

**HINDUSTAN PETROLEUM CORPORATION
LIMITED**

**ENGINEERING & PROJECTS
GRESHAM ASSURANCE HOUSE, 2ND FLOOR,
A-1595(3) 1-A, SIR P M ROAD, FORT
MUMBAI-400 001**



TENDER DOCUMENT

FOR

SOLAR PV SYSTEM AND SOLAR WATER HEATER

FOR

**EAST ZONE OFFICE BUILDING
AT 771, ANANDAPUR
NEAR RUBY HOSPITAL
KOLKATA- 700107**

Introduction

This tender is for Design, Supply , installation and commissioning of 2.5 KW capacity Solar PV System (Solar power plant) for lighting and 1500 litre per day capacity solar water heating system at HINDUSTAN PETROLEUM CORPORATION LIMITED (HPCL) East Zone Office Building at 771, Anandapur, Kolkata 700107. M/s Gherzi Eastern limited (GEL) is appointed Architect/PMC for the project.

JOB SCHEDULE FOR SOLAR PV SYSTEM AND SOLAR WATER HEATER

SL. NO.	DESCRIPTION	QTY	UNIT
1	Design, manufacture, Supply, Installation, commissioning of 2.5 KWp solar PV hybrid system (solar power plant) for lighting as per technical specification .	1	LS
NOTE	Rate shall include providing civil work and Module mounting structure (MS angle support).		
2	Design, manufacture, Supply, Installation, commissioning of 1500 litre per day capacity solar water heater system as per technical specification .	1	LS
NOTE	Rate shall include providing 25mm dia Medium quality GI pipe from Cold water tank to Solar Collector and Solar collector to Hot water tank and hot water tank to Kitchen in 6 th floor with insulation (Appx. Qty 40m). Cold water tank is not in scope of vendor.		
3	Post warranty Comprehensive AMC for solar PV system (solar power plant) and solar water heater system including Preventive maintenance (monthly one visit to site) & break down maintenance (as and when break down call is given). Spares shall be in the scope of vendor.1st year	1	YEAR
4	Post warranty Comprehensive AMC for 2 nd year	1	YEAR
5	Post warranty Comprehensive AMC for 3rd year	1	YEAR

TECHNICAL SPECIFICATION FOR SOLAR PV SYSTEM FOR LIGHTING

The Scope of Work shall include the following,

- a. Design, manufacture, supply, installation, commissioning of 2.5 KWp Solar PV hybrid system (Solar Power Plant) for lighting
- b. Detailed planning of smooth execution of the project
- c. Performance testing of the complete system & warranty
- d. After sales service, directly or through local contractual arrangement
- e. Risk liability of all personnel associated with the implementation realization of the project
- f. Annual maintenance contract of the Power Plant for 3 Years after warranty period.

Light fittings to operate with solar power

18 Watt CFL x 35 nos. Outdoor Lights

5 Watt CFL x 20 nos. Garden Lights

36 Watt LED x 4 nos. Post Top Fitting (36Watt LED X 01)

Note: Supply of light fittings and supply of cable from solar power panel to light fittings are not in the scope of vendor.

Duration of Operation ; 12 Hrs daily.

DESIGN BASIS

Solar PV Power plants shall be designed considering the following:

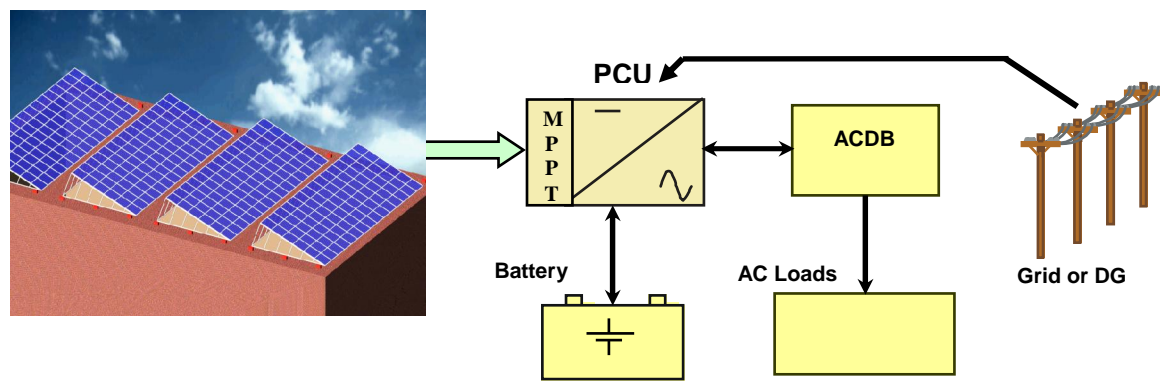
1. Loads: Total load that shall be supplied by 2.5 kWp Solar PV Power plant having 2.5 KVA 230V, 1-ph, 50Hz inverter * 2 nos. The load usage indicated above shall be met by solar power plant.
2. Peak Sun shine hours: 5 hours per day
3. Battery bank shall be designed for 2 days (1 + 1 "No Sun Day") of autonomy. See battery details below.
4. System voltage : 48V / 96V dc (nominal)
5. The efficiency of the Power conditioning unit and battery to be considered as 90% and 85% respectively.
6. Providing Hybrid Power Conditioning Unit (PCU) where battery can be charged through AC power Grid (EB supply) in emergency.

