KERALA STATE ELECTRICITY BOARD LTD

TENDER No. KSEBL/ECP/Allimooppan10KWpoffgrid/39/2019-20 Dated 28.02.2020

CERTIFICATE

Certified that this tender document for '10KWp off grid DDG Solar PV Power plant' with TENDER No. KSEBL/ECP/Allimooppan10KWpoffgrid/39/2019-20 Dtaed 28.02.2020 for the **Appointment of EPC contractor for design as per site conditions, supply, installation, testing & commissioning of 10 KWp OFF-Grid (21kwhr-Autonomy 2 days 7 Hours/day) Ground Mounted SPV Power Plant and Power Distribution Network (OFF GRID Solar PV DDG Project) at Allimooppan Tribal Colony, Thekkadi, Parambikulam under Electrical Section, Muthalamada of Electrical Sub Division, Kollengode including Operation & Maintenance of the plant for 5 years from the date of commissioning.** The performance ratio (AC) shall range from 75-80% for first 5 years. This document which contains NIT, tender documents and is prepared, verified and approved for tendering.

DEPUTY CHIEF ENGINEER
ELECTRICAL CIRCLE,
PALAKKAD

Office of the Deputy Chief Engineer ,
Electrical Circle, Palakkad
Kerala State Electricity Board Limited, Vaidyuthi Bhavan,
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KERALA STATE ELECTRICITY BOARD LTD

TENDER No. KSEBL/ECP/Allimooppan10KWpoffgrid/39/2019-20/28.02.2020

CONDITIONS OF BID AND CONTRACT

FOR

Appointment of EPC contractor for the design as per site conditions, erection, testing & commissioning of 10 KWp OFF-Grid (21kwhr-Autonomy 2 days 7 Hours/day) Ground Mounted SPV Power Plant and Power Distribution Network (OFF GRID Solar PV DDG Project) at Allimooppan Tribal Colony, Thekkadi, Parambikulam under Electrical Section, Muthalamada of Electrical Sub Division, Kollengode including Operation & Maintenance of the plant for 5 years from the date of commissioning. The performance ratio (AC) shall range from 75-80% for first 5 years.

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CONDITIONS OF BID AND CONTRACT

Contents

Part 1

DEFINITIONS AND INTERPRETATIONS

1. '*Accepted schedule'* is the schedule of items of work containing the agreed rates on the basis of which the agreement is drawn for execution of the work.

2. '*Agreed rates'* shall mean the rates accepted and agreed by the KSEBL and the Contractor and which shall be given in the schedule forming part of the contract agreement and valid during the period of contract.

3. '*Agreement Authority*' shall mean the Officers authorized by KSEBL to execute the agreement with the Contractor for executing the work/project.

4. *'Bank'* means State Bank of India and its subsidiaries /associates, Nationalised Banks and also includes Scheduled Banks.

5. The words '*Bid*' and '*Tender*' shall have the same meaning anywhere in these documents.

6. '*Bid Amount/ Bid Price'* means the total bid amount indicated by the bidder in schedule (Schedule of quantities or Bill of Quantities) of the bid documents.

7. '*Bid Security'* or *'Earnest Money Deposit'* shall have the same meaning.

8. *'Bidder'* shall mean the Person, Company, Corporate body, Association, body of individuals, group of persons, Limited Company, Firm, Organization, either single or Joint Venture from India or abroad bidding for the works and his/its executors or administrators or successors or assignees.

9. The '*KSEBL*' shall mean 'The Kerala State Electricity Board Limited'.

11. 'Chairman& Managing Director' shall mean the administrative head of Kerala State Electricity Board Ltd appointed by the Government from time to time.

12. 'Chief Engineer' shall mean the Chief Engineer (Renewable Energy & Energy Savings) or its successor Office of the Kerala State Electricity Board Ltd.

13. *Commissioning and completion* of the project shall mean the solar plant and associated Power Distribution Network (PDN) is energised after obtaining Energisation Sanction from Electrical Inspectorate and the project handed over to KSEBL after proving the desired Performance Ratio as per Clause 2.2.3 of this document.

14. 'Construction Plant' means all equipments, appliances or things of whatever nature required for the execution, completion and maintenance of the works or temporary works but do not include materials or other things intended to form or forming part of the permanent work.

15. 'Contract' shall mean and include the conditions of bid and contract agreed to, specifications, schedules, drawings, annexure, letter of application, accepted schedule of prices and the agreement to be entered into.

16. 'Contract agreement' shall mean the agreement entered into between the Contractor and the KSEBL.

17. 'Contractor' shall mean the Bidder whose Bid has been accepted by KSEBL and shall include the Contractor, legal personnel, representatives, successors and assignees.

18. 'Contractor's Representative' means the person authorised by the Contractor in writing and approved by the Deputy Chief Engineer Electrical Circle, Palakkad to act on behalf of the Contractor for the purpose specified in the letter of authorisation.

19. 'Contractor's Personnel' means the Contractor's representative and all personnel whom the Contractor authorises and utilises at site who may include staff, labourer and all other employees and any personnel assisting the Contractor in the execution of work.

20. 'Defect' shall mean any part of the work not completed or not performing in accordance with contract or specifications.

21. *Defects Liability period* shall mean the maximum period specified by the KSEBL specifically for the project and within this period, the contractor is liable to rectify any defect or damage in the solar plant at his cost, as notified by the Engineer-in- charge. i.e. Five years from the date of commissioning the solar plant after proving the desired performance ratio as per Clause 2.2.3 of this document.

22. ' Deputy Chief Engineer' shall mean the Deputy Chief Engineer Electrical Circle, Palakkad or its successor Office of the Kerala State Electricity Board Ltd in charge of the project or work concerned. The Deputy Chief Engineer may delegate powers to subordinate officers in respect of execution of work.

23. 'Drawing' shall mean collectively all the drawings, revisions and additions/ modifications as per the contract issued from time to time and drawings submitted by the Contractor and accepted by the Engineer-in-charge.

24. '*Elevation/Reduced Level'*- Wherever figures are shown after the word '*Elevation/Reduced Level'* or an abbreviation thereof, they shall mean the height in metres based on bench marks established by the KSEBL at site.

25. 'Engineer *in Charge' –Executive Engineer, Electrical Division, Chittur, Palakkad*.

26. '*EPC Integrator*' shall mean the contractor with whom the KSEBL has entered into agreement for Engineering, Procurement and Construction and Operation and maintenance of the Solar PV Plant as specified for the specified period.

27. 'Financial year' shall mean a year beginning on first April and ending 31 st March in the succeeding year.

28. 'Government' shall mean 'The Government of Kerala'.

29. 'Handing over' shall mean handing over of the Solar Plant to the KSEBL (refer Clause.2.2.3).

30. 'I.SS' means the Indian Standard Specifications of the Bureau of Indian Standards.

31. 'Labourer' shall mean all categories of labour engaged by the Contractor, his sub contractors in connection with the execution of the work covered by these specifications. All these labourers shall be deemed to be employed primarily by the Contractor even though the KSEBL may stand as principal employer to these contractors to enable them to get the required licence as per the Contract Labour Regulation & Abolition Act, 1970 and its amendments if any.

32. 'Letter Of Award' shall mean the letter of formal acceptance signed and issued by the tendering/bidding authority intimating the award of work.

33. 'Letter of Application' shall mean the letter of the bid offering to carry out the works, furnished by the bidder and includes the signed bid documents in full.

34. 'Month' or 'Calendar month' shall mean not only the period from the first of a particular month, but also, any period between a date in a particular month and the day previous to the corresponding date in the subsequent month unless specifically stated otherwise.

35. 'Obligations of KSEBL ' are only those obligations, which have been specifically agreed to in the agreement.

36. 'Part Bill' is any bill preferred during the course of work and before the final bill.

37. 'Performance Certificate' shall mean the certificate issued by the Engineer-in-Charge on the performance of the obligations of Contractor under the contract, when completed and this constitutes the acceptance of the work in total. This certificate will be issued by the KSEBL on the basis of the application of the Contractor and only after the successful completion of period of contract.

38. 'Performance security deposit' shall mean - the Security amount to be remitted as Bank Guarantee by the Contractor for Guaranteed performance of the Contract along with the respective Contract agreement and it shall be an amount equal to 10% of total contract amount. This Bank Guarantee should be valid till the end of Operation and Maintenance period. The Bank Guarantee will be released in equal installments at the end of every year along with the Operation and Maintenance charges. The Bank Guarantee submitted by the contractor will be rounded off to the higher multiple of Rs 1000.

39. 'Period of contract' shall mean the period covered from the date of contract agreement to the satisfactory completion of the work, handing over of the plant back including duly sanctioned extensions and 5 years defect liability period.

40. 'Permanent Works' means the works to be executed and completed by the Contractor under the contract.

41. '*Project'* shall mean the development, design & Engineering, financing, manufacturing, delivery, construction, project management, commissioning, operation and maintenance for five years of the proposed solar plant complete in all respects and all activities incidental thereto.

42. 'Schedules' mean the documents completed and submitted by the Contractor with the bid and as included in the contract, which include the quantities, rates, general specifications, unit and technical particulars.

43. 'Site' shall mean and include the lands and buildings in which the works are to be executed in accordance with the contract.

44. 'Specification' shall mean collectively, all the terms and stipulations contained in the bid, contract agreement and any additions/modifications in accordance with the contract, technical provisions as per relevant BIS Codes and/or National Building Code and those specifically mentioned in construction drawings and its modifications and revisions which specifies the work wherever applicable or written directions of Engineer-in-Charge.

45. 'Sub contractor' shall mean any person named in the bid and agreement for any part of the work and the legal representatives, successors and assignees of such persons.

46. 'Taking over' shall mean taking over the work site by the contractor as per Kerala PWD D-Code.

47. 'Temporary works' are such works of any kind designed, constructed and installed by the Contractor on site which are needed for the execution and completion of the works contemplated in the contract and for the remedy of any defects notified to the Contractor, for which the Contractor is not entitled for any separate payment.

48. Tender/Bid shall have the same meaning and includes all the documents which the bidder submitted with the Letter Of Application as stipulated by the KSEBL and will be included in the contract agreement

49. 'Tendering authority/bidding authority' shall mean the Deputy Chief Engineer , Electrical Circle, Palakkad who invites the bid and issues the bid documents on behalf of KSEBL.

50. 'Test' means the tests which are specified in the contract and mandatory tests specified by rules or regulations, to be carried out in accordance with the specifications before the works or on completion of work to the satisfaction of the KSEBL.

51. 'Time of Completion' shall mean the date within which the work under the contract is required to be completed satisfactorily in accordance with the specifications, drawings etc., including all extra items required to be executed for satisfactory completion of the work and including all extension of time duly granted by the KSEBL.

52. 'The title of clauses' shall not limit, alter or affect the meaning of the specifications or conditions of bid documents.

53. 'Words' imparting the singular number shall include the plural number and plural the singular and the words imparting the masculine gender shall include the feminine and the neutral gender where the context so requires. Words have their normal meaning under the language of the contract unless specifically defined.

54. 'Work' means what the contract requires the Contractor to construct, furnish, supply, provide services for, install, complete, maintain, test and commission and operation and maintenance including supply of sufficient spares, for the specified period and hand over to *KSEBL.*

55. 'Writing' shall include any manuscript, type written or printed statement under or over signature or seal as the case may be.

56. *Performance ratio* is a measure for performance of a PV system taken in to account environmental factors (temperature, irradiation, climate change etc). PR will take in to account minimum level of irradiation needed to generate electrical energy, irradiation levels at a given period of time.

57. DDG means Decentralised Distributed Generation.

Part 2
INFORMATION TO BIDDERS

2.1. GENERAL INFORMATION

2.1.1 The State - Kerala

The state is located at the southern tip of the Indian peninsula. It has wide variety of lands and this eternal beauty encompasses 1.18 per cent of the India. The land area of Kerala is about 38,743 sq km, with a total population of 33,387,677. It is about 3 per cent of the country's population. The population density of the state is about 740 people per square kilometre, About 16 per cent of the people live in the cities. Most of the others live in large, semi-urban villages.

2.1.2 Geography

The state is wedged between the Lakshadweep Sea and the Western Ghats, lying between north latitudes 8°18' and 12°48' and east longitudes 74°52' and 77°22', Kerala experiences the humid equatorial tropic climate. The state has a coast of 590 km (370 mi) and the width of the state varies between 11 and 121 km (22–74 miles). Geographically, Kerala can be divided into three climatically distinct regions: the eastern highlands; rugged and cool mountainous terrain, the central midlands; rolling hills, and the western lowlands; coastal plains. The state is located at the extreme southern tip of the Indian subcontinent and lies near the centre of the Indian tectonic plate; hence, it is subject to comparatively low seismic and volcanic activity.

2.1.3 Transport

Roads

KSRTC is the major agency providing long-haul public bus service in Kerala. Kerala has 145,704 kilometres (90,536 mi) of roads. Roads in Kerala include 1,524 km of national highway 4341.6 km of state highway and 18900 km of district roads. Most of Kerala's west coast is accessible through two national highways: NH 47 and NH 17, and the eastern side are accessible through various state highways. National Highway 17 with the longest stretch of 421 km connects Edapally to Panvel. Road density is

nearly four times the national average, reflecting the state's high population density.

Railways

The Indian Railways' Southern Railway line runs through the state connecting most of the major towns and cities except those in the highland districts of Idukki and Malappuram. The railway network in the state is controlled by two out of six divisions of Southern Railway; Thiruvananthapuram Railway division and Palakkad Railway Division.

Airports

Kerala has four international Airports, Thiruvananthapuram, Cochin, Calicut and Kannur.

2.1.4 Description of Kerala State Electricity Board Limited

The Kerala State Electricity Board Limited , Incorporated under the Companies Act, 1956, constituted by the Government of Kerala, on 14th January 2011, is in the business of Generation, Transmission and Distribution of electricity and striving to provide quality electricity at affordable cost to all classes of consumers in the state of Kerala. The Government of Kerala issued orders on 30.10.2013 vesting the functions and undertakings to Kerala State Electricity Board Limited as a fully owned Government company. The Corporate Office will function to co-ordinate and control the activities of Kerala State Electricity Board Limited. The office of Deputy Chief Engineer, Electrical Circle, Palkakad will form the part of the corporate office authorized to issue tender for the appointment of EPC contractor for establishing 10 KWp OFF-Grid DDG Solar PV power project at Allimooppan Tribal colony in Palakkad District.

2.2. PROJECT INFORMATION

2.2.1 Name of Work- 10 KWp OFF-GRID DDG Solar PV Power Project

Appointment of EPC contractor for the design as per site conditions, erection testing and commissioning of 10 KWp OFF-Grid (21kwhr-

Autonomy 2 days 7 Hours/day) Ground Mounted SPV Power Plant, construction of control room and Power Distribution Network (OFF GRID Solar PV DDG Project) at Allimooppan Tribal Colony, Thekkadi, Parambikulam under Electrical Section, Muthalamada of Electrical Sub Division, Kollengode including Operation & Maintenance of the plant for 5 years from the date of commissioning. The performance ratio of the plant shall be 75 - 80% in clause 2.2.3 of tender documents.

2.2.2 Probable Amount of Contract (PAC) - Rupees 37,31,357/-

PAC= PAC1+PAC2

PAC- 1 – Supply of materials and labour charges for installation, testing, commissioning till handing over

PAC- 2 – Operation & Maintenance charges

2.2.3 Scope of the Work

1. Total Capacity - 10 KWp off-grid DDG Solar PV project
2. Number of locations- 1
3. Operation and Maintenance- Five years from date of commissioning as per Clause 6.9.
4. Performance ratio (AC) -75-80% as detailed below

The work includes design, planning, investigation, survey, engineering, manufacture/procurement, manufacturer's quality assurance, shop testing (including type testing where specified/required), transportation, handling storage, erection including all civil/structural works, electrical and general works, piping, cabling, instrumentation, installation, testing and commissioning, training, services, permits and insurance at all stages of 10 KWp OFF-Grid Solar PV DDG project at Allimooppan Tribal Colony, Thekkadi, Parambikulam under Electrical Section, Muthalamada of Electrical Sub Division, Kollengode in Palakkad District and handing over the SPV Plant to KSEBL to its full satisfaction after proving the performance ratio (AC) within a period of 7 consecutive days of

commissioning and 5 years after commissioning. The performance ratio (AC) of the solar plant shall range from 75- 80% for first 5 years.

Operation and maintenance charges shall be released at the end of each year. Performance ratio (AC) shall be proved within a period of 7 consecutive days at the end of each year for release of O&M charges.

The **performance ratio test** as per IEC 61724 has to be carried out at site by the EPC contractor in presence of authorized officials from KSEBL, deriving samples within a period of 7 consecutive days sufficient to provide operational data representative of insolation and ambient conditions as desired by the agreement authority to prove the Performance ratio achieved in the range of 75-80% as per obligations under the EPC contract. This is mandatory for commissioning and handing over the plant to the KSEBL after 5 years of O&M. It is also agreed that if the specified performance ratio is not achieved, the same shall be demonstrated within a period of another 7 consecutive days and still if it is not achieved, EPC contractor shall enhance/ improve the quality of the plant with all suitable modification requirements on balance of systems at his own cost to achieve the performance ratio.

The performance ratio (AC) can be checked at any time in between if deemed necessary by the Engineer in charge.

The contractor shall be liable to pay liquidated damages for lower generation. The “lower generation” mentioned in this tender for calculating liquidated damages is as follows. If the plant outage is due to component failure or lack of maintenance and unless it is rectified within 7 days from the date of intimation to the contractor, the contractor is liable for LD. The monetary compensation for the plant outage days shall be computed as 4 units per KWp/Day multiplied by the approved average annual energy purchase cost of that year and will be deducted from the payments to the contractor till the same is rectified. For the year 2017-18, KSERC has approved the average pooled power purchase cost of KSEBL as Rs. 3.26/unit. Average Pooled Cost of Power Purchase will be revised by KSERC for each year.

The contractor will be responsible for all required activities at his own cost for the demonstration of the specified performance ratio (as per Clause 2.2.3).

If the contractor fails to prove the desired performance ratio (as per Clause 2.2.3) during any of the consecutive years the annual O&M period will be extended to that time period till the desired performance ratio (as per Clause 2.2.3) is attained. The contractor shall design the solar plant with sufficient number of solar PV panels so as to produce the desired capacity. The contractor shall be responsible for obtaining consents, clearances, including Electrical Inspectorate sanction, permit and approval from appropriate authorities and KSEBL.

The EPC Integrator shall also be responsible for the operation and maintenance of the plant for the first five years after commissioning. The extension of O&M after the obligatory 5 years to the entire life of the plant shall be arranged by the KSEBL and all the expenditure shall be met by the KSEBL. The plant shall be designed for a project life of 25 years.

2.2.4 Period of Completion and commissioning

The period of completion of work will be reckoned from 10 days from the date of agreement or the date of handing over the site, even if not in full, but in a manner the work can be commenced and proceeded with in accordance with the programme of works, whichever is earlier and Time of Completion will be worked out accordingly. The work shall be completed in all respects, tested, commissioned and handed over to KSEBL after the 5 years of O&M.

2.2.5. Location

The project site is located at Allimooppan Tribal Colony, Thekkadi, Param-bikulam, Muthalamada Village, Palakkad

2.2.6 Brief Description of Work

KSEBL intends to develop 10KWp off-grid DDG Solar PV project at Allimooppan Tribal Colony, Thekkadi, Parambikulam under Electrical Section, Muthalamada of Electrical Sub-division Kollengode. A 10KWp plant including a Photo Voltaic Station (PV Station) can be set up in the land. Soil test should be carried out before carrying out the design and erection activities.

All civil constructions and structure designs including supply, installation, testing and commissioning of 10 KWp off-grid DDG Solar PV power plant (21kwhr – Autonomy 2 days 7 Hours/day), Construction of control room and associated power distribution network and its operation & maintenance for 5 years from the date of commissioning shall be under the scope of contractor.

2.3 BIDDING DETAILS

2.3.1 Bidding Process

Competitive e-tenders in three cover system with Earnest Money Deposit (EMD) and agreement as per annexure-I in first cover and tender documents, documents related to financial, technical soundness and any other documents submitted by bidder in second cover, Price Bid in third cover are invited from EPC contractors for the selection among the qualified bidders.

All the bidders participating in the bid will be evaluated for their financial capability, technical soundness and previous experience in executing works of similar nature….. The Bidder shall furnish relevant details as per tender documents for meeting financial, technical and experience criteria.

The final selection among the bidders will be done as follows.

The price bids containing schedule of technical particulars and schedule of prices of the bidders will be evaluated as per the relevant clauses provided elsewhere in these conditions.

The bidders will be ranked according to the criteria set forth by the KSEBL for the selection of the best bid. The KSEBL will finally select the best bid and the bid of the successful bidder will be accepted for execution of work. The KSEBL reserves the right to reject the bid or disqualify any bidder without assigning any reason.

2.3.2 Execution of agreement

The successful bidder shall execute agreement within 15 days from the date of issue of Letter of Award of contract, with the KSEBL as per the terms and conditions set forth in the Bid document. After execution of the agreement the successful bidder shall be known as 'EPC Integrator.'

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Part 3
INSTRUCTIONS TO BIDDERS

3.1. INTRODUCTION

3.1.1 E-tenders are invited as specified in the Schedule given in 3.5 below.

3.1.2 The Tender documents and other details may be downloaded from the website www.etenders.kerala.gov.in

3.1.3 The tender document fee of Indian Rupee Rs 5000/- + Rs 900/- (taxes as Governed by GST) along with EMD of Rs 50,000/- shall be through online payment system. The tender document fees and EMD can be paid through e-Payment facility provided by the e-Procurement system. **State Bank of India Multi Option Payment System (SBI MOPS Gateway).** Bidders are required to avail Internet Banking Facility for making tender remittances in e Procurement System.

3.1.4 Kerala Government Public Sector Undertakings are exempted from furnishing EMD. MSME with Udyog Adhar Registration are exempted from furnishing EMD as well as Bid submission fee.

3.1.5 All the Tender documents are to be submitted online and in the designated covers/envelopes on the above website. All the bid documents shall be submitted in their designated online covers. Tenders/bids shall be accepted only through online mode in the website and no manual submission shall be entertained. The tender cost once paid is not refundable on any account, nor will the amount be adjusted towards the cost of any other tender.

3.1.6 The bidders are advised to carefully examine all instructions, conditions, terms, specifications, drawings etc. in the bid documents and details regarding the facilities at work site, approaches, availability of labour, working seasons, geology, climate etc. The bidders are advised to visit the project site, before preparing the bid documents. In case of any doubt or issue, the bidder may collect whatever information required from the bidding authority. The rates shall be quoted after precisely considering all aspects that may be encountered in the implementation of the project. The quoted rates shall be on the bidders' risk and remain firm during the period of contract. The Contractor is not entitled for any claim other than that agreed to in the contract.

3.2. PREPARATION OF BID

3.2.1 Intending bidders should submit their bids only through on line mode to the website www.etenders.kerala.gov.in on or before the time and date specified in the Notice Inviting Tender.

3.2.2 Every bid shall be accompanied by a Bid Security (EMD) vide clause 4.8. Bids not accompanied by sufficient EMD will be rejected. The EMD shall be remitted as specified and in the remittance form provided by the e-Procurement system for this particular bid. The EMD of the unsuccessful bidders will be returned as soon as possible after the execution of the agreement for the said work. EMD shall be non- interest bearing. The EMD of successful bidder will be transferred to KSEBL account from NIC & the same shall be refunded

on request from the contractor after successful execution of contract agreement.

3.2.3 The Bid shall be accompanied by a Letter of Application, the form of which is given vide Annexure 2.

3.2.4 The bidders shall submit the Bid with agreement in the format given in Annexure 1 of this document, duly signed and attested by two witnesses, in Kerala Government Stamp Paper worth Rs.200/-. The bid agreement in original shall be sent by Registered post or Speed post or by Courier or by messenger in sealed cover so as to reach the following address, before the opening of the bid. The Cover containing the documents shall be superscribed with the words "Bid agreement in Original for Bid No "TENDER No. KSEBL/ECPKD/Allimooppan10KWpoffgrid/39/2019-20/28.02.2020**"**.

The Bid agreement (Bid Integrity Pact) shall be submitted in one sealed super scribed cover. Bids of those bidders who fail to submit the aforesaid originals (hard copies) within the time aforesaid will not be considered. Bids without agreement or in proper form will be rejected.

THE DEPUTY CHIEF ENGINEER, ELECTRICL CIRCLE, KSEB LTD, VASIDHYUTHIBHAVAN, T B ROAD, PALAKKAD-678014, KERALA, INDIA

3.2.5 KSEBL reserves the right to reject any tender which does not comply with the above conditions.

3.2.6 **Signing of Bid Document**

The bid including all uploaded documents shall be digitally signed by the bidder / duly authorized representative of the bidding company. Bidder is responsible for ensuring the validity of digital signature and its proper us-age by their employee. The Bidder shall sign the Bids wherever required. If the bidder is a Joint Venture undertaking, all the parties need not sign, provided that a joint venture agreement and power of attorney for the person to sign is submitted along with the Bid. Bid by a Partnership Firm shall contain the full names of all partners. Bid shall be signed in the name

of the Partnership Firm by one of the members of the partnership authorized for the purpose or by an authorized representative followed by the name and designation of the person signing. Bids by Corporations shall be signed with the legal name of the Corporation followed by the name, Signature and designation of the President, Secretary or other person authorized to bind it in the matter.

The copy of the constitution of Firm/Partnership with the name of partners duly attested by a registered notary public and the instrument authorizing the persons to sign on behalf of the Firm shall be furnished. The bidder shall prepare and submit, as part of his Bid, a complete construction programme showing in detail his proposed programme of the operation for the orderly performance of the Work within the time specified in the specifications.

The construction programme shall be in such form and with such details as to show properly the sequence of operations, the progress for each item or group of like items in the schedule.

3.3. SUBMISSION OF BID

All the bid documents shall be submitted in 3 parts, in their designated online covers in electronic format. Bids shall be accepted only through online mode in the website and no manual submission shall be entertained.

Cover No.1 This cover shall contain- The Scanned copy of the Bid agreement as per Annexure 1 uploaded as pdf.

