Chhattisgarh State Renewable Energy Development Agency (CREDA)

(Dept. of Energy, Govt. of Chhattisgarh)

Near Energy Education Park, Village Fundhar
VIP (Air Port Road) Raipur 492015 (C.G.) Ph.: 0771-7112473, 7112459
E-mail: contact.creda.gov.in, Website: www.creda.cgstate.gov.in

E.BID DOCUMENT No. 10371/CREDA/HOR/RE-III/SPVPP/2018 DT. 25-07-2018

FOR, DESIGN, SUPPLY, INSTALLATION & COMMISSIONING OF SOLAR PHOTOVOLTAIC POWER PLANTS WITH FIVE YEARS ON SITE WARRANTEE IN CHHATTISGARH STATE

Important Events and their schedule for this E.Bid are as follows-

S. No	Particulars	Date	Time	Place
1.	Pre – Bid Meeting	04-08-18	From 11:30 AM	At Bio Diesel Conference Hall, Near Energy Education Park, VIP Road, Raipur
2.	Submission of Bid Documents, Technical Bid	20-08-18	Till 01.00 PM	
3.	Submission of Price Bid through http://cspc.co.in	20-08-18	Till 01.00 PM	http://cspc.co.in Web Portal
4.	Examination of Bid Documents & Technical Bid	20-08-18	from 03.00 PM	At Bio Diesel Conference Hall, Near Energy Education Park, VIP Road, Raipur
5.	Opening of Price Bid	20-08-18	After Technical Bid or the next day	

Bid Document Cost- Rs 10,000/-

Document can also be downloaded from our website **: www.creda.cgstate.gov.in**
the cost of bid as mentioned in NIT, shall have to be deposited along with the bid documents.

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Ref. No. XXXX/CREDA/HOR/RE-III/SPVPP/2018 **Date XX-07-2018**

A. **NOTICE INVITING E.BID**

CREDA invites E.Bids from experienced System Integrators of CREDA registered in SPV Projects for 2018-19, for Standardisation of rates for design, supply, installation, commissioning of Solar Photovoltaic Power Plants with five years comprehensive onsite unconditional warrantee FOR site in Chhattisgarh state, as per following details:

S. No.	Item Description	Cost of Bid Document	EMD	Essentials*
1	Solar Photovoltaic Power Plants of various capacities	Rs 10,000/-	Rs 10.00 Lakh	**** for details pl. see eligibility conditions of the bid documents.***

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Note:-

1. Price Bid shall be submitted online only at http://www.cspc.co.in,* however technical bid will have to be submitted in hard copy at Bio Diesel Conference Hall, Near Energy Education Park, VIP Road, Raipur. Bidders are advised to follow the instructions provided for Registration and E Submission Process accordingly.
2. The bid forms, General Instructions to Bidders and other details including amendments / changed can be viewed/ downloaded from website creda.cgstate.gov.in
3. Bid notice is also available on CREDA website creda.cgstate.gov.in the link notice or http://www.cspc.co.in .
4. Bidders are requested to attend Pre Bid meeting with their suggestions/ objections/ reservations if any with details so as to avoid any confusion and to ensure clarity and transparency regarding the bid.

CREDA reserves all right to extend the deadline for submission of Bids or accept/reject any or all bid in full/part without assigning any reasons whatsoever.

(Rajiv Khare)
Chief Engineer

B CHECK LIST

To ensure that your bid submitted to CREDA is complete in all respects, please go through the following checklist & tick mark for the enclosures attached with your bid:

S.No.	Description	Attached / Not Attached	Page no. if attached
1	Proof of submission of Bid Fee & EMD		
2	Copy of valid registration certificate of system integrator in CREDA for FY 2018-19		
3	Balance Sheets of last three financial years showing positive net worth of min. 10 Lakh as on 31-03-2018 and overall annual turnover of 05 Crores in last three Financial Years in SPV Programme duly certified by a registered Chartered Accountant		
4	Engineering Document with technical details, drawings, Specifications & Valid Test Reports of components.		
5	List and Completion & Performance Certificates of SPV Off Grid Power Plants installed by the Bidder (issued by Govt/Govt UT /Govt Agency) as a proof of minimum experience		
6	The original document duly signed & sealed on each page, as a confirmation of acceptance of Terms & Conditions (T&C)		
7	Declaration of the supplier about any relatives working with CREDA		

(Sign & Seal of the Bidder)

Details of EMD & Bid Document Fee Attached

S.No.	Description
1	**Earnest Money Deposit** - Earnest Money Deposit of Rs. 10.00 Lakh /-, submitted in the form of Demand Draft/Banker's Cheque/ TDR/FDR/NEFT/RTGS/drawn on .....Bank, ...Branch, bearing DD/BC/TDR/FDR / NEFT/RTGS/..... dated.....is attached herewith.
2	**Bid Document Fee** - Bid Document Fee of Rs. 10,000/-, submitted in the form of Demand Draft/Banker's Cheque, drawn on ..... Bank, ...Branch, bearing DD/BC No..... dated ..... is attached herewith.

(Sign & Seal of the Bidder)

C. UNDERTAKING OF THE BIDDER

I/We have read carefully and examined the notice inviting bid, schedule, General Rules and terms and conditions of the contract, special conditions, Schedule of Rates and other documents and Rules referred to in the bid document for the supply.

I/We hereby bid my rates for the execution of the work for CREDA as specified within the time stipulated in the schedule in accordance with all aspects with the specifications, designs, drawings and instructions with such conditions so far as applicable.

I/We agree to keep the bid open for Ninety (90) days from the due date of submission thereof and not to make any modifications in its terms and conditions.

A sum of Rs 10 Lakh (Ten Lakh only) is hereby forwarded as earnest money in the form of Demand Draft/ Bankers Cheque /RTGS/NEFT/TDR/FDR payable to CREDA at Raipur (C.G.). If I/We, fail to commence or complete the work ordered in specified time I/We agree that the CREDA shall, without prejudice to any other right or remedy, be at liberty to forfeit the said Earnest Money absolutely. The said Earnest Money shall be retained by CREDA towards security deposit to execute all the works referred to in the bid documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be required by CREDA.

I/We hereby declare that I/We shall treat the bid documents, specifications and other records connected with the work as secret/confidential and shall not communicate information derived there- from to any person other than a person to whom I/We have authorized to communicate the same or use the information in any manner prejudicial to the safety of CREDA/Government.

I/We shall abide to all the laws and shall be responsible for making payments of all the taxes, duties, levies and other Govt. dues etc. to the appropriate Govt. departments.

We are registered in GST vide registration No._____. And our PAN No. under the Income Tax Act is _____

I/We shall be responsible for the payment of the respective taxes to the appropriate authorities and should I/we fail to do so, I/we hereby authorize CREDA to recover the taxes due from us and deposit the same with the appropriate authorities on their demand.

Dated:

Place:

Signature

Name of Bidder with seal

Witness

Signature:

Name:

Postal Address:

D. GENERAL INFORMATION ABOUT THE BID

S.No.	Particulars	Details
1	E.Bid No.	10371/CREDA/HOR/RE-3/SPVPP/E.Bid/2018 Date: 25-07-2018.
2	Particulars of the work	Design, supply, installation, commissioning of Solar Photovoltaic Power Plant Systems of various capacities with five years comprehensive onsite unconditional warrantee.
3	Time Period for completion of the work	Maximum 3 Months from the date of allocation of Work/ Date of completion of Work Order whichever is earlier.
4	Mode of submission of Bids	Technical Bid – Off Line Price Bid – E Bidding through **http://www.cspc.co.in** website (online)
5	Pre – Bid Meeting	**From 11.30 Hours Date 04-08-2018.**
6	Last date and time for submission of Technical Bid and Technical Documents (Offline) and Price Bid(Online)	**Till 13.00 Hours Date 20-08-2018.**
7	Period of validity of rates for acceptance	Three months from the date of opening.
8	Date and time of opening of Technical Bid	**From 15.00 hours Date 20-08-2018.**
9	Date and time of opening of Price Bid	**After Technical bid Date 20-08-2018 or on the next date.**
10	Place of opening Bid	At Bio Diesel Conference Hall, Near Energy Education Park, VIP Road, Raipur.

E. ELIGIBILITY CRITERIA

1. Bidder should be registered in CREDA as a System Integrator in SPV Programme for the financial year 2018-19 on the date of opening of this Bid.
2. Bidder should have following minimum direct experience of supply, installation and commissioning of SPV Off Grid Power Plants (with Battery Bank) under Govt. Scheme or Market Mode:-

S.No.	Cap. of SPV Power Plant	Essentials		
		SI Category	Min. Aggregate capacity (KW)	Single installed capacity (KW)
1	1-10 KW	'A'	25 KW	05 KW
2	11-50 KW	'B'	100 KW	10 KW
3	51-100 KW	'C'	250 KW	20 KW

Also, for SPV off Grid Power Plants with LTO/LFP Battery, Bidder should have installed minimum 50 KW of SPV off Grid System with Li-Battery. Certificate issued by Govt Department / Govt UT shall only be considered.

3. Bidder must have a minimum positive net worth of 10 Lakh as on 31-03-2018.
4. Bidders should have a Overall Annual Turnover of Rs. 5 crore in last three Financial Years in SPV Programme ending on 31st March of each FY i.e. FY 2015-16, FY 2016-17, FY 2017-18.
5. Bidder will have to submit audited copy of balance sheet certified by a registered chartered accountant as a proof for point no. 4 and 5.
6. Bidders whose performance is poor in operation & maintenance activities and whose percentage of non- functional/non- working systems is more than 5% will not be allowed to participate in tender. Also they will have to submit a performance certificate of the signed by authorized signatory of O&M section of CREDA for systems installed under Govt./ Market Mode. If the bidders have installed systems in any other states/UT, bidders have to submit performance Certificate issued by Govt Department / Govt UT in prescribed format shall only be considered.
7. Bidders may not be allowed to participate in the Bid who have not completed more than 25% of allocated works within stipulated/ extended time limit.
8. The Bidder should have valid GST registration certificate in the state. A copy of which should be enclosed
9. Bidders who are **Blacklisted/Debarred** by CREDA or any other Govt Agency/ Department / UT, **will not be** allowed to participate in this bid. System integrator whose registration has been suspended by CREDA due to bad performance or other reasons shall not be eligible to participate in price bid.
10. Bidders who have any litigation pending in any court with CREDA on the date of opening of the bid shall not be eligible for this bid.
11. Any information/data submitted/rendered by the applicant/bidder if found false/forged/wrong would entitle CREDA to reject/cancel the bid submitted by bidder.