Note: Vendors have to quote for wattage and / or, capacity of the plant as well as inverter which shall be capable of meeting our requirement as given above .

Transmission and distribution voltage

The output voltage shall be 230 V, 1-ph, 50 Hz supplied by PCU.

Operation of the system



The schematic requirement of the Solar PV hybrid power plant is shown above. Solar Photovoltaic array produces DC electricity directly from the sun light. The Power Conditioning Unit (PCU) shall provide conditional output to support load. The power conditioning unit shall consist of MPPT charge controller and bi-directional inverter to supply continuous power to the dedicated local load with support (power) to the load coming either from the solar array, battery bank or grid/DG in that order of preference. Battery bank is required to support the load in case of longer power cuts or grid/DG unavailability.

Theory of operation

The 1-phase system incorporating a bi-directional inverter shall be designed for capability to supply continuous power to a dedicated local load with the power to the load coming either from the solar array, battery bank or grid/DG in that order of preference. It shall be capable of operation in a “grid interactive or grid charging” mode and shall automatically change over to “stand alone” operation with no break in power in the event grid moves out of range in its individual phase voltages or frequency. When the grid does come back into range, the system shall change over to “grid interactive” mode. All the available solar power from the PV array shall be utilized by using a software based control algorithm on the DC input of the PCU.

GRID INTERACTIVE or GRID CHARGING MODE

- The battery bank shall be kept at its nominated float voltage with the required charge coming from the solar array or the grid.
- The local load, up to the full instantaneous available capacity of the solar array and limited to the maximum capacity of the inverter, shall be supplied from the inverter with the balance of the energy coming from the grid/DG.

STANDALONE MODE

- The local load shall be supplied directly from the inverter with the energy coming from the solar array and the battery bank in the event the load is greater than the available array power.
- In the event the local load being less than the available array power, battery charging shall occur until the float voltage is reached whereupon the array power shall be progressively offloaded.
- The load voltage and frequency shall be controlled to the inverter's nominal specifications.
- Feeding grid is not envisaged

System requirements

- Maximum point power tracking (MPPT) of PV energy.
- No break in change over from 'grid interactive/charging' mode to 'stand alone' operation and vice versa.
- Maximum use of Solar Energy (Priority of Solar over AC mains): The grid charging shall be switched on only when battery reaches 30% Depth of discharge (DOD) apx (1.9-1.95 V/cell depending on the type of the battery) and stopped when battery has reached 60-70% DOD (2.1-2.15 V/cell depending on the type of the battery) thus ensuring solar energy is fully utilized. i.e., after grid charging has stopped, solar will have to put another 30% -40% of energy into the battery.
- When Solar, mains is available and battery is fully charged: The load shall be supplied by solar energy. Battery will act as reservoir to support in case of temporary cloud coverage and/or less sun intensity. Grid charging shall not take place unless until battery voltage goes below 1.95V/cell.
- When solar is not available but grid is available: If battery is also charged, then energy shall be drawn from the battery till such time battery voltage reaches below 1.95V/cell. Below 1.95V/cell, AC mains shall supply the load along with charging the battery bank.

- When battery is fully discharged and only solar is available: A part load may be connected to the system, there by ensuring load supply as well as battery charging.

The system shall consist of following equipments:

- 1. SPV modules of suitable rating and array.**
- 2. Power Conditioning Unit (MPPT solar charge controller+ Bi-directional Inverter)**
- 3. Module Mounting structures**
- 4. Battery Bank with accessories**
- 5. Cables and installation accessories**
- 6. Junction box**
- 7. Earthing kit**
- 8. Lightning arrestors**
- 9. Distribution boards**
- 10. PVC pipes and accessories**
- 11. Tool kit**

Technical specifications of major components of Solar PV Power Plant

1	Solar PV modules and array
2	Module mounting structures for Solar PV Modules
3	Junction Boxes
4	Power Conditioning Unit (MPPT solar charge controller+ Bi-directional Inverter)
5	Battery Bank with Accessories
6	Distribution Boards
7	Cables and installation accessories
8	Earthing and lightning protection
9	Battery and control room

Solar PV modules and array

Crystalline high power cells shall be used in the Solar Photovoltaic module. Each Solar module shall consist of 72(minimum) Photovoltaic cells redundantly interconnected and peak power rating shall not be less than 165 W. The bidder offering single module with highest wattage shall be given preference provided all other things are equal..

To connect the solar module interconnection cable shall be provided. Photo / electrical conversion efficiency of SPV module shall be greater than 12%.

Module shall be made of high transmissivity glass front surface giving high encapsulation gain and hot butyl rubber edge sealant for module protection and mechanical support.

All materials used shall have a proven history of reliable and stable operation in external applications. It shall perform satisfactorily in relative humidity up to 100% with temperatures between -10 Deg C and +85 Deg C and with stand gust up to 200km/h from back side of the panel.

