

BID DOCUMENT
for
Design, Manufacturing, Supply, Installation & Commissioning
And
5 years Operation and Maintenance of 2 X 200 kWp SPV Power Plant at Kharu,
Leh-Ladakh



NIT NO: 14 of 2014-15

LREDA/SPV/2014-15/14

Due Date: 20/12/2014

At

Ladakh Renewable Energy Development Agency (LREDA)
Ladakh Autonomous Hill Development Council (LAHDC), Leh-Ladakh
Block II, 1st Floor, Council Secretariat, Leh-Ladakh

**LADAKH RENEWABLE ENERGY DEVELOPMENT AGENCY (LREDA), LADAKH
AUTONOMOUS HILL DEVELOPMENT COUNCIL (LAHDC), LEH-LADAKH**

TENDER NOTICE No: 14 of 2014-15

**Subject: Design, Supply, Installation & Commissioning, Performance Testing and 5 years
Operation & Maintenance of 2 X 200 kWp SPV Power Plant at Kharu, Leh-Ladakh**

For and on behalf of the Chief Executive Councillor/Chairman, LAHDC, Leh sealed tenders affixed with Rs.5/= revenue stamps are invited from reputed Solar Photo Voltaic (SPV) Module manufacturers for the supply and installation of SPV Power Plants of 2 X 200 kWp capacity. The firm must have ISO 9001 and ISO 14001 certification, manufacturing facilities for SPV Module in India & should have a service centre at Leh. The tenders should be addressed to the Project Director, Ladakh Renewable Energy Development Agency, Leh, Ladakh J&K and should reach the office of the same on or before 2:00 p.m.

| S No. | Description | Details |
|--------------|---|---|
| 1 | Noticing Inviting Tender (NIT) No. | 14 of 2014-15 (LREDA/SPV/2014-15/14) |
| 2 | Scope of Work | Design, Procurement, Supply, Installation, Commissioning, Testing and 5 years operation & maintenance of 200 kWp X 2 kWp SPV Power Plant at Kharu, Leh-Ladakh |
| 3 | Place of Issue & submission of bid document and address for communication | Ladakh Renewable Energy Development Agency, Block II, 1 st Floor, Council Secretariat Complex, Leh-Ladakh, 194101, J&K |
| 4 | Period of availability of bid document | 21/11/2014 – 20/12/2014 |
| 5 | Last Date and Time of Submission of Tender | 20/12/2014 before 2:00 P.M. |
| 6 | Date and Time of Opening of Technical and Commercial Bid | 20/12/2014 after 3:00 P.M. |
| 7 | Date and Time of opening of Price Bid | Within 10 days of opening of Technical and Commercial Bid |
| 8 | Validity of Offer | 6 months from the date of submission of tender |
| 9 | Time of Completion | 30 th September 2015 |

| | | |
|----|---------------------------------------|---|
| 10 | Cost of Bid Document (non-refundable) | Rs. 3000/- |
| 11 | Earnest Money (EMD) - refundable | Rs. 19,00,000/- (Nineteen Lacs Only) |
| 12 | Validity of Earnest Money | 6 months from the submission of bid (in the form of Demand Draft or Bank Guarantee from a nationalized/scheduled Bank in favour of Project Director, LREDA-LAHDC, Leh-Ladakh) |

A pre-bid meeting will be held on 19/12/2014 at 11:00 hrs. at the office of the undersigned to clarify issues and to answer questions on the matters that may be raised

Eligibility Criteria and other details can be seen in the bidding documents and can be downloaded from www.ladakhenergy.org

No: LREDA/SPV/2014-15/14

Dated: 21/11/2014

-Signed-

Project Director
LREDA-LAHDC
Leh-Ladakh

Form -F1 (to be submitted with technical bid – Part I)

SCHEDULE OF GENERAL PARTICULARS OF BIDDER

1. Name of the bidder :
2. Postal address :
3. Telegraphic address :
4. Telephone/Telex/Fax etc :
5. Name and designation of the representative of bidder to whom all reference shall be made to expeditious technical coordination :
6. Amount and reference of earnest money deposited :
7. Financial capacity of the contractor/firm for carrying out the work (Annual Turnover during last three years of contractor/ firm)
8. Has anything extra than price of one item (As mentioned in price schedule) has been written in the price schedule
9. Experience of executing similar type of projects

Signature of the Bidder:

Date:

FORM-II (to be submitted with commercial bid – Part II)

To,

The Project Director
Ladakh Renewable Energy Development Agency
Ladakh Autonomous Hill Development Council,
Leh Ladakh
JAMMU AND KASHMIR

Subject: “Design, Manufacture, Procurement, Supply, Installation and Commissioning, Performance Testing, and 5 years of operation & maintenance of 2 X 200 kWp SPV Power Plant at Kharu in Leh District of Jammu and Kashmir”

Sir,

In compliance with your invitation for tender, the undersigned hereby offers for “*Design, Manufacture, Procurement, Supply, Installation and Commissioning, Performance Testing, and 5 years of operation & maintenance of 2 X 200 kWp SPV Power Plant at Kharu in Leh District of Jammu and Kashmir*” in accordance with the provisions of the contract and agrees that upon receipt of written notice of award of the contract and within 07 calendar days, the undersigned will execute agreement in accordance with the tender as accepted.

