
PU	Power Unit; a combination of a single PCS with associated Battery System, and associated Control System
Reference Meter	Calibrated meter such as Fluke 435
RTAC	Real Time Automation Controller – SEL 3530 device
SCADA	Supervisory Control And Data Acquisition
SOC	State of Charge
SOH	State of Health
VT	Voltage Transformer
XFMR	Transformer
WebUI	ESS Graphical Web User Interface

Purpose
The Commissioning Procedure is conducted at the Buyer's Battery Energy Storage System site. Tests are conducted in a grid -tied configuration or islanded configuration based on the test. Equipment configuration during the test will be managed as is expected during commercial operations subsequent to successful completion of this test. The enclosures will be installed on concrete slabs at the site. The system is monitored by internal instrument transformers, external instrument transformers, and metering functionalities to monitor and record voltages, currents, power disturbances, etc.

This is a field test grid conditions can dominate the output of the system and as such, if it can be documented that grid conditions cause a result that appears to not meet the Pass/Fail Criteria, an exception may be taken. Seller and the Buyer will determine modified criteria or decide to re-run the test when the grid conditions have improved. Each test has a section for Notes/Test Conditions. Test conditions such as extreme weather or abnormal grid conditions should be noted.

Because of the amount of time required to run the entire test suite, some of the tests may not be witnessed by the customer. In such cases, Seller will run the tests in advance and provide test data. Any testing to be run prior to witness testing shall be confirmed with the customer in advance.

A Power Unit (PU) consists of a single Power Conditioning System (PCS, bi-directional grid-connected power electronic converter) connected to a battery pack and associated control system. The Energy Storage System (ESS) installed at the Project Site is composed of six (6) PU's. The ESS is monitored by internal instrument transformers, external instrument transformers, and power quality meters to monitor and record voltage, current, power disturbances, and harmonics.

Reference - Drawing XXX-XX (Drawing will be from Seller drawing set, official drawing number will be finalized after contract signing).

Safety
The use of Personal Protective Equipment (PPE) during the performance of procedures outlined in this document is required.

Only authorized personnel will be allowed in the test area, and all authorized personnel and equipment operators will wear PPE in accordance to the arc flash labels relevant to that gear.

Authorized personnel will isolate and LOTO all energy sources feeding a device to verify zero energy.

Before starting any procedure, be certain correct policies are identified and adhered to including but not limited to appropriate training, approach distances, safety equipment, Job Hazard Analysis (JHA), and Lock-Out/Tag-Out (LOTO).

At no time during the energizing, shall any personnel be within a distance of 50 feet of pad mount transformers and Switch Gear being energized, and covered under this procedure.
All personnel shall maintain this distance until specifically released by the Project Engineer.

Seller will have personnel trained in CPR and proper PPE required for electrical installations including MV electrical equipment during the project installation. In the event of a medical emergency, arc flash and/or fire, site personnel should call 911 or local emergency responders.

Lock Out/Tag Out (LOTO)
LOTO is an acronym for Lock Out/Tag Out. A Lockout Device is a physical device which can be opened or removed only by means of a key.

A lockout hasp is designed to accept additional locks where multiple locks are required. If there is no space on a lockout hasp for additional padlocks, an additional lockout hasp must be attached.

Locks which can be opened by the same key shall not be used unless such locks are under the sole control of the individual who applied the lock(s).

Combination locks or locks with master keys shall not be used. Lockout devices shall be singularly identified by a Lockout Tag and shall not be used for other purposes.

A Lockout Tag is a distinctive durable tag (red and white in color), attached to the lock, that identifies it as a lockout device and identifies the individual who placed the lock.

The tag must be of standard shape, color, and size. Lockout tags shall be singularly identified (signed) and shall not be used for other purposes.

Conditions Precedent to Performance Testing Procedure

Factory Acceptance Testing

Factory Acceptance Testing (FAT) of all relevant equipment including PCS, battery racks, auxiliary equipment, etc. have been successfully completed by Seller at their facility as per the Owner's approved Factory Acceptance Test Plan.