Solar module shall be crystalline type, employing lamination technology using established polymer (EVA) and Tedlar or Polyester laminate.

Sample modules, representative of the production processes employed in the manufacture of the offered module shall be in accordance with the requirements of IEC 61215 or UL or CE approval. Offered module may also be intrinsically safe for being used in retail outlets. The bidder shall submit appropriate certificates.

Other general requirements of PV module

- The rated output power of any supplied module shall not vary more than 3-5% from the average power rating of all modules.
- The module frame is made of corrosion resistant materials, which is electrolytically compatible with the structural material used for mounting the module.
- Protective devices against surges at the PV module shall be provided, if required. Low voltage drop bypass and / or blocking diode(s) may also be provided, if required.
- Module Junction box (weather resistant) shall be designed for long life outdoor operation in harsh environment.
- A minimum warranty of 10 years shall be given with degradation of power generated not exceeding 10% over the entire 10 year period.
- The solar modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells from the environment. The arrangement and the material of encapsulation shall be compatible with the thermal expansion properties of the Silicon cells and the module framing arrangement/material. The encapsulation arrangement shall ensure complete moisture proofing for the entire life of the solar modules.
- Each module shall have low iron tempered glass front for strength and superior light transmission. It shall also have tough multi layered polymer back sheet for environment protection against moisture and provide high voltage electrical insulation.
- The fill factor of modules shall not be less than 0.70 (typical)
- Array capacity & PCU Capacity shall not be less than the requirement stated. Depending on size of the power plant, number of modules required shall be worked out accordingly
- Data sheet of the offered module shall be submitted along with the offer giving details of peak power, peak current, short circuit current, fill factor, open circuit voltage, peak power voltage etc.

Orientation and Tilt of PV Module

Modules alignment and tilt angle shall be calculated to provide the maximum annual energy output. This shall be decided based on the location of array installation.

Module mounting structure

- The array structure shall be made of hot dip galvanized MS angles of size not less than 50 mm x 50 mm x 6 mm size. The minimum thickness of galvanization shall be at least 70 microns. All nuts & bolts shall be made of very good quality stainless steel. The minimum clearance of the lowest part of the module structure and the developed ground level shall not be less than 500 mm. The structure shall have tilt span of 0 to 60 deg in steps of 5 deg.
- Leg assembly of module mounting structure made of different diameter galvanized tubes may be accepted. The work should be completed with supply, fitting fixing of clamps, saddles, nut & bolts etc. While quoting the rate, the bidder may mention the design & type of structure offered. All nuts & bolts shall be made of very good quality stainless steel.
- The structure shall be designed to allow easy replacement of any module and shall be in line with site requirements.
- The structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly. There shall be no requirement of welding or complex machinery at site.
- The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels at the same time it will withstand wind speed as per IS 875
- The supplier/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings.
- The drawings along with detailed design and calculations for wattage requirements shall be submitted to HPCL for approval before starting the execution work.
- PCC ARRAY FOUNDATION BASE: The legs of the structures made with GI angles will be fixed and grouted in the PCC foundation columns made with 1:2:4 cement concrete. The minimum clearance of the lowest part of any module structure shall not be less 500 mm from ground level. While making foundation design, due consideration shall be given to weight of module assembly, maximum wind speed as per Is 875 and seismic factors for the site.
- The bidder can visit the site before quoting rate for civil works. After taking in to consideration all aspects of the site, condition of soil etc.,

the bidder shall quote for civil works. No extra claim shall be entertained at post project stage. The foundation design of module structure design shall be submitted to HPCL for approval. The work will be carried out as per designs approved by HPCL.

Junction Boxes

The junction boxes shall be dust, vermin and waterproof and made of FRP. The terminals shall be connected to copper bus bar arrangement of proper sizes. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and out going cables. Suitable markings shall be provided on the bus bar for easy identification and cable ferrules shall be fitted at the cable termination points for identification. The junction boxes shall have suitable arrangement for the following:

- Combine groups of modules into independent charging sub-arrays that shall be wired to the PCU.
- Provide a test point for each sub-group for quick fault location.
- To provide group array isolation.
- The rating of the JB's shall be suitable with adequate safety factor to inter connect the Solar PV array.

Power Conditioning Unit (PCU)

As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels before powering equipment designed for nominal mains AC supply. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit" OR simply PCU. In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to maximize Solar PV array energy input into the System.

PCU refers to combination of charge controller and bi-directional inverter and shall be supplied as integrated unit.

Maximum Power Point Tracker (MPPT)

Maximum power point tracker (electronic) shall be integrated into the PCU to maximize energy drawn from the Solar PV array. The MPPT shall be microprocessor / micro-controller based to minimize power losses. The efficiency of the MPPT shall not be less than 94% and shall be suitably designed to meet array capacity.

The PCU shall be microprocessor / micro controller based suitable for automatic grid interaction. The time delay for grid interfacing should be minimum possible.

