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SPECIFICATION SECTION 48 17 13

BATTERY ENERGY STORAGE SYSTEMS

PART 1 - GENERAL

1.01 CODES & REFERENCES

A. The design and installation shall conform to all requirements as defined by the applicable codes, laws, rules, regulations and standards of applicable code enforcing authorities (latest edition unless otherwise noted). The following are key standards that shall be followed. The Engineer of Record and BESS Manufacturer shall ensure all applicable codes are followed:

1. ASTM International (ASTM) (www.astm.org)
2. American National Standards Institute (ANSI), including:
   ANSI C37, Surge withstand capabilities
   ANSI C57, Transformer Standards
3. Institute of Electrical and Electronics Engineers (IEEE), including:
   IEEE 1375, Guide for Protection of Stationary Battery Systems
   IEEE 1491, Guide for Selection and Use of BMS
   IEEE 1547, Standard for Interconnecting Distributed Resources with Electrical Power Systems
   IEEE 2030.7-9, Microgrid controller standards
4. International Electrotechnical Commission (IEC), including:
   IEC 62897, Stationary Energy Storage Systems with Lithium Batteries
5. International Electrical Testing Association (NETA)
6. International Fire Code
7. Local Fire Jurisdiction Requirements
8. National Electrical Manufacturers Association (NEMA)
9. National Fire Protection Association (NFPA), including:
   NFPA 70, National Electrical Code (NEC)
   NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response
   NFPA 791, Recommended Practice and Procedures for Unlabeled Electrical Equipment Evaluation
   NFPA 855, Standard for the Installation of Stationary Energy Storage Systems
10. Underwriters Laboratory (UL), including:
    UL 1642, Standard for Lithium Batteries
    UL 1741/1741-SA, 1741-SB Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Systems
    UL 1973, Standard for Batteries for Use in Stationary Applications
    UL 9540, Standard for Energy Storage Systems and Equipment
    UL 2900, Standard for Software Cybersecurity for Network- Connectable Products

11. Hawaiian Electrical Company (HECO) standards and requirements

12. All other applicable Codes and Ordinances

B. Systems must be able to protect themselves from internal failures and utility grid disturbances. As such, systems must be self-protecting for AC or DC component system failures. In addition, systems must be able to protect themselves from various types of external faults and other abnormal operating conditions on the grid.

C. Systems must be designed to be in compliance with applicable safety standards with regard to construction and potential exposure to chemicals and with regard to module or enclosure resistance to hazards such as ruptures and exposure to fire.

1.02 DEFINITIONS

A. AHJ – Authorities Having Jurisdiction

B. BESS – Battery Energy Storage System

C. BMS – Battery Management System

D. CT – Current Transformer

E. DAS – Data Acquisition System

F. EMS – Energy Management System

G. HMI – Human Machine Interface

H. MSDS – Material Safety Data Sheet

I. OSHA – Occupational Safety and Health Administration

J. PCC – Point of Common Coupling

K. PCS – Power Conversion System

L. PT – Potential Transformer

M. SGIP – Self Generation Incentive Program

N. SOC – State of Charge or Energy: Nominal Energy Remaining / Nominal Full Pack Energy Available

O. UPS – Uninterruptible Power Supply

1.03 SUMMARY

A. Procurement of three (3) 125 kW/280 kWh (scalable up to 560 kWh per system) complete electrochemical Battery Energy Storage Systems (BESS).

B. The BESS system shall be capable of being grid connected and “behind-the-meter”.

C. The BESS system may be AC-coupled, provided that such arrangement meets all applicable codes, utility interconnection requirements and the specified requirements.

D. The BESS shall function to provide time of use self-consumption, export control, off-grid preparation, resiliency and/or grid services.

E. During the operational period of the BESS, the BESS software/BESS Manufacturer shall continually optimize the BESS to meet the functional/operational requirements of the system.

F. The BESS shall include BMS, PCS, Microgrid control and EMS software which operates to safely and optimally manage the BESS critical loads during an outage and ensure code and eligible incentive program compliance. All software provided with BESS shall be capable of remote update and updates shall be provided at a minimum for the warrantied period.