Cover No.2

Bid document

Questionnaire as per Annexure - 9

Un priced list of materials/equipment/works required for successful completion, commissioning operation and maintenance for the five years from the date of commissioning

Scanned copy of certificates in proof of financial, experience and technical capability. Documents as per PART-7 of bid document as well as GTP of PV modules, Inverters battery bank offered as per annexure-10 along with associated documents

All other documents specified in the bid document also can be attached in this cover.

Bids containing deviations including technical deviations and additional conditions will be summarily rejected, provided:

1. The technical deviations are totally unacceptable to KSEBL;
2. Financial implications of the deviations are not spelt out.

The bidder shall submit an attested copy of PAN card of the Authorized Signatory/Firm along with the bid.

Cover No.3

This cover should contain the "**BOQ" - Price bid**

For submission of bids, all interested bidders have to register online as explained above in this document. After registration, bidders shall submit their bid online on www.etenders.kerala.gov.in along with online payment of tender document fees and EMD.

It is necessary to click on "Freeze bid" link/ icon to complete the process of bid submission otherwise the bid will not get submitted online and the same shall not be available for viewing/ opening during bid opening process.

3.4. OPENING OF BID

The bids will be opened on the date & time stipulated in the bid document (online opening).

The **Cover 1** containing Bid agreement will be opened first and verified. Cash remittance through e-Procurement system will also be verified in the e-tendering portal while opening of bid. It will be the responsibility of the bidder to confirm and ensure that the response made towards bid processing fee and EMD in e-tendering portal are valid and confirmation is reflected in the e-procurement system.

The '**Cover 2** ' containing the Bid documents will be opened as per the bidding schedule by the bidding authority or his authorized representative in the presence of bidders or their authorized representatives who are present. If the bidder fails to remit the Tender cost (as per clause 3.1.3) & EMD (as per clause 4.8) and enclose the Bid agreement (in original) as per annexure1, his Bid will be summarily rejected.

Then the '**Cover 3**' containing the Price Bid will be opened by the bidding authority or his authorised representative in the presence of bidders or their authorised representatives who are present. After evaluation of the documents, KSEBL will finally select the best bid and the bid of the successful bidder will be accepted for execution of work. The KSEBL reserves the right to reject the bid or disqualify any bidder without assigning any reason.

Any Bid which does not conform to all the terms, conditions or specifications of bid documents or not substantially responsive and genuine will be rejected.

3.5. BIDDING SCHEDULE

The tentative schedule of key activities of the bidding process is same as given in the Notice inviting Tender. If any day specified in the schedule falls on a holiday for the KSEBL, the next working day of the KSEBL shall be considered. Normal working hours of KSEBL is 10.00 am to 5.00 pm. KSEBL reserves the right to make necessary modifications extending the dates in the tentative schedule above, as situations warrant. Refer clause 4.15 also.

Part 4
GENERAL BID CONDITIONS

4.1 BID PRICES

The bidder shall quote the total amount for the EPC contract including cost for Operation and Maintenance for five years after successful commissioning. The amount quoted by the bidders shall be firm during the period of contract and shall not be varied or adjusted on whatsoever reason on any account.

The payment will be made to the contractor as mentioned in clause 5.2

The Contractor shall take care of all his men, machinery, finished work and ensure sufficient protection of work site from flood, fire, earthquake, slip and similar other natural calamities. In such an event, the Contractor shall make his own arrangement for the rectification of damage or loss at his own cost and no compensation shall be paid by the KSEBL on whatsoever reasons on any account.

All Duties, Taxes, Octroi, Cess, Seigniorage charges, Royalty as Governed by GST etc and other levies payable by the Contractor under the contract unless otherwise specified elsewhere in this document shall be included in the rates and prices and total bid price submitted by the bidder. The prices shall also include customs duties and any other duty applicable in case the contract includes usage of imported items.

The Contractor will not be eligible for any additional payment due to increase in the rates of such taxes, duties etc as Governed by GST. and no amount shall be recovered from the Contractor due to any decrease of such taxes, duties etc.

All taxes, duties etc as Governed by GST. will be reimbursed only on production of **documentary evidence**.

The clause 5.9.2 Taxes, Duties etc as Governed by GST and Recoveries shall also be referred in this context.

Bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in, or to be reasonably inferred from, the Bidding Documents in respect of the design, manufacture, including procurement and subcontracting (if any), Tax, Duties etc as Governed by GST, licensing, delivery, construction, installation and completion of the facilities.This includes the price for design, engineering, manufacturing, supply, handling storage, civil works, erection, testing & commissioning along with maintenance charges of the project. It shall include taxes, duties, Cess etc as Governed by GST, and insurance charges including GST etc.

For **Civil works CPWD rates** shall be followed.

The lowest bidder shall submit a split up of the total prices including necessary ED, GST and other applicable taxes in the price bid in the manner and specified format and in the schedule of Items (Unpriced Bill of Quantities) while submitting bid.

CURRENCIES OF BID

The base currency for the bid is Indian Rupee only.

4.2 COST OF BIDDING

All costs involved in the preparation and submission of Bid shall be borne by the Bidder. The KSEBL will in no case be responsible or liable for any loss to the bidders in this regard. This is applicable in the case of extension or annulment of bidding also.

4.3 LANGUAGE OF BID

The Bid submitted by the bidder and all correspondences and documents relating to the Bid shall be in English language.

4.4 LAW OF BID

This Bid will be governed by the laws of India and Kerala. Any dispute raising out of this bid will be subject to the exclusive jurisdiction of Civil Courts at Palakkad

4.5 WHO CAN BID

Any Person, Company, Corporate body, Association, body of individuals, group of persons, Limited Company, Firm, Organization, either single or Joint Venture from India or abroad, who are legally competent and entitled for entering into contract as per the Law of Contract prevailing in India can bid.

For Joint Venture there shall be a lead bidder. A lead bidder shall submit only one bid for the work. He shall not be a member in any other bid for the same work. There shall be a joint venture which shall be legally enforceable by way of attesting by a registered Notary. This agreement shall be submitted along with the Bid. The agency shall be able to provide an output guarantee for 25 years for the panels for manufacturing defects. Manufacturer's warrantee certificate shall be obtained for the module's performance for at least 90% of minimum rated value at the end of 10years and at least 80% of the minimum rated value at the end of 25 years .Refer clause 6.2.1, 6.2.2, 6.3.1& 6.3.2

4.6 BID VALIDITY

The bid shall be valid for 90 days reckoned from the last date of opening of bid.

In exceptional circumstances, the KSEBL may require extension of the period of validity. The requirement of KSEBL and bidders' response shall be made in writing. A bidder may refuse the request which shall invariably be communicated in stipulated time. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be

required to extend the validity of his bid security for the period of the extension.

4.7 BID SECURITY or EARNEST MONEY DEPOSIT (EMD)

EMD or Bid Security forms part of the Bid. Bids without EMD will be rejected. The amount of EMD shall be **Rs. 50,000/-.** An amount of Rs Fifty Thousand towards EMD and the non-refundable tender cost amounting to Rs 5,000 /-+ Rs 900/- (taxes as Governed by GST) all be remitted to the account number given in the remittance form provided by the e-procurement system for this particular tender. No other mode of payment is allowed. (**Bidder should ensure that tender cost including GST and EMD are remitted as single transaction and not separate. Separate or split remittance will be treated as invalid transactions). The tender document fees and EMD can be paid in the following manner through e- payment facility provided by the e- Procurement system.**

4.8. State Bank of India Multi Option Payment System (SBI MOPS Gateway): Bidders are required to avail Internet Banking Facility in any of below banks for making tender remittances in e Procurement System.

A) Internet Banking Options (Retail)			
1	Allahabad Bank	32	Kotak Mahindra Bank
2	Axis Bank	33	Lakshmi Vilas Bank
3	Andhra Bank	34	Mehsana Urban Co-op Bank
4	Bandan Bank	35	NKGSB Co-operative Bank
5	Bank of Bahrain and Kuwait	36	Oriental Bank of Commerce
6	Bank of Baroda	37	Punjab and Maharashtra Cooperative Bank
7	Bank of India	38	Punjab National Bank
8	Bank of Maharashtra	3	Punjab and Sind Bank

		9	
9	Bassein Catholic Co-operative Bank	40	RBL Bank
10	BNP Paribas	41	Saraswat Cooperative Bank
11	Canara Bank	42	ShamraoVithal Cooperative Bank
12	Catholic Syrian Bank	43	South Indian Bank
13	Central Bank of India	44	Standard Chartered Bank
14	City Union Bank	45	State Bank of India
15	Corporation Bank	46	Syndicate Bank
16	Cosmos Bank	47	Tamilnad Mercantile Bank
17	DCB Bank	48	Tamilnadu Cooperative Bank
18	Dena Bank	49	The Kalyan Janata Sahakari Bank
19	Deutsche Bank	50	TJSB Bank (Erstwhile Thane Janata Sahakari Bank)
20	Dhanalaxmi Bank	51	UCO Bank
21	Federal Bank	52	Union Bank of India
22	HDFC Bank	53	United Bank of India
23	ICICI Bank	54	Vijaya Bank

24	IDBI Bank	55	YES Bank
25	Indian Bank		
26	Indian Overseas Bank		
27	IndusInd Bank		
28	Jammu & Kashmir Bank		
29	Janata Sahakari Bank		
30	Karnataka Bank		
31	Karur Vysya Bank		
B)	**Internet Banking Options (Corporate)**		
1	Bank of Baroda	21	Laxmi Vilas Bank
2	Bank of India	22	Oriental Bank of Commerce
3	Bank of Maharashtra	23	Punjab & Maharashtra Coop Bank
4	BNP Paribas	24	Punjab & Sind Bank
5	Canara Bank	25	Punjab National Bank
6	Catholic Syrian Bank	26	RBL Bank
7	City Union Bank	27	ShamraoVitthal Co-operative Bank
8	Corporation Bank	28	South Indian Bank
9	Cosmos Bank	29	State Bank of India
10	Deutsche Bank	30	Syndicate Bank
11	Development Credit Bank	31	UCO Bank
12	Dhanalaxmi Bank	32	Union Bank of India
13	Federal Bank	33	UPPCL

14	HDFC Bank	34	Vijaya Bank
15	ICICI Bank	35	Axis Bank
16	Indian Overseas Bank		
17	Janta Sahakari Bank		
18	Jammu & Kashmir Bank		
19	Karur Vysya Bank		
20	Kotak Bank		

The EMD will be forfeited:

(a) If a bidder withdraws his bid during the period of bid validity.

(b) If a successful bidder fails to

(i)Execute the agreement or

(ii)Furnish the necessary Performance security deposit within the specified time limit of 15 days from the date of issue of Letter of Award of work.

(c) If the bidder does not accept the corrected amount of bid as per clause 4.12.

4.9 ALTERNATE OFFERS

Alternate offers mean the offers in which the scope of work and major components are affected. No alternate offers are allowed. The bidders should submit offers which comply with the requirements of the bid documents and as indicated in the drawings and specifications.

4.10 AMENDMENTS, ADDITIONS AND ALTERATIONS

The KSEBL may modify the bid documents at its own initiative by using corrigendum.

The corrigendum will be published in the website **etenders.kerala.gov.in**, not later than 10 days prior to the last date for submission of bid, and shall be binding upon them.

The Bid shall be furnished taking into account the corrigendum, if any, issued as mentioned above and any failure in doing so will lead to consequences including rejection of bid for which KSEBL will not be responsible.

The KSEBL may extend the last date for the submission of bids at its discretion in exceptional cases. The bidders shall not amend/add/alter any of the Bid conditions, conditions of contract, specifications etc.

4.11 DOUBTS, CLARIFICATIONS AND PRE-BID MEETING

If the prospective bidder has any doubt on the meaning, interpretations of any portion of the bid document or on the Project, Work etc, he should submit the same to the bidding authority in writing and the soft copy of the queries should be in MS Office/ excel format. The submission shall reach the bidding authority not later than the Pre-Bid meeting as shown in the tentative schedule vide clause 3.5. The Bidder or his official representative is advised to attend the Pre-Bid meeting. The purpose of the meeting is to clarify the issues and doubts and to answer the queries on any matter that may be raised till that date. The questions raised and responses given by the KSEBL will be published in the website, without revealing the identity of the questioner. Any corrigendum based on the queries/clarifications will be released on or before the date of publication of clarifications on queries mentioned in Notice Inviting Tender and will form part of the Bid document. No official clarification will be issued based on further queries raised after the pre-bid meeting.

4.12 CORRECTION OF ERRORS

Bids will be checked for arithmetical errors and will be corrected by KSEBL as follows:

“Where there is a discrepancy between amount in figures and in words, the amount in words will govern.”

4.13 MODIFICATION AND WITHDRAWAL OF BID

No modification or withdrawal of any conditions of Bid once submitted will be permitted. Such withdrawal or modification will lead to forfeiture of Bid Security (EMD) and rejection of Bid.

4.14 KSEBL’S RIGHT TO ACCEPT OR REJECT BID

The KSEBL reserves the right to reject any bid or all bids or annul the bidding process at any time prior to the award of contract without assigning any reason thereof. No liability other than giving information regarding the above to the bidders shall rest with KSEBL.

4.15 LAST DATE FOR SUBMISSION OF BIDS

The Bids shall be received by the bidding authority at the address specified on or before the date and time specified in the schedule of bidding process as per clause 3.5 and in the Notice Inviting Tender.

The KSEBL reserves the right at its discretion to extend the last date of submission by using corrigendum in the e-tender site.

Any Bid received by the KSEBL after the prescribed last date of submission of bids will not be considered.

4.16 CRITERIA FOR EXAMINATION, EVALUATION AND COMPARISON OF BIDS

4.16.1 Examination of Genuineness and Responsiveness

Before selection of the bid for work, the KSEBL will examine all bids for their genuineness and responsiveness.

A genuine Bid shall be one which contains

(a) Authenticated documents and data.

(b) Legally enforceable undertaking/ agreements wherever required.

A responsive Bid:

(a) Shall be properly signed (digital signature) and dated.

(b) Shall contain required Bid Security (EMD) in the prescribed manner.

(c) Shall satisfy to the requirements of the terms and conditions as per the Bid documents.

(d) Shall be provided with all clarifications or substantiation that the KSEBL may require at any time before the award of contract.

(e) Shall contain precisely the details and data required to be furnished under schedules.

(f) Shall be furnished with prescribed agreements executed, Proforma filled in and declarations signed.

(g) Shall conform to all the terms, conditions and specifications of the Bid documents without material deviation or reservation.

A material deviation or reservation is one;

(a) Which affects in the scope, quality or performance of the works.

(b) Which is inconsistent with the Bid documents and limits the KSEBL’s right or the bidder’s obligation under the contract.

(c) Whose rectification would affect unfairly the competitive position of other bidders submitting substantially responsive bids.

Only the genuine and responsive Bid will be considered for further evaluation and comparison for selection.

4.16.2 Evaluation of Bid

The bids will be thoroughly evaluated for the financial capability and technical soundness of the bidders. For this, the value of work done, audited annual accounts, bankers certificate etc. will be evaluated to assess their financial capability. Nature, volume, type etc of works done, time of completion of works done, type of clients, tools, plants and machinery possessed by the bidder, availability of required managerial and technical persons etc. will be evaluated to assess the technical soundness.

Cover 3 containing the schedule of prices offered by the bidder will be opened. The Price Bid of the bidders will be evaluated as per relevant clauses provided elsewhere in this document. For selecting the best Bid, the prime criterion is the lowest combined offer for PAC -1 & PAC -2 (sum of the price quoted for design as per site conditions, installation, supply of materials, testing & commissioning including applicable GST (PAC-1) and operation and maintenance including applicable GST (PAC-2) mentioned in the each sheet of the BOQ.

4.17 ACCEPTANCE OF BID AND AWARD OF CONTRACT

On final selection of Bid for the work, KSEBL will issue Letter of Award to the successful bidder at his address given in the Bid for communication, from the agreement authority. The signed copy of which, in token of acceptance by the bidder will form part of Contract agreement. This letter of Award will contain the sum which KSEBL will pay to the

Contractor as per the accepted bid, which is called the Contract price and any other conditions, terms etc, on awarding the work, the amount of performance security, date of commencement and completion of works etc. will also be included.

After awarding the work by the Letter of Award mentioned above, the successful bidder has to furnish the required Performance security deposit as Bank Guarantee as per clause 5.1.7 and execute the Contract agreement in the Form for agreement provided in the Bid document. The same shall be done within 15 days from the date of issue of Letter of Award.

4.18 RELEASE OF BID SECURITIES

The bid securities of the unsuccessful bidders will be released after the award of work and signing of Contract agreement with the successful bidder.

Part 5
GENERAL CONDITIONS OF CONTRACT

5.1 GENERAL

5.1.1. Execution of agreement

Within 15 days from the date of issue of Letter of Award as per clause 4.17, unless the KSEBL has granted extension of time for execution of agreement after judiciously considering the merit of the ground urged for the extension, the successful bidder shall furnish Performance security Deposit as per clause 5.1.7., sign and execute the Contract agreement prescribed in Annexure-4, with the agreement authority. The agreement shall be executed on Kerala Government Stamp Paper worth Rs.1/- for every Rs.1000/- rupees of agreed total contract amount or as desired by the KSEBL.

Failure of the Contractor to comply with the above requirements shall constitute sufficient grounds for cancellation of award of contract and re-arrange the Work including re-bidding at the risk and cost of the Contractor.

If due to the default of the Bidder/Contractor to furnish requisite Performance Security deposit, execute Contract agreement or to take possession of the site and execute the Work with proper diligence, the Work will be arranged otherwise by KSEBL after forfeiting the security deposit of the concerned contractor. If any loss to the KSEBL results due to this, the same will be recovered from the Contractor as if it were arrears of revenue, but should it be a saving to the KSEBL, the original Contractor shall have no claim whatsoever be the difference. Recoveries on this or on any other account will be made from the sum that may be due to the Contractor on this or any other subsisting contracts or under the Revenue Recovery Act or otherwise as the KSEBL may decide.

5.1.2. Parts of Agreement and Priority

All the Bid documents of the successful bidder in original with modifications, if any, as ordered by KSEBL, the Letter Of Award, correspondence between the selected bidder and the KSEBL deemed necessary by the agreement authority, any other document as called for by KSEBL from the selected bidder and the Contract agreement

executed, approved drawings issued from time to time etc. shall form the full Contract agreement. All the documents forming part of contract document are to be taken as mutually explanatory. For the purpose of interpretation, the priority of the document shall be in accordance with the following sequence:

1. Agreement executed in Kerala Government Stamp Paper
2. Letter of Award
3. Correspondences between KSEBL and the selected bidder included in the agreement.
4. Special Conditions of Contract.
5. General Conditions of Contract
6. Technical specifications and relevant data sheets of the component proposed and the approval for installation in the project.
7. Accepted Schedule of Technical Particulars and construction programme/ time schedule and schematic drawing.
8. Accepted Schedule of Prices
9. General Bid conditions
10. Instructions to bidders.
11. Information to bidders.
12. Drawings including approved drawing issued from time to time.

5.1.3. Essence of Contract

Timely completion, quickness and promptness for execution, quality and cost effectiveness for work are considered as the essence of the contract.

5.1.4. Language of Contract

The language of contract shall be ‘English’.

5.1.5. Law & Jurisdiction of Contract

This contract will be governed by the laws of India and Kerala. Any dispute arising out of this contract will be subject to the exclusive jurisdiction of Civil Courts at Palakkad.

5.1.6. Amount of Contract

The amount of Contract will be the amount accepted by KSEBL for the EPC contract as per the Letter of Award. The contractor is bound to furnish information and data including the data in support of his quoted amount to KSEBL if called upon to do so. The percentage of tax amounts as Governed by GST shall be mentioned.

5.1.7 Performance security deposit

The Contractor shall submit Performance security deposit as Bank Guarantee at the time of execution of agreement in the prescribed format (Annexure 5) for performance security of the Contract and it shall be an amount equal to 10% of the total Contract amount. The Bank Guarantee submitted by the contractor rounded off to the higher multiple of Rs 1000/-. The amount thus worked out will be informed to the successful bidder vide Letter of Award as per clause 4.17.

In order to cover the liabilities under the contract and to ensure sufficient guarantee to cover all possible liabilities pertaining to defects, shortfalls, remedial measures arising out of poor workmanship, materials, loss, excess amount, risk and cost of Contractor in case of alternate arrangements and any type of dues to the KSEBL, an amount as prescribed by KSEBL shall be collected and retained from the Contractor towards Performance Security for the Contract.

The Bank Guarantee shall be initially valid from the date of agreement for a period of 2 years and be kept renewed from time to time till the end of defect liability period including O&M . The performance security B.G will be released in equal installments each year after demonstration of desired performance ratio (AC) as per clause 2.2.3 during the defect liability period. The performance ratio(AC)(as per Clause 2.2.3) will be calculated based on data from pyranometer / Meteonorm data. Failure of the successful bidder to submit the required Performance Guarantee shall constitute sufficient grounds for termination of Contract & forfeiting the EMD.

No interest *will be paid by KSEBL at any stage of contract on the Performance Security*.

The performance ratio (AC)(as per Clause 2.2.3) can be checked at any time in between if deemed necessary by the Engineer in charge (as per clause 2.2.3). If any unusual degradation is noticed in the PR the contractor shall attend and rectify the same within 24 hours on intimation. If not the performance security deposit will be forfeited.

5.1.8 Operations & Responsibilities of Contractor

The Contractor shall proceed with the works with diligence and expedition, supervision and shall be carried out to the entire satisfaction of the Engineer-in-Charge who shall have full power to order the Contractor to alter, enlarge or diminish the form, dimensions, portion or quantities of any of the works or to make use of materials and workmanship of different description and qualities from those herein specified. Works are to be properly carried out to the satisfaction of the Engineer-in -charge.

The whole work entrusted to the Contractor shall be executed in perfect conformity with the contract documents and such explanatory and detailed drawings and directions as may be furnished from time to time by the Engineer-in-Charge for the guidance of the Contractor.

The whole work entrusted to him together with any temporary works associated shall be carried out in the most substantial and proper manner with the best materials and workmanship, and to the entire satisfaction of the Engineer-in-Charge and in such order of time as he may direct. The Contractor shall attend to and execute without delay, all orders and instructions, which may from time to time be issued by the Engineer-in-Charge. When the works or appurtenants there of affects the works or the arrangements of other units of work not covered by this specification, working methods shall be discussed with the Engineer-in-Charge and his prior concurrence shall be obtained.

The Contractor shall submit drawings and specifications for the proposed temporary works for the approval of the Engineer-in-Charge. The Contractor is responsible for design of temporary works. The approval of the Engineer-in- charge does not exempt the Contractor’s responsibility for his design for temporary works.

Preliminary, enabling and temporary works shall generally be limited to

i) Electrification works, communication facilities and water supply works to the Contractor’s site office, camp etc.

ii) Civil Engineering structures connected with the construction of Contractor’s office, installation of plants and equipments etc. at site.

iii) Any other work of temporary nature carried out at site by the Contractor for the execution of the tendered items of the work as decided by the Engineer-in-Charge.

In addition to whatever provisions regarding operations, responsibilities and liabilities of the Contractor stated elsewhere in the contract, the following shall also be included:

The Contract is to include the whole work, whether permanent or temporary which are described in or implied by the contract documents which may be inferred to be obviously necessary for the efficiency, stability and completion of permanent works, the performance of all other operations, supply of all materials labour and chargeable expenses and things described in or implied by the contract documents which may be deemed desirable or required for the completion in all respect of the above works to the satisfaction of the Engineer-in-Charge and all such matters shall be deemed as included in the sum quoted by the Contractor.

Works shown in the drawings and not mentioned in the specifications or described in the specifications without being shown on the drawings shall nevertheless be held to be included in this contract and their execution is to be covered by the quoted sum in the same manner as if they had been expressly shown upon the drawing and described in the specification. If the Contractor has any doubt with regard to any details mentioned in the drawings or in the specifications, he may refer the matter to the Engineer-in-Charge in writing and get the clarifications needed.

The Contractor must take upon himself the entire responsibility for sufficiency of scaffolding, timbering, machinery, tools or implements, and generally of all the resources including labour, materials etc. used for the fulfilment of this Contract. Whether such means may or may not be approved or recommended by the Engineer-in-Charge, the Contractor must accept all risks in the execution of work including risks of accidents, or damages, from whatever cause they arise, until the completion of this Contract.

The Contractor shall carry out all works required as per the specifications in the contract agreement and or as per the latest version of I.S.S or equivalent. He shall furnish all labour, all materials except materials supplied by the KSEBL, machinery, plant, equipment, and shall supply and install all equipments, test and commission and meet the cost of all expendable items and other charges including incidentals and overheads for completing the works and the cost of design and drawings, if any which he may have to make in carrying out the works.

5.2 PAYMENTS

a. The Contractor has to produce Bank Guarantee for an amount of 10% of the Contract amount as Performance Security Deposit at the time of executing Contract Agreement.

b. No amount shall be released as mobilisation advance.

c. 30% of the contract value excluding O&M, will be released to the contractor as cost of major components of the plant(PV modules, Inverters, battery bank and module mounting structures) after delivery of this material at site, inspection and verification by authorized departmental officers, and production of insurance certificates for the materials delivered at site.(Refer clause 5.5.2)

i) The Engineer-in -charge is to be informed about the delivery of material one week in advance by the contractor.

ii) The Engineer in charge shall ensure the site acceptance / rejection of the received material at site within three days of delivery of material along with submitting the SAT procedure of the delivered material from the vendor by the contractor.

iii) The invoices shall be submitted by the contractor as per the accepted price schedule which is to be verified and made ready for release of payment within 15 days of receipt of the invoices subject to the satisfaction of the above conditions.

d. 100% of the total Contract amount except Operation and Maintenance charges will be released after satisfactory completion, testing ,commissioning of the solar plant after proving the Performance ratio (AC) as per clause 2.2.3 .

The contractor can submit the final invoice as per the accepted price schedule within 10 days on proving the Performance ratio (AC) (as per Clause 2.2.3) after completing the project within 06 months.

The invoices shall be verified and final payment may be released within 3 months of receipt of the invoices subject to the satisfaction of the above conditions.

e. The Operation & Maintenance charges shall be released at the end of each year after commissioning and demonstration of the specified Performance ratio (AC) as per clause 2.2.3 at the end of each year during O&M period (5 years).

The performance security amount shall also be released in equal instalments each year (O&M period) from the date of commissioning the project after demonstrating the specified Performance ratio (AC) (as per Clause 2.2.3).