Main features of PCU

- The PCU shall be capable of complete automatic operation, including wake-up, synchronization and shut down.
- The PCU shall be self commutated and shall utilize a circuit topology and components suitably for meeting the specifications listed above at low cost, high conversion efficiency and with high reliability.
- The PCU shall be designed to withstand starting in-rush current when pump is started and provide trip free operation.
- In PCU there shall be a direct current isolation provided at the output by means of a suitable isolating transformer.
- The PCU shall include appropriate self protective and self diagnostic features to protect itself and the PV array from damage in the event of PCU component failure or from parameters - beyond the PCU's safe operating range due to internal or external causes. The self-protective features shall not allow any operation from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging.
- The PCU generated harmonics measured at the point of connection to the utility service, when operating at the rated power shall not exceed a total harmonic distortion of 3 %.
- The high voltage and power circuits of the PCU shall be separated from the low voltage and control circuits. All conductors shall be made of stranded copper and suitable insulation shall be used for the power and control cables.
- The PCU shall withstand a high voltage test of 2 kV rms, between either the input or the output terminals and the cabinet (chassis).
- Full protection against accidental open circuit, short circuit and reverse polarity at the input shall be provided.
- The PCU shall not produce Electromagnetic Interference (EMI) which may cause malfunctioning of electronic and electrical instruments including communication equipment, which are located within the facility in which the PCU is housed.
- The PCU shall include ground lugs for equipment and PV array grounding. The DC circuit ground shall be a solid, single point ground connection in accordance with prevailing national standards.
- All exposed surfaces of ferrous parts shall be thoroughly cleaned, primed and painted or otherwise suitably protected to survive a nominal 15 year design life of the unit. The PCU enclosure shall be weatherproof and capable of surviving intact under all ambient conditions. Moisture condensation and entry of rodents and insects shall be prevented in the PCU enclosure.

- Components and circuit boards mounted inside the enclosures shall be clearly identified with appropriate permanent designations, which shall - also serve to identify the items on the supplied drawings.
- All doors, covers, panels and cable exits shall have gasket or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks. All openings shall be provided with grills or screens with openings not larger than 0.95 cm (about 3/8 inch).
- In the design and fabrication of the PCU the site temperature (0 to 50 degree C), incident sunlight and the effect of ambient temperature on component life shall be considered carefully. Similar consideration shall be given to the heat sinking of MOSFET's, blocking diodes and similar components.

PCU SPECIFICATIONS

Solar Charge Controller + Inverter+ Battery Charger	
Switching device	MOSFET (Metal Oxide Semi-Conductor Field Effect Transistor)
Type	MPPT based PWM charger to charge 96V/48 V (nominal) battery bank with not less than 94% Solar charge controller efficiency
Input voltage from PV array	48 /96V (nom) 68 V/136V max
Protections	<ul style="list-style-type: none"> ➤ Short circuit protection ➤ Input under voltage / Deep discharge of battery ➤ Input surge voltage protection ➤ Over current ➤ Battery reverse polarity protection ➤ Solar array reverse blocking diode (provided in array junction box) ➤ DC rated fuse at input and AC rated fuse at output with suitable contactor/solid-state switches for safe start-up & shutdown of system ➤ Load surge current ➤ Over temperature ➤ Under / Over output voltage ➤ Under / Over frequency ➤ Automatic / manual isolation at input & output ➤ Suitable protection for solid-state switching devices

Dielectric strength	1.1kV between input/output and ground with EMI protections removed		
Cooling	Forced air cooling with temperature sensitive fan operation		
Ambient operation (max)	I. 50 DEG C		
Relative humidity	95% maximum		
Assembly & mounting	As per normal industry practice		
Finish	Epoxy powder coating		
Cable entry	From rear 200mm above ground level		
Load test at factory	Minimum 6 hours at full load		
Features	<ul style="list-style-type: none"> ➤ Bi-directional type inverter ➤ Stand-alone and hybrid mode of operation. ➤ High quality with high efficiency and reliability ➤ Microprocessor based intelligent controller ➤ Self monitoring capability. ➤ Integral design with MPPT solar charge controller and inverter ➤ Highly reliable & efficient solid-state switching devices ➤ Rated for continuous operation at full load ➤ High over-load capability of 200% surge for 10 seconds ➤ Inverter output power factor of 0.8 lag ➤ Automatic re-start facility after over load triggered shutdown ➤ Sleep mode feature: Inverter shall switch off output when output load falls below 1-2 % of rated capacity to save no load losses. 		
Efficiency	<ul style="list-style-type: none"> ➤ 90% at rated load and normal operating conditions ➤ 83% (min) at 25% load and nominal input voltage with UPF load 		
%THD	Sine wave output with 3% THD at full load UPF and nominal input voltage		
Output voltage	230V +/- 1%		
Output frequency	50Hz ± 0.5Hz		
%Regulation	2% against input voltage and load variation		
Battery charger	Bi-directional Inverter/Charger		
Indications	Inverter ON	Grid ON	
	Array ON	Inverter Under Voltage / Over Voltage	
	Inverter Overload	Inverter Over Temperature	

