PROJECT DETAILS

Sl. No.	ITEM	DETAILS
Location Details:		
1	Title of the Project	Design & Engineering, Manufacture / Procurement, Supply, Packing and Forwarding, Transportation, Unloading, Storage at site, Site development, Construction (Civil & Electrical), Erection, Installation, Testing and Commissioning including warrantee obligation with 05 (Five) years Comprehensive Operation and Maintenance of a 50 kW (DC) Solar Photovoltaic, On-grid, Roof-top Power Plant at springdale ……..
2	Location	A-3, City Centre Complex, Kalyani, Nadia – 741235.
3	State	West Bengal
4	Site Latitude	22035/13//N
5	Site longitude	88024/17// E
Plant Details:		
6	Capacity of the power plant	Minimum 50 kW (DC)
7	Grid interfacing voltage	415V, 3-phase, 50 Hz
8	Available Shadow-free area	6000 sq. ft roof area (out total 7500 Sq.ft area)
9	Proposed system	Grid-Tie/Connect (without battery) rooftop solar
10	Proposed Plant Capacity	Minimum 50 kW DC
11	Load to be connected from solar Plant	Building electrical load on Captive Consumption mode.
12	Expected Energy generation	Minimum 1200 kWh/kWp/year
13	Expected Life of the Plant	Minimum. 25 years
14	Array Layout	The elevated structure on overhead tin shed arrangement with easy access to the PV modules

1. Scope of Work

Composite work of Design, Engineering, Manufacture/Procurement, Supply of equipment and materials; testing at manufacturers' site, inspection, packing and forwarding; unloading and safe storage at the site; associated civil works, services, permits, installation and incidentals, erection, testing, and commissioning with Warrantee obligation of 50 kW (DC) Solar Photovoltaic, On-grid, Roof-top Power Plant with associated equipment and materials at the Project site.

SCOPE OF WORK:

Sl. No.	Activities
01	Site survey & planning
02	Drawing Approval
03	Manufacturing / procurement of Balance of System (BOS)
04	Civil work, including the construction of Module Mounting Structure on overhead tin shed etc.
05	Supply of SPV Modules, Inverters and BOS items
06	Fitting and fixing MMS, Modules, Inverters, AC Distribution box (ACDB).
07	Cabling and its termination as per industry standards
08	Installation and commissioning
09	Performance Test
11	Operation and Maintenance
12	Grid connection from Main Distribution Panel to ACDB
14	05 (Five) years of comprehensive operation & maintenance of the plant. Deploying adequate skilled personnel with appropriate electrical workmanship licenses for round-the-clock plant operation shall be a scope of the process and maintenance.

2. Overall Considerations

a) Selection of the array field area shall be clean, levelled, dust-free, shadow-free throughout the day, suitable for solar PV module installation and close to the control room.

b) Net Metering/Net Billing (if any): The same shall be as per state govt./SERC (State Electricity Regulatory Commission) regulation in force at the time of commissioning of the Solar PV Plant. Further, any charges required for deploying Net Meter/ Gross Meter from local DISCOM (Distribution Company) shall be in the scope of the client. However, the EPC agency shall extend customer support for any liaison with DISCOM, if required.

c) Design, Fabrication, Manufacturing, Supply, Installation, Testing, and Commissioning, operation and Maintenance of on-grid Solar power plants shall be included in the composite work. The contractor is

responsible for all tasks necessary to properly install a Solar PV Power Plant, including all civil and welding work required for mounting solar module structures. The entire project must be completed on a **turnkey basis**. The contractor must complete all tasks associated with the proper installation and operation of the system at the quoted price.

d) All necessary electrical wiring from the electrical distribution box up to the PCU of the Solar PV Power Plant and back from the PCU to the distribution box shall have to be done by the contractor, including the supply of all required materials.

e) The generated electricity from the power plant will be utilized to energize the dedicated load of the building. In case separate additional electric cable/wiring, etc., is required for connecting the dedicated load with the solar power plant, it shall have to be supplied and laid down in concealed conduits by the contractor as needed.

