**TECHNICAL PROPOSAL**

The scope of this document is to provide the functional and technical requirements for solar street lights to the client. Solar power supply system of 48V DC nominal voltage with low maintenance Lithium Ion Battery banks, solar cells, charge control unit, power cables, and other necessary accessories and installations material shall be supplied for the power generation through solar light for energy efficiency measures. All the supply items shall be as per the technical specification mentioned in the later section of this document.

1.2.1 The quantity and capacity of solar modules, solar batteries and charge control units are as mentioned in the later section of this documents.

1.2.2 All the equipment /battery sets supplied against this tender shall operate efficiently under normal use during warranty period of one year from delivery date. The equipment /battery set or any part thereof shall be replaced by the supplier free of cost, if found defective during warranty period.

1.2.3 A training shall be arranged at supplier premises by the successful bidder for installation and maintenance of the power plant delivered under the contract.

**2 ENVIRONMENTAL CONDITIONS**

Continuous Performance:

The batteries shall work continuously in the following environmental conditions.

Ambient Temperature 0°C to 55°C

Relative Humidity: Up to 100%.

2.2 Optimum Environmental Conditions:

2.2.1 During shipment and storage prior to installation, the batteries might be placed in premises without any air conditioning and exposed to the following climatic conditions: -

i. Ambient Temperature: -15°C to 55ºC

ii. Relative Humidity: Up to 100%.

Hence the batteries shall withstand above-mentioned environmental conditions during shipment and storage.

**PHOTOVOLTAIC.**

The best way to utilize the solar energy is no doubt through photovoltaics' which converts the sun energy directly into electricity – the most demanding type of energy. Photovoltaic is particularly suitable for small power requirements and remote area applications.

Energy technologists are now convinced that the development and adaptation of solar energy technologies can bring a revolution in the life style and living standards of low-income people in extreme remote areas.

SOLAR MODULES:

a) The solar panels shall be of high efficiency monocrystalline cells with anti-reflective coating. The module efficiency shall not be less than 15%. The modules shall be weather proof and its front shall be of high strength tempered glass. Module design conforms to MNRE Approved design.

b) Solar modules shall be provided with lightweight aluminum and pre-drilled mounting holes' frames.

c) The efficient operation period of module shall be twenty-five (25) years. The drop-in output power of the module shall be at least 1% per year.

d) The solar modules are of 12V nominal operating voltage. All solar cells shall match electrically to assure the greatest power output.

Ambient temperature: -20°C to 75°C

Relative humidity: Up to 100%

**SOLAR MODULES MOUNTING STRUCTURE**

Solar mounting structure stand shall be adjustable to obtain best tilt angles for its installation.

4.1 Galvanized steel and pre -drilled mounting holes' structure frames shall provide for easy installation of solar modules

4.2 Mounting structure shall resist corrosive forces namely wind, rain, sand and solar radiation

**UNIVERSAL CHARGE CONTROL UNIT**

An industrial class universal charge controller for automatically managing the battery charging

shall be provided. The control unit shall be solid-state electromechanical device to control the charging of batteries from solar modules and to protect the batteries from excessive charge, discharge and reverse power transfer.

The charge controller shall have the following features:

i) Boost, Equalize and Float charging of batteries

ii) Temperature compensated regulation voltages. Adjustable setting of voltage and current. Comprehensive metering.

iii) Equipped with Lightening protection and Overload protection

iv) Reverse battery polarity protection. Low battery voltage protection. Adjustable low and high voltage disconnection.

**Batteries**

I. Lithium Ion is a low maintenance battery.

II. Low Maintenance - no periodic discharge is needed

III. The energy density of lithium-ion is typically twice that of the standard nickel-cadmium

IV. Recommended storage temperatures of 15°C (59°F)

Solar Integrated Street Light System.

i) Integrated Street light system has the battery and charge controller integrated below the panels to give the freedom from battery theft

ii) With Lithium Ion batteries installed, the system becomes completely maintenance free

iii) The panels and the luminaires provided with 360° rotation for flexible setting up

iv) More than 12 Hrs. Backup

v) Panels have adjustable levels of moving the angles up or down with regards to the sun direction

vi) Automatic Dusk to Dawn operations program to have better performance.

vii) 6 hours' full mode and 6 hours' dim mode 50% dimming mode operations programmed for better performance.

viii) High lumens LED Luminaires

ix) IP65, IP66 Ingress protection

x)

**Pole**

• Recommended Height of the Pole should be 4.5 meters above ground

• G.I. Pipe with outer diameter to be 2.5” and thickness 3.65mm

• Installation of poles out of scope .