	Battery Low		
Enclosure	IP 30 (For indoor application)		
Weight / Dimension	The details of the inverter will be provided in the specification / user manual		
Battery type	Tubular lead acid type		

BATTERY BANK

- The batteries shall be solar photo voltaic batteries of flooded electrolyte, low maintenance, lead Acid and made of hard rubber container.
- The batteries shall use 2V cells and battery capacity is to be designed at C10 rate with end cell cut off voltage of 1.80V / cell.
- The battery shall be designed for negative temperatures prevailing a site.
- Battery terminal shall be provided with covers.
- Batteries shall be provided with micro porous vent plugs with floats.
- Charging instructions shall be provided along with the batteries.
- Suitable carrying handle shall be provided.
- A suitable battery rack with interconnections & end connector shall be provided to suitably house the batteries in the bank. The features and dimensions of the battery rack shall be provided along with the bid document.
- The batteries shall be suitable for recharging by means of solar charge controller.
- Bidder shall mention the design cycle life of batteries at 80%, 40% and 20% depth of discharge at 25 deg. C.
- The self discharge of batteries shall be less than 2 % per month.
- The charge efficiency shall be more than 90% up to 70% state of charge.
- The topping up frequency shall be >12 months.
- The batteries shall consist of individual cells, which can be carried separately with ease while transporting.

- Offered batteries shall comply to the following at 27 deg C:

10 % of DOD: 7200 cycles

50 % of DOD: 3000 cycles

80 % of DOD: 1200 cycles

Battery Rack & Accessories

Battery interconnecting links shall be provided for interconnecting the cells in series and in parallel as needed. Connectors for inter cell connection (series / parallel) shall be maintenance free screws. Insulated terminal covers shall be provided.

DC Distribution Board (DCDB)

Solar array side breaker and battery side breaker shall be housed in enclosure. These can also be housed within the PCU to save space.

AC Distribution Board (ACDB)

- An ACDB shall be provided in between PCU and load/grid interface
- It shall have 32 A MCB of suitable rating for connection and disconnection of PCU from load.

It shall have 6 A x 5 nos. MCB's to supply power to the loads

Cables and accessories

All the cables shall be supplied conforming to IS 1554 / 694 Part 1 of 1988 & shall be of 650 V/ 1.1 kV grade as per requirement. Only polyethylene copper cables shall be used. The size of the cables between array interconnections, array to junction boxes, junction boxes to PCU etc shall be so selected to keep the voltage drop and losses to the minimum.

Cables shall be of either CCI/Universal/ Finolex make. Scope of the work also includes cable laying – including in trenches -, back-filling and restoration of excavated areas to original state .

The bidder shall supply installation accessories, which are required to install and successfully commission the power plant.

Earthing and lightning protection

Earthing: The array structure of the PV yard shall be grounded properly using adequate number of earthing kits. All metal casing / shielding of the plant shall be thoroughly grounded to ensure safety of the power plant. Earth resistance readings for each site must be measured by a qualified and licensed electrical

contractor and submitted. Resistance values shall conform to either CCOE stipulations or that of IEE regulations.

Lightning: The SPV Power Plant shall be provided with lightning & over voltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc.

Metal oxide variastors shall be provided inside the Array Junction Boxes. In addition suitable MOV's (Metal Oxide Variastors) also shall be provided in the Inverter to protect the inverter from over voltage.

Battery room and control room

The bidder shall give the details of array layout and control room/battery room layout along with the offer. The room shall be provided by HPCL to meet the space requirement to house PCU, Distribution Boards and Battery bank etc.

Bill of Materials

A complete Bill of Materials inclusive of Solar PV Modules, array Junction box, main junction box, cables, Battery bank, PCU, Array mounting structures etc shall be provided along with the offer. The numbers of each component proposed for supply shall be clearly specified. The items not listed in BOM but required for successful installation/commissioning of power plants shall also be added, as required at no extra cost to HPCL.

Spare parts

Bidder shall keep stock of essential spares at their nearest service center and/or at site at their cost for 3 years of Comprehensive AMC and 1 year of warranty. However bidder shall list out spare parts required for power plant.

Installation and commissioning

- The quotation shall include cost for Installation and commissioning of power plant.
- The bidder is responsible for arranging all the accessories and measuring instruments required to smoothly commission the power plants.
- The plant shall be commissioned in the presence of HPCL authorized personnel / Consultant.
- An acceptance report shall be prepared and signed by all participating parties.

Packing, shipping and marking

The bidder shall be responsible for assuring that all commodities shipped are properly packed and protected to prevent damage or deterioration during shipment. Packaging and shipping costs shall be borne by the supplier. Customs clearance and all costs and actions associated with import duties, taxes and processing of documents within India are borne by the bidder.

Documentation

Two sets of installation manual / user manual shall be supplied along with the power plant. The manual shall include complete system details such as array lay out, schematic of the system, inverter details, working principle etc. Step by step maintenance and trouble shooting procedures shall be given in the manuals.