The undersigned further agrees that if awarded the contract, we will commence this work within 30 days after the date of receipt of work order and that we will carry out the work within the time limit fixed in accordance with the conditions of the contract.

Earnest Money for Rs 19,00,000.00 (Rupees Nineteen lacs only) is enclosed as bank draft no./bank guarantee no:..... Date: Payable at
Name of bank

Bidder is

A corporation organized in the state of

Signature

Title

Address

OFFICE OF THE PROJECT DIRECTOR, LADAKH RENEWABLE ENERGY DEVELOPMENT AGENCY, LADAKH AUTONOMOUS HILL DEVELOPMENT COUNCIL (LAHDC), LEH-LADAKH

NIT NO: 14 of 2014-15

For and on behalf of the Chief Executive Councillor/Chairman, LAHDC, Leh sealed tenders affixed with Rs.5/= revenue stamps are invited from reputed Solar Photo Voltaic (SPV) Module manufacturers for the supply and installation of SPV Power Plants of 2 X 200 kWp capacity. The firm must have ISO 9001 and ISO 14001 certification, manufacturing facilities for SPV Module in India & should have a service centre at Leh. The tenders should be addressed to the Project Director, Ladakh Renewable Energy Development Agency, Leh, Ladakh J&K and should reach the office of the same on or before 2:00 p.m. as per the following terms/conditions and specifications:

Power Plant Location

| <i>Sl. No.</i> | <i>Name of Defense Unit</i> | <i>Block</i> | <i>Power Plant Capacity (kW)</i> | <i>Distance from Leh (km)</i> | <i>Type of Road</i> |
|----------------|-----------------------------|--------------|----------------------------------|-------------------------------|---------------------|
| 1 | Kharu | Leh | 2 X 200 | 20 | Motorable |

1. Scope of Work

The broad scope of the works includes the design, procurement, supply, installation and commissioning, testing and operation and maintenance for a period of 5 years of a 200 kWp X 2 Solar Photovoltaic Power Plant based to be commissioned at Kharu, Leh-Ladakh, Jammu & Kashmir.

2. Minimum Criterion for Bidding

The bidder must have following minimum criterion for bidding:

- a. The bidder must have ISO 9001 certification for quality management systems.
- b. The bidder must have ISO 14001 certification for environmental requirements.
- c. The bidder must have annual turnover of Rs. 200 Crores in the last financial year.
- d. Only Indian manufacturers of solar cells and solar PV modules can participate in the bidding. Certification of the same should be attached.
- e. The bidder must have solar module manufacturing facility in India and offered modules should be manufactured in accordance with IEC 61215 Edition II for meeting quality standards of crystalline silicon solar cell modules.
- f. The bidder must qualify to IEC 61730 (Part I and Part II) for safety qualification testing.
- g. The bidder must have experience of supplying, installing and commissioning Solar Photo-Voltaic Power Plants industry for more than 2 years in India.
- h. The bidder must have his service centre in Leh.
- i. The bidder must be a total integrated system designer which is inclusive of solar modules, solar charge controller, junction boxes, and mounting structures and monitoring equipment.
- j. The bidder must ensure that the battery manufacturer/supplier has ISO 9001 certification and the batteries are manufactures as per relevant BIS standards.
- k. Company authorized dealers or agencies shall not be allowed to participate in the tender.

1. Detailed specifications of the following components of the power plant must be made available during the tender opening date. For those bidders having tenders submitted without the detailed components, the price bid shall not be opened.
 1. Sample of the solar panel quoted for each power plant
 2. Sample of the battery quoted for each power plant
 3. Detailed Specification of PCU for the power plant to be submitted

3. Experience of the Bidder

- a. A comprehensive list of past projects implemented, by the bidder in India or abroad, indicating clients, dates, size of projects and any other relevant material should be included in the offer.
- b. The bidder must have sufficient experience and expertise in the field of SPV Power Plants and should have completed the supply, installation and commissioning and maintaining atleast five SPV power plants with battery back-up of minimum 100 kWp capacity. Records shall be produced for the same.
- c. Experience in installation of SPV Power Plants in hilly or mountainous terrains is a must. Experience of installations carried out in hilly Indian states shall be produced in this regard.