The proportionate amount for decrease in the production of energy units will be deducted for liquidated damages from the amount to be released and only the remaining will be released after demonstrating the required Performance ratio. i.e. the contractor shall compensate for lower generation.

f. The Quoted taxes and duties etc as Governed by GST will be released subject to an undertaking from the Contractor in Kerala Government Stamp paper that "If any dispute in payment of taxes and duties etc as Governed by GST from concerned Tax authorities occurs in future, he shall indemnify KSEBL from such liabilities and the contractor shall be liable for the additions, loss or cost on account of such discrepancies /dispute".

5.2.1. Dues from the Contractor

All sums of money found due from the Contractor to the KSEBL under this contract shall be recovered from the Contractor from his security and bills payable to him and from other assets movable or immovable as if the dues are arrears of land revenue under the provisions of Revenue Recovery Act for the time being in force or in any other manner as the KSEBL may deem fit.

5.3 WORK

5.3.1 Taking over the site and commencement of Work

After executing the agreement the contractor or his authorised agent shall take over the site from the Engineer- in -charge within 10 days and commence the work immediately. If the contractor does not turn up, the acknowledgement form for handing over of site duly signed by the Engineer in charge shall be sent to the contractor through registered post and it shall be deemed that the contractor has taken over the site from the date of posting. The contractor shall sign an acknowledgement in the form or his authorised agent while the site is taken over by the contractor. The Engineer-in-charge shall forward copy of acknowledgement directly to the agreement authority under intimation to the other officers. (Ref. PWD D-Code). There after the Contractor shall proceed the work with due expedition and without delay. The contractor shall submit the design brief and quality plan of the SPV to the Engineer -in-charge and get it approved before starting the work .The Contractor shall also submit a general lay out plan to the Engineer-in-Charge before the commencement of

work for approval, showing details such as dump yards, camp facility, storage area, construction plant and equipment for execution of the work etc as directed by Engineer-in-Charge.

5.3.2 Commencement and Completion

The work shall commence within 15 days from the date of agreement after taking over the site and completed within 6 months (maximum) from the date of handing over of site However, the period of completion of work as stipulated vide clause 2.2.4 will be reckoned from 10 days from the date of agreement or the date of handing over the site, even if not in full, but in a manner the work can be commenced and proceeded with in accordance with the programme of works, whichever is earlier and Time of Completion will be worked out accordingly. All the works stipulated under the scope of the Contract shall be completed in all respects, supplies made, services provided and final cleaning up done and required testing shall be completed and commissioned before the expiry of the Time of Completion thus worked out, unless the time of completion is postponed and period of completion is extended by a written letter from the agreement Authority.

5.3.3 Certificate of Completion and Taking Over

The solar PV plant will be taken over by KSEBL on completion of all works stipulated under the scope of work. After testing and commissioning of the Project the contractor will have to prove performance ratio (AC) mandatorily as per **clause 2.2.3**. If the contractor fails to prove the desired performance ratio at the time of completion and during any of the consecutive years of defect liability period he will be given a second chance to demonstrate the PR in another 7 days. Still if it is not achieved, EPC contractor shall enhance /improve the quality of the plant by replacement of the components with all suitable modification requirements on balance of systems at his own cost to achieve the performance ratio as per clause 2.2.3.The contractor shall be responsible for all required activities to demonstrate the specified performance ratio till the end of defect liability period.

Thereafter subject to the execution of O&M for 5 years and if there are no obligations to arise out of the Contract, **the Engineer in charge** shall furnish a certificate to the Contractor to the effect that all the works are completed satisfactorily and no work remains incomplete as per the terms of the contract. Dues and liabilities if any, outstanding against the

Contractor shall also be included in this certificate. The issue of this certificate does not relieve the Contractor from the obligations during the Defects Liability Period defined vide item No. 19 of part I, 'Definitions and Interpretations'. The KSEBL shall finally take over the plant only after due completion of the conditions as specified in Handing over Clause in Part -9 of tender document.

No work shall be considered as complete until the Contractor has removed all scaffoldings, surplus materials and rubbish and cleaned off the dirt from all wood work, doors, windows, walls, floors or from other parts of the structure before the work has been measured by the Engineer-in-Charge. The Contractor shall clear the work within the time limit specified by the Engineer-in-Charge, failing which, the Contractor shall have no claims on the surplus materials and the works shall be cleared at the risk and cost of the Contractor.

The work shall be treated completed only when the Engineer-in- charge issues certificate of completion where the actual date of completion of work will be mentioned. In case of termination or foreclosure the Engineer- in -charge will issue the certificate of completion to that effect. If the contractor fails to complete any part of the work as required for satisfactory completion before taking over and / or the date of completion specified, and fails to remove the surplus materials, the KSEBL will complete the works and remove the surplus materials etc and the amount incurred for the same will be realised from the contractor from any amount due to him from this work or any other work with KSEBL or his assets in appropriate proceedings. The contractor will not have any claim over the surplus materials so removed by the KSEBL.

5.3.4 Defects Liability Period

The Contractor is liable to rectify any defect or damage notified by the Engineer - in – Charge, at Contractor's cost during the Defect Liability Period, which shall be 5 years reckoned from the date of commissioning the project, i.e.; to cover the entire Operation & Maintenance period. The Contractor shall guarantee for the performance of the entire project and its components during this period. If any defect, cracks, shrinkage or other faults in the works appear at any time prior to the end of the Defects Liability Period, the Engineer may instruct the Contractor to rectify the defects immediately. If the Contractor fails to carry out the directions given by the Engineer-in-Charge and does not rectify the defects within a reasonable time, the Engineer-in-Charge shall make

alternate arrangements for making good the defects through other agencies and the cost thereof plus 21% shall be recovered from the Contractor from the amounts payable to the Contractor by way of forfeiting Performance Security deposit or any other means.

If the drawings, specifications and contract documents do not contain particulars of materials and work which are obviously necessary for the proper completion of the work and intention to include which is nevertheless to be inferred, all such materials and works shall be supplied and executed by the Contractor without any extra charge.

Any unusual defects like considerable dip in Performance ratio etc; if notified by the Engineer-in-charge shall be attended to within 24 hours or else KSEBL reserves the right to forfeit the performance security.

The Contractor is bound to furnish information and data including the data in support of his quoted amount to the KSEBL if called upon to do so.

If the contractor fails to prove the desired Performance ratio (AC) as per **clause 2.2.3** during any of the consecutive years the annual O&M period will be extended to that time period till the desired Performance ratio as per **clause 2.2.3** is attained .

5.3.5 Suspension of Work

The Contractor shall not suspend the work without the written consent of the Engineer - in - charge. In the event of suspension of the work on Contractor's own accord without written permission, the KSEBL shall have the right to recover all losses to KSEBL on account of such suspension as per law and even resorting to Revenue Recovery Act provisions.

The KSEBL shall not be liable to pay any amount to the Contractor towards loss arising from suspension of the works or delay in execution of the Work due to any strike or agitation by the labourers of the Contractor.

The KSEBL shall have for just and sufficient reasons, the right to suspend the works or to delay the works by an order in writing by the Engineer-in-Charge.

If such suspension is necessary for the proper execution of the works or by reason of weather conditions or by some default on the part of the Contractor or necessary for the safety of the works or any part thereof, or necessary for the safety of adjoining property, or safety of the general public, or workmen or those who have to be at the site, or to ensure safety, or to avoid disruption to traffic and utilities, or to permit fast repairs and restoration of any damaged utilities, the Contractor shall not

be entitled to any extra cost incurred during the period of any suspension of work.

5.3.6 Suspension of Work on Account of Climatic Conditions

The Engineer-in-Charge may order the Contractor to suspend the Work or part of a work or work in a specified location that may be subjected to damage by climatic or weather conditions. The Contractor shall have no claim for compensation for losses in this account.

The care and safeguarding of works, site, men, machinery, materials, tools and plants are the responsibility of the Contractor without any extra payment from the KSEBL. Losses or damage to KSEBL on account of failure from the Contractor in safeguarding from weather and climatic conditions as mentioned above will be realised from the Contractor. Any event of stoppage on account of climatic conditions shall be brought to the notice of the Engineer-in-Charge immediately with reasons for such stoppage.

No claims for extra work/expenditure necessitated on account of stoppage due to the fault of the Contractor will be entertained. The KSEBL will not be liable for any loss or damages or any other sum of money, if any, sustained by the Contractor on account of climatic and weather conditions. The KSEBL will pay to the Contractor, all reasonable expenses and grant suitable extension of time arising from suspension of works or delay by such order in writing of the KSEBL unless such suspension be due to some default on the part of the Contractor.

5.3.7 Tools, Plant and Equipment

The Contractor shall provide at his own expense all tools, plant and equipment required for the execution and completion of work in all respects as per the contract. The Contractors are advised to take necessary insurance coverage for the tools, plant and equipment used for the project. The Contractor shall furnish as desired by the Engineer-in-Charge all details of tools, plant and equipment mobilised to the site with date of mobilisation. He shall de-mobilise no tools, plant and equipment without the written consent from the Engineer-in-Charge.

5.3.8 Force Majeure

Force Majeure is defined as a cause which is beyond the control of the Contractor or the KSEBL which could not be foreseen with a reasonable

amount of diligence and which substantially affects the performance of the contract such as,

1. Volcanic eruption, Earthquake, Cyclone, floods or droughts.

2. Civil war or war like operations or Acts classified under invasion of foreign enemies or hostilities, or Rebellion or terrorist action or Riots

3. Epidemics and similar conditions.

No party in the contract shall be liable to the other for any loss and damage occurred due to force majeure condition and shall not apply to the obligations of either party to make payment to the other party under the contract due to occurrence of force majeure conditions.

A notice shall be given to the Engineer-in-Charge within 14 days after the Contractor became aware or should have become aware of the relevant event or circumstances constituting force majeure. Engineer-in-Charge will ascertain the extent of delay due to the event.

The machinery, equipment and other valuable material of the Contractor at work site shall be insured by them so that any loss or damage due to force majeure situation can be taken up by the Contractor with the insurance companies for getting their claims. The KSEBL will not give any financial assistance on this account.

All equipment, machinery, works etc. which are furnished, installed, constructed and handed over / to be handed over to the KSEBL under the contract for the completion of the project shall be insured by the Contractor for the period of contract. The entire cost on account of this shall be borne by the Contractor. Losses or damage if occurred to such machinery, equipment and work shall be made good at the risk of Contractor.

5.3.9 Liquidated Damages / Penalty

Any delay in commissioning a Project will adversely affect the total planning which in turn will affect the State and the public exchequer. Hence, for any damage or loss caused to the KSEBL due to the failure from the part of the Contractor in completing the Work in all respects within the stipulated period of completion vide clause 5.3.2, the Contractor shall compensate for the same. The Liquidated Damages (not as penalty) is to be realised at the end of the period of completion. The maximum amount of Liquidated Damages shall be limited to 10% of the accepted Contract Amount or Contract Price

whichever is higher. The rate of Liquidated Damages shall be 1% of agreed Probable Amount of Contract or Contract Price whichever is higher per week of delay subject to a maximum of 10% of agreed Probable Amount of Contract or Contract Price, whichever is higher. If the work could not be completed and handed over after proving the required PR within 10 weeks from the date of completion of the SPV plant shall be terminated and then balance will be arranged at the risk and cost of the contractor.

Penalty imposed, if any, shall be deducted from the amount of Liquidated Damages. If the delay prolongs in excess of 200 days from the agreed date of completion as per the original agreement, the Work is liable to be terminated and balance works will be arranged to be completed at the risk and cost of the Contractor.

The Contractor shall be required to evaluate the PR for the entire year at the end of every year of operation & Maintenance or maintenance during the entire defect liability period. The acceptable (minimum or above) PR values to be demonstrated by the Contractor at the end of each year after accounting for the degradation are as per clause 2.2.3. If the specified PR % is not achieved PR shall be demonstrated in another consecutive 7 days. If PR is not achieved in the second chance, Contractor shall correct the plant at his own cost to achieve the minimum specified PR for each year. The O & M period will be extended to that time period till the desired PR ratio is attained. The contractor shall be liable to pay liquidated damages for lower generation.

5.3.10 Default by the Contractor

If the Contractor neglects or fails to proceed with the works with due diligence and expedition or violates any of the provision of the Contract, the Engineer-in-Charge may give the Contractor a notice identifying deficiencies in performance of the Contract and demanding corrective action within the period of 14 days. After receipt of notice the Contractor shall take immediate action to rectify the mistakes and other deficiencies pointed out by the Engineer-in-Charge and report the matter to him.

5.3.11 Termination of Contract

If the Contractor fails to take satisfactory corrective action within the time frame specified in the notice i.e., 14 days after receipt of the notice, the Agreement authority reserves the right to terminate the contract in whole or in part after issuing seven days' notice to the Contractor based

on the recommendation from the Engineer-in-charge seeking explanation from the Contractor why the Contract should not be terminated at his risk and cost. Materials, machinery, tools, plant and equipment, scaffolding materials etc. available shall not be removed from the site thereafter, without previous sanction from the Engineer-in-Charge. If the Contractor fails to give a satisfactory reply to the notice within the stipulated time of seven days or the reply received is not satisfactory, the Agreement Authority shall terminate the contract either in whole or part without further notice and shall arrange to execute the balance works at the risk and cost of the Contractor. The Contractor shall be issued the letter of termination of the contract intimating that the Work will be rearranged at his risk and cost. The Contractor's amount available with the KSEBL such as Security Deposit, Retention Money, running account bill payable if any etc. shall not be released to him until the balance works are carried out and the liabilities of the Contractor are fully assessed. All the Bank Guarantees and other security bonds, if any, shall be got extended or encashed if necessary to protect the interests of the KSEBL. The amount retained with the KSEBL and the Bank Guarantees etc. will be credited to KSEBL account to make good the losses that may be incurred by KSEBL on rearrangement of the works. The list of Contractor's equipment, machinery, tools, scaffolding materials etc. available at site shall be prepared by the Engineer-in-Charge in the presence of the Contractor or his authorised representative and shall be got signed by both parties. The KSEBL reserves the right to confiscate the above items and sell the same by public auction or any other means and credit the net proceeds to KSEBL account towards realisation of the losses that may occur on rearrangement of the works.

If there is any surplus amount available with the KSEBL after execution of the balance works, KSEBL is not bound to pay the surplus amount to the Contractor.

In the event of termination, the Engineer-in-Charge may also take possession of the works, site, plant, equipment and materials brought or placed thereon and cause the balance works to be completed by utilising them through other agencies, at the risk and cost of the Contractor. In such a case, the value of work done through such agencies will be credited to the Contractor at his contract rates.

On completion of such works, if the expenses incurred for carrying out such work, by other agencies as certified by the Engineer-in-Charge are in excess of the value of the work credited to the Contractor, the difference

shall be recovered from the Contractor by the KSEBL from the amount of Security for performance and any other money withheld from the Contractor. In case, this results in expenditure in excess of the total of the amount of security for performance, retention money and other money withheld from the Contractor, the KSEBL shall have right to make good this amount by resorting to legal proceedings. In addition, he shall also be liable for the imposition of Liquidated Damages under the Contract as per clause 5.3.9.

The Engineer-in-Charge may also direct that a part or the whole of such plant, equipment and materials be removed from the site within a stipulated period. If the Contractor fails to do so, the Engineer-in-Charge may cause them to be sold, holding the net proceeds of such sale to the credit of the Contractor. After completion of the works and settlement of accounts, the lien of the KSEBL on the Contractor's plant, equipment and balance of materials will be released.

In the event of termination of contract, the Contractor, shall within 30 days thereof, make available to the KSEBL all the working areas and access thereto, as well as sites which were in his occupation for the performance of the Contract. He shall also return the tools and plants, if any, given to him by KSEBL.

Termination of the contract shall be adequate authority for the Engineer-in-Charge to demand discharge of the obligation from the guarantors of the security for performance.

5.3.12 Power, Water, Fuel and Lubricants

The Contractor shall make his own arrangements for availing power, providing fuel, water for the works, camps, colonies, street lighting and all other requirements at his cost. The KSEBL will render all assistance and help for getting the power supply. The Contractor shall not use trees available in the project site or adjacent forest land for the purpose of firewood.

5.3.13 Re-Assignment of Work

The work shall not be re-assigned to any one by the Contractor on any reasons

5.3.14 Foreclosure

If KSEBL does not require the whole or any part of the Work to be carried out at any time after award of the Contract, the Engineer-in-Charge will give notice to the Contractor in writing to that effect. The notice shall be issued 28 days prior to the last date required by the KSEBL for taking over of the Work or part of the Work. The Contractor shall hand over the works completed and demobilise from the site. The Contractor shall not have any claim to any compensation whatsoever, on account of any profit or advantage which he might have derived had he executed such works.

Thereupon, the Contractor shall be paid at contract rates for works executed as certified by the Engineer-in-Charge for the items which could not be fully utilised because of the foreclosure.

Materials supplied by KSEBL except for normal wastage shall be returned to the place from where it was issued.

5.3.14 Possession Prior to Completion

The Engineer-in-Charge has the right to take possession or use any completed part of the Work. Such possession or use shall not be deemed as acceptance of any work.

5.3.15 Communication Facilities

The Contractor shall install, operate and maintain communication facilities connected to the site offices of the Contractor in good working order at or near the different work sites in order to have prompt communication round the clock every day, with some responsible employee of the Contractor, put in charge. The Contractor shall also install, maintain and operate other communication and signal facilities necessary for the safe and efficient execution of the Work. Authorised employees of the KSEBL shall have free use of such facilities installed by the Contractor for the transmission of official message. The entire cost of providing and maintaining communication as provided in this paragraph shall be included in the quoted amount and no extra claim for the above will be entertained.

5.3.16 Quality Assurance

The Contractor shall establish a Quality Assurance system for the Work to demonstrate the compliance of such part with the requirement of the contract and specifications. The Quality Assurance system shall be subject to the approval of the Engineer-in-Charge. The system shall be in accordance with the specifications stated in the Contract or with BIS specifications unless otherwise specified anywhere in this Contract. The Engineer-in-Charge shall be entitled to inspect the system and the reports shall be periodically sent to him by the Contractor. Compliance with the Quality Assurance system shall not relieve the Contractor from any of his obligations or responsibilities under the Contract.

The cost of all Quality Assurance operation shall be included in the quoted amount under the price schedule and no extra claim will be entertained. The details of sampling, testing, procedures etc. for different works are given in the Technical Specifications of the Contract. If these details are not stated in the technical document, BIS specification shall be followed. The Contractor shall provide samples and test without any extra cost and co-operate in the testing of materials if so desired by the Engineer-in-Charge.

5.3.17 Supervision

The KSEBL will engage sufficient number of supervisory staff at the site of Work. The Contractor shall provide them necessary facilities and assistance to examine and measure the works. The supervisory staff shall not have power to revoke, alter, enlarge or relax any requirement of the Contract, but may sanction to execute the works authorised by the Engineer-in-Charge. The supervisors will act as the representatives of Engineer-in-Charge and his delegated officers and will have power to give notice to the Contractor or his foreman of non-approval of any work, and such work shall be suspended or use of such material shall be discontinued until the decision of the Engineer-in-Charge or his delegated officer is obtained. The Engineer-in-Charge shall have access at all times to the places of storage and places where materials are being manufactured or processed or equipment are being manufactured for use in work under the Contract to determine whether their manufacture and process are proceeding in accordance with the drawings and specifications.

The work shall be conducted under the general direction and control of the Engineer-in-Charge and his delegated officers and is subject to inspection to ensure strict compliance with the terms of the Contract. Any failure from the part of KSEBL to detect or discover errors, faults, defects or the Work not in accordance with the requirement of Contract during the progress of work shall not be deemed as acceptance thereof or waiver of defect.

The Contractor shall execute the whole and every part of the work in the most substantial and workman like manner and in all other aspects.

If any work found as unsound, imperfect or done with unskilled workmanship or any material or article provided are unsound or quality inferior to that in accordance with the Contract, the Contractor shall forthwith rectify, reconstruct or remove in whole or part at his own charge and cost as noticed by the Engineer-in-Charge. In the event of failing to do so within seven days from the written notice from the Engineer-in-Charge, KSEBL may have the right to rectify, re-execute, remove or replace such work or material as the case may be at the risk and expense of the Contractor in all respects. The Engineer-in-Charge may reject any work at any stage which he considers to be defective in quality.

5.3.18 Clean Up

Upon completion of the Work, the Contractor shall remove from the vicinity of the Work all plant, buildings rubbish, unused materials, concrete forms and other like materials belonging to him or under his direction during construction to the satisfaction of the Engineer-in-Charge and in the event of his failure to do so, the same may be removed by the KSEBL at the expense of the Contractor within 15 days from the date of handing over. The cost on account of clean up shall be included in the quoted rate and no additional extra claim shall be entertained.

5.3.19 Protection of Work

The Contractor shall maintain all works including Preliminary and Enabling works, Temporary works, Care and Diversion works etc. during the progress of work till taking over, and shall take necessary measures to protect and preserve them in good condition at his own expense. The rates quoted shall include cost on account of this and no extra claims shall be entertained.

5.4 CONTRACTOR

5.4.1. Power of Attorney

The Contractor shall not execute Power of Attorney without previous sanction in writing of the authority accepting the Bid in respect of any matter touching this contract and any such Power of Attorney executed without such sanction shall neither be recognized by, nor will be binding upon the KSEBL or its officers. It shall be entirely within the discretion of the authority accepting the Bid either to grant such sanction or to refuse it or to revoke a sanction once given.

5.4.2. Contractor's Nominee

If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies, and if the Contractor is a partnership concern and one of the partners dies, then all sums payable under this contract will be paid to the nominees of the individual Contractor/proprietor if there is one or to his/her legal representative and in the case of partnership, to the surviving partners and the Contractor should fill up the 'Form of Nomination' at the time of executing the agreement and should sign in the presence of two witnesses.

5.4.3. Management of Work

It is the responsibility of the Contractor to manage the entire works to produce the results as contemplated herein. It is for him to plan, organise and execute the work and manage the labour.

In case the Contractor is not able to manage the Work properly and his conduct is conducive to create indiscipline at site and to create confusion in contract administration as adjudged by the agreement Authority, it shall be competent to the agreement Authority to terminate the Contract at the risk and cost of the Contractor as per clause 5.3.11

The Contractor shall also comply with the directions of Engineer-in-Charge in respect of planning, organising, execution and management of works. Failure to do so will lead to termination of contract at the risk and cost of Contractor. In the case of termination, provisions provided in clause 5.3.11 shall apply. In case of labour strikes, indiscipline or unrest of the labourers of the Contractor, the Contractor sustains any loss or damages, the KSEBL shall not be liable for any loss or damage to the

Contractor. No extension of time of completion shall be granted due to labour strikes, indiscipline or unrest of the labourers of the Contractor.

5.4.4. Contractor's Representative

The Contractor may with prior consent of Engineer-in-Charge appoint his representative giving him necessary authority to act on Contractor's behalf under the Contract. The Contractor shall furnish the name and details of such representatives to the Engineer-in-Charge and to his delegated officers well in advance. Without the prior consent of Engineer-in-Charge, the Contractor shall not revoke or replace such appointments.

If the Contractor's representative is to be absent from the site, replacement shall be made by a suitable person with the prior consent of Engineer-in-Charge. The Contractor's representative shall receive instructions on behalf of the Contractor from the Engineer-in-Charge and such instructions shall be deemed to have been given to the Contractor.

The Contractor's representative shall be fluent in language for communication, competent for understanding drawing, executing and managing work.

The Contractor shall employ for the entire period of the contract, sufficient number of competent and qualified Engineering personnel (Graduates and Diploma holders) as required and approved by the Engineer-in-Charge for execution of the Work. The Contractor shall intimate the Engineer-in-Charge in writing the names and identity of technical personnel proposed to be engaged on the Work.

The Engineering Graduates and Engineering Diploma holders are to be paid by the Contractor at the prevailing rates during the entire period of execution of the Work.

In case minimum technical personnel as prescribed by the Engineer- in-charge are not continuously engaged in the Work at site by the Contractor, the expenditure that would have been incurred by the Contractor on such engagement of personnel, subject to the amount as per the provisions of PWD Schedule of Rates, will be recovered from the Contractor.

Cost of works	**Number of persons to be employed**
For works costing from Rs. 2 lakhs to Rs. 5 lakhs	One Diploma holder
For works costing above Rs. 5 lakhs to Rs. 10 lakhs	One Engineering Graduate and one Engineering Diploma holder
For works costing over Rs. 10 lakhs	One Engineering Graduate and two Engineering Diploma holders

For large works, the technical organisation shall be suitably enlarged such that the works can be carried out smoothly as determined by the Engineer-in-Charge. The Engineer-in-Charge may require the Contractor to engage a specialist based on nature of works.

The Contractor shall intimate the Engineer-in-Charge in writing the names and identity of the technical personnel proposed to be engaged on the work. In case minimum technical personnel as mentioned in this clause is not continuously engaged in the work at site by the Contractor, the expenditure that would have been incurred by the Contractor on such engagement of personnel, subject to a minimum amount assessed at the rates of minimum remuneration mentioned above will be recovered from the Contractor.

5.4.5 Engagement and Removal of KSEBL Personnel and Others

The Contractor shall not recruit or attempt to recruit staff and labour from amongst the KSEBL personnel or any person previously in service of the KSEBL or of the Government who has not completed two years after retirement.

The Contractor shall remove any workman or Sub-Contractor or employee in his service from work/site at the instance of directions from the Engineer-in-Charge or other Officer-in-Charge

5.4.6 Notices, Instructions and Correspondence

The Contractor shall have an office near the Work site where notice of directions and instructions from the Engineer-in-Charge may be served. The Contractor shall have an authorised person present in the office during all times who shall receive such notice on behalf of the Contractor.

The Contractor shall furnish the postal address of his site office, e-mail address, telephone and fax numbers. Any notice or instruction to be given to the Contractor under the terms of contract shall be deemed to have been served on him if it has been delivered to his authorised agent or representative at site or sent by registered post to the site office or address of the firm last provided by the Contractor.

5.4.7 Security of the Site

Unless otherwise stated in the Special Conditions

(a) The Contractor shall be responsible for keeping unauthorised persons off the site and equipments installed

(b) Authorised persons shall be limited to the Contractor's personnel and the KSEBL personnel; and any other personnel notified as authorised personnel of the KSEBL.