TECHNICAL SPECIFICATION FOR SOLAR WATER HEATING SYSTEM

Scope: Design, manufacturing, supply, installation and commissioning of 1500 litres per day capacity solar water heating system

Operation: Radiation from the Sun is collected by a solar collector converted into heat energy which transfers into the water flowing through the collectors and then the Hot water is stored in an insulated stainless steel tank.

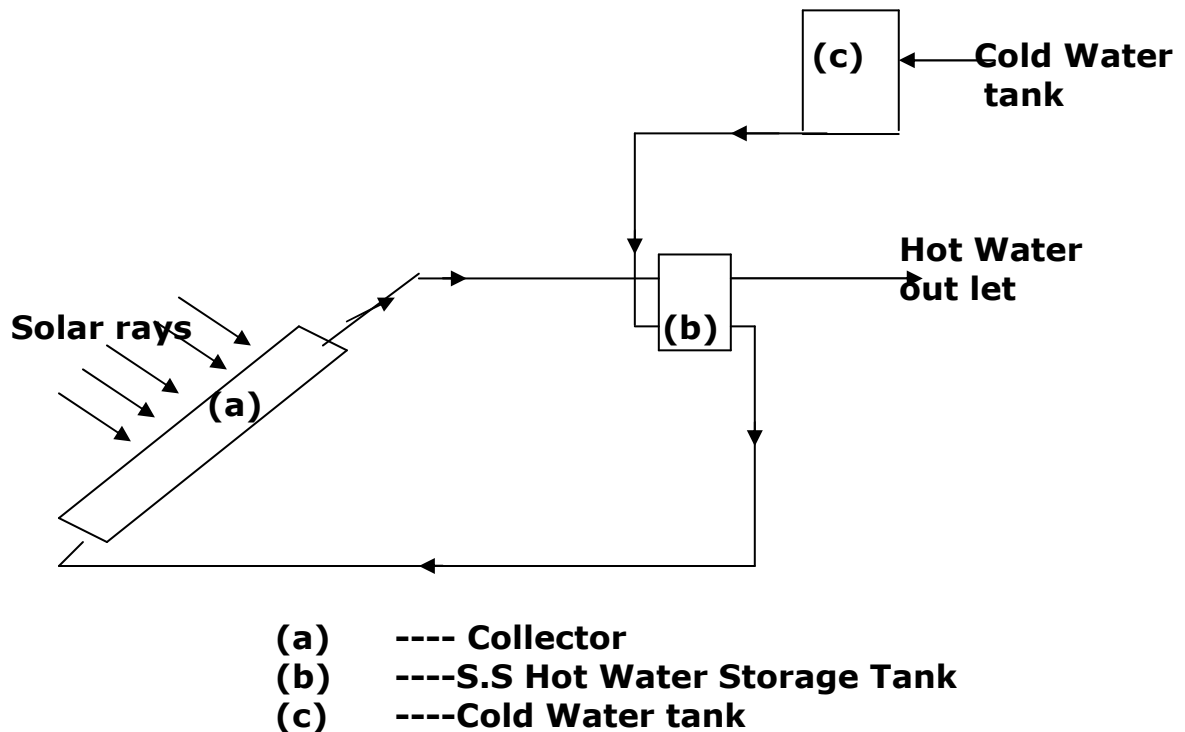
COMPONENTS OF THE SOLAR WATER HEATING SYSTEM

- 1) SOLAR COLLECTORS (Flat plate Collectors with copper tubes)
- 2) INSULATED HOT WATER TANK (SS Tank)
- 3) HOT WATER TANK AND COLLECTOR STAND ALONG WITH OTHER INSTRUMENTS.
- 4) PIPING FROM COLD WATER TANK TO SOLAR COLLECTOR AND SOLAR COLLECTOR TO HOT WATER TANK AND HOT WATER TANK TO KITCHEN .

TECHNICAL SPECIFICATIONS

Out put temperature	60 degree celcius
Type	Non HHC (not for hard water) should handle up to hardness of 300 ppm
	Non Pressurised (can not withstand more than gravity)
Type of Solar collector	Flat plate collector with copper tubes, copper fins, ultrasonically welded with black selective coating, aluminium frame, rockwool insulation
Circulation	Thermosyphon
Hot water tank	Tank made of stainless steel SS 304 grade with PUF insulation and Aluminium cladding
Stand for Collector and hot water tank	MS painted
Internal piping	To be provided
Collector painting	Painted aesthetically with golden yellow using aluminium etch primer to protect surface of the frame and increase durability
Temperature guage	To be provided
Internal piping and collector stand and stand for hot water tank	To be provided

DRAWING OF SOLAR WATER HEATER SYSTEM



Note: 1) Cold water tank is not in the scope of vendor

2) Rate shall include providing 25mm dia GI pipe medium (IS 1239) from cold water tank to collector and collector to hot water tank and hot water tank to kitchen including required gate valve, NRV, Tap etc. Approximate qty of pipe shall be 30meter. Pipe from collector to hot water tank and hot water tank to kitchen shall be insulated. (Building is G+6 structure and kitchen is in 6th floor)

3) Rate shall include lifting of hot water tank and other material to terrace (Building is G+6 structure and kitchen is in 6th floor) and civil works for grouting of stand for hot water tank and solar collector.