I. INSTRUCTIONS, TERMS AND CONDITIONS:

1. The tender should be in three parts viz. Part I, Part II and Part III as described in Clause 2 below. These should be in separate envelopes duly super-scribed as Part I, Part II and Part III, NIT No. and due date. Sealed envelopes containing all the three parts should then be placed in a larger envelope, which should be sealed, and super-scribed by the given NIT No., due date and name of the tenderer. **Tenders not submitted along these lines shall not be opened.**

Clause 2

2. **PART I:** - Part I of the tender should be super-scribed as “***Part I, Technical Details for NIT No 14 of 2014-15***” and should contain

Technical Details:

- a. The bidder ISO 9001 certificate to be enclosed
- b. The bidder ISO 14001 certificate to be enclosed
- c. The bidder must ensure that the battery manufacturer/supplier has ISO 9001 certification and batteries; certificate to be enclosed.
- d. The bidder must have turnover of Rs.200 Crores in the last financial year.
- e. PV Modules shall be manufactured in India and the bidder shall have a module manufacturing facility in India and offered modules shall be manufactured in accordance with IEC 61215 Edition II and IEC 61730 (Part I and Part II); necessary certificates to be enclosed.
- f. The bidder must use solar modules and other balance of system (BoS) components that qualify to the latest edition of BIS or IEC standards; relevant test reports and necessary certificates to be enclosed.

- g. The bidder must have experience of supplying, installing and commissioning solar photo voltaic power plants of 100 kWp and above in India. Preference will be given to those companies who have successfully installed & commissioned such power plants in the Ladakh Region. List & Purchase Order copy & performance certificates must be enclosed.
 - h. The bidder must have PV modules tested at one of the IEC approved test centres. Test certificates to be enclosed.
 - i. The bidder must have his service centre in Leh prior to the date of submission of tender; details of the service centre, address etc. must be enclosed. The service centre shall be examined as a part of the technical evaluation.
 - j. The bidder must be a total integrated system designer inclusive of solar modules, solar charge controllers, junction boxes and mounting structures. Necessary documentation must be enclosed.
3. ***PART II***: Part II of the tender should be super scribed as “***Part II, Commercial Bid for NIT No 14 of 2014-15***” and should contain:
- a) Earnest Money Deposit
 - b) Income Tax Clearance Certificate
4. ***PART III***: Part III of the tender should be super-scribed as “***Part III, Price Bid for NIT No 14 of 2014-15***” and should contain the price bid for the product as per the bill of material for each power plant, & strictly as per the price bid format given in the NIT. The price quoted should include the operation and maintenance contract for 5 years. The supplier has to quote clearly the F.O.R at the site of installation, inclusive of all taxes.
5. The tender should be addressed to **Project Director, LREDA-LAHDC Leh**. Both inner and outer covers duly sealed and super-scribed and sent either under registered cover or cast in the tender box kept in the office of the **Project Director, LREDA-LAHDC Leh**.
6. The tenderer shall ensure timely receipt of tender in the office of the **Project Director, LREDA-LAHDC, Leh**, the tenders received by hand or by post after due date of receipt of tenders shall not be entertained even if the tender has been posted/ dispatched much before the due date of receipt.
7. The tenders will be opened on **20-12-2014 at 2 PM** in the office of the **Project Director, LREDA-LAHDC, Leh**, on the date of opening of the tenders only the technical and the commercial parts (Part-I & Part-II) shall be opened in the presence of the tenderers who may be present, the price bid (Part-III) shall be opened only in case of such tenderers who on scrutiny of Part-I & Part-II of their offer are found to have qualified for opening of the price bid on the same day at the Project Director’s office or any other day at the discretion of the purchasing committee. In case the due date of opening of the tenders falls on a holiday being declared subsequently, the tenders will be opened on the next working day.
8. Tenders must be complete in all respects; all the terms and conditions of tender including the technical specifications should be carefully studied for the sake of submitting complete and comprehensive tender documents. Failure to comply with any of terms and conditions or instructions of the offer with insufficient particulars which are likely to render fair comparison of tender as a whole impossible may lead to rejection even if otherwise it is a competitive offer/tender.

9. Telegraphic tenders or the tenders of such tenderers who have not purchased tender document shall not be entertained. Any request by post or by hand or telegraphically for any modification addition or deletion etc. in the tenders shall not be considered.
10. The tenders shall be prepared in a formal manner with all quotations written both in figures & words. The tenders shall be typed or written in ink, any tender written by pencil shall be rejected. There shall be no erasures or overwriting and if corrections are made the same shall be neatly done and attested. A systematic form of totalling shall be adopted to avoid any ambiguity. The detailed description of the equipment offered shall be given Rank charge, if any shall be debited to the account of the tenderer.
11. The tenderer shall furnish an affidavit duly attested by notary that design of their equipment is free from legal encumbrances and that no legal case of any kind of litigation regarding the patent design is pending in any court of law.
12. No tenderer unless otherwise specified in these specifications, terms and conditions shall be exempted from depositing earnest money.
13. The tenderer must have full-fledged service centre with all repairing facilities in Leh.
14. No claim shall be laid against the department either in respect of interest or depreciation in value for the amount of security deposit and or earnest money. In the case of bank deposits the department shall not be responsible for any loss on account of failure of the bank.