5.4.8 Fencing and Lighting

The Contractor shall be responsible for the proper fencing, if required, guarding, lighting and watching of all works comprised in the Contract and for the proper provision of temporary road way, footways, guards and fences as far as the same may be rendered necessary by reasons of the work for the accommodation and protection of pedestrians or other traffic and owners and occupants of adjacent property and the public.

5.4.9 Site Investigations and Representations

The Contractor shall satisfy himself about the nature and location of work, general and local conditions including those bearing upon transportation, disposal, handling and storage of materials, flow through the river at site, availability and nature of labour, availability of water etc. or similar physical conditions at the site, the configuration and condition of ground, the character, quality and quantity of the surface and sub surface materials to be encountered, the character, and capacity of equipment and facilities needed preliminary to and

during the execution of the Work and all other matters which can any way affect the Work or the cost thereof under this contract. Any default or failure by the Contractor to acquaint him with all the available information concerning this condition will not relieve him from the responsibility for the execution of the contract.

If the drawings, specifications or description of items do not contain particulars of materials and work which are obviously necessary for the proper completion of the Work and the intention to include which is nevertheless to be inferred all such materials and works shall be supplied and executed by the Contractor without extra charge, and the KSEBL will furnish to the Contractor with responsible expedition after receiving from the Contractor a request in writing thereof, such details as are necessary.

5.4.10 Liability Due to Damage of Work or Plant

The Contractor shall, during the progress of the Work, properly cover up and protect the work and plant from injury by exposure to the weather, natural calamities such as flood, rain and by any other cause. He shall take every reasonable, proper, timely and useful precaution against accident or injury to the same from any cause. The Contractor shall remain answerable and liable to accidents or injuries thereto which may arise or be occasioned by the acts or omissions of the Contractor or his supervisory staff or his workmen or his Sub- Contractors and all losses and damages to the works or plant arising from such accidents or injuries as aforesaid shall be made good in the most complete and substantial manner by and at the sole cost of the Contractor and to the reasonable satisfaction of the Engineer - in -charge. Should any such loss or damage happen to units of works or plant or material falling outside the scope of this contract, the same shall be replaced or compensated for, to the satisfaction of the Engineer-in-Charge.

Until the Work is taken over or deemed to be taken over by the agreement Authority, the Contractor shall be liable for and shall indemnify the KSEBL in respect of all damages or injury to any person or to any property of the KSEBL or of others occasioned by the act of the Contractor or members of his organisation including his workmen or his Sub–Contractors or piece - work Contractor or by defective work or materials but not due to causes completely beyond his control.

5.4.11 Time Limit for Claims

Any claim arising out of this Contract should be submitted before the agreement Authority within 30 days from the date of occurrence of the event which leads to such claim. The Contractor is precluded from raising any such claim after the expiry of the above period.

5.5 KSEBL

5.5.1. A) Role of agreement Authority

The agreement Authority is the Kerala State Electricity Board Ltd., constituted by the Government of Kerala and is represented by an officer of the KSEBL as authorized by the KSEBL. Here, Deputy Chief Engineer Electrical Cicrle, Palakkad will be the represented agreement Authority. He / She is represented by Executive Engineer, Assistant Executive Engineer, Assistant Engineer and subordinate staffs as per Delegation of Powers prevailing in the KSEBL. These Officers shall exercise within their delegated power as prevalent in KSEBL regarding management, co-ordination and directions in execution of the contract with the Engineer-in-Charge and the contractor. The commitments made by these officers are based on the agreement executed and powers delegated. If an ambiguity or discrepancy is found in the document of contract, necessary clarification will be made and instructions will be issued by the Agreement Authority.

Approval of major items such as PV modules, inverters, battery bank, Module Mounting structures and if any, as per tender specifications and recommended by the Technical committee and Single line diagram, other drawings, BOM and other component approval shall also be issued by the Agreement authority.

The contractor shall submit letters of inspection calls sufficiently in advance specifying the date and venue of inspection to the agreement authority. All the major components should undergo factory inspection tests.

The agreement authority shall arrange inspection of material/equipment and upon satisfactory completion of the inspection and test, shall approve and issue Material Dispatch Clearance Certificate.

B) Role of Engineer- in Charge.

Executive Engineer of the Electrical Division Chittur in which the work is executed will be the Engineer-in Charge of the project and will be defined in the LoA. The scope of the duties include site Inspection, installation, issuing layout approvals, testing and commissioning of the project, sorting out the bottle necks arising with the contractor, communicating the daily progress with the Agreement Authority and if necessary for taking up the matter in which decision is required and the following.

- The site will be handed over to the Contractor, by the Engineer- in – Charge at the time of commencement of work.
- The Contractor shall submit a general lay out plan to the Engineer-in-Charge before the commencement of work for approval, showing details such as dump yards, camp facility, storage area, construction plant and equipment for execution of the work etc as directed by Engineer-in-Charge.
- Engineer-in-Charge shall take necessary actions such as tree cutting sanction from social forestry department and land construction approval if required.
- Contractor is responsible for obtaining consents, clearances including Electrical Inspectorate sanction, various permit and approval from appropriate authorities. Engineer-in-Charge shall provide sufficient support in this regard.
- Functional testing and erection of equipments should be carried out in the presence of officer appointed by the Engineer-in-Charge and the approvals will be given only if the same is satisfactory.
- The Engineer-in Charge may delegate powers to subordinate officers in respect of execution of work such as Site supervision of Electrical works and arrangements for interconnection facility, Technical support and civil supervision and work measurement.
- The Engineer-in-Charge shall engage sufficient number of supervisory staff at the site of Work. The supervisors will act as the representatives of Engineer-in-Charge and his delegated officers. The work shall be conducted under the general direction and control of the Engineer-in-Charge and his delegated officers and is subject to inspection to ensure strict compliance with the terms of the Contract.

- Commissioning test with all required testing shall be conducted by the contractor in presence of KSEBL officers delegated by the Engineer-in-Charge.
- Engineer-in- Charge shall be the Payment authority of the projects.

5.5.2. Site Inspection/Acceptance Test

a. Except as otherwise provided in paragraph (d) hereunder, all materials and workmanship shall be subject to inspection, examination and testing by the Engineer-in-Charge at any and all times during manufacture and/or construction at any and all places where such manufacture and/or construction are carried out. The KSEBL shall have the right to reject defective material and workmanship or require its correction/rectification. Rejected workmanship shall be satisfactorily rectified and rejected material shall be replaced with proper material without charge therefore, and the Contractor shall promptly segregate and remove the rejected material from the premises at his own cost. If the Contractor fails to proceed at once with the replacement of rejected material and/or the correction of defective workmanship, the KSEBL may, by a contract or otherwise, replace such material and/or correct such workmanship and charge the cost thereof to the Contractor and/ or may terminate the right of the Contractor to proceed further as provided under clause 5.3.11 of these Specifications. The Contractor and his surety are liable for any damage caused to the KSEBL resulting from the above.

b. The Contractor shall furnish promptly and without any additional charge all reasonable facilities, labour and materials necessary for the safe and convenient inspection and test that may be required by the Engineer-in-Charge. All inspection and test by the KSEBL shall be performed in such a manner as not to unnecessarily delay the work. Special, full-size, and performance tests shall be done as described in the Specification. The Contractor shall be charged with any additional cost of inspection when material and workmanship are not ready for inspection at the time of inspection, as required by the Engineer-in-Charge.

c. Should it be considered necessary or advisable by the KSEBL any time before final acceptance of the entire work to make an

examination of work already completed by removing or tearing out the same, the Contractor shall, on request, promptly furnish all necessary facilities, labour and material if such work is found to be defective with respect to the Specifications due to the fault of the Contractor or of his Sub - Contractor who shall defray all expenses of such examination and satisfactory reconstruction.

d. Inspection of materials and finished articles to be incorporated in the work shall be made at the place of production, manufacture or shipment wherever the quantity justifies it, unless otherwise stated in the Specifications and such inspection and written or other formal acceptance, unless otherwise stated in the Specification, shall be final except, as regards latent defects, departure from specific requirements of the Contract, damage or loss in transit, fraud or such other gross mistake if at all found later. Subject to the requirements contained in the preceding sentence the inspection of materials and workmanship for final acceptance as a whole or in part shall be made at site, nothing contained in this paragraph shall in any way restrict the KSEBL's right under any warranty or guarantee.

e. If the Contractor fails to comply with any of the conditions of the Contract or with instructions or decision of the Engineer-in-Charge issued there under, except where otherwise specifically provided in this contract, the Engineer-in-Charge may after giving written notice to the Contractor take necessary steps for the compliance of the said conditions, instructions or decision and any expenditure thus incurred shall be recoverable from the Contractor.

f. The work during its progress (or) during the defect liability period can also be inspected by the Deput Chief Engineer (or) his authorized representative(s) and any defects pointed out by him shall be attended by the Contractor under intimation to the Engineer in charge.

g. SAT (SITE ACCEPTANCE TEST)Documentation for material approval including RFID reading for the panel shall be submitted two weeks before material acceptance test and if necessary additional test will be added and on acceptance of documents the test will commence.

5.5.3. Correctness of Bid

It shall definitely be understood that the KSEBL does not accept any responsibility for the correctness or completeness of the bid.

5.5.4. Orders after Award

After the Bid has been accepted by the KSEBL, all orders and instructions to the Contractor shall be given by the Engineer-in-Charge on behalf of the KSEBL except otherwise provided in the Contract.

5.5.5. Lien Withhold Payments

The KSEBL shall have a lien on and over all or any money that may become due and payable to the Contractor under this Contract and also over the Security and Retention deposits/guarantees, in respect of any debt or sum that may become due and payable to the Government and/or KSEBL by the Contractor, either alone or jointly with another or others, or either under this or under any other contracts or transactions of any nature whatsoever between the Government and/or KSEBL and the Contractor and also in respect of any Government tax or taxes as Governed by GST or other money which may become due and payable to the Government by any other statutory enactment or enactments in force or modifications or substitutions thereof and KSEBL shall at all time be entitled to deduct the said debt or sum or tax as Governed by GST due by the Contractor from the money, Securities like Bank Guarantee or deposit which may become payable/ returnable to the Contractor under this contract.

5.6 LABOUR

5.6.1 General

The Contractor shall be bound by the provisions of 'Contract Labour (Regulation and Abolition) Act of India, 1970' and amendment thereof and the Rules framed there under. He shall get himself registered under the Act at the appropriate time. Contractor shall implement the provisions of Act scrupulously.

The Contractor shall also be bound by the applicable contract labour regulations in respect of wage, payment of wages, fixation of wage periods, hours of work, leave, registers to be maintained by the

Contractor, display of notices regarding wages, fines and deduction, maintenance of registers, submission of returns etc.

The rates quoted by the Contractor shall include labour costs on the following items as well as other fringe benefits that are fixed to the labour as per the existing provisions of law.

(i) Fair wages including Dearness Allowance
(ii) Leave wages
(iii) Wages for paid holidays (National and festival holidays)
(iv) Retrenchment compensation.
(v) Workmen compensation
(vi) Bonus
(vii) Other allowances, if any.

The responsibility for paying wages and other benefits to the labourers is entirely that of the Contractor. KSEBL takes no responsibility, towards the wages and other benefits which the Contractors have to pay to the labourers till the completion of the Contract. All the expenditure towards this is deemed to have been included in the rates/amount quoted by the Contractor. The Contractor shall comply with the provision of various labour laws , rules and regulations as applicable in regard to all matters provided therein and shall indemnify the KSEBL in respect of all claims that may be made against the KSEBL for non-compliance thereof by the Contractor.

Notwithstanding anything contained herein, the Engineer-in-Charge may take such actions as may be necessary for compliance of the various labour laws and recover the costs thereof from the Contractor.

Any dispute between the labour and the Contractor shall be resolved by the Contractor without loss of time and in case the dispute cannot be resolved in reasonable time, it shall be referred to the Labour Department of the Government for conciliation and settlement of dispute. The decision taken by the Labour Department during conciliation meeting shall be binding on the Contractor. Any extra cost involved as a result of conciliation settlement shall entirely be borne by the Contractor.

All disputes between the Contractor and Labourers shall be classified as Industrial Disputes. In case it is found that the disputes between Labour and Contractor are not resolved in time the KSEBL may help the Contractor in accelerating conciliation settlement without any commitment on the part of the KSEBL.

Fair wages not less than the minimum wages that may be fixed from time to time in accordance with the law or Act or Rules there under applicable to the area covered by the Work shall be paid by the Contractor to all labourers and their wage rate shall be prominently displayed in the labour camps and important work sites in Malayalam and English script. All statutory and other increase in wages, customary and fringe benefits that may become payable by the Contractor to his labourers entirely shall be borne by the Contractor and the KSEBL will not compensate additional expenditure, if any, incurred by the Contractor on such accounts. Payment of wages to the labourers shall be made at regular and reasonable intervals and shall be governed by labour regulations. Proper identity cards shall be issued to the labourers and aquittance records for the payments shall be maintained and made available for inspection by the KSEBL.

The Contractor shall assume all responsibility for payment of wages and other benefits from time to time till the completion of the Work whether minimum wages have been notified or not.

5.6.2 Recruitment of Labour

The Contractor shall not employ child labour or criminals or outlaws. While recruiting labourers, the Contractor should give preference to those available in local areas.

5.6.3 Law and Order

The maintenance of the law and order is the responsibility of the Government. It is the Contractor’s responsibility to maintain good relations with the labour and others and to maintain discipline of labour at site. Any problem on maintenance of law & order shall be referred to the appropriate Government authority, for redressal, by the Contractor.

5.6.4 Labour Reports

The Contractor shall report monthly, within 5 days after the close of each calendar month, on specified forms, the number of persons under different category on their respective pay rolls and such other information as may be required by the Engineer –in- Charge.

Labour reports showing the strength of labourers and other details under each category should be submitted every week by the Contractor, if so required by the Engineer-in-Charge.

5.6.5 Accidents

It shall be the responsibility of the Contractor to take protective measures to prevent accidents on the works. He shall indemnify the KSEBL against any claim for damages or for injury to persons or property resulting from and in the course of the work and also under the provisions of the Workmen Compensation Act. The Contractor shall take CAR (Contractor's All Risk) policy in order to cover all risk, which may arise from the Contract and produce the certificate before the Engineer-in -Charge and convince the Engineer-in-Charge of the existence of such insurance coverage failing which the payments to the Contractor will be withheld.

On the occurrence of an accident during the course of the work which results in death or which is so serious as likely to result in death, the Contractor shall report the facts stating clearly and with sufficient details, the circumstances of the accident and the subsequent action taken by him, in writing to the Engineer-in-Charge, Labour Commissioner and other concerned authorities within twenty four hours of such accident. In case of fatal accidents, the Contractor shall at once inform the Commissioner for Workmen Compensation, the details of the accident stating whether he accepts or disclaims the liability. All other accidents on the works involving injuries to persons or damage to property shall also be promptly reported to the Engineer-in-Charge stating clearly and with sufficient details, the facts and circumstances of the accidents and the action taken. In all cases, the Contractor shall indemnify the KSEBL against all losses or damage resulting directly or indirectly from the Contractor's failure to report in the manner aforesaid. This includes penalties or fines, if any, payable by the KSEBL as a consequence of failure to give notice under the Workmen's Compensation Act or failure to conform to the provisions of the said Act in regard to such accidents.

In the event of an accident in respect of which compensation may become payable under the Workmen's Compensation Act, the Engineer-in-Charge will retain such amount which he feels sufficient to meet the liability, from the amount due and payable to the

Contractor. On receipt of any award of compensation from the competent authority under the said Act, the difference in amount will be adjusted.

The Engineer-in-Charge will have the right to deduct from the amount due to the Contractor any sum required for making good the loss suffered by a worker or workers on any reasons of non-fulfilment of the conditions of the Contract. The Contractor shall primarily be responsible for all payments to be made under and for the observance of the regulations aforesaid without prejudice to his right to claim indemnity from his Labourers. The applicable contract labour regulation currently in force and future amendments thereof shall be deemed to be part of this Contract and any breach of this shall be violation of contract.

5.6.6 Work During Night or on Holidays

Wherever work is carried out at night, adequate lighting of working areas and access paths should be provided by the Contractor, at his cost.

Sufficient notice is to be given by the Contractor to the Engineer-in-Charge regarding the details of work in shifts so that necessary supervision by the KSEBL could be provided.

To achieve the required progress, the work shall be carried out whenever necessary round the clock in shifts even on holidays. No extra amount on account of any shift work or work on holidays is payable to the Contractor. The work shall be arranged on holidays after getting the permission of the Engineer-in-Charge so that necessary supervision by the KSEBL could be provided.

When some unavoidable works are to be carried out, on considerations of safety of property, security of personnel, and / or on technical considerations, such works shall be carried out on an emergency basis by the Contractor as per the directions of the Engineer-in-Charge.

The cost of such works shall be borne by the KSEBL and the Contractor shall be paid accordingly. The decision of the Engineer-in-Charge in all matters in this regard shall be final and binding.

5.6.7 Other Workmen

The Engineer-in-Charge will have full authority to depute workmen on the worksite to execute other works not included in the contract. The Contractor shall afford reasonable facility during working hours to enable such workmen to carry out other works provided that such works shall be carried out in such a manner as not to impede the progress of the work included in the contract. The Contractor however shall not be liable for any damage which may happen to such other works, provided he complies with the instructions in connection therewith and provided that the damage is not caused by the Contractor or his workmen.

5.7 MATERIALS

5.7.1 General

No material will generally be issued by the KSEBL for the work to the Contractor. All materials required for the work including cement and steel shall be supplied by the Contractor at site as per the specifications. Materials supplied or brought by the Contractor at site shall not be taken out of the site without the written permission of the Engineer-in-Charge.

If it is intended by the KSEBL to supply any material, it shall be specifically mentioned in the Special Conditions of Contract or the Engineer-in-Charge may with special sanction of the KSEBL opt for supply of any material in the interest of maintaining quality and timely execution of work. Any material under the ownership, custody or possession of the KSEBL should not be used without specific permission from the Engineer-in-Charge or his authorised representative. If there is any misuse or wastage through negligence by the Contractor, the Contractor is liable to pay penalty as decided by the Engineer-in-Charge.

5.7.2 Storage of material

The Contractor shall at his own expense, provide and furnish sheds and yards in such situations and in such numbers as in the opinion of the agreement Authority and requisite for carrying on the work under this contract for the storage of materials arranged by him or handed over to him by KSEBL. The Contractor shall keep at each of such sheds and

yards, a sufficient quantity of materials in stock so as to avoid delay in carrying out the works with due expedition.

5.7.3 Misuse of Materials

No material or equipment under the ownership or possession of the KSEBL shall be used by the Contractor without written permission from the competent authorities. Any use in contravention to above condition will constitute misuse of material or equipment. If there is any misuse or waste of material through negligence by the Contractor, he shall be liable to pay penalty as decided by the Engineer-in-Charge.

5.8 ENVIRONMENT

5.8.1 Safeguards for Environmental Protection

The Contractor is bound to follow the safeguards that are provided herein, in respect of safeguard for environmental protection at no extra cost. The Acts, Rules and Regulations regarding environmental protection enacted from time to time shall be followed at his cost without fail. Preservation of Existing Vegetation

The Contractor will preserve and protect all existing vegetation such as trees on or adjacent to the site which do not interfere with or cause inconvenience to the construction as may be determined by the Engineer-in-Charge. The Contractor will be held responsible for all unauthorised cutting or damaging of trees including damage due to careless operation of equipment, stockpiling of materials or tracking grass areas by equipment. Care shall be taken by the Contractor, especially in the existing solar plant, in felling trees authorised for removal to avoid any unnecessary damage to vegetation and trees that are to remain in place and to structures under construction by workmen. Cutting and removal of trees, if any, shall be done by the Contractor or his men only after obtaining due permission from the agreement Authority.

5.8.2 Interference with Public, Public Properties, Other Departments and Safety of Public

All access to work sites and other areas other than those specifically agreed to be constructed by the KSEBL herein in these specifications, if any, shall be provided by the Contractor at his own expense. The KSEBL assumes no responsibility for the condition of roads and

structures thereon that may be used by the Contractor in performing the work under these specifications or in travelling to and from the site of the work. No Payment will be made to the Contractor by the KSEBL for any work done in constructing, improving, repairing or maintaining any road or structure thereon for use in the performance of the work under these specifications. All roads subject to interference by work shall be kept open or suitable detours shall be provided by the Contractor during the period of time covered by this Contract for the KSEBL and others who may be engaged in other construction work in the vicinity of the Work covered by this specification.

The Contractor shall arrange and prosecute the Work under these Specifications so as not to interfere with other works or with existing improvements. The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient red lights, danger signals and shall take all necessary precautions for the protection of the Work and the safety of the public. Roads closed to traffic shall be protected by effective barricades and warning and detour signs shall be displayed suitably.

All barricades and obstructions shall be illuminated at night and all lights shall be kept lit from sunset to sunrise.

5.8.3 Protection of Adjoining Premises, Structures etc.

The Contractor shall protect adjoining sites against structural, decorative and other damage that may be caused during the course of execution of the Work and he shall make good any such damage occurred at his own cost.

5.9 MISCELLANEOUS

5.9.1 Toll & Duties

The Contractor shall, unless otherwise specifically provided in the Contract, pay all duties, Seigniorage charges, tolls, quarry fees, Octroi, Royalties and other taxes on all materials and articles that he may use and as governed by the GST.

5.9.2 Taxes, Duties and Recoveries

The price offered by the bidder shall include all taxes and duties as governed by the GST and other charges imposed outside India under

the laws and regulations of the Country of origin on the production, manufacture, sale and transport of the imported equipment, materials and supplies to be used on or furnished under the contract, and on the services performed under the contract. Any variation in the taxes, duties etc as governed by the GST and other charges mentioned above during the period of contract shall be borne by the Contractor.

The price offered by the bidder shall also include all taxes and duties etc as governed by the GST and that may be levied according to the laws and regulations in force at the time of bidding and during the period of the Contract in India on the equipment, materials, work and supplies (permanent, temporary and consumable) and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay tax on all profits made by him in respect of the Contract.

Recoveries of Income Tax, and any other taxes payable by the Contractor as governed by the GST will be made from the bills due to him and will be regularised on receipt of advice from the assessing authorities and as per rules in force from time to time. All taxes and levies recoverable under the statutes in force from time to time shall be recovered from the Contractor. Clause 4.1, 'Bid Prices', shall also be referred in this connection.

Bidder should submit an undertaking to the effect that if any dispute on payment of taxes from the concerned tax authorities occurs in future, the bidder shall indemnify KSEBL from such liabilities and the contractor will be liable for the additions, loss or cost on account of such discrepancies / disputes.

5.9.3 Tax Clearance Certificate

The KSEBL may require the Contractor to produce Income Tax, Agriculture Income Tax and any other applicable tax clearance certificates from the respective authorities and copy of PAN card, before entering into the agreement with him for the Contract and the Contractor will have to produce all such documents as and when called for. Final payment of the Contractor will be made only after the production of all applicable tax clearance certificates and other certificates regarding compounded rate of work, contract tax, concessional rate of sales tax, non-deduction of work contract tax etc

as governed by the GST from the departments concerned and attested copy of PAN Card in the case of Income Tax.

5.9.4 Insurance

The Contractor shall secure and maintain throughout the duration of this Contract, insurance of such types and in such amounts as may be necessary to protect himself and the interests of the KSEBL, against all usual hazards or risk of loss. The form and limits of such insurance and the company together with the underwriting thereof in each case, such as will be acceptable to the KSEBL but, regardless of such acceptance, it shall be the responsibility of the Contractor to maintain adequate insurance coverage at all times. Failure of the Contractor to maintain adequate coverage shall not relieve him of any contractual responsibility.

The Contractor, without limiting KSEBL's obligations and responsibilities shall insure:

(a) the works, together with materials and plant to the full replacement cost and third party liability at site.

(b) an additional sum of 15% of such replacement cost to cover additional costs and incidental to the rectification of loss or damage including professional fees and cost of demolishing and removing any part of works and of removing debris of whatsoever nature, and

(c) the Contractor's equipment and other things brought to site, for a sum sufficient to provide for their replacement at the site.

(d) The insurance against third party liability at site shall be ensured before commencing the execution of work, against any damage or loss or injury which may occur to the equipment being shifted/ installed or to any property or person (including property and employees of the Employer) by or arising out of the execution of works or temporary works in carrying out of the Contract. The insurance coverage shall be revalidated till the certification of project.

The insurances under item (a) and (b) shall be in the joint names of Contractor and KSEBL and shall cover:

(i) the Contractor against all losses or damage, from whatsoever cause arising from the start of work at the site until the date of issue of the relevant taking over certificate in respect of the works or any section or part thereof as the case may be, and

ii) The Contractor for his liability :

1. during the Defects Liability Period for loss or damage arising from a cause occurring prior to the commencement of Defect Liability Period,
2. for loss or damage caused by the Contractor in the course of any operations carried out by him under the terms of the Contract, and
3. for loss or damage caused by the Contractor in the course of any operation carried out by him during execution of works to the neighbouring habitats, life and property around the boundary of the site.

If the Contractor fails to effect in force the insurances referred in the above clauses, or any other insurance which he may be required to effect under the terms of the contract, then and in any such case, KSEBL may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the KSEBL as aforesaid from any amounts due or which may become due to the Contractor, or recover the same as a debt due from the Contractor

5.9.5 Death, Insanity, Bankruptcy, Insolvency, Imprisonment, or Varying Joint Venture Arrangement.

1. In the event of death or insanity of the Contractor, his legal heirs, legatees, next friend, Manager or other representative as per law or any person in whom the Contract may become vested shall forthwith give notice thereof in writing to the Engineer-in-Charge and within one month shall take all reasonable steps to prevent stoppage of the work.

The said person or persons have the option of carrying out the Contract, subject to his or their providing such guarantee as may be required by the Engineer-in-Charge not exceeding the value of the work remaining unexecuted and an agreement executed for continuing the balance work. In the event of the stoppage of the works, the period of the option under this clause shall be fourteen days only, provided the above option not been exercised, then, the Contract may be terminated by the KSEBL by notice in writing pasted at site and advertised in one issue of the local news paper. In the event of termination, same power and provisions reserved by the Engineer-in-Charge in clause 5.3.11 shall apply.