F. INSTRUCTIONS TO BIDDERS

1. The Bidder is expected to examine all instructions, forms, terms and specifications as mentioned in the Bid document. Failure to furnish all information required by the Bid documents or submission of a bid not substantially responsive to the Bid Document in every respect will be at the Bidder's risk and is likely to result in out-right rejection of the Bid.

2. Bidder should have a valid system integrator registeration in CREDA in SPV Programme for FY 2018-19 at the time of opening the bid.

3. LOCAL CONDITIONS:

It shall be imperative on each bidder to fully inform him of all local conditions and factors, which may have any effect on the execution of the works covered under these documents and specifications. AGENCY shall not entertain any request for clarifications from the Bidder, regarding such local conditions.

4 CLARIFICATION OF BID DOCUMETS:

A. A prospective Bidder requiring any clarification of the Bid Documents may contact AGENCY in writing or by Fax at the AGENCY's mailing address indicated in the Invitation for Bid.

B. Verbal clarifications and information's given by the AGENCY or its employees or its Representatives shall not be in any way entertained.

5. AMENDMENT OF BID DOCUMENTS:

At any time prior to the submission of the bid or prior to the opening of the financial bid for any reason, whether at its own initiative or in response to a clarification requested by the Bidder, CREDA may, modify the Bid documents by amendments.

6. BIDDING PROCESS- For ease of accessing the e-bidding website and registration the following is to be done by bidder –

A. Visit http://cspc.co.in

B. Click on e-bidding button on right hand side of the page.

C. The user will be directed to e-bidding page where all information regarding registration is available along with helpline details.

D. The Bidder must submit attested copies of all legal documents pertaining to the constitution of their Concern as applicable, along with the Bid, to authenticate their identity, such as affidavit of Sole Proprietorship/Partnership Deed/ Registration Certificate/ Certificate of incorporation of the Company/Memorandum of Association of the Company and Power of Attorney authorising a person to represent the firm in all matters with respect to the Bid.

E. Price Bid shall be submitted online only at http://www.cspc.co.in however technical bid will have to be submitted in hard copy. Bid Documents including Technical Bid and other document must reach At Bio Diesel Conference Hall, Near Energy Education Park, VIP Road, Raipur latest by 01.00 PM on 20.08.2018. Bids submitted after scheduled time and date shall not be considered.

F. Technical Bid Documents should be submitted in prescribed manner in separate envelops duly super scribed and placed as follows- (A)Bid Fees and EMD , (B) Eligibility Documents as per point E(1) to E(11) mentioned above (C) Technical Bid and Complete bid document in original duly signed by authorized signatory on each & every page of the bid document.

G. The envelopes must be clearly marked as "(A)Bid Fees and EMD /(B) Eligibility Documents / (C) Technical Bid and Complete bid document in original /**of "BID DOCUMENT NO. 10371/CREDA/HOR/RE-3/SPVPP/2018, Date: 25-07-2018, DUE ON 20-08-18".**

7. The Specifications of SPV Power plants should be as specified in the bid.

8. Bidder shall have to submit details of GST & PAN registration numbers issued by the appropriate authority.

9. The documentary evidence for meeting the eligibility criteria must mandatorily be submitted along as per check list with bid in prescribed manner.

10. Each offered solar module should have RFID & I-V curve measured with a sun simulator of a SPV Module Manufacturer re-registered/approved by MNRE with record of suitable calibration reference, as per guidelines of MNRE.

11. Bidders must enclose the safety procedure & manual.

12. When Technical Bid Documents & Eligibility documents are delivered through messenger, it should be submitted at Bio Diesel Conference Hall, Near Energy Education Park, VIP Road, Raipur latest by 1.00 PM on 20.08.2018. Nobody is authorized to receive or grant receipt for bid delivered on behalf of CREDA.

13. Bidder should quote their rates considering variation of site conditions, variation in price of different components and keeping the quantum and quality of work in mind. If CREDA anticipates that rate is abnormally low or high, CREDA shall have liberty to amend the rates or reject the bid.

14. **VALIDITY:** Full descriptive particulars and complete specifications should accompany the offer. Offers should be kept open for acceptance for at least three months from the date of opening. After finalization of this bid the approved rates shall be valid till one year from the date of award; however CREDA shall have liberty to increase or decrease this validity if needed.

15. The terms, conditions and specifications mentioned in bid document shall be binding on the bidders and no condition or stipulation contrary to the conditions shall be acceptable. It may please be noted that the bidders who do not accept terms and conditions stipulated in this bid documents, their offers shall be liable to be rejected out-rightly without assigning any further reasons.

16. Each page of bid document & enclosures shall be signed by the bidder and seal affixed. All the pages of the documents issued must be submitted along with the offer. In case of any corrections/alterations in the bid, the bidder should attest the same; otherwise bids may not be considered.

17. CREDA reserves the right (i) to reject or accept any or all bids wholly or partly without assigning any reason on the grounds considered advantageous to CREDA, whether it is the lowest bid or not and (ii) to split the quantities against the bid on more than one firm for the same items/ work. No reason will be assigned by CREDA for this and will be binding on the bidders. The bidder who had quoted the lowest price shall be preferred for placing order. Due to large quantum of work & limitation of the time period for completion of the work CREDA shall take consent from more than one bidder if they agree to work on rates standardized by CREDA. CREDA may undergo agreement with those eligible bidders who give consent to work on rates standardized by CREDA and may place work orders to them. Rates approved through this bid may be standardized for all eligible bids to work in year 2018-19 and shall be valid till 31-03-2019. However CREDA reserves right to curtail or extend this period.

18. Offers through Telegraph/ Fax/Emails or open offers etc. received shall be summarily rejected.

19. All the bidders shall essentially indicate the break-up of prices as shown in Price Bid. In case any of the charges are not included in the quoted prices, the same shall be clearly shown as extra, indicating specifically the rate/scale of such charges. The lowest prices quoted shall be considered.

20. BID DOCUMENT FEE AND EARNEST MONEY:

Each bidder should submit Bid Document Fee and earnest money Rs 10.00 lakh for participating in bid in the form of Demand Draft/Bankers Cheque or RTGS/NEFT /TDR / FDR/as mentioned in the NIT of **BID DOCUMENT NO. 10371/CREDA/HOR/RE-3/ SPVPP/2018 Date 25-07-2018 DUE ON 20-08-2018",** in a separate envelope else they will summarily be rejected and returned. Bid Document Fee, EMD submitted in any other form e.g. Cash/Bank Guarantee etc shall not be accepted. [Exemption from EMD shall be given only to those SSI units of Chhattisgarh State who submit the competency certificate on which it should be clearly mentioned that, "the company/firm is registered in Chhattisgarh for manufacturing of that particular product"]. CREDA Competency Certificate for EMD will not be considered as EMD for this Rate Contract Bid.

21. FORFEITURE OF EARNEST MONEY DEPOSIT:

It should be clearly understood that in the event of bidder failing to enter into the agreement in the prescribed format on their quoted rates and also fails to execute assigned works within stipulations, if he is so communicated within the validity period of the offer, the full amount of earnest money shall be forfeited and bidder will be debarred from future business with CREDA. CREDA's decision in this respect will be final and binding on the bidder.

25 PRICE:

The prices quoted should be firm and F.O.R. destination excluding GST payable on the bill of supply and installation / services. GST as applicable on the date of billing shall be paid additionally as per applicable rate over the above quoted prices.

26 ENGINEERING DOCUMENT & TEST CERTIFICATE:

Bidders will have to submit Engineering Documents with technical details, drawings, Specifications of components and make etc to CREDA for approval, as and when asked by CREDA. Works may only be started out only after approval of the Engineering Document and their samples.

27. SAMPLES:

If Require CREDA may inspect the consignment before dispatch of the material at shall be delivered/ accepted as per the scope of work and specifications, as get it tested in accreted laboratory at its own cost.

28. TAX OBLIGATIONS:

TDS for Income Tax, GST, Civil Work etc shall be recovered under various acts and deposited with the appropriate authority. Eligible bidder will have to submit break up of costs and taxes before execution of agreement with CREDA so as to ensure tax deposition as per Govt Rules accordingly.

29. TECHNICAL CRITERIA

a) The eligible SI to whom work is likely to be awarded should have their own service unit cum office within Chhattisgarh state.

b) The Bidders should have sufficient technically qualified and well-experienced manpower for execution of the project and after sales service of the systems. These details may be called by CREDA and in case there is any deficiency found the SI may be debarred from the bid.

30. PREVENTION OF CONFLICT OF INTEREST:

a) All persons/groups/agencies/workers/Bidders including their blood relatives who are employed or have been assigned jobs/works with Chhattisgarh CREDA, Raipur are prohibited from biding for the work mentioned in this document, without prior approval of CEO, CREDA Chhattisgarh, Raipur.

b) Any violation of this clause will lead to the automatic rejection of the bid irrespective of the stage. If the violation of this clause is found out after the issuance of work order it will lead to the automatic cancellation of the work order from the date of detection. In such case the bid Security Amount/EMD will be forfeited by CREDA, Raipur.

31. MISCELLANEOUS:

a) The Selection Process shall be governed by and constructed in accordance with the laws of india and the courts at Raipur shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or in connection with the selection process.

b) All forms of canvassing, misrepresentation, or voluntage withholding or omission of facts for the above work will render the applicant ineligible for the biding process & CREDA, Raipur reserve the right to take action as per law.

c) CREDA, Raipur in its sole discretion and without incurring any obligation or liability, reserve the right, at any time to:

i. Suspend and/or cancel the Selection Process and/or amend and/or supplement the Selection Process or modify the dates or other terms and condition relating thereto; in case of cancellation or suspension of the process CREDA, Raipur will return the security/bid amount in 60 days.

ii. Consult with any bidder in order to receive clarification or further information;

iii. Independently verify, disqualify, reject and/or accept any and all submission or other information and/or evidence submitted by or on behalf of any Bidder.

iv. It shall be deemed that by submitted the proposal, the bidder agrees and releases CREDA , its employees, irrevocably, unconditionally, fully and finally from any and all liability for proven and adjudication claims, losses, damages, costs, expences or liabilities in any way related to or arising from the exercise of any rights and/or performance of any obligations hereunder.

v. The bidder, once applied, will not be allowed to withdraw at any stage. If the bidder wants to withdraw, the entire amount of EMD will be forfeited.

32. JURISDICTION OF THE COURT: Any dispute arising out of the contract shall be subject to the jurisdiction of court in Chhattisgarh.

G. GENERAL CONDITIONS OF CONTRACT

1. DEFINITIONS: In writing General Conditions of Contract, the specifications and bill of quantity, the following words shall have the meanings hereby indicated, unless there is something in the subject matter or content inconsistent with the subject.