II. SPECIAL INSTRUCTIONS:

- a. Tenders not submitted on the lines indicated above are liable to be rejected without any correspondence.
- b. Request for extension on the last date of receipt of tenders shall be ignored.
- c. The purchaser reserves the right to order additional quantity or reduce the quantity of the material advertised at the time of placement of order for which the quoted rate shall be valid.
- d. All legal proceedings in connection with the order, tender will be subject to the jurisdiction of local court of Jammu and Kashmir State alone.
- e. The purchaser reserves the right to divide the order between two or more tenders for 100% achievement.
- f. In case of any doubt, dispute or differences arising out of the contract, the same shall be referred to the Finance Commissioner (Planning) and Ladakh Affairs Department, J&K Government for the decision under J&K State Arbitration Act.
- g. The purchaser shall not be bound to accept the lowest or any tender and reserves to itself the right of accepting the whole or a portion of any of the tender, as it may deem fit, without assigning any reason thereof.
- h. Any form of canvassing by the tenderers to influence the consideration of their tender shall liable to summary rejection.
- i. In order to avoid delay caused by postal correspondence and to expedite the process, the purchaser may require the successful tenderer to hold technical & commercial negotiations and convey the decision/acceptance on behalf of the tenderer, with the Purchase Committee.
- j. The condition hereafter deal with systems details and supplementary conditions of the contract in addition to those stipulated in foregoing clauses which along with schedules and annexure, shall be deemed to form part of detail specification for equipment. The tenderer are advised to study and familiarize themselves with the terms & conditions of the tender.

- k. All material shall be of standard quality in the market and be capable of satisfactory operation when exposed to the local atmospheric conditions at site.
- l. The tenderer is required to submit a statement of facts in details as to their previous experience in performing a similar or comparably work and business and technical similar or comparable work and business & technical organization. Financial resources and manufacturing facilities available to be used in performing the contract shall be submitted at the time of the tender
- m. Force majeure clause shall apply.
- n. No other conditions except those mentioned above will be acceptable.
- o. Offers not complying with the delivery schedule shall be considered non-responsive and shall not be evaluated
- p. Offers not providing clause by clause compliance shall be considered non-responsive and shall not be evaluated
- q. Offers not providing minimum array capacity of designated rating (Wp) shall be considered non-responsive and shall not be evaluated
- r. Offers not submitted as per price bid format shall be considered non-responsive and shall not be evaluated.

III. EARNEST MONEY:

- 1. Tenders shall be accompanied with the earnest money **Rs.19,00,000.00 (Rupees nineteen lacs only)** in the form of CDR/FDR/DD/BG pledged to the Project Director, LREDA-LAHDC, Leh.
- 2. Tenders not accompanied with the required amount of earnest money will be rejected and their price bid shall not be opened.
- 3. The earnest money of the tenderers shall be forfeited if they withdraw their tender or raise the prices of their offer within the validity period. The earnest money shall also be forfeited in case of the tenderers who do not comply with the purchase order placed on them within the validity period of the offer or violate any terms and conditions contained herein for this, purchase order shall be deemed to have been placed from the due date of letter of intent.
- 4. Earnest money deposit shall be released in favour of the unsuccessful tender(s) within one month after the final acceptance of the tender.

IV. SECURITY DEPOSIT:

- 1. The successful tenderer(s) shall be required to furnish security deposit equivalent to 10% of the value of the contract in the CDR/FDR/bank guarantee from nationalized/scheduled bank pledged to the Project Director, LREDA-LAHDC, Leh at the time the contract is allotted. This shall be released after testing and commissioning of the SPV Solar Power Plants.
- 2. In case a bank guarantee is submitted as security deposit, validity of the Bank Guarantee shall be for a minimum period of 12 months from the date of issue of the contract.
- 3. Security deposit shall be furnished within one month from the date of detailed purchase order. Failure to do so within the stipulated period will make the contract liable for cancellation together with forfeiture of EMD at the discretion of chairman purchase committee. The EMD of the successful tenderer(s) equivalent to Rs.19,00,000/- shall be released after the submission of the security deposit.

V. WARRANTY:

- 1. The mechanical structures, electrical works including inverters/charge controllers/power conditioning unit/ maximum power point tracker, distribution board/digital meters/, storage batteries, monitoring equipment and overall workmanship of the solar power plants must be warranted for a minimum of 5 years.**
2. PV modules used in solar power plants must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
3. Necessary maintenance spares for five years trouble free operation shall also be supplied with the system.
4. The supplier shall be responsible to replace free of cost (including transportation and insurance expenses) to the purchaser whole or any part of supply which under normal and proper use becomes dysfunctional.
5. In case the supplier fails to rectify/replace the defective/damaged equipment including transit damage, shortages within one month from the date of intimation of such shortage/damage, they shall have to pay interest to Project Director, LREDA-LAHDC, and Leh @3% per month on the value of such materials.