2. If the Contractor is imprisoned, becomes insolvent, goes on liquidation or amalgamated,

a) The KSEBL is at liberty to terminate the contract unless the KSEBL is compelled by the order of Court to permit the persons authorised by the Court, Receiver, and Liquidator or other person with whom the Contract become vested to carry out the Contract as directed by the Court to the satisfaction of the KSEBL.

b) In case of termination of Contract, notice in writing, should be given to the Contractor, Receiver, Liquidator or the person to whom the Contract is vested and take further action as provided in clause 5.3.10 'Default by the Contractor' treating as if this termination is ordered under that clause, complying with legal requirements, such as moving appropriate court of law, as may be required.

3. Where, as a result of acceptance of the tender, the execution of this Contract is to be undertaken by the Contractor as a joint venture as per the joint venture agreement annexed to the Contract entered into by the Contractor with the KSEBL, the terms of joint venture agreement shall not be changed by the parties to such agreement during the subsistence of the Contract without the previous approval of the KSEBL.

In case of violation of this condition the KSEBL will be entitled,

a) to terminate the contract entered into with the Contractor and take further actions as provided by clause 5.3.10 'Default by the Contractor,' treating as if this termination is ordered under that clause or to implement any alternative instead of terminating the contract.

b) enter in to a fresh arrangement with the Contractor for executing the remaining work or part thereof, subject to the condition that the terms and conditions of the original Contract except those which are specifically altered by the KSEBL and communicated in writing to the other party, will be automatically applicable to fresh agreements entered into.

Operation of any of the two alternatives will be at the discretion of the KSEBL and decision of the KSEBL will be final and binding.

4. If the Contractor is an individual or a proprietary concern and the individual or proprietor dies and if the Contractor is a partnership concern and one of the partners dies, then all sums payable under this contract will be paid to the legatee of the individual

Contractor/proprietor if there is one, or to his/her legal heirs and in the case of partnership, to the surviving partners and the legal heirs of deceased partner or as per the terms of the partnership deed. The Contractor should fill up the 'form of nomination' at the time of executing agreement and should sign in the presence of two witnesses.

5.9.6 Performance of this contract, Arbitration / Settlement of Disputes

This contract has to be performed complying with the laws of India and Kerala and any dispute araising out of this contract will be subject to the exclusive jurisdiction of Civil Courts at Thiruvananthapuram.

5.9.7 Patents and Copyrights

The Contractor shall hold and save the KSEBL, its officers, agents, servants and employees, harmless from liability of any nature or kind, including costs and expenses for or on account of any copy with or without copyright composition, secret process, patented or unpatented invention, article or appliance, manufactured or used in including their use by the KSEBL unless otherwise specifically stipulated in this Contract. The Contractor shall not use any patent invention over which the KSEBL has a right to use, except with the written permission of the agreement Authority. The agreement Authority may permit the Contractor to use such patent invention on collecting Royalty or otherwise. A patent invention which has been permitted to be used in respect of one contract shall not be used in any other contract or anywhere else or for any other purpose.

5.9.8 Right To Information

The Contractor shall be bound to provide all documents/information required by the State Public Information Officer in discharge of his duties under the Right to Information Act.

5.9.9 Old Curiosities

All gold, silver, oil or other minerals of any description and all precious stones, coins, treasures, relics of antiquity and other similar

things and any other item of archaeological importance which shall be found in or upon the site during excavation or demolition of existing structures or anywhere in the site, shall be the absolute property of the Government and the Contractor shall duly preserve the same to the satisfaction of the Engineer-in-Charge and shall from time to time deliver the same to such officials of the Government as per the law in force.

5.9.10 Collusion and Bribery

Any bribe, commission, gift or advantage given, promised or offered by or on behalf of the Contractor or his partner, agent or servant or any one on his or on their behalf to any officer, servant, representative or agent of the KSEBL relating to the obtaining or to the execution of his or any other contract with the KSEBL shall in addition to any criminal liability which he may incur, subject the Contractor to the cancellation of this and all other contracts and also to payment of any loss or damages resulting from any such cancellation to like extent as is provided in case of cancellation under clause 5.3.11 and the KSEBL shall be entitled to deduct the amounts so payable from the Contractor. Any question of dispute as to the commission of any offence under the present clause shall be settled by the KSEBL in such manner and on such evidence or information as the KSEBL shall think fit and sufficient and the decision of the KSEBL shall be final and conclusive.

5.9.11 Observance of Local Rules, Regulation, Laws etc.

The Contractor shall conform to all laws of the land and the regulation and bye-laws of the Local Authority, Corporation, Board or Local Self Government etc. constituted as per the statute of Government of Kerala and Government of India and the Contractor shall strictly abide by all such Laws, Rules and Regulations.

5.9.12 Interventions by Extraneous Forces / Agencies

The KSEBL will not be liable for any damage or compensation for holdups or delay in discharge of obligations of KSEBL caused by intervention of court or extraneous forces beyond the control of the KSEBL. If, however, such delays are found to cause delay in completion of Works, and if the KSEBL is satisfied that the delay or

hold up is not due to the fault of the Contractor, the KSEBL may consider suitable extension of Time Of Completion and/or revision of rates, subject to relevant provisions in the General Conditions of Contract and/or Special Conditions of Contract to compensate the losses that may be incurred by the Contractor in that respect.

5.9.13 Safety Aspects

The Contractor is bound to follow the applicable safety provisions provided in these specifications and to follow the directions of the Engineer–in-Charge in this respect. The cost for providing safety provisions shall be deemed to be included in the rates agreed to. All safety rules and regulations introduced from time to time by appropriate authorities shall also be followed at no extra cost.

5.9.14 Co-operation With Other Contractors

When two or more Contractors are engaged in the same premises, they shall work together in a spirit of co-operation and accommodation. The Contractor shall not take or cause to be taken any step or action that may cause disruption, discontentment or disturbance to the works, labour and arrangement of other Contractor(s). In the case of difficulties in coordination amongst the Contractors, the Engineer-in-Charge will direct the manner in which each Contractor shall conduct his work.

Each Contractor shall, while scheduling his works, take into account the timings for interlinking of works of other Contractors, if such interlinking is necessary for proper fulfilment of the Contract as per Schedule.

5.9.15 Foreign Exchange

No Foreign Exchange will be provided by the KSEBL for carrying out the works.

5.10 SAFETY ENGINEERING AND SAFETY CODE

5.10.1. General

Accident prevention shall be an essential part of the programme of the Contractor for the work in order to reduce the cost of construction measured in terms of,

(a) human life sacrificed;
(b) temporary and permanent disabilities to workers;
(c) loss of materials resulting from accidents;
(d) loss or damage to equipment;
(e) the cost of workmen's compensation and insurance; and
(f) loss of time due to accidents.

The safety programme should be developed to cope with the particular hazards for each operation such as, blasting, tunnelling, drilling, excavation, transport, handling concrete etc.

5.10.2 General Safety Programme

The following programme shall be promoted by the Contractor to reduce the accident rate on construction.

(a) Render full support to the work force in observing safety measures.
(b) Designate a qualified person to organise and monitor safety programme.
(c) Develop a public safety programme.
(d) Develop a safety programme for each job.
(e) Indoctrinate new employees. Educate the employees regarding the hazards of their work and explain to them how they can reduce the accidents to themselves and to other workers.
(f) Make safety practices effective.
(g) Promote good housekeeping.
(h) Maintain adequate first aid facilities,
(i) Seek assistance from insurance carrier, if available.

5.10.3 Safety Equipment

All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the persons employed on the site and maintained in a condition suitable for immediate use and the Contractor should take adequate steps to ensure proper use of equipment by those concerned.

5.10.4 Display of Safety Provisions

The safety provisions should be brought to the notice of all concerned by display on a notice KSEBL at a prominent place at the work spot. The persons responsible for compliance of the Safety Code shall be named therein by the Contractor.

5.10.5 Inspection by Officers

To ensure effective enforcement of the Rules and Regulations of safety precautions, the arrangements made by the Contractor shall be open to inspection by the Labour Officer, Engineer-in-Charge or their representatives.

5.10.6 Safety Acts and Rules

Not withstanding the above clauses, the Contractor is bound to comply with all Acts, Rules and Regulations in force from time to time regarding safety of person and property.

5.10.7 Compensation

All works shall be carried out adhering to the provisions of Safety Engineering Code and the rates quoted by the Contractor shall include the costs incidental thereto.

5.11 MISCELLANEOUS

The Contractors are expected to maintain good relations with their labour/employees and trade unions and any dispute arising between the Contractors and their labour/employees will be considered as Industrial Dispute between the Contractors and their labour/employees and shall be settled by them without any delay failing which the conciliation machinery of Government of Kerala may begin to function. It may even be referred to Labour

Department for arbitration. In such an event the award by the Labour Department shall be binding on the Contractors and the Contractors shall implement the award at their cost. It shall be noted that the KSEBL will not be liable for financial implications due to settlements as aforesaid.

5.12 HEALTH AND SANITARY PROVISIONS

All Enactments, Rules, Regulations or by-Laws regarding Health and Sanitation, with special reference to First Aid, drinking water, latrines and urinals, drainage and sewerage system, rest room in work places, facilities for children of workers, canteen etc. shall be strictly followed.

Part 6
SPECIAL CONDITIONS OF CONTRACT FOR SUPPLY, ERECTION & COMMISSIONING AND OPERATION & MAINTENANCE

6.1 INTRODUCTION

The Bidder is advised to read carefully all instructions and conditions appearing in this document and understand them fully. Bidder should furnish duly filled Bid Response sheets, Schedules, and Annexure etc contained in this Bid documents along with desired documents. Failure to provide the information as required may render the bid technically unacceptable.

6.2 TECHNICAL

- The output of the offered Solar PV plant (with 330Wp panel or above each) should not be less than 10KWp. The 10KWp Solar PV Plants shall be complete systems and meet the Technical Specifications of the Bid Documents. The contractor shall design the solar plant with sufficient number of solar PV panels so as to produce the desired capacity.
- Any offer which does not include all the jobs/services mentioned in the Scope of Work will be considered as incomplete and rejected.

6.2.1 Bidder's Qualification

- Bidder shall be System Integrator cum EPC contractor who have designed, engineered, installed, tested and commissioned Grid

Connected Solar Power plants of offered technology and meeting experience detailed at Para 6.2.2 below and 6.3.

6.2.2 Experience

- The bidder should have successfully installed solar photovoltaic power plants (Off-Grid and On-Grid) of at least 100KWp aggregate capacity in the last 5 years as on date of NIT, out of which at least one plant should be an OFF-Grid SPV Power Plant of capacity 10KWp or more which should be in successful operation in India for minimum period of six months as on the date of Notice inviting tender. The contractor shall be able to provide an output guarantee for 25 years for the panels for manufacturing defects and shall use solar PV panels that are approved by KSEB Ltd.
- The Bidder shall furnish the following documentary evidences to establish his qualification and experience above along with the bid.

Copy of Work Order/Contract agreement and completion certificate that the bidder has experience as above.

Performance Certificate from the user regarding successful operation of the Solar PV power plant Project for at least six months.

6.3. FINANCIAL

6.3.1 Solvency

The Bidder should produce, a Solvency Certificate obtained within a period of 6 months immediately preceding the date of notification of the bid, for an amount equivalent to the Probable Amount of Contract or more, from the Tahsildar or Nationalized/ Scheduled Bank or a Net Worth Certificate issued by a registered Chartered Accountant, along with the bid.

6.3.2 Annual turn over

The Bidder should have a minimum annual turnover for an amount equivalent to Probable Amount of Contract or more for at least 3 years in the last 5 financial years. This shall be supported by audited financial statements.

6.4 PERFORMANCE OF THE SPV PLANT

The PV Power Plant should be designed and simulated with the offered quality components by the bidder (PV Modules, Inverters, Module

mounting structure etc.) and Manufacturer's warrantee certificate shall be obtained for the module's performance as given below.
The electrical degradation of power generated shall not exceed 5% of the minimum rated power of the project over the 5 year period and not more than 10% after ten years and not more than 20% at the end of 25 years.

6.5 ANNUAL MAINTENANCE CONTRACT (AMC)

The Annual Maintenance contract shall begin after the Operations and Maintenance period. If desired, the EPC contractor may be asked to execute the AMC for 5 years on agreement between KSEBL and the contractor at mutually agreed price.

6.6 GENERAL

1. Bid document may be checked before submission to ensure that all information/documents required for qualification are included.
2. Bidder or any authorized representative of the bidders may attend the Bid opening.
3. KSEB Ltd may at its sole discretion, extend the bid submission due date/ time.

6.7 Documents to submit - who receives the Contract

Contractor shall specify all basic design details, including details of the PV modules and the support structures, inverters, cables, integration and power evacuation details with existing power system, with appropriate diagram and drawings.
The drawings along with detailed structure design and material selected and their standards, Guaranteed Technical Particulars, details of each items, make, model number and specification conforming to relevant standards, entire drawings, detailed test reports, list of Operation & Maintenance spares for major materials, detailed Bill of materials and Priced Bill of Quantities in respect of materials/equipments and works for the entire Project shall be submitted within 15 days of receipt of the Award of contract .
The bidder should submit and get the necessary approval of the following detailed Engineering Drawings in addition to the proposed Project Execution Schedule, before execution of the project:

a. Single Line Diagram of the PV Power Plant

b. Detailed plan of PV Array installation
c. Schematic Diagram
d. Module Mounting Structure (Plan & Elevation)
e. Control room building designated
f. Spike earthing
g. Structure eating
h. Array Junction Box earthing
i. House wring scheme and wiring material specifications
j. Plant fencing design
k. Battery Calculation & specifications
l. Light Arrestor design/ Surge protection device specifications

All materials and equipments required for successful completion and commissioning of the project must be included.

The design details and other accessories should adhere to and match with the technical specification provided in the tender document and corrigendum if any and as per the Guaranteed Technical Particulars offered in the bid.

The PV Plant installation shall be with the same components as per the successful bid offer.

6.8 PROJECT REVIEW MEETINGS

The Contractor shall present the Programme and status at various review meetings as required.

A. **Weekly Review Meeting**:

Level of Participation: Representative of Engineer-in-charge, Contractor's Site In charge and Job Engineers

Agenda:

a) Weekly programme v/s actual achieved in the past week and programme for next week.
b) Remedial Actions and hold up analysis.
c) Client query/approval

B. **Monthly Review Meeting:**

Level of Participation: Engineer in charge /Senior Officers of KSEBL and Contractors.

Agenda:

a) Progress Status/Statistics.
b) Completion Outlook
c) Major hold ups/slippages
d) Assistance required
e) Critical issues.

f) Client query/approval

6.9 OPERATION AND MAINTENANCE

Operation and maintenance of the Off-grid DDG solar PV plant and associated power distribution network for a period of 5 years of Defects Liability period is the responsibility of the bidder.

Operation and Maintenance during this period shall include supply of spares of panels, inverters and all equipments in the solar plant including transportation of these items from the original manufacturer, consumables, general comprehensive insurance covering fire, earthquake.

The solar plant should be maintained shadow free. The tree branches if any causing hindrance to the shadow free operation of solar plant shall be cut and removed under the supervision of KSEBL official. Vegetation and weed growth near solar plant shall be removed.

Copies of the Insurance Policies are to be given to KSEBL as and when taken.

The contractor shall ensure efficient operation of the SPV plant and the associated facilities to achieve the maximum power generation from the plant. For this purpose the contractor shall engage the services of adequate number of Engineers and Technicians trained under "Suryamitra" Skill Development Programme of MNRE. The contractor shall also attend to all failures, rectifications, breakdowns, 5 year comprehensive Operation and Maintenance checks.

Adequate training should be given to personnel identified by the KSEB for Daily Monitoring Information like solar energy generated, solar meter readings etc.

Monthly System (MIS) reports with generation and down time analysis data has to be sent to KSEBL Corporate

office as well as the Engineer in charge by E – mail during the defect liability period.

The contractor should not misuse the land and assign responsibility for the safety of machinery within the premises.

6.10 PROGRESS REPORTS:

6.10.1 **Monthly Progress Report:**

This report shall be submitted (e-mailed) to the agreement Authority as well as Engineer in charge on a monthly basis within Ten Calendar days from cut-off date as agreed upon, covering overall scenario of the work. The report shall include but not be limited, to the following:

a) Brief introduction of the work.
b) Activities executed/achievements during the month
c) Schedule v/s Actual percentage progress manufacturing/delivery, sub- contracting, construction and overall work.
d) Quantum wise status of purchase orders against scheduled shall also be indicated.
e) Areas of concern/problem/hold ups, impact and action plans.
f) Resources deployment status.

6.10.2 **Time Schedule**

The Bidder is required to submit a Project Time Schedule in Bar Chart Form, along with the Bid. The Schedule shall cover all aspects like sub- ordering, manufacturing and delivery, sub-contracting and construction within the completion time indicated in the Bid Document. The KSEBL interface activities, if any, shall be clearly identified with their latest required dates. KSEBL reserves the right to disqualify the Bidder if the above Schedule submitted by the Bidder is not in line with the overall project requirement.

6.11 GENERAL

1. Bid document may be checked before submission to ensure that all information/ documents required for qualification are included.

2. Bidder or any authorized representative of the bidders may attend the Bid opening.

3. KSEB Ltd may at its sole discretion, extend the bid submission due date/ time.

4. Special Conditions of Contract shall be read in conjunction with the general conditions of contract, Schedule of Price, technical specifications, drawings and any other document forming part of this contract wherever the context so requires. Where any portion of the Special Conditions of Contract is repugnant to or at variance with any provisions of the General Conditions of Contract then unless a different intention appears, the provision of the Special Conditions of Contract shall be deemed to override the provisions of the General Conditions of Contract 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 General Conditions of Contract.

The materials, design and workmanship shall satisfy the applicable standards, specifications contained herein and Codes referred to. Where the Detailed Technical Specifications stipulate requirements in addition to those contained in the Standard Codes and Specifications (both International and Indian Standards wherever applicable), those additional requirements shall also be satisfied. In the absence of any Standard/Specifications covering any part of the work covered in this tender document, the instructions/directions of Engineer-in-Charge will be binding on the Contractor.

PART 7

7 REQUIREMENT OF BIDDERS:

7.1 Financial Criteria

a) Bidder should meet the financial Criteria as per Para 6.3 of bid document.

b) For proof of Annual turnover, attested copies of the following documents should be submitted along with the bid:

i) A certificate issued by a practising Chartered/ Cost Accountants' Firm, certifying the Annual Turnover and nature of business, and
ii) Audited Balance Sheet and Profit & Loss Account etc. along with the Bid to establish experience / track record and financial capabilities meeting Bid Rejection Criteria.

c) The bidder or its Proprietor/ Partner(s)/ Director(s) of the firm should not have been convicted by a Court of Law for an offence involving moral turpitude in relation to business dealings during the past seven (7) years. The bidder shall give an affidavit (on Rs Ten) to this effect. The affidavit must be affirmed before the competent judicial authority or duly notarized by the Notary. Besides, bidder should furnish litigation history of their firm or group firm. The litigation history shall include:

(i) Arbitration cases pending.
(ii) Disputed incomplete works.
(iii) Pending civil cases against the firm and/or its Proprietor / Partner (s) / Director (s) involving moral turpitude in relation to business dealings.
(iv) Pending criminal cases against the firm and/or its Proprietor / Partner(s)/Director(s) involving moral turpitude in relation to business dealings.

(v) Punishments awarded under civil cases and/or criminal cases involving moral turpitude in relation to business dealings to the firm and/or its Proprietor/ Partner(s)/ Director(s).

d) The Bidder should confirm that they have not been banned or de-listed by any Govt. or Quasi-Govt. Agencies or PSU's. If so banned this fact must be clearly stated by Bidder in his offer. However, it may not necessarily be a cause of disqualifying/rejecting the bid. If this declaration is not given, bid will be rejected as non-responsive.

e) The entire work of design, engineering, manufacturing, supply, handling storage, civil works, erection, testing & commissioning along with O&M of the project for successful completion, commissioning and Operation & maintenance of the 10KWp Off-grid DDG solar PV Plant and Distribution network upto the metering point of service connection at Allimooppan Tribal Colony for 5 years should be offered by the bidder. Partial bidding is not acceptable.

f) The bidder shall prepare and submit, as part of his Bid, a complete construction programme showing in detail his proposed programme of the operation for the orderly performance of the Work within the time specified in the specifications.

7.2 Experience

PV modules of the bidder should have valid qualification test certificate as per IEC 61215 and IEC 61730 1&2, IEC 61701and PV modules must be Indian make.

Indian manufacturers of Solar Cells and PV Modules can also participate in the bidding.

A bidder to qualify for setting up of SPV power should have successfully installed solar photovoltaic power plants (Off-Grid and On-Grid) of at least 100KWp aggregate capacity in the last 5 years as on date of Notice Inviting Tender, out of which at least one plant should be an off-grid SPV

Power plant of capacity 10KWp or more which should be in successful operation in India for minimum period of six month as on the date of Notice inviting tender.

The Bidder shall furnish the following documentary evidences to establish his qualification and experience above along with the bid.

a) Copy of Work Order/ Contract agreement and completion certificate that the bidder has experience as above.

Performance Certificate from the user regarding successful operation of the Solar PV power plant Project for at least six months

The Bidder shall furnish documentary evidences to establish his qualification and experience along with the bid.

7.3 Technical Criteria

It is proposed to promote only commercially established and operational technologies to minimize the technology risk and to achieve the commissioning of the Projects. Materials deployed in the solar power plant must have valid test certificates for their qualification as per specified IEC/ BIS Standards by one of the Accredited Test Centers in India. In case of equipment for which such Test facilities may not exist in India, test certificates from reputed Labs abroad will be acceptable.

Bidder shall furnish details of Solar PV Module, inverters and battery along with their offer in Guarantee Technical Particular datasheets provided in Annexure-10

7.3.1 Technical Requirements for Solar PV Power Plants

The following are some of the technical measures required to ensure quality of equipment used in off grid DDG solar photovoltaic power projects:

7.3.1.1 PV Module Qualification

The PV modules used in the solar power projects must qualify to the latest edition of any of the following IEC PV module qualification test or equivalent BIS standards.

Crystalline Silicon Solar Cell Modules :IEC 61215

In addition, PV modules must conform to IEC61730 Part 1- requirements for construction & Part 2 – requirements for testing, for safety qualification.

For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701

7.3.1.2 Authorized Test Centres

The PV modules must qualify (enclose test reports/certificate from IEC/NABL accredited laboratory) as per relevant IEC standard. Additionally the performance of PV modules at STC must be tested and approved by one of the IEC/NABL accredited test centres including Solar Energy Centre.

7.3.1.3 Identification and Traceability

Each PV module used in any solar power project must use a RF identification tag. RFID shall be mandatorily placed inside the module laminate and it must be able to withstand harsh environmental conditions. The following information must be mentioned in the RFID used on each module.

i. Name of the manufacturer of PV module
ii. Name of the Manufacturer of Solar Cells
iii. Month and year of the manufacturer (separately for solar cells and modules)
iv. Country of origin (separately for solar cells and module)
v. I-V Curve for the module
vi. Wattage, Im, Vm and FF of the module
vii. Unique serial no. and Model no. of the module
viii. Date and year of obtaining IEC PV module qualification certification
ix. Name of the test lab issuing IEC certificate
x. Other relevant information on traceability of solar cells and module as per ISO 9000.

7.3.1.4 Warranty

The mechanical structures, electrical works and overall workman ship of the solar power plants must be ensure longevity. PV modules used in the 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. Manufacturers warranty certificate shall be obtained for the modules performance in this regard.

7.3.2 Inverter

The inverters should comply with applicable IEC/ equivalent BIS standard. For efficiency measurements and environmental tests, standard codes IEC 61683 and IEC 60068 2(1, 2, 14, 30) should be followed.

The inverters should be tested from the MNRE approved test centres / NABL /BIS accredited testing - calibration laboratories. In case of imported inverters, these should be approved by international test houses, and should confirm to international standards.

7.4 TECHNICAL PARTICULARS OF COMPONENTS

Technical information to be provided			
Sl. No.	**Brief Description**	**Name and address of the manufacturer /Make/Description**	**Standards to which it complies as per test certificate**

1	SPV modules for a total capacity of 10KWp as per specifications: Test certificate No: Date of Test certificate: Lab from which test certificate is obtained: Copy of test certificate enclosed (Yes/No)?		
2	SPV module mounting structure suitable for accommodating 10KWp at Allimooppan tribal colony area) SPV modules including foundation as per specifications		
3	Inverters as per specifications: Test certificate No: Date of Test certificate: Lab from which test certificate is obtained: Copy of test certificate enclosed(Yes/No)?		
4	Array Junction Boxes		
5	Battery		
6	DC Distribution units as per specifications		
7	AC Distribution units as per specifications		
8	Cables requirement as per design		
9	Lightning arrester		
10	Earthing complete set		

11	Spares, tools and plant for 5 years operation and maintenance		
12	Providing training to engineers and site staff for operating Maintenance and trouble shooting skills		
13	Operation and maintenance of the SPV Power Plant for a period of 5 years from date of commissioning of the power plant.		
14	Engineering, electrical drawings and installations and O&M manuals		
15	Any other equipment required to complete the installation		

Bidders are to clearly mention the name and address of the manufacturer of each components quoted by them.

- Also attach test certificates in full of relevant equipment. Attach the above information in this format & upload as additional attachments in cover 2

Bidder must submit valid test certificates of the components (solar PV module and Inverter) offered. Bids without valid IEC test certificates will be rejected. Bidder shall also furnish details of Solar PV Module (Under Standard Testing Condition) and inverters along with their offer in Guaranteed Technical Particular datasheets provided in the bid.

7.5 MINIMUM REQUIREMENT OF TECHNICAL PERSONS

Sl.No	Qualification	Professional Experience	No of Persons

7.6 FINANCIAL STATEMENT

Financial Statement (Data For Previous Three Years- In Indian			
a. Information from Balance Sheet			
Year			
Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current			
b. Information from Income Statement			
Year			
Total Revenue			
Profit before Tax			
Profit after tax			

7.7 TOTAL TURNOVER

(Bidder and / or each member of Joint Venture /Consortium/Group must fill in this form)

Year	Amount
Total	

7.8

Form(A)

COMPLETED WORKS IN WHICH YOUR FIRM WAS THE MAIN CONTRACTOR

(DURING LAST 5 YEARS.)

