

**AMENDMENT-1 (Dated: 24.10.2017)**

NIT No: RECPDCL/LT/J&amp;K/SOLAR/2017-18/2572

**Electrification of Un-electrified Villages in Jammu & Kashmir State by installing Solar Stand alone systems including 5-years Comprehensive Maintenance**

| Package | Name of Package  | No. of Villages |
|---------|------------------|-----------------|
| 3       | <u>Kupwara-I</u> | 5               |

| S. No. | Reference   | Existing Clause  | Amended clause   |
|--------|---|--|--|
| 1      | DETAILED SCOPE OF WORK Section-4  | Design, engineering, manufacture, testing, supply including transportation up to designated Store Location and storage and delivery of Solar Home Power Packs (with PV panel, MPPT & charge controller cum inverter module, battery and accessories), installation including 05 (five) years' comprehensive Maintenance and including supply of spares as per the following specifications, terms and conditions | Design, engineering, manufacture, testing, supply including transportation up to F.O.R destination basis (beneficiary location) and storage and delivery of Solar based Home Power Packs: A. C. Model, 300 Wp each for every un-electrified household (with PV panel/module, MPPT & charge controller cum inverter, battery and accessories), installation including 05 (five) years' comprehensive Maintenance and including supply of spares as per the following specifications, terms and conditions |
| 2      | 'TABLE OF CONTENTS', Sr. No. 8 ANNEXURE – 1   | TECHNICAL SPECIFICATIONS OF <u>GRID CONNECTED ROOFTOP SOLAR PV POWER PLANT</u>   | TECHNICAL SPECIFICATIONS OF <u>OFF GRID SOLAR PV STAND ALONE SYSTEMS</u>   |
| 3      | Battery of SECTION-4 (DETAILED SCOPE OF WORK), A Solar Home Lighting System             | Battery 75 Ah, 24V, @C/10  | As per MNRE Technical specifications, Battery should be of 24V/120Ah - C/10 Rated ; Tubular sealed maintenance free GEL type.  |
| 4      | Annexure-5 TECHNICAL BID  | MAKE (Manufacturer) as mentioned in the floated tender   | MAKE (Manufacturer) that is complying MNRE specifications.   |
| 5      | Clause 10 - PAYMENT TERMS of Section 7, COMMERCIAL TERMS, CONDITIONS & OTHER PROVISIONS | Ratios of payments:<br>Supply receipt & acceptance (50%)<br><br>Erection, testing, and commissioning (30%)<br><br>Successful completion of comprehensive maintenance - Half yearly basis (20%)   | Ratios of payments:<br>Supply receipt & acceptance (60%)<br><br>Erection, testing, and commissioning (30%)<br><br>Successful completion of comprehensive maintenance - Half yearly basis (10%)   |