VI. OPERATION AND MAINTENANCE:

1. The supplier shall be responsible for the operation & maintenance of the systems for a period of 5 years from the date of commissioning of the systems. The price quoted by the supplier should include the Operation & Maintenance for 5 years. The manufacturer will submit a quarterly report about the maintenance of the system.
2. The bidder shall give the details of their service centres in Leh district and ensure that all the essential men and materials are placed to ensure quick and efficient operation after sales service.
3. A list of employed men with designations, contact numbers, office address etc., who shall be responsible for operation and maintenance activities, shall be submitted to LREDA. Registration details of the service centre/s shall be given at the time of bidding.
4. During the Operation and Maintenance period, the supplier shall train local personnel for operation and maintenance. An explanation of preventative maintenance schedule, plan of operation, scope and implementation of the after sales service is to be defined and properly documented.
5. Compensation for persons employed by the successful bidder for operation & maintenance shall be under the scope of the company for the period of operation and maintenance.

VII. SALES TAX ETC:

1. The rates offered by the tenderer for design, manufacturing, supply, installation, commissioning, construction of civil works and operation and maintenance should be inclusive of all taxes, F.O.R. at the site.

VIII. DELIVERY OF THE POWER PLANT:

1. The completion and delivery of the power plant shall be mutually agreed at the time of order finalization.
2. In case of failure to deliver in full the required supplies on order, the purchaser shall have the right to make a risk purchase at the cost of supplier and/or cancel the contract and claim reasonable compensation/damages. The contract of supply shall be repudiated if the supplies are not made within the prescribed period and to the satisfaction of the purchasing officer.

IX. VALIDITY:

1. The tender should be unconditionally valid for a period of 6 months from the date of opening of the tenders. The quoted price per system as such shall be firm and not variable with the market price.
2. The rates approved as per the NIT year would be valid for further purchase of the systems during the validity period. Any tenderer revising the offer within the validity period, without prejudice to other remedies available with the department is likely to be blacklisted.

X. PAYMENT SCHEDULE:

1. 25% shall be made as advanced payment to the successful, subject to the submission of a bank guarantee for an equal amount valid for a period of one year at least. Another 25% shall be released on receipt of the material at the site, 45% after the installation and commissioning. 5% shall be released after successful completion of 5 years of operation and maintenance (this may be released in five equal instalments at the end of each year on submission of documentary evidence confirming successful O&M during that year).

XI. PENALTY:

1. In case of failure on the part of the tenderer to make supplies and execute the work in full, part thereof within the delivery schedule stipulated in the purchase order, penalty @ 0.5% per week of undelivered portion subject to a maximum of 15% of the cost of undelivered portion shall be levied.

XII. CHANGES:

1. No variation or modification or waiver of any of the terms and provisions of these specifications shall be deemed valid unless mutually agreed upon in writing by both the purchaser and the supplier.

XIII. PACKING:

1. 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 are to be borne by the bidder. The supplier shall be responsible for all the damages/losses if any. All crates shall be marked with proper signs indicating UP and DOWN sides of the packing and also unpacking instructions considered necessary by the supplier.

XIV. INSURANCE:

1. The bidder shall provide insurance coverage ex-factory until commissioning, and acceptance for replacement or repair of any part of the consignment due to damage or loss.

XV. HEALTH, SAFETY AND ENVIROMENT:

1. The bidder shall submit the following before starting the installation of the power plant.
 - Safety and Environment policy of the Company
 - HSE Manuals for Installation
 - Emergency Management Plan

XVI. CLEAN DEVELOPMENT MECHANISM (CDM) BENEFITS:

- All CDM/Carbon Trading benefits from the installation, commissioning and operation of SPV Power Plants shall be the property of the beneficiary.

XVII. MATERIAL INSPECTION:

- The material inspection shall be done at the factory location before shipment of the material from factory location. The material inspection charges (boarding /lodging) for two representatives from LREDA have to be borne by the successful tenderer.

XVIII. AGREEMENT:

- The successful tenderer(s) shall be required to execute an agreement on a valid stamped paper for strict compliance of the terms and conditions of the contract, vis-à-vis the NIT and the supply order within seven days of placement of the order