CREDA shall mean the Chhattisgarh State Renewable Energy Development Agency represented through the CEO.

Work shall mean any work entrusted to the bidder as mentioned in the scope of work and sanction order.

The "Engineer in charge" shall mean the Engineer or Engineers authorized by CEO, CREDA for the purpose of this contract. Inspecting Authority shall mean any Engineering person or personnel authorized by CREDA to supervise and inspect the erection of the SPV Power plants System.

"The Eligible SI/ bidder" shall mean the bidder awarded with the contract or their successors and permitted assigns. Contract Price shall mean the sum named in or calculated in accordance with the provisions of the contract as the contract price. General Conditions shall mean the General conditions of Contract.

"Specifications" shall mean the specifications annexed to these General Conditions of contract and shall include the schedules and drawings attached thereto or issued to the eligible SI from time to time, as well as all samples and pattern, if any,

"Month" shall mean calendar month. "Writing" shall include any manuscript, typewritten, printed or other statement reproduced in any visible form whether under seal or written by hand.

2. CONTRACT DOCUMENT:

The term "Contract" shall mean and include the General conditions, specifications, schedules, drawings, work orders etc., issued against the contract schedule of price or their final general conditions, any special conditions applying to the particular contract specification and drawings and agreement to be entered into. Terms and conditions not herein defined shall have the same meaning as are assigned to them in the Indian contract Act or any other Act in vogue or by any person of common knowledge and prudence.

3. MANNER OF EXECUTION:

Execution of work shall be carried out in an approved manner as outlined in the technical specifications or where not outlined, in accordance with desired Specifications laid down by CREDA, to the reasonable satisfaction of the Engineer.

i) The eligible Contractor shall conduct a detailed survey of site and submit Site Clearance and necessary documents and survey details in concerned District Office of CREDA in prescribed manner.

ii) District / Regional Office CREDA shall examine these reports and after satisfaction forward these to concerned Superintending Engineer of Head office of CREDA for approval.

iii) The Contractor shall start work within 15 days after the date of issue of work Order. Work order will be given to the chosen System Integrator only after execution of the agreement with CREDA.

iv) All the materials required for the installation of SPV power plants System as per Work Order issued shall be kept at site in the custody of the SI. CREDA shall not be responsible for any loss or damage of any material during the installation.

v) All the electrical works should be done as per Indian electricity Act. The persons engaged for carrying out electrical works should have a valid license of required category accordingly.

vi) After installation and joint inspection will be done in presence of beneficiary, SI and CREDA and after successful commissioning of SPV power plants systemsand its approval from CREDA a JCC will be signed and the claim will be forwarded for payments as per guidelines and procedures of CREDA.

4. VARIATIONS, ADDITIONS & OMMISSIONS:

CREDA shall have the right to alter, amend, omit, split or otherwise vary the quantum of work, by notice in writing to the SI. The eligible SI shall carry out such variation in accordance with the rates specified in the contract so far as they may apply and where such rates are not available; those will be mutually agreed between CREDA and the eligible SI.

5. INSPECTION DURING ERECTION:

The Engineer in Charge or his authorized representative (s) shall be entitled at all reasonable times to inspect and supervise and test during installation and commissioning. Such inspection will not relieve the eligible SI from their obligations under this contract. Material can be inspected before dispatch by the authorized representatives of CREDA at the factory at the cost of the eligible SI, if desired by CREDA.

6. COMPLETION OF WORK:

Time being the essence of contract, the installation of the SPV power plants systems shall be completed within the time schedule prescribed in the Work order. Time limit will start from the date of site approval/approval of layout.

7. ELIGIBLE SIs DEFAULT LIABILITY:

CREDA may by written notice of default to the eligible SI, terminate the contract in circumstances detailed hereunder:

(a) If in the opinion of the CREDA, the eligible SI fails to complete the work within the time specified in the Work Order or within the period for which extension has been granted by CREDA to the eligible SI.

(b) If in the opinion of CREDA, the eligible SI fails to comply with any of the provisions of this contract.

(c) In the event of CREDA terminating the contract in whole or in part as provided in paragraph (a) above, CREDA reserves the right to engage another eligible SI or agency upon such terms and in such a manner as it may deem appropriate and the eligible SI shall be liable to CREDA for any additional costs or any losses caused to CREDA as may be required for the completion of erection of the SPV power plants systemsand or for penalty as defined under this bid document until such reasonable time as may be required for the final completion of the work.

(d) In the event CREDA does not terminate the contract as provided in paragraph (a) the eligible SI shall continue performance of the contract, in which case he shall be liable to CREDA for penalty for delay as set out in this bid document until the work is completed.

(e) The maximum liability of the bidder is limited to 100% of contract value.

8. FORCE MAJEURE:

The eligible SI shall not be liable for any penalty for delay or for failure to perform the contract for reasons of FORCE MAJEURE such as of God, acts of public, enemy, naxal problems, acts of government, cyclone, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes provided that the contract, shall within 10 (ten) days from the beginning of such delay notice the CREDA in writing of the cause of delay. CREDA shall verify the facts and grant such extension as facts justify. Delay in supply of any accessories of Solar Water Purification System etc by the related vendors, to whom the bidder has placed order, shall also not be treated as force majeure.

9. REJECTION OF WORKS:

In the event of any of the material supplied/ work done by the eligible SI is found defective in material or workman ship or otherwise not in conformity with the requirements of this contract specifications, CREDA shall either reject the material and/ or work and advise the eligible SI to rectify the same. The eligible SI on receipt of such notices shall rectify or replace the defective material and rectify the work, free of cost. If the eligible SI fails to do so, CREDA may,

i At its option replace or rectify such defective materials and/ or work and recover the extra cost so involved from the eligible SI plus fifteen percent service charges of the cost of such rectification, from the eligible SI and/ or terminate the contract for balance work/ supplies with enforcement of penalty as per contract

ii Defective materials/ workmanship will not be accepted under any conditions and shall be rejected outright without compensation. The eligible SI shall be liable for any loss/ damage sustained by CREDA due to defective work.

10. EXTENSION OF THE TIME:

If the completion of installation is delayed due to any reason beyond the control of the eligible SI, the eligible SI shall without delay give notice to the CREDA in writing of his claim for an extension of time. CREDA on receipt of such notice may agree to extend the contract/delivery date of the Solar System as may be reasonable but without prejudice to other terms and conditions of the contract.

11. MAKES OF EQUIPMENTS TO BE USED IN THE WORK:

The eligible SI has to ensure that equipments as per Technical Requirements of guidelines of CREDA as complied with. The eligible SI has also to ensure that he will use only components of approved vendors of CREDA. The material/works for which CREDA/MNRE or IEC/BIS/IS specification is not available, engineer-in-charge of the works will examine and approve the material/works, preferably of all makes on which CREDA has report of satisfactory performance. Test certificates for all major equipments should be submitted to the engineer-in-charge of the works before installation of the same. It is to be clarified that the bid does not limit participating bidder to use approved vendors at the time of bid itself. Any vendor (whose product is as per bid specifications /MNRE Norms) item can be used provided its vendor registration is completed with CREDA, which may also be done even at stage after award. The process of vendor registration is open throughout and normally does not take more than two weeks after an application is made. The vendor registration process can be seen on website also.

12. WARRANTEE PERIOD AND POST INSTALLATION SERVICES:

The work done/ material supplied by the eligible SI should be warranted for satisfactory operation and against any defect in material and workmanship including, Controllers and other balance of equipments, at least for a period of 5 (five) years, from the date of commissioning of the SPV power plants systems including other works as per scope of work. Warrantee on SPV Modules shall be for 10 (ten) years from the date of commissioning of the SPV power plants systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and not less than 80% at the end of 25 years. The above warrantee certificates shall be furnished to the CREDA for approval. Any defect noticed during this period should be rectified by the supplier free of cost upon written notice from CREDA provided such defects may be due to bad workmanship or bad materials used. The warrantee period shall be extended by the period during which the plant remains non-operative due to reasons within control of the eligible SIs. This warrantee must be an unconditional onsite warrantee and the eligible SI will have to replace the defective material within 7days positively from the date of information given to him. Care should necessarily be taken to make the SPV Water Purification operational, once the reporting of the fault/non operational status is done, within a week. If the SPV Water Purification is not made operational within 7 days CREDA may rectify the same at the cost of SI, and the warrantee period shall be extended for a month for the same. This warrantee must be an unconditional onsite warrantee and the eligible SI will have to replace the defective material within 7 days positively from the date of information given to him.

System Integrators shall have to establish their service stations in the state and shall have to keep sufficient quantity of spares and man power to ensure proper service network for taking care of smooth functioning of SPV power plants systems installed by them. SI shall have to give a toll free number to register complaints.

13. TERMS OF PAYMENT:

The following terms of payment shall apply for the bid: -

a) 95% of the cost as per the work order after satisfactory supply, installation, commissioning & performance test of the SPV power plants systemsat site with proper handing over.

b) Balance 05% of the cost of system as per the work order shall be retained by CREDA as Security Deposit for a period of 60 months. However the same may be released to SI on submission of TDR of equivalent amount duly pledged in favour of CREDA valid for a period of five years issued by a scheduled bank. Payment will be done after receipt of Beneficiary contribution to CREDA.

c) GST shall be paid extra as applicable on the date of billing.

14. PENALTY FOR DELAY IN COMPLETION OF CONTRACT:

If the eligible SI fails to complete the erection, testing and commissioning etc, within the phased time schedule specified in the work order or any extension granted there to, CREDA will recover from the eligible SI as penalty of one percent (1%) of the system/work price for each week of delay or part thereof. For this purpose, the date of taking over shall be reckoned as the date of completion. The total penalty shall not exceed 5% (five percent) of the Cost. The repeated fault may result in forfeiture of part or whole of money and even termination of the contract.

Penalty may be recovered from payments due or by invocation of performance security. CREDA may also debar the SI from future business for upto 3 years in case of non performance of work in time limit.

15. PERFORMANCE SECURITY:

The Performance Security shall be 5% of the eligible payments and shall be deposited in manner under clause no. 13. For the purpose of 13(b) the EMD may be considered to be converted into part of performance security. EMD shall be refunded only upon submission of at least equal amount towards Performance Security or else EMD shall be deemed to be converted into Performance Security.

16. INSURANCE: The eligible SI shall arrange insurance coverage for the materials and SPV power plants systemsat his/beneficiary's custody for the work under execution and successful commissioning and subsequent handover to the beneficiary. The eligible SI shall take up insurance or such other measures for the manpower so as to cover the claim for damage arising under workmen's compensation Act and other applicable State/ Central laws. CREDA shall not bear any responsibility on this account.