|                     |   |
|---------------------|---|
| Sl. No.             | 6   |
| Reference           | <b>A: Solar Home Lighting System of SECTION-4 (DETAILED SCOPE OF WORK)</b>  |
| Existing Clause (s) | As per floated Tender   |
| Amended clause (s)  | <p>A. Solar based Home Power Packs: A. C. Model, 300 Wp<br/>As per MNRE technical specifications, A Solar Home System (SHS) should consists of a PV module, control electronics, battery, inter-connecting cables and an inverter.<br/>The System consists of:</p> <p>a) SPV Module (with Module Mounting Structure) : 300 Wp<br/>b) SPV Module Mounting Structure on Pole: A corrosion resistant metallic frame structure to be provided along with PV modules which shall be suitable for fixing on the pole of 3 mtr length, 3" dia. (40NB). The frame structure should have provision so that the module can be oriented at the suitable tilt angle.</p> <p>c) Battery: 24V/120Ah - C/10 Rated ; Tubular sealed maintenance free GEL type<br/>d) Battery Stand: A vented plastic/ wooden/ metallic box with acid proof corrosion resistant paint. A vented, acid proof and corrosion resistant metallic box or wooden box or plastic box made of Poly propylene - Copolymer (PP-CP) with a locking arrangement for should be provided for housing the battery.</p> <p>e) Solar Charge Controller with MPPT: 24V, 15 A<br/>f) Solar Inverter: 24V, 300VA, Pure Sine wave (THD&lt;5%)<br/>g) AC Load (Supply &amp; connecting): Maximum 100 Watt AC load for 6-7 Hours/ day and should have 100 Watt Load limiter (if end user puts more than 100 Watt AC load, it should trip/avoid connection of more than 100 Watt)</p> <ul style="list-style-type: none"> <li>• 5 Nos. of AC White Light Emitting Diode (W-LED) Luminaire (max. 6.0 Watts each ) with holder for 6 Hrs. / day usage</li> <li>• 3-Pin 230V AC, 5 Amp Power connection point</li> <li>• Provision of AC outlet for operating the radio and for Mobile Phone Charging</li> </ul> <p>h) Cables and Wiring: ISI marked system wiring should be provided as per following:</p> <ul style="list-style-type: none"> <li>• Panel to Inverter/charge controller: Min. 2 core 4 sq. mm flexible multi strand copper conductor cable as per IS 694. Cable between panel to Solar DC charge controller shall be fixed properly with cable ties and shall be laid underground or enclosed in pipe as per CPWD specifications between installation support and household.</li> <li>• Inverter/Charge controller to battery: Min. 2 core 4 sq. mm flexible multi strand copper conductor cable as per IS 694</li> <li>• Battery to battery connections: Min. 2 core 4 sq. mm flexible multi-strand copper conductor cable as per IS 694</li> </ul> <p>All cables shall be terminated using copper lugs (ring type) duly crimped by a crimping machine. The cable shall be free of joints.<br/>Wiring fixtures: Rigid non-metallic 12mm dia conduits for electrical installations as per IS-2509 (latest amendment) having ISI stamping to be used for all system and internal wiring works. The wires must be properly dressed and fixed on supporting structure at 1 feet intervals. Suitable tying materials like nylon cable ties or 16/18 SWG insulated GI wire shall</p> |

|  |   |
|--|---|
|  | <p>be used to tie / dress the wire at interval of 1 ft. Depending on size of wall structure available at beneficiary house, decision shall be taken to provide length of cable ties. In case brick wall or solid structure of house is available for wiring, clips may be provided at 1 feet distance to hold the rigid nonmetallic 12mm dia conduits pipes. 25 w power plug, USB port shall be installed on a switch board properly installed on wall structure. At all corners wiring should be dressed properly using round corners etc.</p> <p>The detailed technical specification of cable ties shall be included as mentioned below: -<br/> Non-releasable Nylon Cable Ties shall be used suitable for continuous use on -40 degree to +85 degree centigrade temperature. It should be MIL 23190 E Tensile Strength complied cable ties having flame resistance capacity in accordance with UL 94V2. Following sizes of cable ties shall be used depending upon requirement at site</p> <p>(a) 120mm Long - 4.8mm Wide<br/> (b) 200mm Long - 4.8mm Wide<br/> (c) 430mm Long - 4.8mm Wide</p> <p><b>(VENDORS HAVE TO SUPPLY &amp; CONNECT ALL ABOVE SPECIFIED ITEMS ALONG WITH SOLAR DEVICES. SUPPLY OF FAN &amp; TV ITEMS IS NOT IN THE SCOPE. GIVING/PROVIDING POWER CONNECTIONS TO FAN &amp; TV ITEMS IS ALSO PART OF PROJECT SCOPE)</b></p> |
|--|---|

|                     |   |
|---------------------|---|
| Sl. No.             | 7   |
| Reference           | Annexure-1 TECHNICAL SEPCIFICATIONS   |
| Existing Clause (s) | As per floated Tender   |
| Amended clause (s)  | <p><b>Technical Specifications should be as per MNRE specifications</b></p> <p><b>PV MODULE (S)</b></p> <p>I. Indigenously manufactured PV modules should be used</p> <p>II. The PV modules should be made up of crystalline silicon solar cells and must have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 from an NABL or IECQ accredited Laboratory.</p> <p>III. <b>The module efficiency should not be less than 14%.</b></p> <p>IV. The terminal box on the module should have a provision for opening, for replacing the cable, if required.</p> <p>V. There should be a Name Plate fixed inside the module which will give:</p> <p>a. Name of the Manufacturer or Distinctive Logo.<br/> b. Model Number<br/> c. Serial Number<br/> d. Year of manufacture</p> <p>VI. A distinctive serial number starting with NSM will be engraved on the frame of the module or screen printed on the tedlar sheet of the module.</p> <p><b>BATTERY</b></p> <p>I. The battery should be Tubular sealed maintenance free GEL type</p> <p>II. 75 % of the rated capacity of the battery should be between fully charged &amp; load cut off conditions.</p> <p>III. Battery should conform to the latest BIS/ International standards.</p> <p><b>LIGHT SOURCE</b></p> |