XIX. TECHNICAL SPECIFICATION (refer to Annexure I for 2 X 200 kWp SPV Plant):

-Signed-
Project Director,
LREDA-LAHDC
Leh-Ladakh

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

**ANNEXURE I – TECHNICAL SPECIFICATIONS FOR 2 X 200 kWp
SOLAR POWER PLANT (WITH BATTERY BACK-UP) FOR
LEH-LADAKH**

PREPARED BY,

**Ladakh Renewable Energy Development Agency
LAHDC, LEH, LADAKH**

PREPARED BY LREDA,LAHDC,LEH

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

1. Bill of Material

1.1 List of Components of a Typical Solar Power Plant

| Sl. No | Description | Total Qty | UOM |
|--------|---|---------------------------|------|
| 1 | Solar modules (minimum 200 Wp crystalline) | 2 X 200 | kWp |
| 2 | Module Mounting Structures | Suitable for above | Set |
| 3 | Array Junction Box | Suitable for above | Set |
| 4 | Main Junction Box | Suitable for above | No. |
| 5 | PCU (200 kW, O/P - 415 V, DC – 360 V) | 2 | Set. |
| 6 | PCU accessories for data logging & remote monitoring | 2 | Set. |
| 7 | 1C X 4 Sq.mm. Poly Ethylene Cu.cable (solar grade) – modules to AJB | 4900 | m |
| 8 | 2C X 16 Sq.mm. Poly Ethylene Cu.cable - AJB to MJB | 960 | m |
| 9 | 1C X 95 Sq.mm. Poly Ethylene Cu.cable – MJB to DCDB | 280 | m |
| 10 | 1C X 120 Sq. mm. Poly Ethylene Cu.cable - DCDB to PCU 2 Run | 120 | m |
| 11 | 3.5C X 120 Sq.mm. Poly Ethylene Cu.cable - PCU to ACDB 2 Run | 80 | m |
| 12 | 1C X 120 Sq.mm. Poly Ethylene Cu cable – PCU to BB 3 Run | 96 | m |
| 13 | AC Distribution Board with MCB, voltmeter, ammeter and energy meter for PCU output and change over switch | 2 | No. |
| 14 | DC Distribution Board | 2 | No. |
| 15 | Battery bank - 240V, 3000 Ah Lead Acid @ C10, 27 deg C with rack and accessories | 2 | Sets |
| 16 | Solar Water Distillation plant (3-4 litres per day) | Suitable for battery bank | Set |
| 17 | Maintenance Free Earthing System | 144 | Nos. |
| 18 | Lightning and overvoltage protection | 1 | Set |
| 19 | G.I Strips | 4000 | m |
| 20 | Solar Radiation, Temperature (ambient and array) etc. sensors | 1 | Set |
| 21 | Spares for PCU | 1 | Set |
| 22 | Installation kit | 1 | Set |

All the cables listed above are indicative only. It may vary during the time of installation.

1.2 The bidder is responsible for arranging all the hardware, accessories, measuring instruments or any other item needed for successful installation/ commissioning/ operation and maintenance of the power plant.

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

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.

2. Scope of Work

This job involves by means of the enclosed specification, design, manufacture, supply, installation, commissioning of the Solar PV Power Systems with 5 years warranty period including 5 years of operation and maintenance.

The Scope of Work shall include the following,

- a. Design, manufacture and supply of Solar PV Power Plant
- b. Detailed planning for smooth execution of the project
- c. Installation and commissioning of the SPV Power Plant
- d. Performance testing of the complete system & warranty of the system for 5 years faultless operation
- e. Operation and maintenance of the system for a period of 5 years
- f. Risk liability of all personnel associated with the implementation realization of the project
- g. Operation & Maintenance of the Power Plant for 5 Years including 5 years of warranty period.

3. 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 |
| 5 | Battery Bank with Accessories |
| 6 | Solar Distillation Plant |
| 7 | DC & AC Distribution Boards |
| 8 | Cables and installation accessories |
| 9 | Earthing and lightning protection |
| 10 | Data Logging and Monitoring System |

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

a. SOLAR PV MODULES & ARRAY

Crystalline high power cells shall be used in the Solar Photovoltaic module. Each solar module shall consist of redundantly interconnected photovoltaic cells and peak power rating shall not be less than 200 Wp. **However, higher wattage modules shall be preferred.**

Individual Solar PV Module should be of capacity 200 Wp or higher conforming to **IEC: 61215Ed 2 or latest – Edition II, IEC: 61730 – I: 2007, IEC: 61730 – II: 2007**, manufactured in India in a plant certified under ISO 9001: 2008 & ISO 14001 and also type tested by any of the accredited test laboratories in India or abroad. These PV modules should be manufactured by the supplier at their own manufacturing unit in India. The Solar PV Module should be made of mono/ multi crystalline Silicon Solar Cell connected in series/parallel. The bidder shall submit the appropriate certificates.

To connect the solar modules interconnection cables shall be provided. Photoelectric conversion efficiency of SPV module shall be greater than 16%. Modules shall be made of high transmissivity glass front surface giving high encapsulation gain and silicon 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 -30 Deg C and +85 Deg C and with stand gust up to 200km/h from the back side of the panel. Proof of the same shall be included in the technical bid.

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

Other General Requirements of PV module

- The supplied modules should be PID resistance; a certificate should be submitted with the bid document.
- 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 shall be made of corrosion resistant materials, which are 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) shall also be provided.