(Each bidder or member of Joint Venture /Consortium/Group must fill in this form)

Name & Type of Project /Works & its location	Brief technical description	Name & Address of Client.	Period of contract (as provided in the agreement.)	Cost of project (in Rs.)	Type & cost of project which you sublet.	Year of starting	Year of completion		Reasons for delay if any.	Name & Address of consultants if any.
							Schedule	Actual		

Form(B)

COMPLETED WORKS IN WHICH YOUR FIRM WAS IN JOINT VENTURE

(DURING LAST 5 YEARS.)

(Each bidder or member of Joint Venture /Consortium/Group must fill in this form)

Name & Type of Project / Works & location.	Brief technical description.	Name & address of client.	Cost.		Period of contract (As provided in agreement)	Year of starting.	Year of completion		Reasons for delay (if any.)	Name of consultant if any.
			Entire in Rs.	Yours in Rs.			Schedule	Actual		

Form(C)

COMPLETED WORKS IN WHICH YOUR FIRM IS WORKING AS SUB-CONTRACTORS

(DURING LAST 5 YEARS.)

(INDICATE PHASE OF WORK FOR WHICH YOUR FIRM IS RESPONSIBLE.)

(Each bidder or member of Joint Venture /Consortium/Group must fill in this form)

Name of project /works and its location and phase of work.	Name and address of client.	Cost in Rs.	Name of main contractors.	Period of contract (as provided in agreement)	Year of starting.	Percentage of work completed.	Name of consultant if any.
		Entire cost of your portion					

Signature & Seal of bidder	

PART 8

8. Technical Specifications

8.1 Brief Description of the project

KSEBL intends to appoint of EPC contractor for the design as per site conditions, erection, testing & commissioning of 10KWP off –grid DDG solar PV project (21 kwhr-Autonomy 2days 7 hours/ day) at Allimooppan Tribal colony, Thekkadi, Parambikulam under Electrical section, Muthalamada of Electrical subdivision, Kollengode including operation & maintenance of the plant for 5 years from the date of commissioning. The performance ratio of the plant shall be 75 - 80%.

DDG means Decentralised Distributed Generation. **Installation of Power Distribution network that shall operate on the electrical power produced by the SPV power plant and Electrification and providing connection to 29 houses at Allimooppan Tribal colony will also be under the scope of the contractor.**

8.2 TECHNOLOGY

The Bidder is free to choose any Solar PV power generation Technology viz High efficiency Mono/Poly crystalline silicon Solar Cell Modules manufactured in India **of reputed make.** Under this bid, it is proposed to promote only established and operational technologies to minimize the technology risk and to achieve the commissioning of the projects in state. The bidder shall however submit the technology selected for its Project.

8.2.1 General Quality requirements of SPV Plant

The bidder shall use SPV modules of adequate capacity, Inverters, Junction boxes, etc to ensure generation of power as per design estimates.

1. This is to be done by applying liberal de-rating factors for the array and recognizing the efficiency parameters of Inverters. The output at Inverter(s) will be checked. The meter reading will be considered for verifying the Performance Ratio.

2. Use of equipment and systems with proven design and performance that have a high availability track record under similar service conditions.

3. Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.

4. Strict compliance with the approved and proven quality assurance norms and procedures during the different phases of the project.

5. Limits for harmonics as per CEA technical standard on Grid connectivity are as follow:

Individual voltage harmonics distortion (THD) shall be as per IEEE 519-2014.

6. The power plant has to operate in parallel with the PDN and battery bank. The Solar Power Plant design should be equipped with requisite protective measures so as to protect equipment in solar power plant against any of possible fault.

7.The Solar plant shall be equipped with necessary protection systems including physical isolation to ensure isolation of the solar power plant from the PDN at the time of any fault or/and any additional suitable protection.

8. The bidder shall be required to build a Photo voltaic Station (PV Station) housing the Inverter, battery bank, control equipment, metering equipment, ACDB, DCDB as per approved drawing.

9. The alarm contact shall be provided for hardware failures, failures of internal and external auxiliary supplies etc.. The alarm signals should be via system fault relay (voltage free contact).

Deviations if any, for satisfactory implementation of the project shall be clearly mentioned, with reason. The Bidder must submit a proposal based upon their own design with basic requirement mentioned in this Bid documents.

In order to win the Contract, the Bidder must optimize their own design for Solar Photovoltaic (SPV) proven technology so that it best meets the evaluation criteria given in this bid document. **The bidders are advised to visit the site before designing the plant and offer their bid.** The bidders are also required to incorporate all the system required for realizing 10KWp off-grid DDG Solar PV Power plant at Allimooppan Tribal colony. The successful bidder shall submit the detailed design of the complete solar DDG system by using their software to optimize the string sizing considering the specific location, insolation, nature of load etc.

The equipment and materials for the Solar PV Power Plant with associated system (Typical) shall include but not be limited to the Supply, Erection, Testing & Commissioning of the following:

1. Solar PV modules, of suitable rating in each array.
2. Solar PV modules in array to generate 10KWp including mounting frames, structures, array foundation and module inter connection.
3. Array Junction boxes/SMU, distribution boxes, fuse boxes, MCBs, Surge Arrestors etc.
4. Inverter with SCADA compatibility, LT Power Interfacing Panel, common AC power evacuation panel with bus bars and Load Break switch and any other equipment required for the smooth and satisfactory operation of the Solar PV Plant.

5. LT Power and Control Cables including end terminations and other required accessories, if any, for both AC & DC power
6. Load Break switch, protective relays, cables with end terminations
7. Lightning arrestors.
8. Tool kit and Earthing kit
9. Control equipments related to solar system
10. Testing, maintenance and Condition monitoring equipments.
11. Mandatory spares & spares for 5 years
12. Any other equipment / material required to complete the 10 KWp off -grid DDG Solar Power Plant.

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13. Receipt, unloading, storage, erection, testing and commissioning of all supplied material.

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14.Design of off-grid DDG Solar Power Plant and its associated electrical & mechanical auxiliary systems which includes preparation of single line diagrams and installation drawings, electrical lay outs, erection key diagrams, electrical and physical clearance diagrams, indoor and outdoor lighting/illumination etc. design memorandum and other relevant drawings and documents required for engineering of all facilities within the demarcated area under this contract, are covered under Bidders scope of work.

15. The Bidder is required to measure the Solar Radiation and other climatic conditions. This is necessary to study Solar Level and Guaranteed Performance of the Solar Power Plant. The satellite based analysis is to be combined with direct ground based measurement equipment in order to achieve the necessary accuracy in the assessment of solar levels and climatic conditions.

The major categories of site-specific assessment required are:

1. Global Solar Radiation (“GSR”)
2. Diffused Solar Radiation (“DSR”)
3. Sunshine Duration
4. Atmospheric Turbidity
5. Temperature & Humidity
6. Wind Speed

16. Contractor shall be responsible for obtaining all statutory clearances including but not limited from Electrical Inspector regarding operation of the Plant. KSEB Ltd shall however facilitate to ensure that the same is obtained successfully.

17. Installation of battery bank and Power Distribution Network as per specification for storage as well as distribution of power shall be under bidder’s scope of work including effecting servicing connection to houses .

8.3 PLANT SPECIFICATION

8.3.1 PV MODULES

8.3.1.1 PV Module Qualification

The PV modules used in the solar power projects must qualify to the latest edition of any of the following IEC PV module qualification test or equivalent BIS standards.

Crystalline Silicon Solar Cell Modules :IEC 61215

In addition, PV modules must qualify to IEC 61730 Part 1- requirements for construction & Part 2 – requirements for testing, for safety qualification for testing. For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701.

8.3.1.2 Authorized Test Centers

The PV modules must be tested and approved by one of the IEC authorized test centers. In addition a PV module qualification test certificate as per IEC standard, issued by ETDC, Bangalore or Solar Energy Center will also valid. MNRE will provides the list of authorized testing laboratories / centers from time to time.

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8.3.1.3 Identification and Traceability

Each PV module used in any solar power project must use a RF identification tag. RFID shall be mandatorily placed inside the module laminate and it must be able to withstand harsh environmental conditions.

The following information must be mentioned in the RFID used on each module.

i. Name of the manufacturer of PV module

ii. Name of the Manufacturer of Solar Cells

iii. Month and year of the manufacturer (separately for solar cells and modules)

iv. Country of origin (separately for solar cells and module)

v. I-V Curve for the module

vi. Peak Wattage, Im, Vm and FF of the module

vii. Unique serial no. and Model no. of the module

viii. Date and year of obtaining IEC PV module qualification certification

ix. Name of the test lab issuing IEC certification.

x. Other relevant information on traceability of solar cells and module as per ISO 9000 series

The following details should be provided on the module

I. Name of the manufacturer
II. Month & year of manufacture
III. Rated power at STC
IV. Vmp, Imp, Voc, Isc

Solar PV power plants must install necessary equipment to measure the generation of DC power as well as AC power generated from the plant. The contractor is responsible for arranging all facilities/equipment required for PR measurement.

8.3.1.4 Warranty

The mechanical structures, electrical works including power conditioners/inverters/charge controllers/maximum power point tracker units /distribution boards/digital meters/switchgear/storage batteries, etc and overall workman ship of the Off grid solar power plants must be warranted for a minimum of 5 years. PV modules used in Off grid 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.

a) The PV modules used should be made in India.
b) The front surface of the module shall consist of impact resistant, low iron and high transmission toughened glass.
c) The module frame shall be made of GI/ Anodized Aluminium / corrosion resistant material which shall be electrolytically compatible with the structural material used for mounting the modules.
d) It shall have back sheet for environment protection against moisture and high voltage electrical insulation.
e) The fill factor of module shall not be less than 0.70 (typical). The V-I curve of each PV module with Sl. Nos. should be submitted along with Modules meeting the required specifications.
f) Solar cell shall have surface anti-reflective coating to help to absorb more light in all weather conditions.
g) Solar module shall be laminated using lamination technology using established polymer (EVA) and tedlar/Polyester laminate.
h) Output Cables: Polarized Weather Proof DC rated multi-contact connector of relevant international/national standards

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i) Cables shall meet IEC 60227 / IS 694, IEC 60502 / IS 1554 (Pt. I & II) standards and should have excellent resistance to heat, cold, water, oil, abrasion, UV radiation.

j) Photo conversion efficiency of SPV Module should be greater than 17%.

k) DC negative conductor shall be bonded to the ground via Ground Fault Detector Interrupter (GFDI). The grounding point shall be as close as possible to the PV Array.

l) Bidder shall provide data sheet for Solar PV Module (Under STC) along with their offer as per Guaranteed Technical Particular Data Sheet- 1.

8.3.2 PCU/ INVERTER

1. The power conditioning unit shall adjust the voltage & frequency levels to suit the Grid. The PCU should be designed to be completely compatible with the SPV array voltage and grid supply voltage.
2. Inverter output should be compatible with the grid frequency. PCU shall be capable to synchronize independently & automatically with KSEBL grid power line frequency to attain synchronization and export power generated by solar plant to grid. The PCU shall be capable of complete automatic operation, including wake-up, synchronization & shut down.
3. The combined kVA rating of all PCUs shall not be less than corresponding KVA at standard temperature.
4. The inverter shall be efficient based on PWM-MPPT with IGBT/ MOSFET based design, preferably IGBT.
5. The PCU shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line.
6. The PCU shall have the required protection arrangements against earth leakage faults.
7. Specifically, the PCU should be three phase power conditioning unit using static solid state components.
8. The sine wave output of the inverter shall be suitable for connecting to 415V, 3 phase AC LT voltage grid.
9. The inverter shall incorporate grid islanding protection, suitable DC/AC fuses/circuit breakers and voltage surge protection. Fuses used in the DC circuit shall be DC rated.
10. The peak inverter efficiency shall exceed 97% at full load
11. The kVA ratings of inverters for PV systems should be chosen as per the PV system wattage.
12. The output power factor should be of suitable range to supply or sink reactive power.
13. Inverter shall provide display of PV array DC voltage, current and power, AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency.

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14. The inverter shall include adequate internal cooling arrangements (exhaust fan and ducting) for operation in a non-AC environment.
15. Operating temperature Range shall be 0 to 55 deg C
16. THD should be less than 3 %.
17. The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes. The Inverters should qualify to IEC 61683 or equivalent standard. The inverters should also qualify at the IEC 60068 2 (1,2,14,30). Maximum Power Point Tracker (MPPT) shall be integrated in the power conditioner unit to maximize energy drawn from the Solar PV array and should qualify relevant IEC standards.
18. The Bidder shall furnish Guaranteed Technical Particulars.

8.3.3 WATER FOR CLEANING

Contractor shall provide permanent arrangement for module washing in the SPV Plant. Contractor shall make arrangement for water storage in the form of underground sumps or over-head tanks as required for module washing system

8.3.4 SAFETY REGULATIONS

Adequate fire fighting equipment and extinguishing agents of sufficient capacity and quantity must always be available at site and kept ready for immediate use.

One liquefied CO2 fire extinguisher upright type of capacity 10 kg having IS: 2878, IS: 8149 marked per installation of 15kW shall be supplied by the Contractor and kept near the Inverter accommodation and shall also be responsible for periodic renewal during the maintenance period. The fire extinguisher shall be suitable for fighting fire of oils, solvents, gases, paints, varnishes, electrical wiring, live machinery fires and all flammable liquid & gas.

8.3.5 BATTERY

The batteries must be conforming to the latest edition of any of the following IEC / equivalent BIS Standards/MNRE guidelines for design qualification and type approval: IEC 61427 / IS 1651/ IS 13369/IS 15549.The battery bank capacity should

be as specified in the tender document of Tublar Gel TYpe and suitable for solar application.

8.3.5.1 The general specifications shall be as under:

(A) The battery bank shall consist of required number of deep-discharge electrochemical storage cells, suitably interconnected as required. Parallel connections of storage cells will be discouraged.

(B) The cells shall be capable of deep discharge and frequent cycling with long maintenance intervals and high columbic efficiency. Automotive or car batteries shall not be accepted.

(C)The nominal voltage and capacity of the storage bank shall be selected and specified by the supplier in the bid. Autonomy of the battery bank should be 2days 7Hrs per day

(D) The self-discharge rate of the battery bank or individual cell shall not exceed three (3) percent per month.

(E) The permitted maximum depth of discharge (DOD), shall be specified by the supplier in the bid. Supplier should also specify the expected life of the Battery bank.

(F) The cells shall include explosion proof safety vents.

(G) The cells shall include the

(B) The cells shall be capable of deerequired number or corrosion resistant inter-cells with all required chemicals electrolyte packed in separate containers

(H) The flooded electrolyte type cells shall preferably be supplied in dry charged condition. Full instructions and technical details shall be provided for electrolyte filling and battery recharging at site for the first time.

(I)If the cells are supplied in uncharged conditions, then the supplier shall provide full instructions for first time charging including, but not limited to, the following: A checklist of all items required:

1 Minimum specification with possible alternatives of the required battery charger

2 for first time charging.

0 Instruction of electrolyte filling, battery charging etc. and instructions on the

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1 transportation of charged batteries, if required.

(J) Suitable number of corrosion resistant and acid-proof storage racks shall be supplied to accommodate the cells tester and other accessories. The rack design shall be such that minimum space is required, without any way obstructing the maintenance requirements. For metallic racks, standards specified for control panel enclosures and other metallic shall govern.

(K) All the connectors should be insulated except for the end portions.

(L) All technical and other details pertaining to the storage cells shall be supplied including but not limited to the following: -

1. Rated voltage and ampere-hour capacity of each storage cell at the rated discharge rate.
2. Permitted maximum DOD.
3. Self discharge rate.
4. Cycle life of the storage cell and the anticipated life (in years) of the battery bank.
5. Total number of storage cells in use.
6. Details on cell interconnections, if any.

All the connectors should be insulated except at both ends from where the connectors are connected to battery terminals. Every cell should have proper numbering marked clearly for its identification. Only pre-insulated connectors should be used.

8.3.5.2 Battery Rack:

Placement of battery should be such that maintenance of the battery could be carried out easily. The non-reactive acid proof material should be provided to cover the entire floor space covering the battery rack. Battery rack should compulsorily be placed on the appropriate rubbers pads to avoid the contact of wooden racks with the floor, to protect wooden rack particularly from termite. Termite resistant material should be provided.

8.3.5.3 Battery Protection Panel

The battery protection panel shall be made of suitable powder coated metal casting having two incoming and two outgoing terminals .There shall be 2 Nos HRC Fuses of suitable rating with fuse holder/base etc as required.2 poles MCB/MCCB can also be used

for isolation purpose instead of fuses, if required. BPP should be connected between Battery Bank &DCDB. This can be integrated in the PCU.

8.3.6 Module Mounting Structure

The modules will be fixed on structures with fixed arrangement. Array support structure shall be fabricated using corrosion resistant GI electrically compatible with the structural material. Array support structure welded joints and fasteners shall be adequately treated to resist corrosion. All fasteners (nuts and bolts) should be made of **stainless steel**(SS 304 grade) only.

The mounting steel structure shall be as per latest BIS 2062 (amended up to date) and galvanisation of mounting structure shall be in compliance of BIS 4759 (amended up to date).

8.3.6.1 Mechanical Specifications

Standards applicable for Structures shall be

The mounting steel structure : BIS 2062 (amended up to date)

Galvanisation of mounting structure : BIS 4759 (amended up to date).

Photo-voltaic arrays must be mounted on a stable, durable structure that can support the array and withstand wind, rain, hail and other adverse conditions. The mechanical structure shall be made up of hot-dip galvanized steel and designed to withstand gusts of wind / cyclonic wind up to 150km/hr from back side of the panel. Stationary structures shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly.

The modules will be fixed on ground mounted structures with fixed arrangement. Array support structure shall be fabricated using corrosion resistant GI electrically compatible with the structural material. Array support structure welded joints and fasteners shall be adequately treated to resist corrosion.

The array will be installed on steel racking structures that are anchored in the ground. Racks will be laid out in parallel matrices allowing for individuals to access the area between the racks for cleaning and other maintenance needs. The min. clearance between lower edge of PV panel and ground level shall not be less than 0.6 m. In between the row of solar panels

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sufficient gap need to be provided to avoid falling of shadow of previous row on the next row. Seismic factors for the site will be considered while making the design of the foundation.

The bidder/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagram and drawings. **The detailed structure design drawings should be submitted along with the bid**. The material selected and their standards shall be submitted to KSEBL for approval before starting the execution of work. The work will be carried out as per design approved by KSEBL.

Wind velocity withstanding capacity	150 km/hr
Structure material	Hot dip Galvanized Steel as per BIS specifications 2062 &4759
Bolts, Nuts, fasteners, panel mounting clamps	Stainless at documentations Steel SS 304
Mounting arrangement shall be designed to mount on ground.	Design approval of structure foundation shall be obtained from Engineer-in Charge before executing the work.
Minimum distance between ground level and lower edge of PV panel	0.6 meter
Access for panel cleaning and maintenance	Panel top and bottom shall be accessible for cleaning and from the bottom for access to the module junction box
Panel Tilt angle	North South Orientation with a fixed tilt angle of 9 -13 degrees (depending on location) facing true South

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8.3.7 LIGHTNING PROTECTION:

- The SPV power plant should be provided with lightning and over voltage protection.
- The entire space occupying SPV array shall be suitably protected against lightning by deploying required number of lightning arresters. Lightning protection should be provided as per IEC 62305.
- The protection against induced high voltages shall be provided by the use of surge protection devices (SPDs) and the earthing terminal of the SPD shall be connected to the earth through the earthing system.
- Surge protection shall be provided on the DC side and AC side of the solar system.
- The DC surge protection device shall be installed in the DC distribution box adjacent to the solar grid inverter.
- The AC surge protection devices shall be In the AC distribution box
- The source of over voltage can be lightning or other atmospheric disturbance. The lightning conductors shall be made as per applicable Indian Standards in order to protect the entire array yard from lightning stroke.

8.3.8 EARTHING PROTECTION:

- Earthing System shall connect all non –current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV module mounting structures in one long run. The earth strips should not be bolted. Earthing GI strips shall be interconnected by proper welding.
- The complete earthing system shall be electrically connected to provide return to earth from all equipment independent of mechanical connection.

- The equipment grounding wire shall be connected to earth strip by proper fixing arrangement. The each strip shall be continued upto at least 500mm from the equipments.
- Earthing system design should be as per the standard practices and should conform to the 1987 edition of IS 3043**.**
- Masonry enclosure with the earth pit of size not less than 400mm X 400mm (depth) complete with cemented brick work (1:6) of minimum 150mm width duly plastered with cement mortar (inside) shall be provided. Hinged inspection covers of size not less than 300mm X 300mm with locking arrangement shall be provided. Suitable handle shall be provided on the cover by means of welding a rod on top of the cover for future maintenance.
- Minimum four (04) numbers of interconnected earth pit needs to be provided. Minimum required gap shall be provided in between earth pits as per relevant standard .Body earthing shall be provided in inverter, each panel, module mounting structure, kiosk and in any other item as required.
- Earthing system must be interconnected through GI strip to arrive equipotential bonding. The size of the GI earth strip must be minimum 25mm X 6mm.

All metal casing / shielding of the plant shall be thoroughly grounded in accordance with Indian electricity act / IE Rules. The earthing for array and LT power system shall be as required as per provisions of IS.

The complete earthing system shall be mechanically and electrically connected to provide independent return to earth. All three phase

equipment shall have two distinct earth connections. An earth bus shall be provided inside the control facility. For each earth pit, necessary test point shall have to be provided.

In compliance to Rule 33 and 61 of Indian Electricity Rules, 1956 (as amended up to date), all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.

8.3.9 AJB (Array junction Box)

This shall consist of suitable FRP/Thermoplastic/ polycarbonate / powder coated metal casting. In this box/boxes a separate arrangement which shall consist of SPDs and DC connector of suitable specifications for Array which can withstand respective flow of current. Each main junction shall be fitted with appropriate blocking diode. The junction boxes shall be of reputed make and should be as per IP 65(for outdoor) , IP21 (for indoor).

8.3.10 DCDB (DC DISTRIBUTION BOARD)

- DC bus/ cable which can handle the current and the voltage of inverter output safely with necessary surge arrester as per the relevant IS standards.
- DC panel should be equipped with an adequate capacity indoor DC circuit breaker along with control circuit, protection relays, fuses, annunciations.
- DCDB shall have sheet from enclosure of dust and vermin proof, the busbar/ cables are to be made of copper of desired size. DCDB shall be fabricated to comply with IP 65 protection.

- DCDB with the purpose of providing the option for isolating the battery bank. There shall be copper bus bars of suitable rating. These can either be independent or integrated in the PCU.

8.3.11 AC DISTRIBUTION BOARD (ACDB):

This shall consist of box of suitable powder coated metal casting. One feeder per phase shall be provided in ACDB with MCB of suitable capacity installed at each feeder in the ACDB. One Electronic Energy Meter, ISI make, Single / Three Phase, (as per requirement) of good quality shall also be installed in ACDB suitably placed to measure the consumption of power from SPV Power Plant. Proper rating MCB shall be installed at every feeder (in case of single phase output also, there shall be three feeders) to protect feeders from the short circuit current as per the requirement of the site. A separate dedicated feeder from conventional line to PCU as well as ACDB should also be installed

. Two numbers of real time based Timers shall also be installed in ACDB placed in a suitable metal box which can be easily hanged ,with settable time ranging from 0-24 hours operation in two spells for eg:-5A.M to 9 A.M and 6 PM to 10 PM. One timer shall be for domestic feeders while another one separately for street light feeder.

A separate change over switch of proper rating should also be suitably installed in the ACDB to isolate the existing connected load from the Solar System. ACDB should be connected between PCU & Load.

8.3.12 DANGER BOARDS:

Danger boards should be provided as and where necessary as per IE Act/IE Rules/CEA Safety rules as amended up to date, as per the instructions of KSEB Ltd & affixed at various appropriate locations.

8.3.13 CABLES/WIRE:

All connections should be properly made through suitable lug/terminal crimped with use of suitable proper cable glands. The size of cables/wires should be designed considering the line loses, maximum load on line, keeping voltage drop within permissible limit and other related factors. For normal configuration the minimum suggested sizes of cables are:

Module to Module/AJBs	minimum 4 sq mm (single core)
MJBs to AJBs	minimum 10/16 sq mm (two core),with respect to current ratings of designing
MJBs to DCDB	minimum 25 sq mm (single core) or as per design&rating.
DCDB to PCU	-minimum 25 sq mm (single core),or as per design&rating.
Battery to BPP	minimum 25 sq mm (single core)or as per design&rating.
BPP to DCDB	minimum 25 sq mm (single core)or as per design &rating.
DCDB to PCU	minimum 25 sq mm (single core)or as per design &rating.
PCU to ACDB	as per design & rating

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The size & rating of the cables may vary depending on the design & capacity of SPV Power Plant. Participant should compulsorily get the design & rating of the cables approved from KSEB Ltd prior to the installation.

8.3.14 Balance Of Systems (Bos)

1. Conduits/concealed cable trays shall be provided for all DC cabling . Conduits/concealed cable trays shall be adequately secured.
2. The DC and AC cable type shall be PVC/XLPE insulated, suitably armoured, 1100V grade multi stranded copper conductor. Appropriate colour coding shall be used.
3. The DC and AC cables of adequate electrical voltage and current ratings shall be also rated for 'in conduit wet and outdoor use'.
4. The DC and AC cable size shall be selected to maintain losses over the entire lengths of the cables to minimum.
5. All wires used shall conform to IS and should be of appropriate voltage grade. Only copper conductor wires of reputed make shall be used.
6. DC cables from array combiner box to DC distribution box in the control room shall be laid inside cable duct where available or secured with conduits/concealed cable trays where duct is not available.
7. The DC and AC distribution boxes shall be wall mounted inside control Room.
8. DC distribution box shall incorporate DC disconnect switch, lightening surge protectors, any other protection equipment, screw type terminal strips and strain relief cable glands.
9. AC distribution box shall incorporate AC circuit breaker, surge voltage protectors, any other protection equipment, plant energy meter, screw type terminal strips and strain relief cable glands.
10. DC and AC cabling between inverter and distribution boxes shall be secured with conduits/concealed cable trays.
11. The total AC cable losses shall be maximum of 1% of the plant AC output over the specified ambient temperature range.
12. All cable conduits shall be GI/HDPE type.
13. All cable trays shall be powder coated steel or GI or equivalent.