- I. The luminaries should use white LEDs. The colour temperature of white LEDs should be in the range of 5500 $\circ$ K – 6500 $\circ$ K. Use of LEDs which emit ultraviolet light will not be permitted.
- II. The light output from the white LED light source should be constant through-out the operation of the lights.
- III. The lamps should be housed in an assembly suitable for indoor use with an appropriate heat sink to dissipate the heat generated by LEDs during operation. The temperature of LED should not increase more than 10 $\circ$  above room temperature. This condition should be complied for 5 hours of operation of the lamp at a stretch while battery operating at any voltage between the loads disconnect and the charge regulation set point.
- IV. The luminaries must use the optics and diffuser in order to have uniform and glare free light.
- V. The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of white LEDs used in the lighting system must be furnished along with the system.
- VI. All Luminaries should have a built in ON/OFF switch and fuse.

#### **ELECTRONICS**

- I. Electronics should operate at 24 V and should have adequate temperature compensation arrangement for proper charging of the battery throughout the year.
- II. Inverter should be with “THD” less than 5% and Efficiency more than 90 %.
- III. Necessary lengths of wires / cables, switches and fuses should be provided.
- IV. The system should have separate ports for connecting each load along with a charging port for mobile and laptop.
- v. The idle current i.e. when there is no load (& inverter is switched OFF, in case of A.C. Systems) and no display, it should be less than 150 mA.
- VI. The voltage drop from module terminals to the battery terminals should not exceed 1.0 volts including the dropage across the diode and the cable when measured at maximum charging current.
- VII. The PCB containing the electronics should be capable of solder free installation and replacement.
- VIII. Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.
- IX. The inverter output AC voltage should not change with the decreased battery voltage in the operating voltage range of the battery
- X. Overall total Efficiency of the Electronics should be minimum 85%

#### **ELECTRONIC PROTECTIONS**

- I. Adequate protection is to be incorporated under “No Load” condition, e.g. when the lamps and other loads are removed and the system is switched ON.
- II. The system should have protection against battery overcharge, deep discharge condition.
- III. Load reconnect should be provided at 90 % of the battery capacity status.

- IV. Adequate protection should be provided against battery reverse polarity.
- V. Fuses should be provided to protect against short circuit conditions.
- VI. Protection for reverse flow of current through the PV module(s) should be provided.

#### **MECHANICAL COMPONENTS**

- (i) Corrosion resistant frame structure should be provided to hold the SPV module.
- (ii) The frame structure should have provision to adjust its angle of inclination to the horizontal, so that it can be installed at the specified tilt angle.
- (iii) Light source should be either for wall mounted or ceiling mounted or can be hung from the ceiling in a stable manner, as per site requirements.
- (iv) A vented plastic/ wooden/ metallic box with acid proof corrosion resistant paint for housing the storage battery indoors should be provided.

#### **INDICATORS**

- The system should have two indicators, green and red.
- The green indicator should indicate the charging under progress and should glow only when the charging is taking place. It should stop glowing when the battery is fully charged.
- Red indicator should indicate the battery “Load Cut Off” condition

#### **QUALITY AND WARRANTY**

- (i) **The Solar home system including Battery will be warranted for a period of five years from the date of supply.**
- (ii) **The PV module(s) will be warranted for a minimum period of 25 years from the date of supply.** PV modules used in Solar Home Lighting System must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.
- (iii) The Warranty Card to be supplied with the system must contain the details of the system. The manufacturers can also provide additional information about the system and conditions of warranty as necessary.

#### **OPERATION and MAINTENANCE MANUAL**

An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the Solar Home System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaics.
- A small write-up (with a block diagram) on Solar Home Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Significance of indicators.
- Type, Model number, voltage & capacity of the battery, used in the system.
- The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of W-LEDs used in the lighting system must be indicated in the manual.
- Clear instructions about mounting of PV module(s).
- Clear instructions on regular maintenance and trouble shooting of the Solar Home Lighting System.
- DO's and DONT's.

|  |  |
|--|--|
|  | <ul style="list-style-type: none"><li>• Name and address of the contact person for repair and maintenance.</li></ul> |
|--|--|

\*\*\*\*\*