17. PENALTY DUE FROM THE ELIGIBLE SI:

All costs of damages for which the eligible SI is liable to the CREDA will be deducted from any money due to the eligible SI including the security deposit.

18. ELIGIBLE SI'S RESPONSIBILITY:

Notwithstanding anything mentioned in the specifications of subsequent approval or acceptance of the SPV power plants systemsby CREDA, if any, the ultimate responsibility for satisfactory performance of the entrusted work shall rest with the eligible SI. If in any case the eligible SI does not complete the work as per the Work orders issued to them then CREDA may take over the task & complete the project at the cost of eligible SI.

19. RESPONSIBILITY TO RECTIFY THE LOSS AND DAMAGE:

If any loss or damage occurs to the work or any part thereof or materials/ plant/ equipments for incorporation therein the period for which the eligible SI is responsible for the cause thereof or from any cause whatsoever, the eligible SI shall at his own cost rectify/ replace such loss or damage, so that the permanent work confirms in every respect with the provision of the contract to the satisfaction of the Engineer. The eligible SI shall also be liable for any loss or damage to the work/ equipments occasioned by him in course of any operation carried out to him during performing the contract.

20. RESPONSIBILITY TOWARDS THE WORKMAN OR OUT SIDERS:

The eligible SI shall have to take insurance coverage from any authorized Insurance Company against Workmen compensation due under Workmen Compensation Act and submit copy of the insurance document before issuance of Sanction order**.** The eligible SI shall ensure all safety measures during execution and repairs of the work. CREDA, will, in no case be responsible for any accident fatal or non-fatal, caused to any workman or outsider in course of transport or execution or repairs of work. All the expenditure including treatment or compensation will be entirely borne by the eligible SIs. The eligible SI shall also be responsible for any claims of the workers including PF, Gratuity, ESI & other legal obligations.

21. NON-ASSIGNMENTS:

The eligible SI shall not assign or transfer the work orders issued as per this contract or any part thereof without the prior approval of CREDA.

22. CERTIFICATES NOT TO AFFECT RIGHTS OF CREDA:

The issuance of any certificate by CREDA or any extension of time granted by CREDA shall not prejudice the rights of CREDA in terms of the contract nor shall they relieve the eligible SI of his obligations for due performance of the contract.

23. SETTLEMENT OF DISPUTES THROUGH ARBITRATION:

i. Except as otherwise specifically provided in the contract, all disputes concerning questions of fact arising under the contract shall be decided by the Chief Executive Officer (CEO), CREDA provided a written appeal by the eligible SI is made to CREDA. The decision of the CEO, CREDA shall be final and binding to the all concerns.

ii. Any dispute or difference including those considered as such by only of the parties arising out of or in connection with the contract shall be to the extent possible be settled amicably between the parties. If amicable settlement cannot be reached then all disputed issues shall be settled by arbitration.

24. LAWS GOVERNING CONTRACT:

The contract shall be constituted according to and subject to the Laws of India and jurisdiction of the courts in Chhattisgarh.

Compliance with Labour Regulations-During continuance of contract, the contractor shall abide at all times by all applicable existing labour enactment and rules made there under, regulations, notifications and bye laws of state and central Govt or local authority that may be passed/issued or may be issued.

25. LANGUAGE AND MEASURES:

All documents pertaining to the Contract including specifications, schedules, notice correspondences, operating and maintenance instructions, drawings or any other writings shall be written in English / Hindi language. The metric system of measurement shall be used in this contract.

26. CORRESPONDENCE:

i. Any notice to the eligible SI under the terms of the contract shall be served by registered mail to the registered office of the eligible SI or by hand to the authorized local representative of the eligible SI and copy by post to the eligible SI's principal place of business.

ii. Any notice to CREDA shall be served to the CEO, CREDA, Raipur in the same manner.

27. SECRECY:

The eligible SI shall treat the details of the specifications and other documents as private and confidential and they shall not be reproduced without written authorization from CREDA.

28. CREDA reserves all right to change/ amend any condition of the Bid or accept/reject any or all bids in full/part without assigning any reasons whatsoever.

29. CREDA reserves all rights to increase or decrease quantum of works to be allocated to bidders if required without assigning any reason.

30. In case of non-compliance of any terms and conditions by bidder, CREDA, may discontinue the contract if required and may forfeit the EMD.

31. CREDA reserves the right to cancel the work allotted to the bidder if the bidder fails to complete the work within stipulated/ extended time limit as mentioned in the Work Order. Subsequently CREDA shall also have right to reallocate the work fully or partly to any other eligible bidder for completion of the work. CREDA shall also have right to forfeit payment of uncompleted work of the bidder if require.

32. AGREEMENT:

The successful eligible SI shall have to enter into an agreement with the officer assigned by CEO, CREDA in the approved contract agreement form within 07 days of the receipt of call from CREDA.

H. PROCEDURE FOR FINALIZATION OF BID

1. BID EVALUATION CRITERIA

(i) Offer of only those parties who are found qualifying based on eligibility Criteria will be taken into further consideration and prices of only those parties qualifying based of these criterion will be opened.

(ii) EVALUTION OF PRICE BID

Effective price= L1 of individual item shall be termed as effective price.

Grading of Bidder= L1, L2, L3……..Ln shall be decided on the basis of sum of price quoted for individual item.

(iii) The Grading of Bidder as calculated above shall be used for determination L1, L2 and so on for work allocation alone.

(iv) Other things being equal, the lowest rates shall normally be preferred, but CREDA shall have rights and liberty to amend/lower the rates and negotiate with L1.

(v) Conditional bids shall not be accepted.

(vi) However CREDA shall have rights and liberty to call any /other parties to work on approved rates as and when requires in accordance with quantum of work and scheduled time limits for completion of targets.

I. ALLOCATION OF TARGETS AND AREA OF WORK

(i) Initially all the eligible SI will awarded with equal nos. of work. However further allocations shall be made on the basis of their speed of work, quality and performance subsequently.

(ii) CREDA reserve rights to increase or decrease quantities to be allocated to eligible contractors .

We (on behalf of Eligible SI/ bidder) have read all the above stated details & accept to comply with it in total.

(Name, Signature & Seal of the bidder)

J. SCOPE OF WORK

1. The scope of work shall also includes the followings:

- Survey of Sites, Submission of site clearance certificate where the SPV Power Plants are to be mounted. A layout plan of the site should also be submitted clearly indicating the identified location for installation of SPV Modules, Structures and other components shall be installed. Work order shall be issued only after receipt of satisfactory reports suitable for system installation. SI shall furnish all necessary information to beneficiary for SPV Power Plants Warrantee, Do & Don'ts etc. so as to avoid further misunderstandings and disputes.

- Detailed planning of time bound smooth execution of project.

- Survey of Sites, designing, supply, installation & commissioning of SPV Power Plant as per design and specifications approved by CREDA, on turnkey basis.

  Note- Bidder shall have to take approval of the engineering documents, Bill of Materials and samples from CREDA prior to commencement of the work. Five years unconditional onsite warrantee for manufacturing defects shall be required for each of the system after successful commissioning and proper handing over.

- Providing User Manuals and Warrantee Cards to beneficiary / CREDA.

- SI shall have to submit JCCs within 15 days of Installation and Commissioning of SPV Power Plants in District Office of CREDA.

- Unconditional onsite warrantee for manufacturing defects for Five years faultless operation, assure inventory for maintenance.

- Providing Prompt Service Facilities to customers/ beneficiaries.

- Risk liability of all personnel associated with implementation and realization of the project.

- Training of at least two persons nominated by user, on the various aspects of design and maintenance of the offered system after commissioning of the system.

- The eligible SI shall maintain sufficient inventory of the spares to ensure that the system can be made functional within 7 days from the communication of breakdown of the system during currency of the warrantee period.

  The contractor shall run the system on trial basis and shall closely monitor the performance of the system before handing over the system, so that the assured annual power generation can be estimated for monitoring of the performance of the system. CREDA shall examine the data of generation and ascertain if the generation is adequate with reference to the capacity of the SPV Systems.

- Performance Guarantee Test: Successful performance guarantee test to demonstrate the rated capacity of SPV Power Plants as per CREDA's norms shall have to be conducted by SI in presence of representatives of CREDA, if required.

K. TECHNICAL SPECIFICATIONS

SPECIFICATIONS OF SPV POWER PLANT

1. SPV MODULES

1.1 Type and Quality

The total Solar PV array capacity shall be as specified in price schedule and shall be assembled with minimum 250Wp for LMLA Battery & 300 Wp for LFP/LTO Battery (with minimum nominal voltage of 24 V) Multi/Mono Crystalline/MNRE approved solar modules with 72 full cells (no cut cells allowed) with minimum 15% Module Efficiency. The modules should be tested and certified by a Govt. of India authorized test centers or should conform to relevant IEC standard as per MNRE guidelines. Offered module shall have a power discharge warranty of 90% of the rated power for 10 years. The rated discharge power and Efficiency of any supplied module shall not be less than the specified power rating and Efficiency of the modules, in any case. Every module should have suitable by-pass diode at its terminal box. The SPV Modules must be installed in such a way so as to deliver proper voltage and current to ensure desired power discharge as per specifications of CREDA for the size of SPVPP ordered. Modules with Cut Cells shall be permitted.

1.2 The modules used shall have following specifications:

Type	:	Mono crystalline/ Multi crystalline/ MNRE approved Solar Modules
Specification and standard	:	Confirming to Prevailing MNRE guidelines

1.3 The PV modules must conform to the latest edition of any of the following IEC/ equivalent BIS Standards for PV module design qualification and type approval:
Crystalline Silicon Terrestrial PV Modules: IEC 61215 / IS14286

1.4 **IDENTIFICATION AND TRACEABILITY –**

Each PV module must use a RFidentification tag (RFID), which must contain the following information:

(i) Name of the manufacturer of PV Module
(ii) Name of the Manufacturer of Solar cells
(iii) Month and year of the manufacture (separately for solar cell and module)
(iv) Country of origin (separately for solar cells and module)
(v) I-V curve for the module
(vi) Peak Wattage, Im, Vm and FF for the module
(vii) Unique Serial No and Model No of the module
(viii) Date and year of obtaining IEC PV modulequalification certificate
(ix) Name of the test lab issuing IEC certificate
(x) Other relevant information on traceability of solar cells and module as per ISO 9000 series.

The RFID must be inside of module lamination. The module laminate, but must be able to withstand harsh environmental conditions.