**20W Integrated LED SOLAR STREET LIGHT**

LUMINAIRE

SYSTEM WATTAGE (LED + DRIVER) 20W

SYSTEM OUT PUT (AFTERACCOUNTING ALL LOSES) 2800 LUMENS

LED LEVEL EFFICIENCY 140 LUMENS/WATT

LED LIFE 50,000 HOURS

DRIVER EFFICIENCY 85%

DRIVER TYPE DC-DC

HOUSING IP 65 ALUMINIUM DIE-CAST HOUSING, IP66

LUMINAIRE ARM POWDER COATED

SOLAR PANEL CAPACITY 60 Wp

SOLAR CELLS POLYCRYSTALLINE SILICON CELSS

SOLAR CELL EFFICIENCY 13.50%

JUNCTION BOX IP65, IP66

MOUNTING FRAME POWDER COATED

COUNTRY OF MANUFACTURER INDIA

**MNRE APPROVED :YES**

BATTERY AND BATTERY BOX

CAPACITY 12V, 19.8Ah LI-ION BATTERY

TYPE LI-ION BATTERY OF LOW MAINTENANCE

PERMITTED DEPTH OF DISCHARGE 70%

BATTERY BACKUP 12 HOURS

MOUNTING POSITION IN BUILT BOX WITH P.V. PANEL STRUCTURE

BIS Certified : YES

BATTERY BOX MATERIAL & PROTECTION M.S. SHEET WITH POWDER COATED

CHARGE CONTROLLER TYPE PWM BASED

RATING 11.1V NOMINAL, LOAD 2.1A MAX.SMPS FOR LED LOAD.

EFFICIENCY 85%

ENCLOSURE IP65, IP66

**POLE**

TYPE MS GALVANIZED POLE/ OCTAGONAL GALVANIZED POLE

HEIGHT 5 MTRS Above ground

WIND SPEED RESISTANCE 170kmph SYSTEM

DUTY CYCLE 4 Hrs Full and 8 hrs 50% dimming

SYSTEM PROTECTIONS OVERCHARGE PROTECTION FOR BATTERY

DEEP DISCHARGE PROTECTION FOR BATTERY

REVERSE POLARITY PROTECTION FOR PANEL AND BATTERY

TEMPERATURE COMPENSATED CHARGING FOR BATTERY

LIGHTNING PROTECTION

INDICATIONS CHARGE INDICATION THROUGH GREEN LED INDICATION

DISCHARGE INDICATION RED LED

BATTERY UNDER VOLTAGE RED LED ON/OFF

**40W Integrated LED Solar Street Light**

LUMINAIRE

SYSTEM WATTAGE (LED + DRIVER) 40W

SYSTEM OUT PUT (AFTER ACCOUNTING ALL LOSES) 16,800 Lumens

LED LEVEL EFFICIENCY 140 Lumens/Watt

LED LIFE 50,000 Hours

DRIVER EFFICIENCY 85%

DRIVER TYPE DC-DC

HOUSING IP 65 ALUMINIUM DIE-CAST HOUSING, IP66

LUMINAIRE ARM POWDER COATED

SOLAR PANEL CAPACITY 120 Wp

SOLAR CELLS POLYCRYSTALLINE SILICON CELSS

SOLAR CELL EFFICIENCY 13.50%

JUNCTION BOX IP65, IP66

MOUNTING FRAME POWDER COATED

COUNTRY OF MANUFACTURER INDIA

MNRE APPROVED YES

BATTERY AND BATTERY BOX

**CAPACITY 12V, 39.6 Ah Li- Ion BATTERY**

TYPE LI-ION BATTERY OF LOW MAINTENANCE

PERMITTED DEPTH OF DISCHARGE 70%

BATTERY BACKUP 12 Hours

MOUNTING POSITION IN BUILT BOX WITH P.V. PANEL STRUCTURE

BIS Certified YES

BATTERY BOX MATERIAL &

PROTECTION M.S. SHEET WITH POWDER COATED

CHARGE CONTROLLER TYPE PWM BASED

RATING 11.1V NOMINAL, LOAD 2.1A MAX.SMPS FOR LED LOAD.

EFFICIENCY 85%

ENCLOSURE IP65, IP66

POLE

TYPE MS GALVANIZED POLE/ OCTAGONAL GALVANIZED POLE

HEIGHT 5 MTRS Above ground

SYSTEM REQUIREMENTS

DUTY CYCLE 4 Hrs Full and 8 hrs 50% dimming

SYSTEM PROTECTIONS OVERCHARGE PROTECTION FOR BATTERY

DEEP DISCHARGE PROTECTION FOR BATTERY

REVERSE POLARITY PROTECTION FOR PANEL AND BATTERY

TEMPERATURE COMPENSATED CHARGING FOR BATTERY

LIGHTNING PROTECTION

INDICATIONS CHARGE INDICATION THROUGH GREEN LED INDICATION

DISCHARGE INDICATION RED LED

BATTERY UNDER VOLTAGE RED LED ON/OFF