8.3.15 Power Distribution Network

Installation of Power Distribution Network: To supply, install &commissioning of Power Distribution Network at the site which shall operate on the electrical power produced by the SPV Power plant installed at the concerned site in the following manner:

(1)Installation of domestic connection to every household through service wire as per the standard as per the specifications of KSEB Ltd

(2) Installation of appropriate load limiting switch / fuse for controlling domestic / street lighting connections, as per requirement of the site.

(3) Supply, installation & grouting of PSC/GI Poles as per REC norms (or if the tenderer has better drawing he may attach the same with additional offer) for overhead / underground

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distribution network of cables at village/site. All the poles/street lights should be numbered by oil paint in the specified format of KSEB Ltd. Two numbers of MS sign boards and danger/Interlinking Boards has to be supplied, painted (in the same manner as pole painting instructions) & clamped on the poles of the PDN as per KSEB instructions.

(4) Supply, installation & commissioning of overhead cabling from pole to pole & pole to house. Cabling between pole to pole should be done as per standard norms of REC. Cables of XLPE Insulated Armoured LT Cables shall be used for LT Power Distribution.

(5) Supply, installation & commissioning of required numbers of poles with LED Lamp as Street llghts

(6) Supply & installation of earthing kits, stay wire sets with complete set for poles etc. as per norms where ever required.

ii) All the materials to be consumed in Note: i) All cables should be of Aluminium, copper tested for General Test and Measuring Method XLPE insulated Armoured LT cables as per IS 7098 , IS 8130, IS 3975 and IS 5831/1984

The power distribution network should be of best Quality confirming to specification & should be with prior approval of KSEB Ltd

8.3.16 CIVIL WORKS

8.3.16.1 Land Development for site activities

The EPC contractor shall be responsible for detailed soil investigation and contour survey at required locations for the purposes of foundation design for the module structure as well as the Control room. He shall also make the site ready by clearing of bushes, felling of trees, leveling of ground (wherever required) etc. for commencing the project.

8.3.16.2 Building

All Civil works required for the installation of a **Photo Voltaic Station (PV Station) shall be within the scope of the bidder.**

8.3.17 DRAWINGS, DATA AND DOCUMENTS

The Contractor shall furnish following documents/ information along with the offer.

a) General description of equipment offered specifying the important features, make, technical parameters, materials of construction, etc.

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to enable the owner to have proper understanding of the equipment offered and its operation.

b) Technical literature, catalogue and publications.

c) Layout of Complete Power Plant Installation showing location of all major sub- systems.

d) Single line diagram.

e) Typical general arrangement and foundation details.

f) Technical particulars as listed in this specification.

g) Type tests certificates of all major equipments like switchgear, Inverters, Solar Modules etc.

8.3.18 ERECTION, TESTING & COMMISSIONING

1. The contractor shall provide necessary drawings and documents required by statutory authorities and obtain the approval before taking up erection.

2. Any modification in the equipment or installation that may be demanded by the inspecting authorities shall be carried out by the contractor at no additional cost to the KSEBL

3. In accordance with the specific installation instruction as per the manufacturers drawings or as directed by the KSEBL, the successful Bidder shall unload, assemble, erect, install test, commission and hand over all electrical equipments included in this contract after O&M of 5 years.

4. Erection materials including all consumables, tools, testing instruments or any other equipment required for successful commissioning shall be arranged by the successful Bidder in a timely manner.

5. All equipment and instruments, indoor and outdoor, shall be marked with No. and provided with danger boards before commissioning.

6. All Power equipments shall be handled and erected as per the relevant codes of practice and manufacturer's drawings and instruction manuals.

8.3.19 POWER QUALITY REQUIREMENTS

DC Injection into the grid: It is proposed to limit DC injection within 1% of the rated current of the inverter as per IEC 61727.

Harmonics on AC side:

The limits for harmonics shall as follows:

a. Total Voltage harmonic Distortion as per IEEE-519 2014

b. Individual Voltage harmonics Distortion as per IEEE-519 2014

c. Total Current harmonic Distortion as per IEEE-519 2014

d. Output frequency = 50Hz +/- 0.5Hz

PART-9

9.1 Operation & Maintenance of the Plant

The contractor shall be responsible for Comprehensive Operation and maintenance of the Solar Power Plant along with Power Distribution Network System installed at Allimooppan for a period of five (5) years from the date of commissioning of this solar project.
The EPC contractor will operate the DDG solar Plant and shall provide for, at a minimum, the following services:

Performing routine and non-routine maintenance on the solar Plant along with Power Distribution Network System for a period of five years from the date of commissioning of solar project;

- **I.** Operating the solar Plant along with Power Distribution Network System;
- **II.** Providing all materials and services necessary for solar Plant along with Power Distribution Network System maintenance;
- **III.** Performing all duties for the safe and efficient operation and maintenance as per the standards;
- **IV.** Complying with all regulatory obligations;

Contractor shall impart basic training to the employer personnel with the concurrence of the Engineer in Charge and also conduct O & M Training at the designated Training centers of the KSEBL as required with participation of OEM Trainers.
The contractor shall supply **manual** for Operation and Maintenance of all the system in English.
Contractor shall perform the Work and supply all required spare parts in a prudent and efficient manner and in accordance with-

(i) Manufacturers and systems designers' specifications, the Annual Operating Plan for the Plant and all operation and maintenance manuals,

(ii) All Indian applicable laws including environmental protection, pollution, sanitary, employment and safety laws, ("Government Rules").

(iii) Prudent Utility Practice.

Operator shall use all reasonable and practical efforts:

- To maximize plant capacity utilization
- To minimize plant downtime
- Optimize useful life of all the equipments of the energy project.

Contractor shall be responsible for all the required activities for the successful running, optimum energy generation & maintenance of all the Solar Photovoltaic Power Plant along with Power Distribution Network System covering:

a) Monitoring controlling, troubleshooting maintaining of records, registers.

b) Supply of all spares, consumables and fixing/application, inverters, indoor panels , cables terminals kits, Circuit Breakers, Isolators switch, and all other associated equipment of solar plant etc , for a period of 5 (five) years. Cost of these items (including Cost of spares) shall be included in the price quoted.

c) Supply & use of consumables throughout the maintenance period as per recommendations of the equipment manufacturers.

d) Conducting periodical checking, testing, over hauling and preventive action.

e) Monthly General up keeping including cleaning of all equipment, PV Station, amenities, Solar Photovoltaic array area, Power Distribution Network System etc .

f) Submission of Monthly reports to KSEBL on the energy generation & operating conditions of the solar plant by 2nd day of every month to the Engineer in Charge and copy of consolidated report of all locations to the Deputy Chief Engineer , Electrical Circle, Palakkad.

g) Taking care of the full security aspects of the Solar Power Plant along with Power Distribution Network System.

h) Replacement of damaged modules if any, during the period of 5(five) years.

i) Replacement of Inverter and all type of Battery if any used and any other equipment in solar plant along with Power Distribution Network System time to time if required, during the period of 5(five) years.

j) Insurance covering all risks (Fire & allied perils, earth quake, terrorists, and burglary.

k) Maintaining and replacement of Lightning Arrestors.

l) Continuous monitoring the performance of the Solar Power Plant and regular inspection and maintenance of the whole system including Modules, INVERTER's, junction boxes, cables, outdoor/indoor Distribution Board and all associated equipment etc. necessary for extracting and maintaining the maximum energy

output from the Solar Power Plant.

m) Successful running of Solar Power Plant for the desired Performance ratio as per clause 2.2.3 of bid document

n) Contractor personnel shall arrange the Annual Calibration of Energy Meters shall be done by the respective TMR Divisions. Meters with net metering mechanism should be provided by the contractor. It shall be the responsibility of the contractor to promptly rectify/ replace the defective meter so as to ensure that the errors in the energy meters are within specified limit. Cost of calibration and rectification/ replacement, if any shall be borne by the Contractor. Shortfall on the account of metering error to meet the Generation shall only be the responsibility of the Contractor.

o) Periodic Testing/ calibration of all measuring devices as per respective manufacturer's instruction/ guideline.

The period of Operation and Maintenance will be deemed to commence from the date of commissioning of solar Photovoltaic Power Plant.

9.1.1 Operation and Monitoring

Operation part consists of deputing necessary manpower necessary to monitor the Solar Photovoltaic Power Plant at the optimum capacity. Operation procedures such as preparation to start, routine operations with safety precautions, monitoring of Solar Power Plant etc. shall be carried out as per the manufacturer's instructions to have trouble free operation of the complete system Performance evaluation shall be carried out annually in presence of the officials of KSEBL

Daily work of the operators in the Solar Photovoltaic Power Plants involves:

1) Cleaning of Modules, logging the voltage, current, power factor, power and energy output of the solar Power Plant.

2) Note down failures, interruption in supply and tripping, reason for such tripping, duration of such interruption etc.

3) Check battery voltage, specific gravity and temperature

The operator shall record monthly energy output, down time, etc

9.2 Maintenance

The contractor shall carry out the periodical/plant maintenance as given in the manufacturer's service manual and perform at least minimum requirement.

Preventive/Routine Maintenance shall be done by the Contractor at least once in a every three months and shall include activities such as, cleaning and checking the health of the SPV system, cleaning of module surface, tightening of all electrical connections, mounting structure, Inverter operations and any other activity that may be required for proper functioning of the SPV system along with Power Distribution Network as a whole. The contractor shall ensure the generation data availability for proper monitoring of the system.

Regular periodic checks of the Modules, Inverters and battery bank shall be carried out as a part of routine preventive maintenance.

In order to meet the maintenance requirements stock of consumables are to be maintained as well as various spare as recommended by the manufacturer at least for 5 years to be kept for usage.

Particular care shall be taken for outdoor equipment to prevent corrosion. Cleaning of the junction boxes, cable joints, insulators etc shall also be carried out at every three month interval.

Resistance of the earthing system as well as individual earthing is to be measured and recorded every month. If the earth resistance is more than 3 ohm, suitable action is to be taken to bring down the same.

According to the recommendations stock of special tools and tackles shall be maintained for Modules, inverters, battery bank and other major electrical equipment.

Solar modules surface shall be thoroughly cleaned twice every month to ensure maximum possible generation. Manufacturer's approved method of cleaning shall be adopted for the purpose.

A maintenance record is to be maintained by the contractor to record the regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance, reasons for the breakdowns, steps taken to attend the breakdown, duration of the breakdown etc.

The installation / Maintenance of the off grid DDG solar PV plant during the non-office hours and holidays should be carried out only with the prior written approval of custodian of site.

The Contractor shall deploy enough manpower at Solar Photovoltaic Power Plant site to carryout work instructions and preventive maintenance schedules as specified.

The Contractor will attend to any breakdown jobs immediately for repair/replacement /adjustments and complete at the earliest working round the clock. The details of the emergency assistance personnel of the contractor shall be displayed in the location. During breakdowns (not attributable to normal wear and tear) at O&M period, the Contractor shall immediately report the accidents, if any, to the parties involved showing the circumstances under which it happened and the extent of damage and or injury caused.

The Contractor shall comply with the provision of all relevant acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Mines Act 1952, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guide lines or any modification thereof or any other law relating whereto and rules made there under from time to time.

The contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules.

The Contractor shall ensure that all safety measures are taken at the site to avoid accidents to his Workmen.

If negligence / mal-operation of the contractor's operator results in failure of equipment such equipment should be repaired replaced by contractor at free of cost.

If any jobs covered in O&M Scope are not carried out by the contractor during the O&M period, pro-rata deduction will be made based on the quantum of work from the amount due to the contractor/security deposit.

9.3 Tools and Tackles

The Contractor shall arrange for all the necessary tools and tackles for carrying out all the maintenance work covered under this contract.

The Contractor shall check growth of vegetation, accumulation of debris and water clogging and clear the site timely.

The contractor shall provide tools specified below with required number of spares as approved by agreement authority. List of tools and spares is as follows.

Tools
Spanner set
Small cable cutters
Nose pliers
Wire strippers
Nut drivers
Screw driver
Knife
Electric tester
Clamp meter-AC-DC-clamp on Meter/AC/DC multimeter
(AC&DC 1000V)

Spares
PV modules
Junction boxes
Fuse and fuse holder
MOVs/Arrestors

MCBs
DC connectors
DC cables
DC SPD
Nuts and bolts
Diodes
Different clamps for MMS
However, in addition to above tools and spares, anything seen necessary for keeping the down time of solar plant to minimum shall be kept in the plant premises.

9.4 PERFORMANCE RATIO: PERFORMANCE RATIO TEST (PR TEST)

The Plant should run minimum two weeks without any major equipment failure to start the PR test. Contractor shall submit two copies of O&M manual with soft copy before the start of PR Test. Depending on the requirement, capacity and suitability Pyranometer shall be installed at locations suggested by KSEBL or else METEONORM data shall be considered for calculating PR.

9.4.1 PR shall be measured as per clause 2.2.3 of tender documents . The PR test shall be conducted at site by the Contractor in presence of the KSEBL officials as per IEC 61724. The PR test procedure shall be

submitted by the Contractor for review and approval. Any special equipment, instrumentation tools and tackles required for the successful completion of the performance test shall be arranged by the Contractor at his own cost.

9.4.2 The procedure for PR demonstration test shall be as follows:

- Weather monitoring station installed in the plant shall be in working condition for minimum 2 weeks and all the parameters shall be available for analysis and verification. The test report for the calibration shall be submitted by the Contractor for approval.
- After the successful verification of the initial parameters by KSEBL officials, PR test shall be conducted as per Clause 2.2.3 of Tender Documents.

9.4.3 Following factors shall be excluded for calculation;

- Irradiance below 250 W/m2
- The measured global solar radiation of the period of the outage of the power evacuation system shall be excluded to calculate average global solar radiation for the period of PR test.

9.4.4 PR Calculation:

Performance Ratio (R p) = Final PV System Yield (Y f)/Reference Yield (Y r)
R p = Y f /Y r
Y f = Plant AC Output (kWh)/Plant Capacity (kWp at STC)
Y r = Collector Plane Irradiance (kWh/m2)/Irr Ref
Irr Ref = 1kW/m2

Performance Ratio of the solar plant for a period of time = Energy measured (kWh)/(Irradiance(kWh/m^2)on the panel x Active area of PV module x PV module efficiency)

Contractor shall demonstrate minimum PR of 75-80% in the initial PR test within 7 consecutive days. If the contractor fails to prove the desired performance ratio at the time of completion and during any of the consecutive years of defect liability period he will be given a second chance to demonstrate the PR within another 7 consecutive days. Still if it is not achieved, the same shall be demonstrated within another 7 consecutive days and still if it is not achieved, EPC contractor shall enhance/improve the quality of the plant by replacement of components with all suitable modification requirements on balance of systems at his own cost to achieve the performance ratio.. After obtaining Energisation Approval from Electrical

sat documentation

Inspectorate and demonstration of minimum specified PR, the solar plant shall be commissioned which shall be the date of completion of the project.

9.5 Handing Over

After the date of operation & maintenance of five years, the Contractor shall hand over the complete system to in the best working condition within 15 days to the KSEBL. Any component found defective/inefficient/worn out shall be rectified/ replaced/ made good at contractor's cost before handing over the system to the KSEBL. In order to ensure longevity & safety of the core equipment and optimum performance of the system the Contractor should use only genuine spares of high quality standards. Contractor has to operate & maintain the SPV plant along with Power Distribution Network till the end of the contract period of five years after commissioning.

PART 10
ANNEXURES

(The annexure given here are for guidance only. The contents of the annexure are to be modified suitably with reference to the nature of the Contract.)

Annexure – 1
(AGREEMENT TO BE EXECUTED BY THE BIDDER AND TO ACCOMPANY THE BID IN KERALA GOVERNMENT STAMP PAPER WORTH Rs.200/-)

Articles of agreement executed on this the……day of……two thousand……between the Kerala State Electricity Board Ltd acting through the Deputy Chief Engineer, Electrical Circle, Vydhyuthi Bhavan, T B Road, Palakkad (hereinafter referred to as "The KSEBL") of the one part and Shri…… (here enter name and address of the Bidder) (hereinafter referred to as "the bounden") of the other part.

WHEREAS in response to the invitation for Bid as per Notification No……dated……and subsequent amendments thereto, the bounden has submitted to the KSEBL a Bid for the ……specified therein subject to the terms and conditions contained in the said Bid documents.

WHEREAS the bounden has also furnished **Rs ……** as e-payment towards EMD for execution of agreement undertaking the due fulfilment of the Contract in case his Bid is accepted by the KSEBL.

NOW THESE PRESENTS WITNESS AND it is hereby mutually agreed as follows:

In case the Bid submitted by the bounden is accepted by the KSEBL with or without modifications and the Contract for the execution of …… …… is awarded to the bounden, the bounden shall within 15 days of Award of his Bid execute an agreement with the KSEBL incorporating all the terms and conditions under which the KSEBL accepts his Bid.

In case the bounden fails to execute the agreement as aforesaid incorporating the terms and conditions governing the Contract the KSEBL shall have power and authority to recover from the bounden any loss or damages caused to the KSEBL by such breach as may be determined by the KSEBL, appropriating the moneys inclusive of Bid Security deposit or any kind of security furnished by the bounden and if the money or security is found to be inadequate, the deficit amount may be recovered from the bounden and his properties movable and immovable and also in the manner hereinafter

contained. The bounden will have no claim or right over the moneys and/or securities and Bid Security appropriated by the KSEBL and those moneys or / and securities shall belong to the KSEBL. All sums found due to the KSEBL under or by virtue of this agreement shall be recoverable from the bounden and his properties movable and immovable under the provisions of the Revenue Recovery Act for the time being in force as though such sums are arrears of land revenue and also in such other manner as the KSEBL may deem fit.

In witness whereof Shri/Smt. .....(here enter name and designation) for and on behalf of the KSEBL and Shri/ Smt. .....the bounden have here unto set their names the day and year shown against their respective signatures.

Signed by Shri. / Smt. .....(Date)

In the presence of witnesses:

1.

2.

Signed by Shri. / Smt. .....(Date)

In the presence of witnesses:

1.

2.

Annexure 2

LETTER OF APPLICATION

(To be filled up by the Bidder)
Name of work: .....
To

The Deputy Chief Engineer , Electrical Crcle,
KSE Board Ltd, Vaidhyuthi Bhavan, T B Road
Palakkad - 678014, Kerala State, India.

Sir/Madam,

1. I/We have downloaded the Bid document from the web site etenders.kerala.gov.in and I/We have not tampered/ modified the Bid forms in any manner. In case, if the same is found to be tampered/modified at a later stage, I/We understand that my/our tender will be summarily rejected and full bid security will be forfeited
2. Having examined carefully the specifications together with the conditions of bid & contract, Schedules, drawings and the accompaniments, I/we hereby offer to carry out the works described in the said specifications, drawings etc. at rates entered herein.
3. I/We hereby undertake to plan, organize, execute and complete the whole of the work entrusted to me / us strictly according to the conditions of contract and the specifications if the work is awarded to me/us.
4. If the work is awarded to me/us, I/we also undertake to remit the Performance security deposit, execute agreement and commence the work as directed by you.
5. I/We have remitted an amount of Rs ..... towards the Bid security and Rs ..... towards tender cost including GST through e-payment.
6. I am/We are enclosing
   i) Power of Attorney of the signatory to the Bidding Document
   ii) Documents showing Financial Situation Information for the last three years such as annual reports, profit and loss account, net worth etc
7. I am/We are also enclosing the agreement in Kerala Stamp Paper worth Rs.200/- to be executed while submitting bid duly executed by me/us.
8. I/We also undertake to abide by the instructions of the KSEBL in carrying out the work envisaged under this contract.

Yours faithfully,

Station:
Date:

Acc: (to be filled up the bidder)
N.B. Portions not applicable to be struck off.

Annexure 3

DECLARATION BY BIDDER

I/We,
.....
.....
.....hereby declare that I am not in any way related to any KSEBL's servant who is in charge of or having control of this work. I agree that if, at any stage, it is found that this declaration is untrue the Bid security/ Performance security deposit as Bank guarantee, paid by me will be forfeited and the contract entered will stand cancelled. It is understood that the relationship with KSEBL's servant referred to herein will be restricted to my Father, Mother, Son, Daughter, Brother, Sister, Direct Uncle, Nephew, Father-in-law, Mother-in-law, Brother-in-law, Sister-in-law, and First Cousins of the Officer concerned.

Place:

Date: Signature of bidder

Annexure 4

FORM OF CONTRACT AGREEMENT
(IN KERALA GOVERNMENT STAMP PAPER WORTH Rs. 1 /- for every 1000/Rupees of agreed total Contract amount as desired by KSEBL)

Articles of agreement No .....made the.....Day of.....20.....between Sri./Smt
.....
..... (here enter name, designation and address of agreement authority) acting for and on behalf of the Kerala State Electricity Board Ltd (*herein after* called the "KSEBL") and Shri.....
.....of.....and Company Limited incorporated under the.....and having its registered office at.....(hereinafter called the Contractor) of the other part.

WHEREAS the Kerala State Electricity Board Ltd is taking up the construction of.....in connection with the.....project.

AND WHEREAS the KSEBL is desirous of starting the actual construction of the..... ..... .at an early date for the benefit of the people.

AND WHEREAS the KSEBL has invited tenders for the construction of .....

AND WHEREAS the Contractor has tendered for .....work as per specifications, drawings and conditions mentioned herein after and appended to this.

AND WHEREAS the KSEBL has been pleased to accept the bid for .....without any modification/with the modifications incorporated as annexure.

AND WHEREAS the KSEBL issued detailed LOA No . ..... dt..... for the execution of the project by the contractor.

AND WHEREAS the Contractor has furnished Performance security deposit Bank Guarantee No .....Dated.....of .....for sum of Rs.....for the proper performance and the completion of the contract in every aspect strictly as per LOA dt..... and work order no..... issued to the contractor and as per the documents appended to this agreement.

Now these presents witness and it is hereby mutually agreed as follows.

In this agreement words and expressions shall have the same meaning as are respectively assigned to them in the conditions of contract herein after referred to.

ARTICLE 1 – SCOPE OF WORK

The Contractor shall perform everything required to be performed for the execution of **design as per site conditions, supply, installation, testing & commissioning of 10 KWp OFF-Grid (21kwhr-Autonomy 2 days 7 Hours/day) Ground Mounted SPV Power Plant and Power Distribution Network (OFF GRID Solar PV DDG Project) at Allimooppan Tribal Colony, Thekkadi, Parambikulam under Electrical Section, Muthalamada of Electrical Sub Division, Kollengode including Operation & Maintenance of the plant for 5 years from the date of commissioning** Project as described in and could be gathered from the documents appended herewith so that they will be finished in complete form as early as possible. He shall provide and furnish all labour, materials, tools, plant and equipment, design, manufacturing and supply of electro mechanical equipments and incur all other expenses required to perform the work except to the extent provided in the attached documents and he shall complete every item of work in workman like manner complete in every respect strictly in accordance with drawings, specifications and conditions of contract as finally agreed to.

ARTICLE II - PAYMENT

In consideration of what the Contractor does under the provisions of this contract, strictly in accordance with the terms thereof the KSEBL agrees to pay the Contractor in Indian currency for the work as shown in schedule of items which includes all the items of work contemplated under the agreement at the percentage rate/rates mentioned therein.

ARTICLE III - COMMENCEMENT AND COMPLETION

The date of commencement of work under this contract shall be within 15 days from the date of agreement and shall be diligently executed until it is complete in every respect. It shall be made ready for commissioning on or before 6 months.

ARTICLE IV - COMPONENT PARTS OF THE AGREEMENT

The Contract documents among other things consist of this agreement on stamp paper.

Bid document

Corrections and amendments to the specifications and conditions of contract included in the bid document.

Annexure, if any, to the above document containing the change in specifications and conditions of contract arrived at after mutual negotiations before awarding the work.

Drawings as listed in the conditions of contract

Schedule of prices as finally accepted.

Approved Construction Programme.

ARTICLE V - ON ANNEXURE

In case of modifications, if any, an annexure containing all modifications agreed to only will be appended and not the intervening correspondence between the parties and all such correspondence including bid forwarding letters will be inoperative.

ARTICLE VI - RATES TO HOLD GOOD IN CASE THE PERIOD OF THE CONTRACT IS EXTENDED

The percentage rate/rates quoted by the Contractor in Schedule of items and accepted by the KSEBL shall hold good for all works done towards the completion of the contract whether during the period mentioned herein or during the extended period, if any.

ARTICLE VII - SERVICE OF NOTICE

Every notice to be given to the Contractor may be given to him personally or left at his residence or last known place of abode or business or handed over to his agent, personally or may be addressed to the Contractor by post at his usual or last known place of abode or business and if so addressed and posted shall be deemed to have been served on the Contractor on the date on which in the ordinary course of post, a letter so addressed and posted would reach his place of abode or business.

ARTICLE VIII - ASSIGNMENT AND SUBLETTING

The Contractor shall not assign or make over the Contract or the benefits or burdens thereof, or any part thereof, to any other person or persons or body corporate. The Contractor shall not underlet or sublet to any person or persons or body Corporate, the execution of the Contract or any part thereof without the consent, in writing, of the KSEBL

ARTICLE IX - INSOLVENCY OR LIQUIDATION

In case the Contractor becomes insolvent or goes in to liquidation or makes or proposes to make any assignment for the benefit of his creditors or proposes any composition with his creditors for the settlement of his debts or carries on his business or the contract under inspection on behalf of his creditors or in case any orders for the

administration of his estate are made against him or in case the Contractor shall commit any act of insolvency or in case in which, under any clause or clauses of this contract the Contractor shall have rendered himself liable to damages amounting to the whole of his security deposit, the Contract be determined and the agreement authority may complete the contract in such time and manner by any such person as the KSEBL shall think fit. But such termination of the contract shall be without any prejudice to any right of remedy of the KSEBL against the Contractor or his sureties in respect of any breach of contract committed by the Contractor.

ARTICLE X - BREACH OF CONTRACT

If the Contractor commits breach of all or any of the terms or Conditions of Contract the KSEBL shall be entitled to recover from the Contractor all damages it might suffer thereby. The amount thus due could be recovered from the Contractor in any manner the KSEBL chooses including recovery by Revenue Recovery Proceedings.

ARTICLE XI – SETTLEMENT OF DISPUTES

In case of disputes between the Contractor and the KSEBL, the matter shall be referred to a 'Dispute Resolution Committee' to be formed by the KSEBL for resolving the dispute.