1.5 The panel should be supplied with CREDA Logo in the form of sticker on the back of SPV panel or duly laminated inside the glass of solar module with the remark "Manufactured for CREDA". Inter connections of solar modules should be through good quality male female joint. Name of manufacturer, S.No. of Module & manufacturing year should be clearly fixed inside the glass lamination of every module. Back label should be affixed behind every module which should clearly state the specifications & capacity of the module.

1.6 The size of Module Frame and the thickness of Glass, Back Sheet and EVA Sheet must be of the maximum size with only positive tolerance of applicable IEC standards. Modules should be of indigenous make and the efficiency of SPV Modules must be above 15 %.

The total capacity of the Solar Photovoltaic Array mentioned in the Rate Sheets is the minimum capacity in wattage of the total SPV modules to be installed in the SPV Power Plant.

1.7 PID Test- SPV Modules must pass PID (Potential Induced Degradation) Test as per norms of MNRE.

The total capacity of the Solar Photovoltaic Power Plants mentioned in the Rate Sheets is the minimum capacity in wattage of the total SPV modules to be installed in the Power Plant with reference to the Voltage at which the SPV Power Plant is designed. Capacities mentioned are the minimum name plate value of the SPV Power Plant.

2. <u>Mechanical Components: MODULE MOUNTING STRUCTURE (MMS):</u>

2.1 Bidder should submit the drawing of the MMS which they shall supply. MMS should be installed along with the hot dipped galvanized (minimum 80 microns) array support structure for mounting of SPV modules at site. The minimum weight of MMS should be around 80 Kgs per KW. The panel frame structure should be capable of withstanding a minimum wind load of 150 Km per hour, after grouting and installation. The drawings of MMS and its foundation must be certified by a qualified structural engineer with certification that it can withstand a wind speed of 150 KMPH. MMS should be sturdy & designed to assist SPV Modules to render maximum output. The hardware (fasteners) used for installation of SPV Modules & MMS should be of suitable Stainless Steel (SS 304). Prior approval of drawing & specification of module mounting structures is required to be taken from CREDA. If bidder submits any design of MMS along with the bid document it may not be considered as approved design but may be considered as sample. This shall not be considered as base for evaluation of bid. Each MMS should be with four legs grouted on pedestals of minimum 500x500x500 mm. Foundation bolts of stainless /GI steel should be at least 300 mm long.

Module Mounting Structures should have theft proof arrangements preferably with the use of Hot Dipped Galvanized C-channel along with the array support structure for locking arrangement of SPV modules for protecting them from theft. Its size should be with reference to the specifications of their own make SPV modules such that modules can comfortably slide in the channel while installation. It should not hide any portion of the photovoltaic circuit encapsulated in the lamination of the SPV module, there by unaffecting the efficiency & rating of the SPV modules. Anti Theft Nut Bolts of SS (with washers) should also be used for better theft proofing along with "C" Channel MMS. Contractors shall have to get a prior approval from CREDA regarding finalization of MMS as per site conditions, before start of work.

3. <u>Foundation</u>: The PCC foundation shall have to be designed on the basis of the weight of the structure with module and minimum wind speed of the site, i.e. 150 Km/hour. Each MMS should be with four legs grouted on pedestals of proper size.

4. **Junction Boxes for Cables from Solar Array:** The junction boxes shall be made up of FRP (Hansel or equivalent make)/PP/ABS (with prior approval of CREDA) with dust, water and vermin proof. It should be provided with proper locking arrangements.

   (a) Series / Array Junction Box (SJB/AJB): All the arrays of the modules shall be connected to MJB/DCDB through AJB. AJB shall have terminals of bus-bar arrangement of appropriate size Junction boxes shall have suitable cable entry with suitable glanding arrangement for both input and output cables. Suitable markings on the bus bars shall have to be provided to identify the bus bars etc. **suitable ferrules shall also have to be provided to identify interconnections. Every AJB should have suitable arrangement Reverse Blocking diode (Schottky diode of suitable rating with respect to the capacity of array)) connected in such a manner that the diode is mounted on a proper heat sink so as to increase the life of diode. Suitable MOV/SPD has to be installed in AJB for protection purpose**. If, in any case Schottky diode & MOV/SPD are installed in the PCU, then also it should be installed in AJB. Each AJB should preferably not have more than four array inputs. Cable interconnection arrangement shall be within conduit pipe on saddles installed properly as per CREDA's instructions**. Cable connection should be done in such a manner that fault findings if any, can be identified easily. The cables should be connected in such a manner that clamp meter can be comfortably inserted around the individual cables to measure the data like current, voltage etc.** AJB should also be marked as A1, A2, & so on. Wherever conduits are laid on roof or ground, then it should be installed on cable tray or appropriate civil structure which should be at least four inches above roof / ground level.

   (b) Main Junction Box (MJB) (where ever required): In MJB the terminals shall be of copper bus-bar arrangement of appropriate size Junction boxes shall have suitable cable entry with suitable glanding arrangement for both input and output cables. Suitable markings on the bus bars shall have to be provided to identify the bus bars etc. **suitable ferrules shall also have to be provided to identify interconnections.** Cable interconnection arrangement shall be such that the faulty array, if any, could be identified easily. MJB shall be installed at suitable place near Array. **Inter connections from AJBs to MJB should be clearly marked, for example -"from A1" & so on. Appropriate crimping tools should be used for crimping of lugs/ connectors to the cables.**

5. POWER CONDITIONING UNIT (PCU):

5.1 Main Features of the PCU:

PCU should be a combined unit comprising of inverter, charge controller, visual display and necessary protections of an approved make registered with CREDA.

- It should be Industrial grade bi-directional Inverter
- It should have Integrated PV Charger Controller.
- It should be rated for continuous operation at full load.
- It should have Programmable battery management parameters.
- It should have Temperature compensated battery charging.
- It should have solar priority grid charging.
- It should Automatic re-start after over load triggered shutdown.
- It should have Continuous battery life and state of health monitoring.
- It should have Integrated data and fault logging
- It should have Communication with external SCADA/network/PC

- It should have facilities like Remote diagnostics, monitoring and reporting via Internet and GSM.
- The PCU should be equipped with a data logger for collecting & recording the hourly data of grid status particular voltage & frequency.
- PCU should have provision for PCU by-pass arrangement so as to cater load directly through grid, in case of PCU failure.
- There should be emergency stop switch on the front panel of PCU .

5.2 PCU Specification LTO Battery:

Switching elements	MOSFET
Type of Charger	MPPT with Constant Current charging (CC) up to Float voltage and there after Constant Voltage (CV) with reduced current till current reduced to 0.02C
Nominal Inverter Capacity	01 to 10 kVA
Nominal Array Capacity	01 to 10 kVA
MPPT Range	AS APPLICABLE
Battery nom. Volt	25.6V, 48V, 96V, 121.6V
Inverter Surge Rating @ 40 deg C	105 % > 60 sec
	150 % > 30 sec
	200 % > 5 sec
Inverter Output Voltage (From no load to full load at nominal battery voltage input)	230V +/- 5% for single phase
Inverter Output Frequency	50 +/- 0.5 Hz
Grid Voltage	230 V +/- 5%
Grid Frequency	50 Hz (Range 48 to 51 Hz)
Inverter THD	<3%
DC Ripple	<3%
Dielectric strength	1.1 KV between input/output and ground with EMI protections removed.
Inverter Efficiency @ 40 deg C, nominal battery voltage	>90%
Operating Ambient Temperature	0 to 50 deg C
Humidity	95% max. Non condensing
Enclosure	Free standing, IP 21 , Epoxy powder coated
Cooling	Temperature controlled fan forced
Protections	1. Short Circuit 2.Overload 3. Over Temperature 4.Over Voltage 5. Lightning 6. Phase imbalance (in case of three phase output) 7. Reverse polarity

Operation

The MPPT Charger should be a DC-DC converter which should power the DC bus from the PV array, as per following:

Two Stage MPPT charger*(for battery bank): These* solar chargers are two stages type. The full available PV current (CC) is pushed into battery/DC bus until the battery voltage reaches to a predefine charge /float Voltage there after Constant Voltage (CV) with reduced current till current reduced to 0.02C. All these voltage are settable according the type of battery. Efficiency of the charger should be > 94%.

Suggestive voltage settings for Lithium Ion (LTO) battery along with BMS.

Nominal Voltage = 2.3 V/cell
Recommended charge Voltage = 2.7 V/cell

The microprocessor control circuit should automatically adjusts the DC-DC converter to ensure that it should always match to the PV array under varying conditions and transfers the maximum possible power. The battery bank should get charged from this DC bus, the charging rate and other parameters being controlled by the supervisory circuit.

A bidirectional inverter should sit between the DC and the AC bus. The DC power should be converted to AC. The PCU should have the provision for connecting to a dedicated load. If the grid is absent or goes out of range the inverter should not interrupt supply. If PV power is available it should be directed to the load and the excess power shall be used for charging the batteries. So the power from the Solar is not wasted. The Inverter should be programmed for solar priority mode of operation. This means that the maximum use be made of the solar energy. Grid power should be used only when the batteries are over discharged or sufficient solar energy is not available from the PV array. If disengaged from the grid battery should keep supplying the power to the dedicated load, ensuring uninterrupted supply. The PCU should have following feature:

- If the load connected to PCU is more than the solar power being generated at any instance, during sunny hours then the load should first consume maximum solar power & balance power required by the connected load should be drawn from the grid power.
- There should be emergency stop switch on front panel.
- There should be provision of bypass arrangement available in PCU. Bypass means that power supply from the grid to the connected load can be bypassed from the PCU, in case PCU goes out of order.

5.3 **PCU Specification for LPF battery:**

Switching elements	MOSFET
Type of Charger	MPPT with Constant Current charging (CC) up to Float voltage and there after Constant Voltage (CV) with reduced current till current reduced to 0.02C
Nominal Inverter Capacity	01 to 10 kVA

Nominal Array Capacity	01 to 10 kVA
MPPT Range	AS APPLICABLE
Battery nom. Volt	25.6V, 48V, 96V, 121.6V
Inverter Surge Rating @ 40 deg C	105 % > 60 sec
	150 % > 30 sec
	200 % > 5 sec
Inverter Output Voltage	230V +/- 2% for single phase
Inverter Output Frequency	50 +/- 0.5 Hz
Grid Voltage	230 V +/- 5%
Grid Frequency	50 Hz (Range 48 to 51 Hz)
Inverter THD	<3%
DC Ripple	<3%
Dielectric strength	1.1 KV between input/output and ground with EMI protections removed.
Inverter Efficiency @ 40 deg C, nominal load	>90%
Operating Ambient Temperature	0 to 50 deg C
Humidity	95% max. Non condensing
Enclosure	Free standing, IP 21 , Epoxy powder coated
Cooling	Temperature controlled fan forced
Protections	1. Short Circuit 2.Overload 3. Over Temperature 4.Over Voltage 5. Lightning 6. Phase imbalance (in case of three phase output) 7. Reverse polarity

Operation

The MPPT Charger should be a DC-DC converter which should power the DC bus from the PV array, as per following:

Two Stage Linear Type Zero Drop MPPT charger*(for battery bank ≤24V): These* solar chargers are two stages type. The full available PV current (CC) is pushed into battery/DC bus until the battery voltage reaches to a predefine charge /float Voltage there after Constant Voltage (CV) with reduced current till current reduced to 0.02C. All these voltage are settable according the type of battery. Efficiency of the charger should be > 98%.