Control System Functionality

The Control System shall be successfully configured to receive data from the Battery System BMS, exchange DNP3 data with the Customer device, transfer data to the Database Server for the calculation, recording and archiving of data points.

Communications

RTU testing should be successfully completed during the commissioning process. The interface between Owner's RTU and ESS SCADA system should be fully tested and functional prior to starting the rest of the Performance Test Procedure. This includes verification of data transmission pathway between the Owner Remote Terminal Unit (RTU) and Seller control system interface i.e. SEL 3530 Real Time Automation Controller (RTAC).

Points of Contact

Item	Description	Company
1		
2		
3		
4		
5		

Site Access

Item	Description	Notes
1	Site Physical Address.	
2	Site Access Instructions	

Site Emergencies

Item	Description	Notes
1	Emergency Response plan for site.	Phone No. - TBD
2	Site Local Fire Dispatch Number.	911 and Buyer contact
3	Emergency meet site.	Substation Front Entrance
4	Enclosure fire alarm horn and strobe locations.	Exterior of BESS enclosures

Testing

1. Unit Startup

Purpose:

Demonstrate the start-up of each PU. This test will be performed on each individual PU.

Procedure:

1. Verify on the WebUI that the PU AC input terminals are energized and voltage values are correct.
2. Verify on the WebUI that the PU DC input terminals are energized and voltage values are correct.
3. Verify that Operational State is "Off", as read on the WebUI view.
4. Start the PU from the WebUI as follows:

    a. Set the Control Mode to "HMI Control".
    b. Set zero real / reactive power setpoints and provide an "Run PQ" command on the command window.

Pass/Fail Criteria		
PU starts with no errors as demonstrated by PCS Unit state changing to "RunPQ" on WebUI.		
Passed	Failed	Date:
Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions

2. Unit Shutdown

Purpose:

Demonstrate the shut-down sequence of the PU. This test will be performed on each individual PU.

Procedure:

1. Verify PU is running as demonstrated by PCS Unit state being "RunPQ" on the WebUI.
2. Stop PU from the WebUI.

Pass/Fail Criteria		
PU performs shutdown with no errors. PCS Unit state shall be in "Off" state on the WebUI after step 2.		
Passed	Failed	Date:
Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions:

3. PCS Emergency Shutdown (or Fast Stop) and Restart

Purpose:

Demonstrate the emergency shut-down (or Fast Stop) and restart sequence of the PU.

Procedure:

1. Verify PU is running as demonstrated by PCS Unit state being "RunPQ" on the WebUI.
2. Stop PU by issuing an electron E-Stop.
3. Verify that the system has stopped.
4. Attempt to start the PU.
5. Reset the electronic E-stop and reset the system fault from the WebUI.
6. Attempt to start the PU from the remote terminal.

Pass/Fail Criteria		
PU stops immediately and opens PU main AC and DC contactors upon completion of step 2, PU state on WebUI goes to "Fault" state. PU does not restart upon completion of step 3 (PU is in a latched fault state). PU starts successfully upon completion of steps 5 & 6 as demonstrated by a PU state of "RunPQ".		
Passed	Failed	Date:
Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions:

4. Battery Metering Verification

Purpose:

Verify battery metering and monitoring system on WebUI. This test will be performed on each individual PU.

Procedure:

1. Verify battery current readings are present and refreshing on WebUI.
2. Verify battery voltage readings are present and refreshing on WebUI.
3. Verify battery temperatures readings are present and refreshing on WebUI.

Pass/Fail Criteria			
Continually updating data for battery current, voltage and temperature on WebUI.			
Unit	Passed	Failed	Date:
1			
2			
3			
Test Performed by:			
Test Witnessed by:			

Notes/Test Conditions:

5. Enclosure Unit Smoke Detection

Purpose:

Verify smoke detection circuit operates correctly and shuts down the PCS Units when smoke is introduced in the enclosure. The fire suppression agent tank will be temporarily disconnected from the firing pin assembly during this test. It will be reconnected for normal operations once the entire ESS system has been commissioned.

