

**TECHNICAL SPECIFICATION OF SOLAR
POWER SYSTEM**

UNOPS- SRI LANKA

Contents

1. Overview	2
2. Scope of Work	2
3. Technical Specifications	2
4. System Overview	3
5. System Capacity	3
6. Electronic Control System/Inverter	3
7. Energy Storage System	
8. Warranty Services	3

1. Overview

There is a requirement in UNOPS, SAMSO office located in Colombo, Sri Lanka i.e. to ensure uninterrupted electricity supply during the prevailing power cuts in the country. The country is currently in a crisis situation which resulted in frequent power outages due to the unavailability of adequate fuel supply to generate electricity. Therefore, to improve the reliability of power supply, it was decided to install an off grid solar system with a battery backup which can be used as the primary source of energy.

At present, There is already a 15kW ongrid solar system installed at the property with an inverter with a capacity of 15kW. The system is about 10 years old and working without any issue. Therefore, the proposed system is an upgrading of the existing system i.e. converting to an offgrid system by introducing a hybrid inverter, battery backup system and coupling with the existing diesel generator. The system should work by giving priority to solar energy, battery power and generators.

2. Scope of Work

The site and specific installation area will be recommended by the consultant/client. However, the bidder is responsible for pre-site visits and gathering all required information for bidding. The scope of work is as follows:

- Equipment transportation and installation.
- System commissioning.
- Trial run.
- Transfer from delivery to operation.
- Operation and maintenance training.

3. Technical Specifications

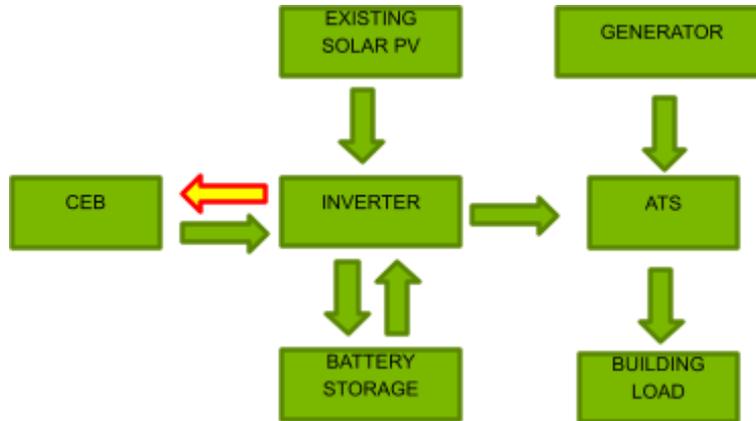
The proposed solution should be based on the following requirements:

- Advanced technologies in the future, ensuring a long system life of more than 10 years of operations.
- Adopts advanced and mature technologies to ensure product stability, reliability, and maintainability.
- Reduce initial investment and OPEX.
- Integrated modular design, smooth capacity expansion, and fast deployment.
- Multi-energy input and AI automatic scheduling, supporting PV, battery, diesel generator, and grid.
- Provisions to tie with grid to export energy (in future with authority approval)
- Remote monitoring and management.
- The bidders are free to propose more advanced/latest technologies with the detailed technical comparison support with product details.

4. System Overview

The system overview is shown in following diagram

Note:- Provision for future use upon receipt of approval from the power Authority (CEB) ←



5. System Capacity

Proposed system shall consist of 25kW on grid hybrid type inverter and of 40kWh Lithium Ion battery bank system.

6. Electronic control system/ Inverter

The Core control system of the proposed solution shall be a lithium-ion battery charging and discharging management.