G. The space available to two of the BESS systems is very limited. Therefore, BESS components shall fit within the following dimensions (height, width, depth):

1. Power Conditioning System: 79”x24”x20”
2. Control Panel: 78”x36”x36”
3. Battery compartments: 90”x51x”51”

H. Prior to shipment, Contractor shall conduct quality assurance tests to include:

1. Ensure the Battery Design comply with the manufacturer’s performance specifications.
2. Ensure and verify that the Battery raw materials meet quality standards.
3. Implementation of six sigma manufacturing methods to include battery cell testing.
4. Test of the batteries to meet performance specifications before shipment.
5. Safety and environmental compliance certifications.
6. Internal audits to access compliance with quality management practices.

1.04 WORK INCLUDED

A. The work shall include the design and engineering (structural, mechanical, electrical, software, etc.), scheduling, materials, equipment, assembly, testing, software, and incidentals necessary to provide a complete, utility-interconnected Battery Energy Storage Systems (BESS) in conformity with applicable codes, eligible incentive programs, and professionally recognized standards.

B. Submit for review and comment of all O&M manuals, and miscellaneous documentation required to provide a complete installation. Provide all as-built documentation including calculations, software, design drawings, equipment drawings required for the BESS.

C. Provide and maintain a Schedule for all fabrication, procurement, installation and testing activities for the project.

D. BESS equipment shall include battery cabinet, batteries, power converter, microgrid control cabinet, metering, current transformers, and islanding equipment.

E. The BESS shall be designed to provide automatic, unattended operation of the BESS, including regular/remote updates for the life of the system.

F. The BESS shall be utility grid connected on the load side of the utility meter (behind-the-meter). The BESS Manufacturer shall be responsible to ensure their equipment is listed

on the Hawaiian Electric Company (HECO) approved inverter/PCS list for the intended use.

1.05 DESCRIPTION

A. This section describes the scope of Battery Energy Storage System (BESS) work.

B. Systems must be able to protect themselves from internal failures and utility grid disturbances. As such, systems must be self-protecting for AC or DC component system failures. In addition, systems must be able to protect themselves from various types of external faults and other abnormal operating conditions on the grid.

C. Systems must be designed to be in compliance with applicable safety standards with regard to construction and potential exposure to chemicals and with regard to module or enclosure resistance to hazards such as ruptures and exposure to fire.

1.06 Project Requirements

A. The BESS shall support the following Non-Island functions:

1. Tariff Management - Tariff Management is controlling the BESS according to variable electricity tariff rates. Typically, by charging the BESS during off-peak and lower cost energy and discharging during expensive on-peak periods. When combined with PV, the lower costs energy is generated from the PV system and used to charge the BESS. The time-of-use structures with charges based on time of consumption broken into costs for energy ($/kWh) and demand ($/kW) and varying by season provide an opportunity for BESS's to create electric cost savings every day of the year.

2. Demand Charge Reduction - Demand Charge Reduction reduces the demand charges ($/kW) on the monthly electric bill for the maximum demand (non-coincidental) and other relevant demand charge periods. The BESS/microgrid controller should incorporate the solar production to determine when the BESS should discharge to reduce the demand charges.

3. Time of Use Self Consumption or Arbitrage – Time of use Self-consumption is where PV generation at a time when the Time of Use rate is low, is used to charge the BESS and stored in the BESS and discharged at a time when the Time of Use rate is high. This should create cost savings when there is a substantial difference between the Time of Use rates throughout the day.

4. Export Management - Export management charges the BESS from the solar PV system to avoid or minimize the export of solar PV energy, or any energy above a defined threshold, to the grid. The energy generated by the solar PV system, which was stored in the BESS, is then discharged to offset grid energy consumption when the solar PV system is generating less than the site is consuming.