Procedure for Enclosure 1:

Item	Description	Comments/Notes	Initials Buyer	Seller
1	Verify all PU are running as demonstrated by PCS Unit state being "RunPQ" on the WebUI.			
2	Locate the smoke detector on the inside ceiling of Enclosure 1.			
3	Use canned smoke sprayed on the orange sniffer tube connected to the smoke detector to activate the detector.			
4	Verify the PUs have shutdown, only in Enclosure 1 and not in the other Enclosures.			
5	Verify that the fire suppression tank pin has fired out of its housing.			
6	Verify that the alarm has been reported with a Fire Suppression Alarm to the WebUI.			
7	Open the Enclosure1 doors to clear out the smoke.			
8	Reset the firing pin for the fire suppression tank.			
9	Reset the system fault from the WebUI.			

Pass/Fail Criteria					
All units fire suppression systems performed as stated in items 4, 5, & 6 of the procedure.					
Unit	Passed	Failed	Date	Initial Buyer	Seller
1					
2					
3					
Test Performed by:					
Test Witnessed by:					

Notes/Test Conditions:

6. Remote Power Setpoint Tracking

Purpose:

Demonstrate the capability of the BESS to follow remote active and reactive power setpoints. This test will be performed one each individual BESS.

Procedure

1. Verify BESS is running as demonstrated by all PCS Unit states being "RunPQ".
2. Set control system state to manual mode via user interface (UI).
3. Write active power values -100%, -50%, 0%, 50%, and 100% to manual active power input.
4. Write reactive power values -100%, -50%, 0%, 50%, and 100% to manual reactive power input.
5. Record power levels as measured by reference meter and displayed in WebUI in the below table.

Active Power Command (kW)	**Active Power Response (kW)**	**Reactive Power Command (kVAR)**	**Reactive Power Response (kVAR)**
-100%		-100%	
-50%		-50%	
0%		0%	
50%		50%	
100%		100%	

Pass/Fail Criteria			
BESS measured response level shall be within the greater of ±5% of the expected response level.			
Unit	Passed	Failed	Date:
1			
2			
3			
Test Performed by:			
Test Witnessed by:			

Notes/Test Conditions:

Appendix B

Site Acceptance Test Plan

Battery System	Set of Battery Racks connected to a single PCS
BMS	Battery Management System
RBMS	Rack level BMS – for each Battery Rack
CT	Current Transformer
CPR	Cardio Pulmonary Resuscitation
MV-01	Switchboard 480 volts
ESS	Energy Storage System
LOTO	Lock Out / Tag Out
PCS	Power Conversion System, i.e., bi-directional grid connected power converter
Plant Controller	Master controller for the ESS
PPE	Personal Protective Equipment
PU	Power Unit; a combination of a single PCS with associated Battery System, and associated Control System
Reference Meter	Calibrated meter such as Fluke 435
RTAC	Real Time Automation Controller – SEL 3530 device or equivalent
SCADA	Supervisory Control and Data Acquisition
SOC	State of Charge
SOH	State of Health

1. Discharge Capacity Test

- Purpose: This test will demonstrate the discharge capacity; the requirement is to achieve nameplate output within 1s and hold for 10 minutes. This capability is representative of the maximum active power levels.
- Procedure:
  A. System Starting State: The BESS will be in the on-line state with each Battery Subsystem at approximately 50% usable SOC and at an initial active power level of 0 MW and reactive power level of 0 MVAR.
  B. Record the BESS active power level at the reference meter.
  C. Command the BESS to follow a full discharge nameplate power signal.
  D. Record and store the BESS active power response. Measurements will be made at the POI and by the BESS control system with a recording in the BESS historian.
  E. System End State: The BESS will be in the on-line state and at a commanded active power level of 0 MW.