Suggestive voltage settings for Lithium Ion (LFP) battery

Recommended charge Voltage = 3.6 V/cell

The microprocessor control circuit should automatically adjusts the DC-DC converter to ensure that it should always match to the PV array under varying conditions and transfers the maximum possible power. The battery bank should get charged from this DC bus, the charging rate and other parameters being controlled by the supervisory circuit.

A bidirectional inverter should sit between the DC and the AC bus. The DC power should be converted to AC. The PCU should have the provision for connecting to a dedicated load. If the grid is absent or goes out of range the inverter should not interrupt supply. If PV power is available it should be directed to the load and the excess power shall be used for charging the batteries. So the power from the Solar is not wasted. The Inverter should be programmed for solar priority mode of operation. This means that the maximum use be made of the solar energy. Grid power should be used only when the batteries are over discharged or sufficient solar energy is not available from the PV array. If disengaged from the grid battery should keep supplying the power to the dedicated load, ensuring uninterrupted supply. The PCU should have following feature:

- If the load connected to PCU is more than the solar power being generated at any instance, during sunny hours then the load should first consume maximum solar power & balance power required by the connected load should be drawn from the grid power.
- There should be emergency stop switch on front panel.
- There should be provision of bypass arrangement available in PCU. Bypass means that power supply from the grid to the connected load can be bypassed from the PCU, in case PCU goes out of order.

5.4 PCU Specification for LMLA Battery:

Switching elements	IGBT (for > 96V)/MOSFET(for ≤ 96V)
Type of Charger	Two stage MPPT (for battery bank >96V) / Two stage PWM (for battery bank ≤ 96V), with settable bulk & float level of battery bank in both the cases.
Nominal Inverter Capacity	01 to 100 KVA
Nominal Array Capacity	01 to 100KVA
MPPT Range	AS APPLICABLE
Battery nom. Volt	24V to 240V

Inverter Surge Rating @ 40 deg C	105 % > 60 sec
	150 % > 30 sec
	200 % > 5 sec
Inverter Output Voltage	230V +/- 2% for single phase / 415V+/- 2% for three phase
Inverter Output Frequency	50 +/- 0.5 Hz
Grid Voltage	230 V +/- 5%
Grid Frequency	50 Hz (Range 48 to 51 Hz)
Inverter THD	<3%
DC Ripple	<3%
Dielectric strength	1.1 KV between input/output and ground with EMI protections removed.
Inverter Efficiency @ 40 deg C, nominal load	>90%
Operating Ambient Temperature	0 to 50 deg C
Humidity	95% max. Non condensing
Enclosure	Free standing, IP 21 , Epoxy powder coated
Cooling	Temperature controlled fan forced
Protections	1. Short Circuit 2.Overload 3. Over Temperature 4.Over Voltage 5. Lightning 6. Phase imbalance (in case of three phase output) 7. Reverse polarity

Operation

The MPPT Charger should be a DC-DC converter which should power the DC bus from the PV array, as per following:

Two Stage Linear Type Zero Drop PWM charger *(for battery bank ≤ 96V): These* solar chargers are two stages type. The full available PV current is pushed into battery/DC bus until the battery voltage reaches to a predefine Bulk voltage level (V1). After that a low frequency PWM charging is activated to charge the battery and remains in this stage until battery voltage comes below to another predefined Float voltage level (V2). All these voltage are settable according the type of battery. Efficiency of the charger should be > 98%.

MPPT Type (for battery bank >96V): Two stage MPPT Charger with settable bulk & float level. The charge should have efficiency >98%.

Suggestive voltage settings for tubular platted lead acid battery:

Bulk Voltage = 2.42V/cell
Float Voltage = 2.35V/cell

The microprocessor control circuit should automatically adjusts the DC-DC converter to ensure that it should always match to the PV array under varying conditions and transfers the maximum possible power. The battery bank should get charged from this DC bus, the charging rate and other parameters being controlled by the supervisory circuit.

A bidirectional inverter should sit between the DC and the AC bus. The DC power should be converted to AC. The PCU should have the provision for connecting to a dedicated load. If the grid is absent or goes out of range the inverter should not interrupt supply. If PV power is available it should be directed to the load and the excess power shall be used for charging the batteries. So the power from the Solar is not wasted. The Inverter should be programmed for solar priority mode of operation. This means that the maximum use be made of the solar energy. Grid power should be used only when the batteries are over discharged or sufficient solar energy is not available from the PV array. If disengaged from the grid battery should keep supplying the power to the dedicated load, ensuring uninterrupted supply. The PCU should have following feature:

- If the load connected to PCU is more than the solar power being generated at any instance, during sunny hours then the load should first consume maximum solar power & balance power required by the connected load should be drawn from the grid power.
- There should be emergency stop switch on front panel.
- There should be provision of bypass arrangement available in PCU. Bypass means that power supply from the grid to the connected load can be bypassed from the PCU, in case PCU goes out of order.

5.5 PROTECTION & SAFETY:

Specifically the inverter should be a single/three phase static solid state type power conditioning unit. Both AC & DC lines shall have suitable MCB/MCCB of same type (i.e. AC or DC) and contactors to allow safe start up and shut down of the system. PCU should have protections for overload, surge current, high Temperature, over/ under voltage and over/ under frequency & reverse polarity. The complete operation process & safety instructions should printed on the sticker & suitably pasted on the PCU.

The inverter shall have provision for input & output isolation (automatic & manual). Separate price should be quoted for Spare Control Cards (for inverter as well as solar charge controller) & other necessary parts as recommended by the manufacturer which can be purchased for any immediate requirement. Each solid-state electronic device shall have to be protected to ensure long life of the inverter as well as smooth functioning of the inverter. Inverter should have safety measures to protect inverter from reverse short circuit current due to lightening or line faults of distribution network.

PCU & Batteries should be suitably placed in control room on a suitable wooden or concrete platform (on rubber mat) with complete safety measure as per norms.

6. Battery Bank & Technical Specifications

6.1 For LTO Battery:

3.2V LTO Cells in series parallel combination for SPV Power Plant along with arrangement for inter connection for battery packs in parallel connection, deep discharge type, maintenance free, environmental friendly.

Supply of Various voltage range 25.3V/48.3V/96.6V/119.6V LTO battery as per detailed Technical Specifications with state of the art BMS and plug & play battery for easy replacement and maintenance anywhere in the state of Chhattisgarh.

BATTERY BANK Capacity -150Ah, 200Ah, 250Ah and 300Ah. (Minimum capacity of individual cell shall be 50Ah).

The battery bank capacity shall be of **25.3V/150Ah, 48.3V/200Ah, 48.3V/250Ah, 96.6V /200Ah, 119.6V/250Ah, 119.6V/350Ah** as specified in the price schedule, LTO type. The general specifications shall be as under:

a) The battery bank shall consist of required number of deep-discharge LTO cells, suitably interconnected in series as required. Parallel connections of LTO cells with in the battery pack may be discouraged. Paralleling of battery at pack/module level is allowed to reach higher capacity.However series connection of battery pack will not be accepted.

b) The cells shall be capable of deep discharge and frequent cycling with long maintenance intervals and high charge discharge efficiency.

c) The nominal voltage is 25.3V/48.3V/96.6V/119.6V and capacity of the storage bank shall be selected and specified by the supplier in the bid.

d) The self-discharge rate of the battery bank or individual cell shall not exceed four (2) percent per month.

e) The permitted maximum depth of discharge (DOD) shall be specified by the supplier in the bid.

f) Unless otherwise specified the cycle life of the battery shall not be less than 10000 Charge discharge cycles between the fully charged state and the permitted maximum DOD which is 100%. It should be able to deliver 80% of its rated capacity from fully charged position to DOD.

g) The cells shall include explosion proof safety events.

h) Weight of the battery shall not exceed for maximum 2 people lifting

i) The cells shall include the required number or corrosion resistant inter-cell required chemicals electrolyte packed in separate containers. Full instructions and technical details shall be provided for electrolyte filling and battery recharging at site for the first time.

j) The battery pack shall be designed such a way that it is easy to handle (plug and play), compact front termination access, minimum installation time and easy to maintain. The outer shell material shall be CRCA with powder coated (harmonized colour with complete solution). IP category will be IP31.

k) All technical and other details pertaining to the Battery packs shall be supplied including but not limited to the following: -

Rated voltage and ampere hour capacity of each Battery Pack has the rated discharge rate.

1. Rated Voltage
2. Ah and Whcapcity of each Pack
3. Recommended Charge and Discharge rate
4. Environment conditions
5. Recommended Inverter Charge Voltage range of each type
6. Permitted maximum DOD.
7. Cycle life of the LTO cell and the anticipated life (in years) of the battery Pack.
8. Total number of storage cells in use.
9. Details on Pack interconnections, if any.

10. Self discharge per month <2% @ 25^{0}C.
11. Charge efficiency ~98% @ 0.2C
12. Discharge Efficiency >96% @ 0.5C
13. Supplied in 50% SOC (approx.).
14. Insulated terminal connectors, fasteners, supplied.
15. Rugged construction & Long Cycle life.
16. Operating temperature & Humidity
    a. Charging -10 to 50°C
    b. Discharging -10 to 60°C
    c. 0 to 95%RH non-condensing
17. Storage Temperature
    a. 0 to 45°C
    b. Charge once in 3 months if not in operation
18. Battery Grounding connection Facility
19. BMS with individual cell monitoring with following operations
    a. SOC and SOH Estimation
    b. Cumulative kWh and Ah
    c. Cycle Count
    d. Flexible Parameter Setting
    e. Cell Balancing
    f. Designed for 1C Charge and Discharge
    g. Low Power Consumption
    h. Battery pack address switch for paralleling the packs to reach higher capacity
20. Battery Protections
    a. Under Voltage / Deep Discharge protection and alarm
    b. Over Voltage/Over Charge protection and alarm
    c. High temperature protection and alarm
    d. Short circuit protection
    e. Reverse Polarity Protection
21. Optional Features in BMS
    a. BMS with MODBUS communication with Inverter for Control and monitor
    b. Local RS232 port for local battery monitoring
    c. Dry Contact Signal min 3 (PFC contacts)
    d. Alarm Indicator
    e. Capacity Indication
    f. Datalogging facility in BMS: min 6 months storage (FIFO method)
    g. Reset Switch
    h. Charging current Limit Function
    i. Sleep and wake up function
    j. Cumulative kWh and Ah

Battery Rack for LTO Battery:

Battery rack for the battery packs should be of CRCA Sheet metal, preferably 19" rackmount suitable for battery mounting & duly powder coated (harmonized colour with complete solution). Placement of battery should be such that maintenance of the battery could be carried out easily. Supporting structure to be provided so that battery should not fall while installation and de installation. All the cables and cable paths should be protected for damage and should not create hindrance for Operation & Maintenance. Battery rack also should have provision for fitting the Fans for cooling if necessary.