4) Hot water tank shall have Electrical back up heater including electrical wiring from 6th floor to hot water tank on terrace and rate quoted shall include cost of the same.

Bill of Materials

A complete Bill of Materials inclusive of Solar collector (Evacuated glass tube type), insulated hot water tank (Stainless Steel), GI pipe from cold water tank to solar Collector, insulated GI pipe from solar collector to hot water tank and hot water tank to kitchen in 6th floor etc shall be provided along with the offer. The numbers of each component proposed for supply shall be clearly specified. The items not listed in BOM but required for successful installation/commissioning of solar water heater system shall also be added, as required at no extra cost to HPCL.

Spare parts

Bidder shall keep stock of essential spares at their nearest service center and/or at site at their cost for 3 years of Comprehensive AMC and 1 year of warranty. However bidder shall list out spare parts required for solar water heater .

Installation and commissioning

- The quotation shall include cost for Installation and commissioning of solar water heater system.
- The bidder is responsible for arranging all the accessories and measuring instruments required to smoothly commission the solar water heater system.
- The solar water heater system shall be commissioned in the presence of HPCL authorized personnel / Consultant.
- An acceptance report shall be prepared and signed by all participating parties.

Packing, shipping and marking

The bidder shall be responsible for assuring that all commodities shipped are properly packed and protected to prevent damage or deterioration during shipment. Packaging and shipping costs shall be borne by the supplier. Customs clearance and all costs and actions associated with import duties, taxes and processing of documents within India are borne by the bidder.

Documentation

Two sets of installation manual / user manual shall be supplied along with the solar water heater . The manual shall include complete system details such as solar collector, schematic of the system, working principle etc. Step by step maintenance and trouble shooting procedures shall be given in the manuals.

SPECIAL CONDITIONS OF CONTRACT

1.0 GENERAL

- 1.1 Special Conditions of Contract (SCC) shall be read in conjunction with the General Conditions of Contract (GCC) also referred to as General Terms & Conditions of Works Contract, Schedule of Quantities, specifications of work, drawings and any other document forming part of this Contract wherever the context so requires.
- 1.2 Notwithstanding the sub-division of the document into these separate sections and volumes, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the Contract so far as it may be practicable to do so.
- 1.3 Where any portion of the GCC is repugnant to or at variance with any provisions of the Special Conditions of Contract, then unless a different intention appears, the provision(s) of the Special Conditions of Contract shall be deemed to override the provision(s) of GCC only to the extent that such repugnancy or variations in the Special Conditions of Contract are not possible of being reconciled with the provisions of GCC.
- 1.4 Wherever it is stated in this Bidding Document that such and such a supply is to be affected or such and such a work is to be carried out, it shall be understood that the same shall be affected and /or carried out by the Contractor at his own cost, unless a different intention is specifically and expressly stated herein or otherwise explicit from the context. Contract Price shall be deemed to have included such cost.
- 1.5 The materials, design & workmanship shall satisfy the applicable relevant Indian Standards, the job specifications contained herein & codes referred to. Where the job specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied. In the absence of any Standard / Specifications / Codes of practice for detailed specifications covering any part of the work covered in this bidding document, the instructions / directions of Engineer-in-Charge will be binding upon the Contractor.

1.6 In case of contradiction between relevant Indian standards, GCC, Special Conditions of Contract, Specifications, Drawings and Schedule of Rates, the following shall prevail in order of precedence.

- i) Detailed Purchase Order along with Statement of Agreed Variations, if any, and its enclosures .
- ii) Fax of Intent (FOI)/Letter of Intent(LOI)
- iii) Job Schedule
- iv) Special Conditions of Contract
- v) Instructions to Bidders
- vi) General Conditions of Contract
- vii) Technical Specifications
- viii) Relevant Indian Standards.
- ix) Drawings/ Data Sheets

2.0 Scope of Work & Scope of Supply

The scope of work and Scope of Supply covered in this Contract will be as described in Job Schedule , Technical Specifications, Drawings, etc.

3.0 Time Schedule

Completion period shall be 2 (two) months from the date of LOI.

4.0 Payment Terms

Payment will be released within 15 days of submission of duly certified Bills at Disbursement section at Mumbai after deduction of WCST(Works Contract Sales Tax) or VAT whichever is applicable, IT(Income Tax) and any other statutory deduction as applicable from time to time, Any MRR(Materials Received Report- An internal document forwarded by HPCL Site –in-Charge/ Engineer to Disbursement Section along with Contractor’s Bill and duly certified measurement sheets for release of payment) Deductions, LD, etc.

5.0 INCOME TAX, SERVICE TAX AND PRICES

Income Tax at the prevailing rate as applicable from time to time shall be deducted from Contractor’s Bills as per Income Tax Act and quoted rates shall be inclusive of this. Owner will issue the TDS (Tax Deduction at Source) Certificate.

6.0 Firm Prices

The contract price shall remain firm and fixed till the completion of work in all respects and no escalation in prices on any account shall be admissible to the Contractor except for statutory variations as per General Terms and Conditions (GTC).