The inverter must meet the following requirements:

- CE standards: IEC 62109-1/2 and 62477-1.
- The rectifier efficiency is high. The PV-to-AC output is greater than 91%, the battery-to-AC output is greater than 92%, and the PV-to-battery input is greater than 93%.
- Multi-peak and high-precision MPPT technology to reap more energy.
- All-in-one design cabinets (PV input, battery input, Grid input, and AC output) shall be easy to deploy.
- The system shall have a modular design and consists of multiple modules, such as the monitoring module, power module (AC and DC), Grid access module. The power system shall be hot-swappable, easy to expand and maintain, and reduce customer investment.
- Shall support 100% load unbalanced output, one or two phases with full load (other phases have no load).
- Shall be capable of intelligent scheduling of the solar energy, grid/ diesel generator, and batteries are supported to optimize solar energy usage. When the battery capacity reaches set DOD, the Grid supply is automatically controlled.
- Shall support centralized NMS management, SMS alarm reporting, periodic self-check notification, and one-click remote inspection.
- Shall provide PV/battery input reverse connection protection and overvoltage/current protection.
- Shall provide AC output short-circuit protection and overvoltage/overcurrent protection.
- MTBF: up to 200,000 hours.
- Operating temperature range: -40°C to $+55^{\circ}\text{C}$.
- Relative humidity: 5–95% RH (non-condensing)
- The power supply cooling mode shall be an intelligent forced air cooling, and the indoor cabinet shall use natural air flow for heat dissipation.

- Communication shall include RS485 or CAN.

7. Energy storage system

The energy storage system shall use lithium iron phosphate technology. It shall consist of dedicated energy storage units and advanced energy storage management units and shall provide functions such as status monitoring, alarm detection and fault protection, active balancing and switchover, redundancy protection and sampling and SOC/SOH management. All these functions shall ensure efficient and reliable operation of the off-grid system.

The battery bank must meet the following requirements or latest advance technology.

- Shall comply with UN38.3, CE, and UL standards. Batteries and battery packs comply with IEC62619 standards.
- Battery positive material: LiFePO₄, minimum charge/discharge life of 3500 @EOL 70%, 85%DOD,35°C,0.5C/0.5C.
- High charge/discharge efficiency (up to 94% round trip), reducing energy loss.
- Maximum charge/discharge current: 0.5C/0.5C
- The Proposed solution shall have a minimum footprint with a maximum back up power density to reduce space required for installation. a 19-inch rack mountable is preferred.
- Shall support multiple charging and discharging modes, such as constant voltage charging and constant current discharge. The current can be automatically adjusted based on the ambient temperature.
- Shall support active self-balancing of battery modules and mixed insertion of old and new battery modules.
- When a new battery replaces a faulty battery, the battery capacity must not need to be pre-adjusted. No energy loss shall occur during capacity balancing between modules.
- Proposed battery system shall be free from Lead, rare earths acid and degassing.
- Cooling type of the battery system shall be 'natural cooling'.
- Battery Shall have a 15 Year Design Life.

8. Warranty Services

Equipment Warranty

- Comprehensive 1 Year warranty for the entire system.
- Battery: 5 years (Minimum).
- Invertor : 5 years (Minimum).
- Maximum years of extended warranty that could be granted for the same quoted price.
- If different parts carry different warranty periods, please specify. However, the minimum warranty period should not be less than 1 year.

Hardware Warranty

- Warranty voiding stickers should be pasted on outer panels of the equipment and accessories.
- Suppliers should clearly state warranty voiding conditions in the quotations if there is any.

Repair Services Warranty

- The Repair Services warranty should be provided against defects of repaired components of the product for a warranty period of 90 days from the delivered date after the repair, or until the end of the original warranty period, which occurs first.
- Suppliers should pick the equipment within 3 working days when a defect is reported during the warranty period.
- Suppliers should return the equipment within 7 working days after repair during the warranty period. Suppliers should provide backup equipment if the repair duration exceeds 1 month.

- 
- Suppliers should carry out necessary software and firmware updates free of charge during the warranty period.
 - Suppliers should have the facilities and certified trained technical staff to carry out the required repairs. (Qualifications and Certifications of technical staff should submit with the bid).

Post Warranty Services

- Extension of Warranty Period and cost of extension of period and cost of extended warranty for post warranty 2nd,3rd,4th, and 5th years.
- 24x7 Technical Support help desk should be available for the technical assistance.
- Bidders should provide one visit within the first year free of cost to inspect the system and to do necessary calibrations/ Services (This has to be done by the trained staff).