ARTICLE XII – LAW AND JURISDICTION OF CONTRACT

Any dispute araising out of this contract will be subject to the exclusive jurisdiction of Civil Courts at Thiruvananthapuram.

ARTICLE XIII - PERFORMANCE GUARANTEE:

During the performance security deposit guarantee period of 5 years from the date of commissioning, the Contractor shall repair free of charge, any defect noticed in the works and/or any damage or defects or functional failure noticed in any accessory transported or installed by the Contractor which fails or proves unsatisfactory under normal operations due to his faulty material handling or workmanship.

However during the guarantee period, if the Contractor fails to rectify the defects if any, in reasonable time, the KSEBL shall arrange to make good the defects in works, accessories etc. and the amount incurred by the KSEBL on this account will be recovered together with 21% of the expenses from the amounts payable to the Contractor.

ARTICLE XIV - RELEASE OF PERFORMANCE SECURITY DEPOSIT GUARANTEE

The performance security deposit will be released in equal instalments at the end of each year during the defect liability period after assessing the Performance Ratio as specified in clause 2.2.3 of bid document.

ARTICLE XV

The Contractor hereby agrees to extend the period of validity of Bank Guarantee furnished by him towards Performance security deposit Guarantee under this contract till such an extension is not required by the agreement.
In witness whereof the parties here to have here unto set their hands the day and year first above written,

Signed, sealed and delivered by ....(agreement authority) on behalf of the Kerala State Electricity Board Ltd.
agreement Authority

In the presence of:
Full name, address and Signature

Full name, address and Signature

Contractor

Signed, sealed and delivered by.....on behalf of the contractor
In the presence of:
Full name, address and Signature
Full name, address and Signature

Annexure 5
PERFORMANCE BANK GUARANTEE

BG No. Date:

This guarantee is made on this ..... day of ..... 20..... by ..... (complete postal address of the bank) hereinafter called 'the **Bank**', which expression shall unless repugnant to the context or meaning thereof shall include its successors and assigns.

WHEREAS the Kerala State Electricity Board Limited, a Company incorporated by the Government of Kerala under the Companies Act, 1956 having its registered office at Vydyuthi Bhavanam, Pattom, Thiruvananthapuram, Kerala, PIN – 695 004, hereinafter called as 'the **Purchaser'**, which expression shall unless repugnant to the context or meaning thereof shall include its successors and assigns in having agreed to exempt .....(hereinafter called "**supplier/contractor(s)**" which expression unless repugnant to the context and meaning thereof shall include its successors and assigns) from depositing with the **Purchaser** a sum of Rs. ..... towards Performance Security Deposit in lieu of the said **supplier/contractor(s)** having agreed to furnish a bank guarantee for the said sum of Rs. ..... as required under the terms and conditions of Purchase Order No. ..... dated ..... (hereinafter referred as the 'order') placed by the **Purchaser** on the said **supplier/contractor(s)** and on specific request on the part of the said **supplier/contractor** (s),we the **Bank** hereby unconditionally and irrevocably affirm and undertake-

(a) At the request of the **supplier/contractor(s)**, we 'the **Bank'**, do hereby unconditionally and irrevocably affirm and undertake that we

are the Guarantor and are responsible to the **Purchaser** up to a total sum of `..... [Rupees ..... only] such sum being payable by us to the **Purchaser** immediately upon receipt of first written demand from the said **Purchaser**.

(b) We unconditionally and irrevocably undertake to pay to the **Purchaser** on an immediate basis, upon receipt of first written demand from the said **Purchaser** and without any cavil or argument or delaying tactics or reference by us to the **supplier/contractor(s)** and without any need for the **Purchaser** to convey to us any reasons for invocation of the guarantee or to prove the failure to perform on the part of the **supplier/contractor(s)** or to show grounds or reasons for the demand or the sum specified therein, the entire sum or sums within the limits of `..... [Rupees .... only].

(c) We hereby waive the necessity of the **Purchaser** demanding the said amount from the **supplier/contractor(s)** prior to serving the demand notice upon us.

(d) We further agree and affirm that no change or addition to or other modification to the terms of the agreement, shall in any way release us from any liability under this unconditional and irrevocable guarantee and we hereby waive notice of any such change, addition or modification. We further agree with the **Purchaser** that the **Purchaser** shall be the sole and exclusive judge to determine that whether or not any sum or sums are due and payable to him by the **supplier/contractor(s),** which are recoverable by the **Purchaser** by invocation of this guarantee.

(e) This guarantee will not be discharged due to the change in constitution of the **Bank** or the **Purchaser**. We undertake not to withdraw or revoke this guarantee during its currency/validity period, except with the previous written consent of the **Purchaser**.

(f) We unconditionally and irrevocably undertake to pay to the **Purchaser**, any amount so demanded not exceeding `..... [Rupees ..... only] notwithstanding any dispute or disputes raised by the Employer or anyone else in any suit or proceedings before any dispute review expert, arbitrator, court, tribunal or other authority, our liability under this guarantee being absolute, unconditional and unequivocal. The payment so made by us under this guarantee to the **Purchaser**, shall be a valid discharge of our liability for payment under this guarantee and the **supplier/contractor(s)** shall have no claim against us for making such payment.

(g) This unconditional and irrevocable guarantee shall remain in full force and effect and shall remain valid until .....and shall be extended from time to time for such period as may be desired by the **supplier/contractor(s)** on whose behalf this guarantee has been given.

Notwithstanding anything contained herein:

1. Our liability under this Bank Guarantee shall not exceed ..... (value in figures) ..... [value in words .....].

2. This unconditional and irrevocable Bank Guarantee shall be valid with effect from..... to .....

3. We are liable to pay the guaranteed amount or any part thereof under this unconditional and irrevocable Bank Guarantee only and only if the **Purchaser** serves upon us a written claim or demand on or before ..... [validity date].

For and on behalf of the Bank
[Signature of authorized signatory(ies)]
Signature:
Name :
Designation:
POA Number:
Contact Nos. : Tel.....
Mobile.....
Fax No.
Email
Common seal of the Bank:

Witness:
1. 2.

Signature:
Name:
Address:
Contact No. Tel. Mobile
email:

Note:

1. For the purpose of executing the bank guarantee, the non-judicial stamp papers of appropriate value shall be purchased in the name of Bank which issues the Bank Guarantee.

2. The Bank Guarantee shall be signed on all the pages by the Bank authority indicating their POA Nos. and should invariably be witnessed.

Annexure 6
PAYMENT DETAILS APPLICATION

Project Date:
Equipment: Contract No:
Name of contractor: Contract Name:
Contract Value: Application:
Unit reference: Serial No.:

To

The Deputy Chief Engineer , Electrical Circle
Kerala State Electricity Board Ltd
Palakkad

Sir,

Pursuant to the above referred contract dated.....the undersigned here by applies for payment of the sum of Rs. .... (specify amount) .The above amount is claimed on account of progress of Status of Implementation with ref. to payment schedule of contract

The application consists of this page, a summary of claim statement and the following signed schedule.

(Please enlarge listing, if necessary)
Note: All progress payments on Works shall be measured in M Books as per Activity Schedule

Signature of contractor/Authorised signatory

Annexure - 7
NO DEVIATION CERTIFICATE

Bid No…….

To

The Deputy Chief Engineer , Electrical Circle
Kerala State Electricity Board Ltd
Palakkad

Dear Sir,

We understand that any deviation/exception in any form from our bid against the above mentioned reference number may result in rejection of our bid. We, therefore, certify that we have not taken any exceptions/deviations anywhere in the bid and we agree that if any deviation is mentioned or noticed, our bid may be rejected.

Yours faithfully,
(Signature of Authorized Signatory)
Name :
Designation :
Company seal :

Note : This “No Deviation Certificate” should be written on the letter head of the bidder indicating BID No. duly signed and stamped with date by a person competent and having the power of attorney to bind the bidder.

Annexure - 8
CHECK LIST

List of required Formats/documents to be submitted online duly signed digitally by Authorized Signatory:

Documents to be submitted in Cover No.- 1.

The bidder shall attach :

Scanned copy of agreement to accompany the Bid as per Annexure 1 shall be uploaded as a single pdf

Document to be submitted in Cover No.- 2.

i) Questionnaire as per Annexure-9

ii) Bid document (downloaded from the website)

iii) Unpriced list of materials/equipment/works required for successful completion, commissioning and operation & maintenance of the plant for 5 years

iv) Attachments to bid document and Additional documents if any as a single pdf.

Sl .No	Necessary Attachments
1	Attested copy of PAN Card of the Authorized Signatory/Firm along with the bid.
2	Letter of application, Declaration by the bidder, No deviation certificate - as per Annexure
3	Certificate of incorporation of the Company
4	Joint venture or consortium or group agreement or MoU executed between the parties exclusively for the Project legally enforced by way of attesting by a notary.
5	Power of Attorney of the signatory to the Bidding Document
6	Copy of Work Order/ Contract agreement and completion certificate that the bidder has experience
7	Performance Certificate from the user regarding successful operation of the Solar PV power plant for at least six months. (documentary evidence supporting Clause 6.2.2 of bid).
8	Solvency certificate from the Nationalized/Scheduled Bank or Net Worth Certificate issued by a Chartered Accountant, Audited financial statements for the at least 3 years in the last 5 financial years(Annual Turnover , Balance sheet , profit and loss account)
9	Litigation History details and proof confirm that they have not been banned or de-listed by any Govt. or Quasi-Govt. Agencies or PSU's. If so banned this fact must be clearly stated by Bidder in his offer (Part 7

	Clause7.1(c, d))
10	Complete construction programme, Sketch/ Schematic diagram of the proposed plant.
11	Test certificates for IEC standards in full of relevant / all major equipments like Inverters, Solar Modules etc. Certificate showing MNRE approval for the offered solar panels.
12	Technical particulars of components offered (Cl.7.4 of bid),Guaranteed Technical Particular data sheet 1, 2,3 as per annexure 10
13	All other documents as per the tender document.

Eligible bidders shall upload scanned copies of the above documents. If any of the documents is not submitted in cover 2, the tender will be rejected.

Document to be submitted in Cover No.- 3.
Price bid.

The total amount (PAC = PAC 1+ PAC2) quoted by the bidder for the tender will be the sum of the amount quoted for Project cost (PAC1) for supply, design & installation (inverters, PV modules, BoS (Balance of System), meters, support structures, DC and AC cables, associated Power Distribution Network for the plant) transportation, erection, civil works, inspection and testing charges and for the operation and maintenance cost for 5 years (PAC 2). Each of this above should be including all inclusive rate with taxes, duties, CESS, freight as Governed by GST and insurance charges, logistics etc including GST. The bidder has to quote the amount (PAC1 & PAC2) in each sheets of the BOQ separately.

Annexure-9

QUESTIONNAIRE

Sl. No.	Questions	Answers (to be furnished by the bidder)
1	Name of Firm	
2	Nationality	
3	Head Office Address Postal Telex No Fax No. E-Mail Phone No.	
4	Former name of firm if any	
5	Branch Office & Address	
6	Type of Organization Individual Partnership Incorporated company	
7	Year & place of establishment	
8	Nature of Firm Member of a group of companies (if yes, give name, address, connections and descriptions of the other companies) Subsidiary of large organization (if yes, give name, address and descriptions of the main company)	

9	Has your firm worked as Developer As a joint venture Main contractor Sub contractor (if yes, please give name, address of prime contractor and details of contractual arrangements with the prime contractor)	
10	Give brief description of field/areas in which you have executed work. Please furnish details and particulars of such works in the relevant formats attached. Furnish exhibits of the important projects executed by you	
11	Are you registered with any other Govt. Department /Public Sector undertaking? (if Yes give details).	
12	What type of work is usually sublet by you	
13	Have you ever failed to complete any work awarded to you? (If so when, where and why)	
14	Have you ever failed to complete the work in time? If any penalty imposed on you, give details	
15	In what other line of business are you financially interested	
16	Have you ever been denied tendering facility by any	

	government /public sector under taking of India or of any other country (if so give details) Have you been debarred from tendering in any Govt. departments /undertaking (if so give details)	
17	How many years have your organization been in business under present business name? What were your fields, when you established your company, when did you add new fields?	
18	Has any officer or partner of your organization ever been an officer or partner of any other organization that failed to complete construction contract? (If so, state name of the individual and other organization) Has any officer or partner of your organization ever failed to complete the construction contract handled in his own name?	
19	Name and address of affiliate subsidiary partnerships, joint ventures and parent companies (indicate nature of the firm and present engagement)	
20	Name of any international organization for which your firm has already been registered /pre-qualified?	
21	What are your sources of finance (Please give details of bank reference –	

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	certificate from bank endorsing your financial stability and certificate to substantiate other sources)	
22	Have your company ever been declared bankrupt (if yes, please give details)	
23	What is the maximum value of projects/works that you can handle What is the maximum value of project/works that you have handled so far**.**	
24	Give the last five years account with auditor's reports, balance sheet, profit and loss account, and income tax clearance certificate.	
25	How much is your paid up capital How much is your working capital How much is your foreign investment How much is your annual turn over for the last 5 years (give separately for each year) How much is your net income for the last 5 years? (Give separately for each year)	
26	Do you intend to associate any other organization for the works, which you are bidding? If so, give full particulars of that organization separately under each head of questionnaire and Forms	

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	Formats(enclosed shall be filled) Details of Engineers & Managerial Personnel Details of machinery and equipment owned by the Company List of Machinery & equipment that company proposes to take on rent and use for the work	
27	Present activities in which your firm is engaged as a Main contractor (last 5 years) Present activities in which your firm is working in Joint Venture (last five years) Present activities in which your firm is working as sub contractor (last five years) Simultaneous contract engagement of the contractor Material Testing facilities available with the firm	
28	Have you conducted site visit of the locations	Yes/No

Note: In the case of Joint venture/consortium/group, the lead bidder shall submit the answers as per the above questionnaire pertaining to each firm in the group.

(The bidder has to prepare the Questionnaire as per this format and upload in pdf format and enclose the cover-2 of the bidding documents)

ANNEXURE-10

GUARANTEED TECHNICAL PARTICULAR DATA SHEET

Guaranteed Technical Particular Data Sheet - 1 Solar PV Module			
Sl.No.	**Particulars**	**Required**	**Offered**
1	PV Module Manufacture name &Country	Indian make,(manufacture name to be specified)	
2	PV Module type	Mono/poly Crystalline	
3	Product Code		
4	No. of PV cells per Module		
5	Total number of PV modules		
6	Max.Power, Pmp@STC	≥330Wp	
7	Max.power tolerance (%)	Not more than 3%	
8	Max.power voltage (Vmp) @STC	To be specified	
9	Max.power current (Imp) @STC	To be specified	
10	Open circuit voltage, Voc@STC	To be specified	
11	Short circuit current, Isc@STC	To be specified	
12	Nominal voltage	To be specified	
13	Nominal Wattage	To be specified	
14	Fill Factor	Not less than 0.7	
15	Temp.coefficient of Voc (%/C)		
16	Temp.coefficient of Pmp (%/C)		
17	Temperature Co-efficient of Isc (%/°C)		
18	Normal Operating Cell Temperature (NOCT) (°C)		
19	Operating Temperature (°C)		
20	Max Temperature rise of solar cells under severe working conditions over Max. Ambient Temp.	To be specified	
21	Module is suitable to operate at 50^0 ambient	Yes/No	

sat documentation

22	Cell efficiency	%	
23	Module efficiency	>17%	
24	Maximum System Voltage	600/1000V	
25	No. of By-pass Diodes		
26	Mounting arrangement for Solar Module	Fixed Arrangement	
27	Solar Module frame material	Anodized Aluminum	
28	Finish		
29	Types of Sections used		
30	Module dimensions cms (LxWxH)	To be specified	
31	PV panel Weight (kg)	To be specified	
32	Module Life (minimum)	25 years	
33	PV array area(sqm)		
34	Standards/Approvals from International Agencies	IEC 61215/IEC 61730/ IEC 61701	
35	Guaranteed output confirm	Yes	
36	Output Cables	Polarized, UV protected &Weather Proof DC rated multi-contact connector	
37	Output Terminal	PV Connectors	
38	Junction Box	Weather resistant HDPE (IP65)	
39	Construction Front Back	 High transmittance glass. Polyester Ethyl Vinyl Acetate(EVA) encapsulate	
40	Glass	Low iron tempered	
41	Total Plant's foot print area (sqm)		
42	Control facility area (sqm)		
43	Copies of test certificates	IEC 61215,61730 part 1&2, IEC 61701	

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Guaranteed Technical Particular Data Sheet - 2
Inverter

Sl. No.	Particulars	Required	Offered
1	Manufacturer		
2	Model name/No.		
3	Number of units		
4	Nominal AC power		
5	Nominal AC voltage		
6	Nominal AC Current		
7	AC grid Frequency range	50Hz ± 0.5%	
8	AC voltage range		
9	Power Factor (+ and -)		
10	Total Harmonic Distortion	As per IEE-519 2014 less than 3%	
11	AC over / under voltage over / under frequency protection		
12	Max PV input power		
13	Maximum DC voltage	1000V	
14	MPPT voltage range		
15	Maximum DC current		
16	No. of DC input ports		
17	Maximum Efficiency	≥ 97%/ as per IEC61683	
18	DC voltage ripple	Less than 3%	
19	Ambient temperature range		
20	Humidity (non condensing)	95%, non condensing	
21	Degree of protection		
22	Dimensions approx. (HxWxD)		
23	Weight		
24	Protective functions	AC over/under voltage, AC over/under frequency, over-temperature, AC and DC over-current, DC over-voltage, short circuit, lightening, phase imbalance (in case of three phase output reverse polarity)	
25	Communication Interface	RS232/RS485. MPIProfiBus/Telephone Modem/WiFi	
26	User-display standard	LCD panel with membrane keypad	
27	Enclosure environment rating		

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28	Safety and EMC		

Guaranteed Technical Particular Data Sheet - 3 Battery Bank			
Sl.No	**Particulars**	**Required**	**To be specified**
1	Battery Type (Tubular Gel Type)		
2	Manufacturer		
3	Model name/No		
4	Number of units		
5	Voltage		
6	Ah Capacity		
7	Container		
8	Cover		
9	Terminals		
10	Electrolyte		
11	Self Discharge	<3% in a month	
12	Life expectancy		
13	Approval	Batteries shall have to be approved by ERTL or CPRI or SEC or MNRE approved test centers.	
14	Service Life	Minimum 5 Years	
15	Ah Efficiency		
16	Charge Efficiency	>90%	
17	Maximum Depth of Discharge(DOD)		

Annexure -11

Quality Certification Standards and Testing for Solar PV Systems/Power Plants	
Solar PV Modules/Panels	
IEC 61215	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IS 14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61646	Design Qualification and Type Approval for Thin-Film Terrestrial Photovoltaic (PV) Modules
IS 16077	Design Qualification and Type Approval for Thin-Film Terrestrial Photovoltaic (PV) Modules
IEC 62108	Design Qualification and Type Approval for Concentrator Photovoltaic (CPV) Modules and Assemblies
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61725	Analytical expression for Daily Solar Profiles
IEC 61853-1	Photovoltaic (PV) Module performance testing and energy rating Part-1: Irradiance and temperature performance measurements, and power rating
IS 16170 : Part 1	Photovoltaic (PV) Module performance testing and energy rating Part-1: Irradiance and temperature performance measurements, and energy rating
IEC 62716	Photovoltaic (PV) Modules - Ammonia (NH3) Corrosion Testing
IEC 60721-2-1	Classification of environmental conditions - Part 2-1 : Environmental conditions appearing in nature - Temperature and humidity

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IEC 61730-1	Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction
IEC 61730-2	Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing
IEC 62804 (Draft Specifications)	Photovoltaic (PV) Modules - Test methods for the detection of potential - induced degradation. IEC TS 62804-1 : Part 1 : Crystalline silicon
IEC 60904-2	Photovoltaic devices - Part 2 : Requirements for photovoltaic reference devices (STC Performance, 1-V)
IEC 60891	Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics (STC Performance)
NREL Report	Light - Induced Degradation (LID) of c-Si Solar Cells
IEC 60364-4-41	Low-voltage electrical installations - part 4-41 : Protection for safety protection against electric shock
IEC TS 62548	Photovoltaic (PV) Arrays - Design requirements
IEC 61829	Crystalline silicon photovoltaic (PV) array- on-site measurement of I-V characteristics
Solar PV String Inverters/INVERTERs	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems- Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems - part 2 : Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
IEC/IS 61683	Photovoltaic systems - Power conditioners : Procedure for measuring Efficiency (10%, 25%, 50%, 75% & 90-100% loading conditions)
IEC 62093	Balance-of-system components for photovoltaic systems - Design qualification natural environments for solar inverters (grid-connected)

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BS EN 50530	Overall efficiency of grid connected photovoltaic inverters: This European standard provides a procedure for the measurement of the accuracy of the maximum power point tracking (MPPT) of inverters, which are used in grid-connected photovoltaic systems. In that case the inverter energizes a low voltage grid of stable AC voltage and constant frequency. Both the static and dynamic MPPT efficiency is considered.
IEC 62116	Utility-interconnected photovoltaic inverters- Test procedure of Islanding prevention measures
UL 1741	Standard for Inverters, Converters, Controllers and interconnection system Equipment for use with Distributed Energy Resources
IEEE 1547	Standard for interconnecting Distributed Resources with Electric Power Systems
IEEE 1547.1	Standard for Conformance Test procedures for Equipment interconnecting Distributed Resources with Electric Power Systems
DIN V VDE V 0126-1-1/A1 VDE V 0126-1 1/A1	Automatic disconnection device between a generator and the public low-voltage grid
IEC 60255-27	Measuring relays and protection equipment - Part 27 : Product safety requirements
IEC 60068-2 (1,2,14,27,30 & 64)	Environmental Testing of PV System - Power Conditioners and Inverters (a) IEC 60068 -2-1: Environmental testing - part 2-1 : Tests - Test A : Cold (b). IEC 60068 -2-2: Environmental testing - part 2-2 : Tests - Test B : Dry heat (c) IEC 60068 -2-14: Environmental testing - part 2-14 : Tests - Test N : Change of temperature (d) IEC 60068 -2-27: Environmental testing - part 2-27 : Tests - Test Ea and guidance : shock (e) IEC 60068 -2-30: Environmental testing - part 2-30 : Tests - Test Db : Damp heat, cyclic (12h+12h cycle)

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	(f) IEC 60068 -2-64: Environmental testing - part 2-64 : Tests - Test Fh : Vibration, broadband random and guidance
IEC 61727	Photovoltaic (PV) systems – characteristics of the utility interface (Parallel operation)
CEA Guidelines/Regulations	Technical standards for connectivity of the distributed Generation Resources at Voltage - level of below 33kV
IEC 62103	Electronic equipment for use in power installations
BS EN 50438	Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks
IEC 61000 Series	Electromagnetic Interference (EMI), and Electromagnetic Compatibility (EMC) testing of PV inverters
IEC61850	Inverters with Reactive Power Control
IEC 62124	Photovoltaic (PV) Stand -alone systems- Design verification
Fuses	
IS/IEC 60947 (Part 1,2 &3) EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC) (a). Low-voltage switchgear and Control-gear, Part-1: General rules (b). Low-voltage switchgear and Control-gear, Part-2: Circuit Breakers (c). Low-voltage switchgear and Control-gear, Part-3: Switches, disconnectors, switch-disconnectors and fuse-combination units (d). EN. 50521: Connectors for photovoltaic systems - Sagety requirement

Surge Arrestors	
IEC 60364-5-53	DC surge protection device (SPD), class 2
IEC 60364-5-53	AC surge protection device (SPD), class 2
IEC 60364-5-53	Electrical installations of buildings-Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control
IS 15086-5	Surge Arresters, Part 5: Selection and Application Recommendations
Cables	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)	General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltage up to and including 1100V, and UV resistant for outdoor installation)
Earthing	
IS 3043-1986	Earthing shall be done in accordance with iS-3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm^2 copper, 10 mm^2 aluminum or 70mm^2 hot dip galvanized steel
IEC 60364-5-53	The SPDs earthing terminal shall be connected to earth through the above mentioned dedicated earthing system; The SPDs shall be of type 2 as per IEC 60364-5-53
IS 3043	Code of practice for earthing (ETD 20: Electrical Installation)

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IEC 62561 Series	IEC 62561-1 Lightning protection system components (LPSC)-Part 1: Requirements for connection components IEC 62561-2 Lightning protection system components (LPSC)-Part 2: Requirements for conductors and earth electrodes IEC 62561-7 Lightning protection system components (LPSC)-Part 2: Requirements for earthing enhancing compounds
Junction Boxes	
IEC 529	Junction boxes and solar panel terminal boxes shall be of the thermo plastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use
IE 62208, IP 54 as per IEC 529	General requirements for junction boxes, charge controllers
Energy Meter	
CEA Regulations	Installation and operation of Energy Meters Regulations 2006, and as amended in 2010 & 2014
IS 13779	AC Static watt-hour Meters Class 1 and 2 - specification
IS 14697	AC Static Transformer Operated Watt-hour and Var-hour Meters, Class 0.2 S and 0.5 S - specification
IS 15884	Alternating Current Direct connected static Prepayment Meters for Active Energy (Class 1 and 2) - Specification
IS 15959	Data exchange for electricity meter reading, tariff and load control-companion specification
IS 16444	AC Static direct connected watt-hour Smart Meter Class 1 and 2 specification (with Import & Export/Net energy measurements)
Systen Performance Monitoring	

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IS/IEC 61724	Guidelines for PV System Performance Monitoring-measurement, Data Exchange, and Analysis
Rooftop PV System/Power Plant inspection	
IEC 62446	Grid connected Solar pV Systems-Minimum requirements for system Documentation, Commissioinng Tests, and Inspection
IEC 61557-1	Electrical Safety in low voltage distribution systems up to 1000 V AC. and 1500 V d.c-Equipment for testing, measuring or monitoring of protective measures - Part 1: General requirements
IEC 60364-6	Low-voltage electrical installations - part 6: Verification
IEC 61829	Crystalline silicon photovoltaic (PV) array- on-site measurement of I-V characteristics
Battery/Electrical Storage	
IEC 61427-1	Secondary cells and batteries for renewable energy storage-General requirements and methods of test-Part 1: Photovoltaic off-grid application
IS 13369	Stationary lead acid bateries (with tubular positive plates) in monobloc containers

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