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

- Module Junction box (weather resistant) shall be designed for long life outdoor operation in harsh environment.
- PV modules used in solar power plants must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 85% at the end of 20 years.
- 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 0.73.
- Other balance of systems components (BoS) must qualify to the latest edition of BIS or IEC standards issued in this regard
- Solar Module Connectors shall be provided as per BIS or IEC standards.
- Array capacity shall not be less than the designed capacity and number of modules required shall be worked out accordingly.
- Each PV module must use a RF identification tag. The following information must be mentioned in the RFID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions.)
 - i. Name & monogram of the manufacturer of PV Module
 - ii. Name of the Manufacturer of Solar cells
 - iii. Month and year of the manufacture (separately for solar cells and module)
 - iv. Polarity of Terminal or leads
 - v. Country of origin (separately for solar cells and module)
 - vi. I-V curve for the module
 - vii. Wattage, I_m , V_m and FF for the module
 - viii. Unique Serial No and Model No of the module
 - ix. Date and year of obtaining IEC PV module qualification certificate
 - x. Name of the test lab issuing IEC certificate
 - xi. Weight of the Module
 - xii. Other relevant information on traceability of solar cells and module as per ISO 9000 series.

Data sheet shall be furnished duly filled as follows:

| | | | |
|----|---------------------------------------|---|--|
| 1) | Mounting arrangement for Solar module | : | |
| 2) | Solar module frame material | : | |

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

| | | | |
|-----|---|---|--|
| 3) | Module type | : | |
| 4) | Module dimensions | : | |
| 5) | No. of solar cells per module | : | |
| 6) | Solar cell manufacturer type | : | |
| 7) | Make of Solar module | : | |
| 8) | Peak power voltage (Vmp) at 25 Deg C | : | |
| 9) | Peak Power current (Imp) at 25 Deg C | : | |
| 10) | Open circuit voltage (Voc) at 25 Deg C | : | |
| 11) | Short circuit current (Isc) at 25 Deg C | : | |
| 12) | Weight of each module | : | |

Orientation and Tilt of PV Module

Modules alignment and tilt angle shall be calculated to provide the maximum annual energy output at site.

b. 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 2 mm. 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.
- 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 high 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 should withstand wind speed up to maximum 200 km/h.

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

- The drawings along with detailed design shall be submitted to LREDA for approval before starting the execution work. The supplier/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings. The work will be carried out as per designs approved by LREDA.
- The clearance of the lowest part of the module structure & the developed ground level shall be 1 meter.
- All fasteners (nuts and bolts) should be made of stainless steel only.
- 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 mix of cement concrete. The minimum clearance of the lowest part of any module structure shall not be less 500 mm from ground level. While making the foundation design, due consideration shall be given to weight of module assembly, maximum wind speed of 150 km/hr 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 LREDA for approval. The work will be carried out as per designs approved by LREDA.

c. JUNCTION BOXES

The junction boxes shall be dust, vermin and waterproof and made of FRP / ABS / Thermo Plastic. 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 outgoing 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 controller.
- Provide arrangement for disconnection for each of the groups.
- 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.
- Metal oxide variastors shall be provided inside the Array Junction Boxes.

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

d. POWER CONDITIONING UNIT

As SPV array produces direct current, 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 the PCU. In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), to maximize Solar PV array energy input into the System.

PCU refers to combination of charge controller and inverter and shall be supplied as integrated unit or different units of charge controller and inverter depending on rating and size of the power plant.

Maximum Power Point Tracker (MPPT)

Maximum Power Point Tracker (Tracker) shall be integrated into the PCU to maximize energy drawn from the Solar PV array. The MPPT should be microprocessor / micro-controller based to minimize power losses. The details of working mechanism of MPPT shall be mentioned.

The efficiency of the MPPT shall not be less than 90% and shall be suitably designed to meet array capacity.

The following IEC certifications shall be applicable for PCUs supplied:

- IEC 600068-2(1,2,14 and 30) or equivalent –Environment
- IEC 62548 safety or equivalent
- IEC 61683 –Efficiency (requirements as Specified above)

Certification as per equivalent Standards for above Standards is also acceptable

Inverter

- Inverters shall be of very high quality, having high efficiency and shall be capable of running in isolated mode. The inverter should be completely compatible with the charge controller and distribution panel.