6.2 Battery Bank & Technical Specifications

3.2V Lithium Ion (LFP) Cells in series parallel combination for SPV Power Plant along with arrangement for inter connection for battery packs in parallel connection, deep discharge type,maintenance free, environmental friendly.

Supply of Various voltage range 25.6V/48V/96V/121.6V LFP battery as per detailed Technical Specifications with state of the art BMS and plug & play battery for easy replacement and maintenance anywhere in the state of Chhattisgarh.

BATTERY BANK: Capacity -25.6V/150Ah, 48V/200Ah, 48V/250Ah, 96V/200Ah, 121.6V/250Ah, 121.6V/350Ah.

The battery bank capacity shall be of **25.6V/150Ah, 48V/200Ah, 48V/250Ah, 96V/200Ah, 121.6V/250Ah, 121.6V/350Ah** as specified in the price schedule, LFP type. The general specifications shall be as under:

a) The battery bank shall consist of required number of deep-discharge LFP cells, suitably interconnected in series as required. Parallel connections of LFP cells with in the battery pack will be discouraged. Paralleling of battery at pack/module level is allowed to reach higher capacity.
b) Cell should be BIS Lab tested with Report of IS 16046:2015/ IEC 62133:2012 with minimum cell capacity of 50Ah.
c) The cells shall be capable of deep discharge and frequent cycling with long maintenance intervals and high charge discharge efficiency.
d) The nominal voltage is 25.6V/48V/96V/121.6V and capacity of the storage bank shall be selected and specified by the supplier in the bid.
e) The self-discharge rate of the battery bank or individual cell shall not exceed four (2) percent per month.
f) The permitted maximum depth of discharge (DOD) shall be specified by the supplier in the bid.
g) Unless otherwise specified the cycle life of the battery shall not be less than 2000 Charge discharge cycles between the fully charged state and the permitted maximum DOD which is 100%. It should be able to deliver 80% of its rated capacity from fully charged position to DOD.
h) The cells shall include explosion proof safety events.
i) Weight of the battery shall not exceed for maximum 2 people lifting
j) The cells shall include the required number or corrosion resistant inter-cell required chemicals electrolyte packed in separate containers. Full instructions and technical details shall be provided for electrolyte filling and battery recharging at site for the first time.

k) The cells shall preferably be supplied in 50% SOC condition, complete with all required accessories as required in packed box. Full instructions and technical details shall be provided for installing and commissioning at site for the first time.

l) The battery pack shall be designed such a way that it is easy to handle (plug and play), compact front termination access, minimum installation time and easy to maintain. The outer shell material shall be CRCA with powder coated (harmonized colour with complete solution). IP category will be IP31.

m) All technical and other details pertaining to the Battery packs shall be supplied including but not limited to the following: -

Rated voltage and ampere hour capacity of each Battery Pack has the rated discharge rate.

1. Rated Voltage
2. Ah and Whcapcity of each Pack
3. Recommended Charge and Discharge rate
4. Environment conditions
5. Recommended Inverter Charge Voltage range of each type
6. Permitted maximum DOD.
7. Cycle life of the LFP cell and the anticipated life (in years) of the battery Pack.
8. Total number of storage cells in use.
9. Details on Pack interconnections, if any.
10. Self discharge per month <2% @ 25^0C.
11. Charge efficiency ~100% @ 0.2C
12. Discharge Efficiency >96% @ 0.5C
13. Supplied in 50% SOC (approx.).
14. Insulated terminal connectors, fasteners, supplied.
15. Rugged construction & Long Cycle life.
16. Operating temperature & Humidity
    a. Charging 0 to 50°C
    b. Discharging 0 to 60°C
    c. 0 to 95%RH non-condensing
17. Storage Temperature
    a. 0 to 45°C
    b. Charge once in 3 months if not in operation
18. Battery Grounding connection Facility
19. BMS with individual cell monitoring and Master Slave operations
    a. SOC and SOH Estimation
    b. Cumulative kWh and Ah
    c. Cycle Count
    d. Flexible Parameter Setting
    e. Cell Balancing
    f. Designed for 1C Charge and Discharge

g. Low Power Consumption

h. Battery pack address switch for paralleling the packs to reach higher capacity

20. Battery Protections

a. Under Voltage / Deep Discharge protection and alarm

b. Over Voltage/Over Charge protection and alarm

c. High temperature protection and alarm

d. Short circuit protection

e. Reverse Polarity Protection

21. Optional Features in BMS

a. BMS with MODBUS communication with Inverter for Control and monitor

b. Local RS232 port for local battery monitoring

c. Dry Contact Signal min 3 (PFC contacts)

d. Alarm Indicator

e. Capacity Indication

f. Datalogging facility in BMS: min 6 months storage (FIFO method)

g. Reset Switch

h. Charging current Limit Function

i. Sleep and wake up function

j. Cumulative kWh and Ah

Battery Rack:

Battery rack for the battery packs should be of CRCA Sheetmetal, preferably 19" rackmount suitable for battery mounting & duly powder coated (harmonized colour with complete solution). Placement of battery should be such that maintenance of the battery could be carried out easily. Supporting structure to be provided so that battery should not fall while installation and de installation. All the cables and cable paths should be protected for damage and should not create hindrance for Operation & Maintenance. Battery rack also should have provision for fitting the Fans for cooling if necessary.

	LFP Specification				
Electrical Characteristics	Nominal Voltage	25.6V	48.0V	96.0V	121.6V
	Nominal Capacity	75Ah	75Ah	50Ah	50Ah
	Energy	1920Wh	3600Wh	4800Wh	6080Wh
	Internal Resistance				
	Cycle Life @100%DOD, 25°C	2000 Cycles	2000 Cycles	2000 Cycles	2000 Cycles
	Self Discharge (per Month)	<2%	<2%	<2%	<2%
	Efficiency of Charge	~100%@0.2C	~100%@0.2C	~100%@0.2C	~100%@0.2C
	Efficiency of Discharge	>96%@0.5C	>96%@0.5C	>96%@0.5C	>96%@0.5C
Standard Charge	Charge Voltage	28.8 ± 0.1V	54.0 ± 0.1V	108 ± 0.1V	136.8 ± 0.1V
	Charge Mode	0.2C to 28.8V,then 28.8V,charge current to	0.2C to 54V,then 54V,charge current to 0.02C(CC/CV)	0.2C to 108V,then 108V,charge current to 0.02C(CC/CV)	0.2C to 136.8V,then 136.8V,charge current to

		0.02C(CC/CV)			0.02C(CC/CV)
	Charge Current	15A	15A	10A	10A
	Max. Charge Current	38A	38A	25A	25A
	Charge Cut-off Voltage (± 0.2V)	29.6V	55.5V	111.0V	140.6V
Standard Discharge	Continuous Current	15A	15A	10A	10A
	Max continuous discharge current	75A	75A	50A	50A
	Discharge Cut-off Voltage (± 0.2V)	22.4V	42.0V	84.0V	106.4V
Environmental	Charge Temperature	0℃ to 50 ℃	0℃ to 50 ℃	0℃ to 50 ℃	0℃ to 50 ℃
	Discharge Temperature	0℃ to 60 ℃	0℃ to 60 ℃	0℃ to 60 ℃	0℃ to 60 ℃
	Storage Temperature	0℃ to 45 ℃	0℃ to 45 ℃	0℃ to 45 ℃	0℃ to 45 ℃
	Water Dust Resistance	IP31	IP31	IP31	IP31
Mechanical	Cell & Method	LFP, 8S1P	LFP, 15S1P	LFP, 30S1P	LFP, 38S1P
	Shell material	CRCA with Powder Coated	CRCA with Powder Coated	CRCA with Powder Coated	CRCA with Powder Coated
	Dimensions (in./mm.)	19" Rack Mount	19" Rack Mount	19" Rack Mount	19" Rack Mount
	Weight (lbs./kg.)	TBD	TBD	TBD	TBD
	Gravimetric specific energy	81Wh/kg	81Wh/kg	81Wh/kg	81Wh/kg
	Protocol (optional)	RS485 MODBUS/RS232	RS485 MODBUS/RS233	RS485 MODBUS/RS235	RS485 MODBUS/RS237
	SOC (optional)	LED	LED	LED	LED

6.3 Battery Bank & Technical Specifications For LMLA Battery:

2 Volts Tubular Plate Cell in dry charged condition for SPV Power Plant along with arrangement for inter connection for these cell in parallel connection, deep discharge electrolyte, Volt meter, Level indicator, Porcelain/acid resistant ceramic vent plug, Petroleum.

Supply of 12 Volts Tubular Plate long life low antimony Tubular Positive Plates Cells as per detailed Technical Specifications with deep discharge electrolyte insulated terminal connectors micro-porous ceramic vent plug for anywhere in the state of Chhattisgarh.

BATTERY BANK: Capacity -24V/300Ah (12V Cell), 48V/300Ah, 96V/300Ah, 96V/600Ah, 120V/600Ah.

The battery bank capacity shall be of **24V/300Ah(12V Cell), 48V/300Ah, 96V/300Ah, 96V/600Ah, 120V/600Ah** as specified in the price schedule, tubular plate LMLA type. 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.

(d) The self-discharge rate of the battery bank or individual cell shall not exceed four (4) percent per month.

(e) The permitted maximum depth of discharge (DOD) shall be specified by the supplier in the bid.

(f) Unless otherwise specified the cycle life of the battery shall not be less than 1200 DC discharged cycles between the fully charged state and the permitted maximum DOD at the rate of C/10. It should be able to deliver 80% of its rated capacity from fully charged position to DOD.

(g) The cells shall include explosion proof safety events.