B. The BESS shall support the following FUTURE Islanding functions:

1. Grid-Forming – Grid-forming is the ability to operate when electricity from the grid is not available. Upon loss of the grid, the BESS needs to transition from grid-following (current-source) to grid-forming (voltage-source). When in grid-forming operation, the BESS provides a voltage and frequency reference for the other generating devices (e.g. PV solar system) and electrical loads.

2. Resiliency – When electricity from the grid is not available, the BESS/Microgrid controller communicates to the relays to open the main breaker to the facility or PV & BESS point of common coupling, isolate the non-critical electric loads, and transition the BESS to grid-forming mode. Once the internal grid is established and stable, the primary functions are related to maintaining stability of the islanded electrical network, managing the balance between generation supply (solar PV, existing diesel genset, and BESS) and load demand, and to maintain electrical safety and protection of the critical loads. When the solar PV system is generating energy, it should serve the designated critical loads and charge the BESS with any energy not required by critical loads. If there is solar PV energy not required by the critical loads and the BESS is approaching 100% State of Charge (SOC), the BESS/Microgrid controller should begin to curtail or shut down the PV system. The BESS/Microgrid controller or contactor should restore the PV system to an operational mode if the BESS can be charged and the solar PV system can operate. If an essential load panel is available at the site the controller will utilize the essential load panel if an essential load panel is not available the controller may use the main panel.

C. The BESS shall prioritize the order of the below listed functions with the first functions as higher priority.

1. Off Grid Preparation
2. Resiliency
3. Time of Use Self Consumption
4. Export Management

D. The Non-Island to Island transition shall occur in less than 60 seconds.

E. The Island to Non-Island transition shall occur in less than 10 Minutes.

F. The Battery Management System should reserve a minimum of 50% of capacity at all times for use in the event of a grid outage.

1.07 SUBMITTALS

A. Study Reports and Calculations. The BESS Manufacturer shall submit all simulation and field test reports. These reports shall contain assumptions, study methods, results, significant findings and conclusions.

B. Record Drawings – Provide as-built record drawings.

C. Instruction Books

1. No later than fifteen (15) calendar days from the date of commissioning, the BESS Manufacturer shall furnish digital (PDF format) detailed instruction books for each energy storage system furnished for the Project. These books shall contain all illustrations, assembly drawings, outline drawings, wiring diagrams, replacement parts list that includes part number identification, a list of recommended spare parts, and instructions necessary for storing, installing, operating and maintaining the equipment. The illustrated parts shall be numbered for identification. All information contained therein shall apply specifically to the equipment furnished and shall not include instructions that are not applicable.

1.08 QUALITY ASSURANCE

A. All equipment shall be listed to Underwriters' Laboratories (UL) standards 1973, 1741, 9540, 9540a, and that is applicable to authorities having jurisdiction (AHJ).

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1.09 MATERIALS, DELIVERY, STORAGE, AND HANDLING

A. All materials shall be delivered new, undamaged and without defects.

B. All equipment shall be handled with care so as not to damage the delivered products. All equipment shall be installed in new and neat condition.

C. Appropriate protective clothing shall be worn when handling the equipment.

1.10 WARRANTY

A. All equipment furnished under this Section shall be warranted by the BESS Manufacturer and the equipment manufacturer(s) for a minimum period of Term. The battery shall be sized to meet a cycle life of at least the Term after substantial completion. Batteries shall maintain at a minimum 70% capacity for the Term. BESS Manufacturer shall include the full cost of replacement of the battery or such components to achieve the 70% capacity for the Term.

B. Warranty shall include all parts and expenses to perform necessary work, inclusive of regular software updates over the warranty period sufficient to meet the operational and functional intent of the system.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS FOR ALTERNATE DESIGN PROPOSALS

A. Manufacturers shall provide equipment that meets all current industry, utility company, and incentive required standards and all performance criteria set forth in the bridging documents and Contract.

2.02 EQUIPMENT AND MATERIALS FOR ALTERNATE DESIGN PROPOSALS

A. <u>BESS Systems Shall Meet the Following Minimum Requirements</u>:

1. The battery shall be from a proven technology designed for the type of service described by this specification and the bridging documents. For the purposes of this specification, proven technology shall be defined as having been in successful commercial service in similar applications for a period of time sufficient to establish a service life and maintenance history. Battery chemistry shall be LFP.

2. Only batteries that are commercially available or for which suitable (not necessarily identical) replacement components can be supplied on short notice throughout the Project life shall be allowed.

3. Efficiency shall be:

    i) Minimum 80% AC round trip EXCEPT for redox flow batteries
    ii) Minimum 60% AC round trip for flow battery technology

4. The usable capacity shall be a minimum of 70% of its nominal rating at the end of the 10-year Term. A scheduled replacement of BESS components is permissible to achieve this requirement provided that the BESS Manufacturer clearly includes the cost of the replacement as part of the warranty/operational costs in their proposal.

5. Total system size shall be 840 kWh, scalable by 280 kWh or equivalent.

6. Modular cabinet design to accommodate the required available footprint of the site. This includes: inverter(s), battery trays, racks, BMS, microgrid controller, HVAC, fire suppression, and outdoor rated enclosure.

B. CYCLE LIFE

1. BESS manufacturer must state depth-of-cycle limitations and the product should be sized such that the depth of discharge corresponds to a cycle life meeting the warranty requirements.

2. For purposes of estimating and demonstrating cycle life, cycles are defined in terms of energy charged and discharged from the BESS. Additional details are to be included in the BESS Manufacturer's warranty terms and conditions.

3. The BESS Manufacturer shall provide a graph or set of graphs that displays the relationship between depth of discharge, SOC% and the corresponding number of cycles available within the system's life.

C. The BESS design and installation shall be modularized and connected in a manner that enables adequate access for easy field removal and replacement of failed modules or equipment. Access areas shall conform to all applicable codes and facilitate access by maintenance personnel. As applicable, the racks shall provide sufficient clearance between tiers to facilitate required maintenance, including testing and inspection, and replacement.

D. All racks and metallic conductive members shall be solidly grounded.

E. Incorporate disconnect switches for AC and DC power disconnect in compliance with applicable codes and utility requirements.

F. Ambient temperature range have been determined by the BESS Manufacturer and appropriate for the Project location. The BESS has been designed to operate and maintain sustainable operating temperatures within the Project's ambient temperature range.

2.03 BESS MANAGEMENT SYSTEMS

A. The system shall include an integrated battery management system (BMS) which monitors the condition of the battery system and capable of sending signals to an integrated microgrid controller to ensure safe and reliable operation of the energy storage system. The BMS service provider must be approved for use by the BESS manufacturer and any applicable utility and incentive programs.

B. The battery management service shall update the BESS functions with the applicable tariff information, including but not limited to energy charges, demand charges, time of use intervals, and demand response programs within 24 hours of when the new Tariff, TOU period, or demand response program is implemented. The customer shall be responsible to furnish any changes in tariff information to the manufacturer so they can update the battery management system.

C. The BESS management systems have been designed to provide for automatic, unattended operation of the BESS. The control system design can provide for local manual operation or remote operation.

D. BATTERY MANAGEMENT SYSTEM (BMS)

1. As a subcomponent of the Project, an Energy Management System (EMS) provides data to operators in real time via a system dashboard/control interface and shall be included to manage the operational health of the BESS and assure safe and optimal performance of the BESS.
2. Uninterrupted Power Supply: All components of the BMS shall be backed up by an online uninterrupted power supply (UPS).
3. Integrated Liquid-Cooling System: HVAC (heating, ventilation, and air conditioning) control to maintain optimal temperature conditions for the energy storage system.
4. Integrated Fire Suppression: The EMS and BMS shall interface with the fire protection system, ensuring the safety of the energy storage system by detecting and responding to fire hazards.
    a. Integration with existing building fire management and fire alarm systems.
    b. Temperature sensor, smoke sensor all seamlessly integrated with the fire protection system.
5. The ESS system should have an available Application Programming Interface (“API”) that can send charge and discharge requests by its authorized representatives.
6. BMS shall provide the following monitoring information:
    a. State of Charge (usable kWh and % of total capacity available for discharge)
    b. Cell Charge Level
    c. Stack Charge Level
    d. Module Charge Level
    e. State of Module Health
    f. DC Voltage/Current – DC voltages and current at battery terminals
    g. Temperature – BESS Enclosure temperature and ambient air temperature
    h. BESS Status (Charging/Idle/Discharging, Non-Island/Island, Normal/Fault)

i. BESS Warning and alarms

j. BESS Logs of operations and alarms

k. Over-the Air management and upgrade of any software versions

l. Cyber Security management of the device itself

m. Notifications and Alerts
   i) Transition from Non-Island to Island mode or from Island to Non-Island mode.

   ii) Fault Conditions

E. BESS Data Acquisition System (DAS) and monitoring system shall meet the following requirements:

1. Where BESS is paired with a PV system, BESS should provide reporting on the same cloud-based platform as the PV system wherever commercially feasible. BESS may have a separate monitoring and cloud-based platform to fulfill all monitoring requirements listed in this section, however key BESS operating parameters including BESS charge and discharge data should be provided on the same platform and time-interval as the PV system.

2. Cellular data shall be used for communications with the DAS/metering systems and cloud-based platforms.

3. The BESS vendor shall have the capability to remotely monitor the BESS and independently and be automatically alerted to BESS alarm conditions without relying on personnel to communicate that such alarm conditions exist.

4. Monthly timescale on the monitoring platform to be aligned with utility billing cycle where possible.

5. Monitoring at a minimum shall provide the following real-time and logged parameters on a maximum 15-min interval or less.

   a. BESS Status (Charging/Idle/Discharging, Non-Island/Island, Normal/Fault)

   b. Instantaneous and accumulated power output (kW and kWh) for both BESS and Site Load

   c. State of Charge (usable kWh and % of total capacity available for discharge)

   d. BESS Warning and alarms

   e. BESS Logs of operations and alarms

6. DAS shall provide data through an open data exchange protocol (FTP Push or API). Data shall, at a minimum, include energy consumption and discharge data, inverter production data, inverter AC power data, inverter current data, inverter voltage data, state of charge, and alarm status readings. All data shall be available over multiple timescales, ranging from 15-minute (or less) intervals to annual intervals and shall include both real-time and historic data.

7. DAS shall provide all reporting required to obtain incentives.

8. DAS Monitoring / Alarms systems must meet the following requirements.
    a. Determine if the BESS is in imminent danger of failing to meet specified performance levels or potential safety hazards exist.
    b. Determine if the BESS can no longer meet the specified performance criteria or safety hazards exist.
    c. BESS Manufacturer and O&M provider shall have the capability to respond to alarm conditions and provide required service to correct such alarm conditions within four hours from the inception of the alarm condition.
    d. The vendor shall include, in the Operation and Maintenance Manual, the recommended corrective action and maintenance procedures for each alarm level or observed condition provided.
9. This Project may participate in grid service markets as identified in the bridging documents, Contract or during design. The BESS shall be capable of integration with grid control and telemetry systems. If grid service(s) are identified as a requirement for this project, all such systems shall be included as part of the Project.

2.04 POWER CONVERSION SYSTEM (PCS) FOR ALTERNATE DESIGN PROPOSALS

A. PCS (Inverters) shall meet the following requirements:
    1. Include a warranty for the Term.
    2. Comply with the following:
        a. UL 1741 listed, inclusive of UL 1741-SA and 1741-SB requirements.
        b. IEEE 1547, including testing to IEEE 1547.1 and IEEE C62.45.
        c. IEEE C62.41.2 and CSA107.1-01.1.
        d. HECO Rule 14 and Applicable Rules and Requirements.
    3. Meet the following requirements:
        a. Nominal AC Voltage (Three-phase, ± 10%): 480 VAC
        b. Nominal AC Frequency (± 0.5 Hz): 60 Hz
        c. Line Power Factor (Above 20% rated power): >0.99
        d. AC Current Distortion (At rated power): <5% THD
        e. Maximum Open Circuit Voltage DC: 1,000 VDC
        f. Maximum Ripple Current (% of rated current): <5%
        g. Minimum Inverter Efficiency: >96% (Peak inverter efficiency 98% or better)
        h. Temperature Range Ambient: -13º F to 113º F (-25º C to 45º C)
        i. Enclosure Environmental Rating (minimum): NEMA 3R
        j. Relative Humidity (non-condensing): 0-95%
        k. Sound level: <85 dB

l. Capable of producing reactive power to operate between a power factor of 0.9 lagging to 0.9 leading (as adjusted on the inverter equipment).

m. Protective Functions: Standard wakeup voltage, wakeup time delay, shutdown power, shutdown time delay, AC over / under voltage and time delays, AC over / under frequency and time delays, ground over current, over-temperature, AC and DC over current, DC over voltage

n. Isolation Transformer (if applicable): High-efficiency type, supplied by the manufacturer of the Inverter Systems, mounted within same enclosure or directly adjacent, with factory-designated wiring provisions.

o. Seismic rating to Project site seismic zone and mounting type.

p. 125 kW PCS bi-directional battery inverter (scalable up to 625 kW).

q. Allow for AC coupled ESS.

r. Non-export certified system (UL 1741-CRD and UL 1741 S(B) certified)

4. The PCS, in conjunction with any microgrid controls (if present), shall be capable of completely automatic unattended operation, including self-protection, and synchronizing and paralleling with the utility. Where a microgrid is part of the project, PCS shall have islanding support functions.

5. The PCS shall be capable of supporting the following applications:

a. Real/reactive power compensation to improve power quality.

b. Peak shaving/demand charge management.

c. Load shifting for time-of-use savings.

d. Black start capability for power backup and microgrid applications.

e. Both grid-tied mode and power backup mode operation.

6. The control of the PCS shall be integrated with the overall Project control system. However, the PCS also shall include all necessary self-protective features and self-diagnostic features to protect itself from damage in the event of component failure or from parameters beyond safe range due to internal or external causes. The self-protective features shall not allow the PCS to be operated in a manner that may be unsafe or damaging.

2.05 ENERGY MANAGEMENT SYSTEM (EMS)

A. The Project shall include all necessary software applications and supporting hardware required to meet the specified operational/functional requirements. Software algorithms, external data input capabilities, and user interfaces shall provide for user specified variable input or set point values, as well as external data value streams.

B. The system shall utilize a cloud-based microgrid controller, which enables seamless control and integration with other energy control systems, such as Power Conversion systems and other Distributed energy Resources (DER's) over Modbus TCP protocol. It shall allow for cloud data exchange and coordinates control between the battery system and other energy management components (Solar, Genset, etc.). All software schedules

and integration shall be handled by the energy storage provider in conjunction with the end-user to tailor the software strategy to the specific site needs.

C. The Project shall include the necessary communication and telemetry hardware, and

D. Provide on-site load consumption monitoring via revenue grade meter.

E. Ability to integrate with existing building management systems and SCADA systems.

F. EMS platform shall be accessed via an online dashboard for remote monitoring and troubleshooting of microgrid operations, as well as local user interface (HMI).

G. Internet access with Wi-Fi and cellular modem features:

1. Supports internet connectivity, allowing remote monitoring and control of the energy storage system. It shall include Wi-Fi features for convenient wireless communication.
2. Have the ability to send data to the cloud via cellular modem.

H. Provide peak shaving capabilities.

I. Use utilities tariff to dispatch the batteries to power the bill.

J. 24/7 monitoring platform with programable alerts SMS and Email notifications):

1. Ability to configure site specific alarms for all integrated DER's for troubleshooting and support (i.e. troubleshooting issues with PV inverters, Gensets, etc.).