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

- The inverter shall be designed for continuous, reliable power supply as per specifications. The inverter shall have high conversion efficiency from 25 percent load to the full rated load. The efficiency of the inverter shall be more than 90% at full load and more than 80% at partial load (50%-75%). The supplier shall specify the conversion efficiency in the offer.
- The inverter shall be designed for high altitude and extreme temperatures of the district of Leh.
- The inverter shall have internal protection arrangement against any sustained fault in the feeder.
- The dimension, weight, foundation details etc. of the inverter shall be clearly indicated in the detailed technical specification.
- The inverter shall have provision for input & output isolation.
- Each solid-state electronic device shall have to be protected to ensure long life of the inverter as well as smooth functioning of the inverter.
- Supplier shall indicate tripping voltage & start up voltage for the inverters & this should be perfectly matched with the recommendation of battery manufacturers.
- The PCU shall be mounted on a suitable reinforced concrete pad inside control room not susceptible to inundation by water. All cable entry to and from the PCU shall be fully sheathed to prevent access of rodents, termites or other insects into the PCU from bottom/top of the PCU in the form of a detachable gland plate.
- Under conditions with the battery in a "Full State of Charge" the available solar power shall supply the site load via the inverter with the excess solar power (if any) being exported to the grid.
- The contractor shall furnish details of proper operation, maintenance and troubleshooting details to LREDA.
- The contractor shall intimate LREDA prior to dispatch of the inverter for inspection. Shop tests on the inverter shall be conducted in the presence of the authorized representative of LREDA in order to verify the capacity and proper working of all control and protection arrangement.
- Testing with regard to output regulation, surge rating, efficiency, cooling, protections, full load, partial load, high voltage shall be submitted to LREDA.
- The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS accredited testing- calibration laboratories.
- The LCD Keypad Display on the PCU shall at minimum display the following:
 - Battery voltage, current, temperature
 - Solar charge current

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

- Solar radiation
- Inverter kWh summation
- Inverter kW, kVA, Volts, Amps
- Output kW, kVA, Volts, Amps

e. **TRANSMISSION AND DISTRIBUTION**

The output voltage shall be 415 V, 3-ph, 50 Hz output with a single unit. T&D network for these power plants shall be accordingly designed and installed by beneficiary. **The necessary cables for connection from the AC Distribution Board to the T&D Network shall be provided by the contractor**

f. **BATTERY BANK**

- These batteries should be certified as per IEC 61427 or IEEE1013 or IEC 1361 equivalent standard.
- The batteries shall be solar photo voltaic batteries of flooded electrolyte, low maintenance, lead acid and made of hard rubber/PP 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.
- Battery terminals 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 modules via solar charge regulators.
- **The batteries shall be designed for operating in ambient temperature of site in the district of Leh.**

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

- The self-discharge of batteries shall be less than 3 % per month at 27 deg. C and less than 6% per month at 30 deg. C
- The charge efficiency shall be more than 90% up to 70% state of charge (SoC).
- The topping up frequency shall be > 6months.
- The batteries shall consist of individual cells, which can be carried separately with ease while transporting.
- Battery dimensions and battery bank dimensions shall be clearly indicated by the bidder.
- Offered batteries shall comply to the following:
 - 10 % of DOD: 7200 cycles
 - 50 % of DOD: 3000 cycles
 - 80 % of DOD: 1200 cycles

Bidder shall mention the design cycle life of batteries at 80%, 50% and 10% depth of discharge at 25 deg. C. .

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.

g. Solar Distillation Plant

Solar distillation plant of capacity 3-4 litres /day shall be supplied along with the battery bank for each power plant. At least two numbers of plastic pots and one funnel are to be supplied along with distillation plant.

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

h. DC & AC Distribution Boards

DC Distribution Board (DCDB)

- The DC DB shall be provided in between PCU and Solar Array. This can be integrated in the PCU also, to save space.
- It shall have MCCB of suitable rating for connection and disconnection of array input.

AC Distribution Board (ACDB)

- An ACDB shall be provided in between PCU and Loads.
- It shall have MCB/MCCB of suitable rating for connection and disconnection of PCU from load.
- It shall have MCB's to supply power to control room loads such as exhaust fans, lighting loads and power plug sockets.
- It shall have energy meter to record energy supplied to loads.

i. Cables and Accessories

All the cables shall be supplied conforming to the latest edition of IS 1554 / 694 Part 1 of 1988 & shall be of 650 V/ 1.1 kV grade as per requirement. Only PVC/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.

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

j. 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. Automatic ground fault protection circuits to be installed to monitor any unwanted current flow to the ground and should active to prevent any damage.

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.

2 X 100 kWp SPV SOLAR POWER PLANT TECHNICAL SPECIFICATION

Necessary foundation for holding the LA is to be arranged keeping in view the wind speed of the site and flexibility in maintenance in future. Latest grounding equipment should be used for this purpose. Each LA shall have to be earthed through suitable size earth bus with earth pits. The earthing pit shall have to be made as per IS 3043.

k. Data Monitoring:

- The plant parameters shall be measured by using SCADA or Equivalent system to monitor, maintain, and control the plant, and also to study the plant performance. The system should meet IEC 61724 standard for this provision. The plant monitoring parameters shall include:
- PV array energy production: Digital Energy Meters to log the actual value of AC/DC Voltage, Current & Energy generated by the PV system shall have to be provided.
- Solar Irradiance: An integrating Pyranometer (Class II or better) shall be provided, with the sensor mounted in the plane of the array. Readout shall be integrated with data logging system.
- Temperature: Temperature probes for recording the Solar panel temperature and ambient temperature shall be provided.

4. Documentation

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