f) Arrangement of proper earthing mechanisms and lightning arresters should be done at the site as per the requirements of the solar power plant.

g) The contractor shall Supply and install a Display board of size 3ft x 2ft showing all technical information of the SPV plant.

h) The warranty, operation and Maintenance period will include rectification/ replacements of all the defective and consumable components/ items, including batteries. However, all the non-functional parts/ materials/ items replaced during the warranty, operation and maintenance period shall be the contractor's property. After the commissioning of the plant, the contractor will conduct one on-site training of the purchaser's /user's personnel regarding assembly, start-up, operation, maintenance and repairs of the Solar PV Power Plant to run the system at the end of 5 (five) years comprehensive maintenance.

i) During the five-year warranty, operation & maintenance period, the contractor must make all necessary arrangements for satisfactory operation, maintenance and performance of the Power Plant.

j) The contractor shall promptly rectify all the defects developed in the Solar PV Power Plant during the warranty and maintenance period, at least within ten days from receipt of the complaint.

3. The equipment and materials

The equipment and materials for the 50 kW (DC) Solar Photovoltaic, On-grid, Roof-top Power Plant shall include but not be limited to the following:

1. Solar PV Modules;
2. Array Junction Box;
3. Solar Inverters;
4. Cables and conductor;
5. Earthing system;
6. Module cleaning arrangement;
7. Recommended spares;
8. Required Tools and Tackles;

9. 415V Distribution Line up to nearest three phase 415V Transmission Line from the Solar PV Power Plant switchyard to the substation has to be arranged.
10. Signage (Project Name Plate and caution);
11. Project Documents (drawing, specifications) etc.
12. Any other items required.

4. Warranty / Guarantee and Annual Maintenance

4.1 The Solar PV Power Plant's complete systems will be warranted for 60 months after handover.

4.2 Routine and Preventive Maintenance:

i. Regular cleaning of PV modules.
ii. Checking & tightening of all electrical connections and mechanical fittings.
iii. Checking and restoring the earthing system.
iv. Cleaning of Inverter and other pieces of electrical equipment.
v. Routine maintenance as recommended by the original equipment manufacturer.

The contractor shall be responsible for routine and preventive maintenance and replacement of each damaged/faulty component/ equipment of the power plant and shall provide all labour, material, consumables, etc., for routine and preventive maintenance at his own cost.

4.3 Breakdown Maintenance:

Breakdown maintenance includes repairs and replacement of power plant components and equipment not covered by routine and preventive maintenance and must be done unexpectedly while the plant is running. The supplier will perform breakdown maintenance on all power plant components. Regardless of the cause, he must pay for breakdown maintenance, including manpower, materials, consumables, parts, and equipment.

5. SPECIFICATIONS

5.1 SOLAR PV MODULES:

a. The capacity of the Solar PV Power Plant project at Springdale ..... and its associated equipment is 50 kWp (DC).
b. Mono-crystalline solar modules of standard updated technology with a capacity greater than 500 Wp are to be used for the proposed plant.
c. The net minimum guaranteed generation of 1200kWh/kWp/year.

The scope of supply shall also include a reasonable number of spare modules (10 nos) required for any normal or breakdown maintenance and special tools & plants as are necessary for erection & maintenance. Corresponding parts of all the pieces of equipment & spares shall be of the exact specification & workmanship and shall be interchangeable.

5.1.1 Material and Performance Warranty

The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than ten (10) years from the date of sale to the original customer

The manufacturer should warrant the output of Solar Module(s) for at least 90% of its rated power after the initial ten years and 80% of its rated power after 25 years from the completion of the trial run at the site/date of final commissioning.

If Module(s) fail to exhibit such power output in the prescribed period. In that case, the Contractor will be bound to either deliver additional PV Module(s) to replace the missing power output with no change in the area of the site used or replace the PV Module(s) with no extra cost claimed at the Owner's sole option.

5.2 ON-GRID STRING INVERTER

The inverters' rated power/plate capacity shall be the inverter's AC output at 50°C.