Pass/Fail Criteria		
The difference between the BESS active power response and the commanded level shall be no less than ±3% as measured by the sum of values at the POI. The time to full output shall be less than 1s. The hold period of such active power value shall be no less than 10 minutes as recorded in the BESS control system historian.		
Passed	Failed	Date:

Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions:

_____
_____

2. Charge Capacity Test

- Purpose: This test will demonstrate the BESS charge capacity; the requirement is to achieve full nameplate charge within 1s and hold for 10 minutes.
- Procedure:
  A. System Starting State: The BESS will be in the on-line state with each Battery Subsystem at approximately 50% usable SOC and at an initial active power level of 0 MW and reactive power level of 0 MVAR.
  B. Record the BESS active power level at the reference meter.
  C. Command the BESS to follow a full nameplate charge signal.
  D. Record and store the BESS active power response. Measurements will be made at the POI and by the BESS control system with a recording in the BESS historian.
  E. System End State: The BESS will be in the on-line state and at a commanded active power level of 0 MW.

Pass/Fail Criteria		
The difference between the BESS active power response and the commanded level shall be no less than ±3% as measured at the POI. The time to full output shall be less than 1s. The hold period of such active power value shall be no less than 10 minutes as recorded in the BESS control system historian.		
Passed	Failed	Date:
Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions:

_____
_____

3. Reactive Power Test

- Purpose: This test will demonstrate the Reactive Power Production capability of the facility.
- System starting state: The Facility will be in the on-line state with each Battery Subsystem at approximately 50% usable SOC and at an initial active power level of 0 MW and reactive power level of 0 MVAR. The Facility control system will be configured to follow a predefined

reactive power profile (see below).

- Procedure:
    - Record the Facility reactive power level at the Reference Meter.
    - Command the Facility to provide half the nameplate MVAR rating for 10 minutes.
    - Command the Facility to absorb half the nameplate MVAR rating for 10 minutes.
    - Record and store the Facility reactive power response. Measurements will be made at the POI and by the Facility control system with recording in the Facility historian.
- System end state: The Facility will be in the on-line state and at a commanded reactive power level of 0 MVAR.

Pass/Fail Criteria		
The Facility reactive power response and the commanded levels shall be within ±3% as measured by the sum of values at the POI. The time to full output shall be less than 1 second. The hold period of such reactive power value shall be no less than 10 minutes as recorded in the Facility Control System historian.		
Passed	Failed	Date:
Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions:

4. Data Resolution Test

- Purpose: This test will demonstrate the capability of the BESS control system to independently detect and record BESS data. The BESS control system must be able to measure and record BESS data with a resolution of no less than 15 samples per minute.
- Procedure:
    A. System Starting State: The BESS will be in the on-line state with each Battery Subsystem at approximately 50% usable SOC.
    B. Discharge the BESS at 25% nameplate power for 5 minutes.
    C. Retrieve the data logs from the on-site database.
    D. Verify values for timestamps, data resolution, system frequency and BESS MW output.
    E. System End State: The BESS will be in the on-line state and at a commanded active power level of 0 MW.

Pass/Fail Criteria
BESS MW active power response to deployment and system frequency will be recorded in the database with a recording rate of no less than 15 samples per minute.

Passed	Failed	Date:
Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions:

5. AGC Test

- Purpose: This test will demonstrate the AGC following capability. This capability is representative of the service profile.
- System starting state: The Facility will be in the on-line state with each Battery Subsystem at approximately 50% usable SOC and at an initial active power level of 0 MW and reactive power level of 0 MVAR. The Control System will be configured to follow a predefined active power profile (see below).
- Procedure:
    - Record the Facility active power level at the Facility Meter.
    - Command the Facility to follow a simulated ISO discharge signal of 25% nameplate power of for 10 minutes.
    - Command the Facility to follow a simulated ISO charge signal of 25% nameplate power of for 10 minutes.
    - Record and store the Facility active power response. Measurements will be made at the POI and by the Control System with recording in the Facility historian.
- System end state: The Facility will be in the on-line state and at a commanded active power level of 0 MW.

Pass/Fail Criteria		
The Facility active power response and the commanded levels shall be within ±3% as measured by the sum of values at the POI.. The hold period of such active power value shall be no less than 10 minutes as recorded in the Facility Control System historian.		
Passed	Failed	Date:
Test Performed by:		
Test Witnessed by:		

Notes/Test Conditions: