CORE CAPRICORN:

3 MW / 4.5MWh Battery Energy Storage System

Supplier Specification: Overview

1. Introduction / Purpose of the Specification

CORE Capricorn Limited, a subsidiary of Community Owned Renewable Energy Partners ("CORE") is looking to procure a c. 3MW / 4.5MWh Battery Energy Storage System (The "System") for installation at Creacombe Farm, South Devon. Creacombe Farm is currently host to two solar PV projects, the FIT subsidised 4.4MWp Creacombe Solar C.I.C. and the unsubsidised 2.9MWp Marlands Solar Limited. Both assets are wholly owned by CORE Capricorn Limited and have operated since December 2019. CORE Capricorn operates for the benefit of Yealm Community Energy, a local Community Benefit Society.

It is proposed that the System will be co-located with Marlands Solar Limited but operate separately as an AC coupled system with independent MPANs within the shared customer substation.

The System will augment the existing business model of CORE Capricorn, providing a further revenue stream to generate Community Benefit Funding in support of Yealm Community Energy's activity in the surrounding parishes. The System will be expected to operate on merchant basis, but CORE will explore a series of different operating models based on System characteristics and market conditions.

The proposed System is being developed in partnership with Plymouth City Council through the ERDF Interreg programme. The project is also supported by Finance Earth and Eden Renewables.

The tender is limited to the supply of the System (to include the Battery, appropriate Power Conversion System and Energy Management System)

2. Site Location

The proposed system will be installed at Creacombe Farm in Yealmpton, nine miles from Plymouth in South Devon.

The location of the site at Gnaton Farm is depicted here. The proposed location of the battery system on the site, and a high level SLD are also included in Figures 2 & 3 below.

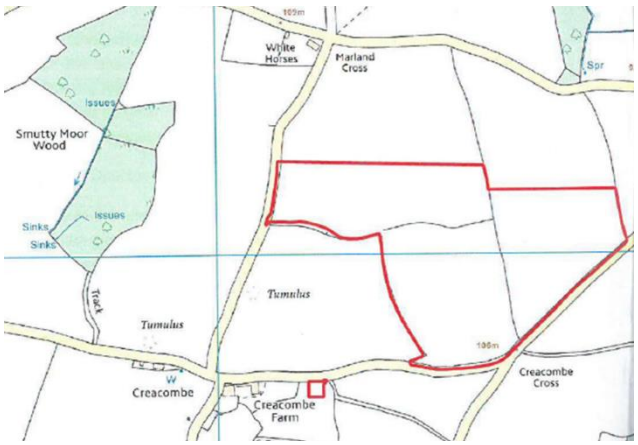

Figure 1: Creacombe Solar Farm location (Right)

3. Project Information

CORE has secured planning permission for the installation of the System at the location identified in figure 2 from South Hams District Council through a non-material amendment to the existing site permissions. This System

CORE has secured grid capacity for the site of 5.6 MW (Import and Export) working with Western Power Distribution. CORE is looking to procure a system of 3MW /4.5 MWh up to 5MW / 7.5MWh against this capacity. CORE is interested to understand the options for modular systems that can be expanded over time.

Creacombe is looking to develop the System over the course of 2022-3. The System will be use to deliver a merchant trading approach.

To access time limited development funding from the ERDF, the project will need to procure the battery system (and will be able to make an initial down payment) in July 2022.

CORE works with a portfolio of community solar assets across the UK including locally at Newton Downs. Successful delivery of this installation is likely to unlock a further stream of solar and storage models across the other community sites in the portfolio

Figure 2 Existing Site As-built layout and Proposed location of battery containers within the existing site.

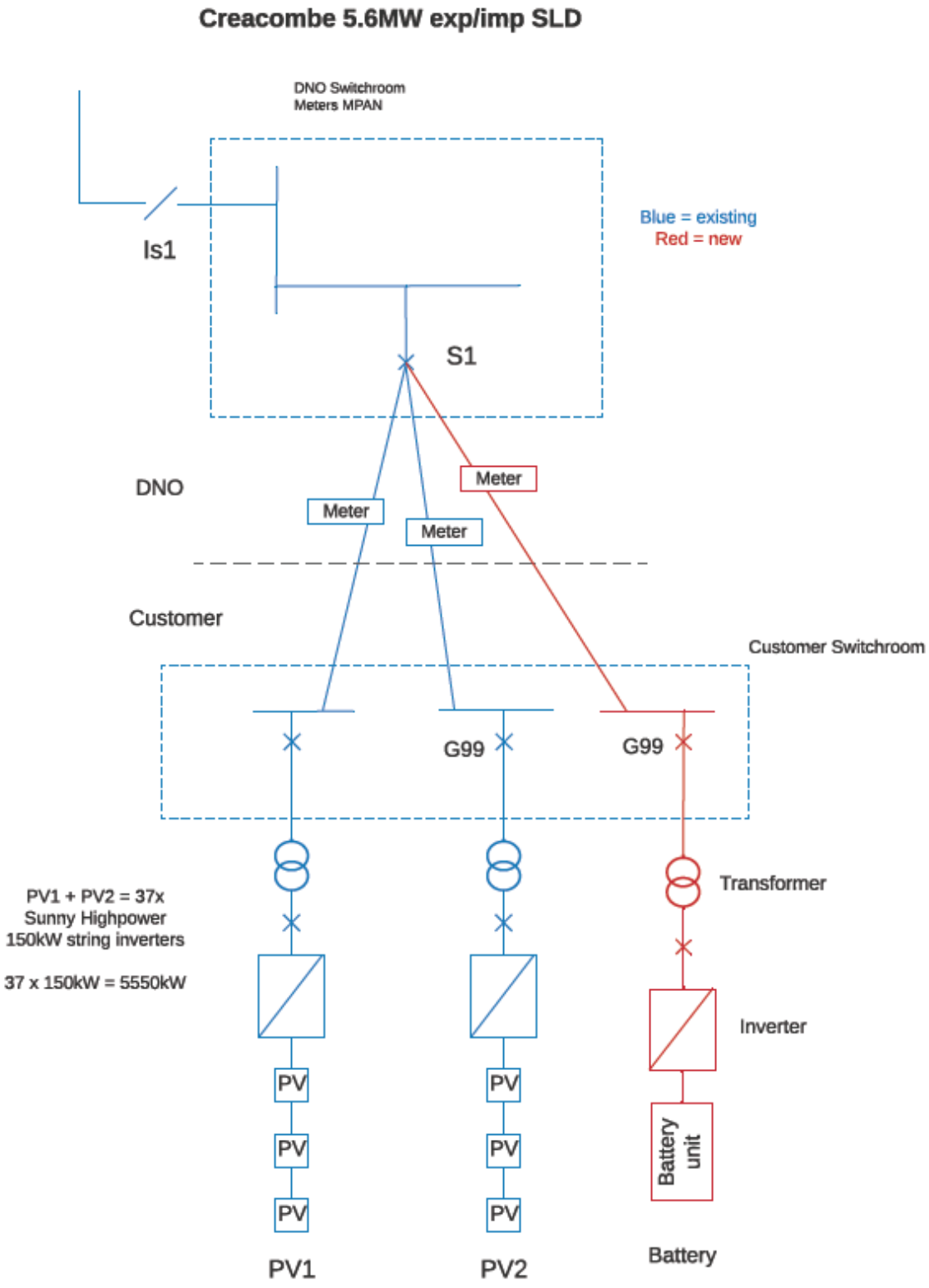

Figure 3 Illustrative Site Single Line Diagram for integration of battery system.

4. Specification of Requirements

The Supplier will be responsible for the following elements of the system.

Specification	Battery Stacks including Battery Management System (BMS)
	Enclosure design specification for customer design
	Confirmation of data requirements for EMS
Studies and Permitting	Communication drawings: Overall Network design (support
	Communication drawings: Communication cable layout
	Electrical drawings: Grounding design/grid (for battery system itself).
Procurement (see section 6)	Battery Stacks including BMS
	Battery enclosure
	Battery enclosure HVAC / thermal controls
	Battery enclosure fire protection and suppression systems
	PCS
	Transformer (optional)
	EMS (optional)
	EMS Software Platform (if EMS supplied)
	Internet Service (confirmation of bandwidth requirements only).
Delivery to Site	Battery Stacks including BMS
	Battery enclosure
	Battery enclosure HVAC / thermal controls
	Battery enclosure fire protection and suppression systems
	PCS
	Transformer (optional)
	EMS (optional)
Rigging and Offloading	Battery Stacks Installation Manual
	Battery enclosure Installation Manual
Installation (support)	Battery Stacks including BMS (support)
	Battery enclosure (support)
	Battery enclosure HVAC / thermal controls (support)
	Battery enclosure fire protection and suppression systems (support)
	PCS (supplier to provide instructions)
Commissioning	
	Battery Stacks and BMS
	PCS (directly or from PCS manufacturer)
	EMS / overall Battery energy system
	Contract and performance testing (support)
Equipment Warranty	Batteries and containers - 5 year workmanship
	Communication and controls
	PCS (assigned warranty)
	Transformer (assigned warranty)
	Performance Guarantee

5. Technical Specification (Equipment detail)

CORE is expecting to procure a Lithium Iron Phosphate (LFP) solution but is willing to consider other applicable battery energy storage system designs.

a. Battery System Specification

The battery energy storage system shall meet the following requirements:

1) The battery shall include the necessary battery cells, connection cables, DC circuit breakers, disconnect switches, local controls, a battery management system, and interfaces to extract required battery telemetries to function properly as part of a power generation facility.
2) The battery management system must be able to maintain battery cell safety requirements as specified by the manufacturer and must be able to prevent any unsafe conditions to battery cells.
3) The battery management system shall charge and discharge individual battery cells to achieve the best performance of the battery.
4) The battery could be packaged in one or more enclosures, and each enclosure must be able to regulate its internal temperature within the ambient temperature limits specified by the battery cell manufacturer. If required Heating Ventilation and Air Conditioning (HVAC) systems need to be installed to regulate the internal temperature of battery enclosure(s).
5) Battery enclosures located outdoors shall be enclosed in lockable, minimum IP54 rated, ISO1496-1 and NFPA 855 compliant enclosures.
6) HVAC system must be able to function automatically to regulate the enclosures internal ambient temperature.
7) The battery shall meet industry standard fire safety requirements, in line with UL 9540 If required, fire suppression systems need to be installed to meet the fire safety requirements.
8) Battery enclosures must have a door interlock system to prohibit the door(s) from being opened while energized.
9) The battery shall have auxiliary power inputs which can be fed by an external power source. If the power grid is available, the auxiliary power shall be fed from the grid, if not it can be fed from the DC power of the battery.
10) The battery management system shall communicate with the central EMS/SCADA/DAS server. Data collection points included shall be (at a minimum):
    a) Battery SOC
    b) Battery SOH
    c) Battery DC voltage (at least rack level)
    d) Battery DC current
    e) Battery DC Power
    f) Alarms related to cells, modules, BMS, temperature, or fire etc.
    g) Battery status and faults (including ground fault interrupts)
11) The battery must not compromise the DC grounding configuration of the PV system.

Warranties

The battery manufacturer shall provide a warranty of at least 5 years.

This should include a limited product warranty and a performance warranty based on expected use.

Spare Parts

If a repair is needed, the manufacturer shall provide the necessary spare parts and assume responsibility for the repair service under the warranty.

b. POWER CONVERSION SYSTEM (DC/AC) (IF APPLICABLE)

CORE is also looking to procure an appropriate power conversion system (PCS) to meet the demands of the System as well as wider site requirements. We would expect the PCS and transformer to comprise of an inverter and transformer. :

1) The PCS shall convert DC voltage power to site AC voltage as an AC couple system (see SLD, Figure 3).
2) The PCS shall convert battery DC voltage to the inverter DC voltage as a DC-coupled system.
3) The PCS shall include the necessary circuit breakers/disconnect switches, local controls, remote EMS/SCADA/DAS interface, and accessories necessary for the PCS to function properly as part of a power generation facility.
4) PCS must be able to receive charge/discharge commands from EMS and operate the battery according to the received commands.
5) Environmental ratings: -20° to +50°C (-4° to 122°F), Humidity: 15 % - 95%, non-condensing, 6,500 ft elevation.
6) PCS located outdoors shall be enclosed in lockable, minimum IP54 rated, ISO1496-1 and NFPA 855 compliant enclosures.
7) . The Supplier's design shall include an analysis of the maximum anticipated operating temperature to ensure that the manufacturer's recommended operating temperature is not exceeded.
8) The enclosure must have a door interlock system to prohibit the door(s) from being opened while energized.
9) PCS located outdoors shall be equipped with canopy structures to protect against direct irradiation from the sun. Canopies shall be sized and located such that inverters are protected against direct sun between 9 am and 3 pm throughout the year.
10) PCS shall incorporate a non-loadbreak, two (2)-pole, lockable disconnect switch for main DC power disconnect for maintenance personnel safety.
11) PCS shall be capable of rated output at 50ºC ambient or better without derating.
12) PCS shall be equipped with all hardware for data collection and communication to the central EMS/SCADA/DAS server, including the ability to write to the control registers to reset PCS and modify AC output parameters. Data collection points shall be integrated into the PCS monitoring and communications package. Data collection points included shall be (at a minimum):
    a) AC Voltage at output side
    b) DC Voltage at battery side
    c) Charge/Discharge Power
    d) Alarms
13) PCS status and faults (including ground fault interrupts)
14) Inverters shall be equipped with multiple fused, disconnectable, DC inputs with built-in current and fault monitoring for input to the SCADA system.

Warranties

The PCS manufacturer shall provide a warranty of at least 5 years.

Spare Parts

If a repair is needed, the manufacturer shall provide the necessary spare parts and assume responsibility for the repair service under the warranty.

c. ENERGY MANAGEMENT SYSTEM (IF APPLICABLE)

The tender may be submitted with or without the EMS. If this EMS is excluded from the response this must be clearly indicated in the response.

The Energy Management System (EMS) shall meet the following requirements:

1) The EMS shall compute the most optimal grid output, battery charge/discharge power for each dispatch period (generally 1 hour).
2) The EMS shall forecast output, price of the grid power to compute the most optimal system operation. If the project revenue is from multiple revenue streams, the EMS must be able to maximize overall revenue from all revenue streams.
3) EMS shall communicate with the inverter, PCS and the BMS
4) The EMS shall provide required site telemetries to the grid operator at a frequency specified by the grid operator. The EMS shall also receive commands from the grid operator.
5) The EMS shall maintain the battery SOC based on the requirement of the grid operator.
6) The EMS must be able to detect contingency situations (eg: grid outage, etc.) and react according to the preset operating objectives.

Warranties

The EMS manufacturer shall provide a warranty of at least 5 years.

Spare Parts

If a repair is needed, the manufacturer shall provide the necessary spare parts and assume responsibility for the repair service under the warranty.

Thank you for taking the time to review these tender materials. We look forwards to your questions and submission.

About CORE Partners

CORE LLP was launched in 2017 to acquire and restructure renewable energy assets to unlock low cost community ownership. CORE has a portfolio of c.40MW of operating solar PV installations across the UK.

CORE Partners has worked to acquire ground-mounted, utility scale solar energy assets. The Triple Bottom Line approach, delivering social, environmental, and financial returns is at the heart of this strategy. CORE Partners, through its Management Board and Investment Committee, have assessed and evaluated the merits of each asset's social, environmental, and financial returns when investing in the projects.

CORE is now working with its fund manager, Finance Earth to identify financial and technical optimisation strategies for its projects. These optimisations include contract negotiations, cost rationalisations, technical improvements, and asset life extensions.

Funding partners

CORE LLP is funded by two leading social and environmental impact investors, Big Society Capital ("BSC") and Power to Change ("PTC").

Big Society Capital is a financial institution with a mission to build the UK's social investment market so that charities and social enterprises can access finance to increase their positive social impacts and become more sustainable. Since its formation in 2012, Big Society Capital has seen over £2 billion of capital deployed towards activities of charities and social enterprises, around 30% of which was from Big Society Capital's own balance sheet with the remainder from co-investors being mainly institutions such as pension and insurance funds.

Power to Change Trust is an independent charitable trust endowed with £150 million from the Big Lottery Fund to grow community businesses in England. Since its establishment in 2015, Power to Change has invested £86 million in nearly 1,300 community businesses, particularly those in deprived areas, and provided over 2,000 days of capacity-building support. It has also engaged with thousands more through research, advocacy, and policy work at local, regional, and national levels.