7.0 LIQUIDATED DAMAGES

In case of any delay in completion of the work beyond the completion period, the Owner shall be entitled to be paid Liquidated Damages by the Vendor. The liquidated damages shall be initially at the rate of 0.5% (half percent) of the total contract value for every week of the delay subject to a maximum of 5% of the total contract value. The liquidated damages shall be recovered by the Owner out of the amounts payable to the vendor or from any Bank Guarantees or Deposits furnished by the Vendor or the Retention Money retained from the Bills of the vendor, either under this contract or any other contract.

8.0 SPECIAL PAYMENT TERMS

Following payment shall be made to the contractor against the running bills subject to the rate awarded to him and the clause regarding retention money as per general terms and conditions.

80% on delivery of material at site
15% on commissioning
5% on acceptance of material by HPCL

9.0 Post commissioning performance testing: The vendor has to arrange for Post commissioning performance testing of the Solar PV System (Solar power plant) and solar water heating system at site to check the rated capacity and to check the smooth functioning of the same .

10.0 PERFORMANCE GAURANTEE/WARRANTY (DEFECT LIABILTY PERIOD)

The vendor shall guarantee the Solar PV System (Solar power plant) and solar water heating system for a period of 18 months from the date of supply or 12 months from the date of successful commissioning. Any damage or defect that may arise or lie undiscovered at the time of commissioning shall be rectified or replaced by the vendor free of cost during defect liability period. The decision of the Engineer In-charge/Site-In charge/Owner shall be the final in deciding whether the defect has to be rectified or replaced.

Vendor shall be responsible for proper design, quality, workmanship, operation & maintenance of all equipment, accessories, etc. supplied by the Vendor.

Performance bank guarantee (PBG) as per HPCL format on a nationalized bank for 10% of total bill value , valid for defect liability period shall be furnished by the contractor or Retention money of 10% of the total bill value shall be deducted from contractor's bill and shall be held free of interest till the defect liability period is over.

Further Vendor shall provide written guarantee that the back – up engineering, maintenance and spare parts shall be available for a minimum period of 5 years after warranty period for all equipment supplied by the vendor .

It shall be obligatory on the part of the Vendor that during the defect liability period / warranty period, Vendor will take complete responsibility for any defect observed in the plant . Cost of all spares , equipment, instruments & services,(be preventive & breakdown) to take care of the above points has to be borne by the vendor during the warranty period .In case of Failure to attend to these promptly, these will be attended through alternate agency at vendor's risk and cost.

The vendor's service engineer will check and service of each equipment and instrument and its accessories and maintain them in good working condition. Any consumables required and servicing the equipments shall be arranged by the Vendor at no extra cost to HPCL during Warranty.

Vendor shall maintain the Solar PV System (Solar power plant) and solar water heating system during warranty period free of cost including cost of spares and consumables if any . No extra payment will be made on account of the maintenance and spares if required during warranty period.

Vendor Shall provide service engineer with minimum one year experience /familiarity in erection / commissioning / maintenance of Solar PV System (Solar power plant) and solar water heating system and should visit site once in a month for taking care of normal operation, all Preventive & Breakdown Maintenance during the total warranty period. The service engineer shall submit monthly report on the System operation, preventive and Breakdown maintenance carried out. This includes backup coverage for such engineers for vacations, illness, training etc at no additional costs.

11.0 POST WARRANTY COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (C A M C)

Solar power Plant and Solar water heater to be maintained by vendor for a period of 3 (three) years after expiry of warranty period (defect liability period). Cost of all consumables , spares, equipment, instruments and Services, (preventive & Breakdown) to take care of maintenance to be borne by the vendor during the AMC period and rate quoted shall include cost of the same. In case of failure to attend service call within 2 days, these will be attended through alternate agency at vendor's risk and cost.

The Post warranty comprehensive AMC shall be a separate contract and shall be signed at beginning of the respective year. The post warranty Comprehensive AMC rates quoted in price shall be included in the evaluation.

Monthly one visit for preventive maintenance and break down maintenance as & when required are included in scope of A.M.C (Annual Maintenance Contract).

The vendor's service engineer will check each equipment & instrument and its accessories and maintain them in good working condition. Any consumables required for servicing the equipments shall be arranged by the Vendor at no extra cost to HPCL during CAMC.

HPCL can terminate the annual maintenance contract by giving three months notice advance to the vendor in case of unsatisfactory service.

During the AMC, Vendor will hold the inventory of minimum spares at the site required for maintaining the system in operating condition. The vendor shall ensure availability of spares (at minimum) at all times at the site and in the custody of HPCL location – in – charge. The vendor should do proper spares management by carrying out periodical testing of the spares, safeguards against obsolescence, any upgradation, timely replenishment, etc.

The Vendor must note that all commissioning spares and the spares / consumables during warranty and comprehensive CAMC shall be supplied by the vendor free of cost.

Agreement for the post warranty CAMC shall be entered before the start of each year. HPCL reserves the right to sign the post warranty AMC for all 3 years or part of it or none or to extend the contract after 3 years subject to mutual consent.