Sl. No.	Parameter	Requirement
1	Output (AC)	50 kW (min)
2	Max. Input Voltage	1100V (DC)
3	No. of MPPT	01/02 nos. independent trackers (min)
4	Requirements	Built-in AC/DC switch DC fuse SPD in DC & AC side Built-in energy data logger
5	Efficiency	More than 98.6%
6	THD	< 3% (at rated power)
7	AC voltage	3 phase 415V (Range: 320-480V)
8	PF	> 99% (at rated power)
9	Protection	DC reverse connection AC short circuit Over voltage protection (DC & AC) Leakage current
10	Isolation	Transformer isolation
11	Allowable relative humidity	0-100%
12	Cooling method	Forced air cooling
13	Display/communication	Graphic LCD with RS485
14	DC connection type	MC4 (Max. 6 mm^2)
15	Operating temperature range	0^{O}C to 60°C
16	Night consumption	< 2 W
18	Warranty	5 years

5.3 MODULE MOUNTING STRUCTURE

Springdale…. aims to set up steel-structured trusses on the tin shed to support and house the photovoltaic panels.

The supplier shall fix the PV modules on support structures with requisite tilt angle to capture maximum solar irradiation.

The array structure shall have hot dip galvanized MS angles or galvanized tubular frames with galvanization thickness of 80 microns or more.

All fasteners for supporting conduits, Nut, and bolts shall be of stainless steel (Grade SS 304), and supporting structures including module mounting structure shall have to be adequately protected against all climatic condition. The entire structure shall be placed on the tin shed.

5.4 DC DISTRIBUTION BOARD (DCDB)

A DCDB shall be provided in between PCU and Solar Array. It shall have an MCCB of Suitable rating for connection and disconnection of the array section. It shall have meters for measuring Array voltage and Array current. (Note: If the features of DCDB are available inside Inverter then no separate DCDB is required)

5.5 Estimation of Water and Auxiliary Power Requirements:

With an approximate water requirement of 2.0 liter per 500Wp PV module, the 50 kWp plant will require around 2000 liters of water per cleaning with facilities of water spraying.

Minimum maintenance schedule:

- Manual cleaning solar panels with clean water and cotton cloth: Once in three months.
- Checking module mounting structure and tightening the nuts & bolts: Once in three months.
- Checking and measuring DC AC and voltage periodically.

5.6 EARTHING PROTECTION:

Equipment and Array Structure earthing are as follows:

- Earthing system design should be as per the standard practices.
- Equipment grounding (Earthing) will connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV panel mounting structures with multiple earth connectivity in one long run. The grounding wire should not be switched, fused or interrupted.
- Earth bus bar of galvanized (Hot Dip) flat 25mm x 3mm or 25 mm x 3 mm on the wall having a clearance of 6 mm from the wall, including providing drilled holes on the GI bus bar complete with GI bolts, nuts, washers, spacing insulators etc. as required.
- Earthing Pit Cover needs to be provided.

5.7 Tentative Bill of Material (BoM) for 50 kWp Solar Plant:

The BOS items/ components of the SPV power plant must conform to the specifications as below:

Sl. No.	Component	Specification	Make
1	Solar PV Module	500 Wp or more	Standard, Reputed as per Industry Standards
2	Module Mounting Structure (MMS)	Robust Raised integrated rooftop structure with bracket for tin shed, a wind-withstanding load of 150 km/Hr.	
3	Inverter (50 kW)	Grid Tied String Inverter Output AC: 415V, 3Ph, 50Hz.	
4	ACDB (60 kW)	3Ph 415Vac, 50 Hz with switches and circuit breakers	
5	Lightning Arrestors	Conventional Type	
6	Earthing	Pipe Earthing	
7	AC & DC Cable	**AC Cable:** XLPE, Aluminum Armored **DC Cable:** Multi-stranded, Annealed high conductivity copper conductor (flexible)	
8	FRP walkway (minimum width 300mm)	As per standard Specification	
9	Pump with module cleaning arrangement (Sprinkler).	0.5 HP surface pump and 02 nos. of 1000 litter water tank.	