K. O&M planning and Fleet Management Capabilities.

L. Ability to participate in Grid Service programs (VPP, Demand Response):

1. Open ADR 2.0 compliant.

M. No single mode of failure shall result in loss of power to the control and data acquisition module.

N. Operations and Control Functions. The EMS shall be the primary dispatching location for local monitoring and control command functions, and is responsible to perform the following by priority in this order:

1. Protect itself (isolate for any internal fault)
2. Remain within power constraints (transformer and Project ratings)
3. Remain within voltage constraints
4. Remain within operating temperature constraints
5. Isolate in response to system anomalies
6. Charge/discharge Real Power and Reactive Power in response to EMS programs or external commands
7. Communicate status and diagnostic data

O. The EMS Shall respond to commands issued remotely or locally, including but not limited to:

1. Change Modes (charge, discharge, etc.)
2. Change Status (enable/disable)
3. Reset Alarms
4. System Reset/Restart

P. Operational States - A command table, with permissible operational states and high level logic, must be submitted by the BESS Manufacturer.

Q. REMOTE OPERATIONS

1. The EMS shall be able to respond to manual commands that are issued remotely by an external supervisory controller using a secure internet-based protocol.
2. The Project shall remain functional in the absence or loss of communication from the remote controller. The Project shall continue its current mode of operation.

2.06 INFORMATION SECURITY FOR ALTERNATE DESIGN PROPOSALS

A. BESS shall include cybersecurity precautions, designed to be hardened against willful attack or human negligence per applicable codes and standards identified in this specification and in common industry practice for BESS.

B. BESS Manufacturer shall develop and implement a cybersecurity plan that addresses and mitigates the critical vulnerabilities inherent in both the hardware and software that comprise the control and data acquisition systems.

2.07 MISC. SYSTEM REQUIREMENTS FOR ALTERNATE DESIGN PROPOSALS

A. Systems shall meet and the controls programming shall comply with Self Generation Incentive Program (SGIP) requirements including performance-based incentives, if the BESS Manufacturer is proposing to fund the system in some part through SGIP.

B. Systems shall be rated in terms of net delivered power and energy in kilowatts (kW) to the Point(s) of Common Coupling and in kilowatt-hours (kWh) of electrical energy storage capacity. All system loads and losses, including wiring losses, losses through the contactor/static switch, power conversion losses, auxiliary loads, and chemical/ionic losses are considered internal to the system and ratings are net of these loads and losses as measured (or calculated if not measured) to the Point(s) of Common Coupling.

C. The system shall be capable of charging from 0% to 100% useable State of Charge (SOC) and discharging from 100% to 0% useable SOC (its rated energy) for a minimum of duration as stated in the drawings and cycling in conformance with incentive and warranty requirements, if applicable.

D. All exterior equipment shall be designed for outdoor environment with minimum NEMA 3R rating and to be sunlight and UV resistant.

E. Fire Mitigation/Safety

1. The BESS Manufacturer shall design its system to minimize any potential risks of fires, ensure safety of any nearby occupied areas, and meet all local, State and national fire codes.

2. Connect BESS Fare Alarm system to Building Fire Alarm System.

F. The BESS Manufacturer shall provide, test and maintain code- and AHJ-compliant fire detection and suppression systems. Cooling Systems

1. The site temperatures and the effect of temperature on component life shall be considered in developing the thermal design for all components, including batteries and PCS. System shall provide all heat removal systems to accommodate the particular needs of Project components and subsystems (e.g., PCS, transformers, etc.).

2. Air handling systems shall include filters to prevent dust intrusion into the system. Design for energy efficiency using high efficiency motors and variable frequency drives, and variable speed compressors.

G. No dissimilar metals are allowed to contact each other (use plastic or rubber washers). Best practices shall be used to avoid corrosion. No aluminum in contact with concrete or masonry materials.

H. Bolted connections shall be non-corrosive and include locking devices designed to prevent twisting over the design life of the BESS.

I. Environmental impact of system equipment containing hazardous materials shall be disclosed, as well as maintenance and disposal/recycling instructions for equipment at the end of its useful life. BESS owned by third-parties shall provide for disposal/recycling at end of life at no-cost.

PART 3 - EXECUTION

NOT USED

END OF SPECIFICATION SECTION 48 17 13