(h) The cells shall include the required number or corrosion resistant inter-cell required chemicals electrolyte packed in separate containers. Full instructions and technical details shall be provided for electrolyte filling and battery recharging at site for the first time.

(i) The cells shall preferably be supplied in dry charged condition, complete with all required chemicals electrolyte packed in separate containers. Full instructions and technical details shall be provided for electrolyte filling and battery recharging at site for the first time.

(j) 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 check list of all items required.
- Minimum specification with possible alternatives, of the required battery charger for first time charging
- Instruction of electrolyte filling, battery charging etc. and instructions on the transportation of charged batteries, if required.

(k) Suitable number of corrosion resistant and acid-proof storage racks shall be supplied to accommodate the cells. 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.

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

Rated voltage and ampere hour capacity of each storage cell has the rated discharge rate.

1. Permitted maximum DOD.
2. Self discharge rate.
3. Cycle life of the storage cell and the anticipated life (in years) of the battery bank.
4. Total number of storage cells in use.

5. Details on cell interconnections, if any.
6. Rates for single tier and double tier battery rate should be quoted in Price Bid.
7. Self discharge per month < 3% @ 27^0C.
8. Charge efficiency >93% @ 20% DOD (i.e. 80% SOC).
9. Topping-up frequency not more than once in 12 months after commissioning.
10. Supplied in dry charge condition.
11. Insulated terminal connectors, fasteners, sealed floats and charge instruction card supplied.
12. Special micro-porous ceramic vent plugs.
13. Low antimony tubular positive plates.
14. Rugged construction & Long Cycle life.

Battery Rack For LMLA Battery:

Battery rack for the battery bank of 2V cells should be of Metallic suitable for battery mounting & duly painted. Placement of battery should be such that maintenance of the battery could be carried out easily. The non-reactive acid proof mat should be provided to cover the entire floor space of the battery room.

7. Tools Kit and Connectors:

Necessary tools kits and connectors are to be provided along with each battery bank for any immediate maintenance compositions.

8. LIGHTNING AND OVER VOLTAGE PROTECTION:

The SPV Power Plant shall be provided with lightening and over voltage protection. The principal aim in this protection is to reduce the over voltage to a tolerable value before it reaches the PV or other sub-systems components. The source of over voltage can be lightening or any other atmospheric disturbance. The Lighting Arrestor (LA) is to be made of 1¼" diameter (minimum) and 12 feet long GI spike on the basis of the necessary meteorological data of the location of the projects. Necessary foundation for holding the LA is to be arranged keeping in view the wind speed of the site and flexibility in maintenance in future. Each LA shall have to be earthed through suitable size earth bus with earth pits. The earthing pit shall have to be made as per IS 3043. LA shall be installed to protect the array field, all machines and control panels installed in the control rooms. Number of LA shall vary with the capacity of SPV Power Plant &location.

Surge Protection Device: Internal surge protection shall consist of three MOV type arrestors connected from +ve and –ve terminals to earth (via Y arrangement) for higher withstand of the continuous PV-DC voltage during earth fault condition. SPD shall have safe disconnection and short circuit interruption arrangements through integrated DC in built bypass fuse (parallel) which should get tripped during failure mode of MOV, extinguishing DC arc safely in order to protect the installation against fire hazards. Nominal discharge current (In) at 8/20 micro seconds shall be minimum 10 KA with maximum discharge (Imax) at 8/20 micro seconds minimum 20 KA with visual indication (through mechanical flag) in modules to monitor the life of SPD.

9. EARTHING PROTECTION:

Each array structure of the PV yard shall be grounded properly. In addition the lightening arrestor/masts shall also be provided inside the array field. Provision shall be kept for

shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant shall be thoroughly grounded in accordance with Indian Electricity Act/IE rules as amended up to date. The earthling pit shall be made as per IS: 3043. All the array structures, equipments& control systems shall be compulsorily connected to the earth. Number of earthling shall vary with the capacity of SPV Power Plant & location. G.I. /Copper strips should be used for earthling instead of G.I. wires. LA should be installed to protect the array field & machines installed in the control rooms.Number of LA shall vary with the capacity of SPV PowerPlant & location.The LA installations should be get approved fromCREDA prior to installation.

10. DC DISTRIBUTION BOARD (DCDB):

This shall consist of suitable powder coated metal casing. In this box a separate arrangement which shall consist of MCCBs of suitable specifications & which can withstand respective flow of current, with the purpose of providing the option for isolating the battery bank & SPV arrays should be made. There shall be copper bus bars of suitable rating. Proper rating HRC fuse & MCCB/Isolator for DC application should be suitably installed in DCDB as battery bank isolator. Best quality Ah meter has to be installed to measure the cumulative charging & discharging status of battery bank. In DC circuits AC MCB or MCCB shall not be permitted.

11. AC DISTRIBUTION BOARD (ACDB):

This shall consist of box of suitable powder coated metal casing. 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, of good quality shall also be installed in ACDB suitable 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 & instructions of CREDA. A separate dedicated feeder from conventional/grid line to PCU as well as ACDB should also be installed, if required as per CREDA's instruction. 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 & cater the power to the existing load from conventional power (Grid), in case of emergency. ACDB should be connected between PCU & Load. Separate Electronic Energy Meters & Timers should be installed for all systems including 1 kWp system.

12. DANGER BOARDS:

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

13. CABLES/WIRE:

All cables should be of copper as per IS and should be of 650V/1.1 KV grade as per requirement. 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. The cable/wire should be of ISI/ISO mark for overhead distribution, with prior approval of CREDA. For normal configuration the minimum suggested sizes of cables are:

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

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

14. <u>JUNCTION BOXES</u>: Junction Boxes (SJB / AJB / MJB) shall be mounted on poles of array support structure. The junction boxes should be made of FRP (Hensel or equivalent make (IP65), with prior approval of CREDA). It should be provided with proper locking arrangements.

L. PRICE BID – A

Schedule of Rates for SPV Power Plants with LTO Batteries

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(For all category of SI i.e. A, B & C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 1.2 KW/ 25.3V/ 150 Ah with LTO Battery	
	Installation and Commissioning at site	
2	Supply of SPVPP system at the site Cap.- 2.4 KW/ 48.3V/ 150 Ah with LTO Battery	
	Installation and Commissioning at site	
3	Supply of SPVPP system at the site Cap.- 03 KW/ 48.3V/ 250 Ah with LTO battery	
	Installation and Commissioning at site	
4	Supply of SPVPP system at the site Cap.- 3.6 KW/ 48.3V/ 250 Ah with LTO Battery	
	Installation and Commissioning at site	
5	Supply of SPVPP system at the site Cap.- 4.8 KW/ 96.6V/ 100 Ah with LTO Battery	
	Installation and Commissioning at site	
6	Supply of SPVPP system at the site Cap.- 06 KW/ 96.6V/ 200 Ah with LTO Battery	
	Installation and Commissioning at site	
7	Supply of SPVPP system at the site Cap.- 7.2 KW/ 96.6V/ 250 Ah with LTO Battery	
	Installation and Commissioning at site	
8	Supply of SPVPP system at the site Cap.- 09 KW/ 119.6V/ 150 Ah with LTO Battery	
	Installation and Commissioning at site	
9	Supply of SPVPP system at the site Cap.- 10.5 KW/ 119.6V/ 300 Ah with LTO Battery	
	Installation and Commissioning at site	
	Total cost(1 to 9)	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date:**

PRICE BID – B

Schedule of Rates for SPV Power Plants with LFP Batteries

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(For all category of SI i.e. A, B & C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 1.2 KW/ 25.6V/ 150 Ah with LFP Battery	
	Installation and Commissioning at site	
2	Supply of SPVPP system at the site Cap.- 2.4 KW/ 48V/ 150 Ah with LFP Battery	
	Installation and Commissioning at site	
3	Supply of SPVPP system at the site Cap.- 03 KW/ 48V/ 225 Ah with LFP battery	
	Installation and Commissioning at site	
4	Supply of SPVPP system at the site Cap.- 3.6 KW/ 48V/ 225 Ah with LFP Battery	
	Installation and Commissioning at site	
5	Supply of SPVPP system at the site Cap.- 4.8 KW/ 96V/ 100 Ah with LFP Battery	
	Installation and Commissioning at site	
6	Supply of SPVPP system at the site Cap.- 06 KW/ 96V/ 200 Ah with LFP Battery	
	Installation and Commissioning at site	
7	Supply of SPVPP system at the site Cap.- 7.2 KW/ 96V/ 250 Ah with LFP Battery	
	Installation and Commissioning at site	
8	Supply of SPVPP system at the site Cap.- 09 KW/ 121.6V/ 150 Ah with LFP Battery	
	Installation and Commissioning at site	
9	Supply of SPVPP system at the site Cap.- 10.5 KW/ 121.6V/ 300 Ah with LFP Battery	
	Installation and Commissioning at site	
	Total cost(1 to 9)	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date**

PRICE BID – C

Schedule of Rates for SPV Power Plants with LMLA Batteries

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(For all category of SI i.e. A, B & C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 1.0 KW/ 24V/ 300 Ah with LMLA Battery	
	Installation and Commissioning at site	
2	Supply of SPVPP system at the site Cap.- 2.0 KW/ 48V/ 300 Ah with LMLA Battery	
	Installation and Commissioning at site	
3	Supply of SPVPP system at the site Cap.- 3.0 KW/ 48V/ 400 Ah with LMLA Battery	
	Installation and Commissioning at site	
4	Supply of SPVPP system at the site Cap.- 4.0 KW/ 96V/ 300 Ah with LMLA Battery	
	Installation and Commissioning at site	
5	Supply of SPVPP system at the site Cap.- 5.0 KW/ 96V/ 300 Ah with LMLA Battery	
	Installation and Commissioning at site	
6	Supply of SPVPP system at the site Cap.- 6.0 KW/ 96V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
7	Supply of SPVPP system at the site Cap.- 8.0 KW/ 120V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
8	Supply of SPVPP system at the site Cap.- 10.0 KW/ 120V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
	Total cost(1 to 8)	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date:**

PRICE BID – D

Schedule of Rates for SPV Power Plants with LMLA Batteries

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(Only For SI Category – B & C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 15.0 KW/ 240V/ 400 Ah with LMLA Battery	
	Installation and Commissioning at site	
2	Supply of SPVPP system at the site Cap.- 20.0 KW/ 240V/ 400 Ah with LMLA Battery	
	Installation and Commissioning at site	
3	Supply of SPVPP system at the site Cap.- 25.0 KW/ 240V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
4	Supply of SPVPP system at the site Cap.- 30.0 KW/ 240V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
5	Supply of SPVPP system at the site Cap.- 40.0 KW/ 240V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
6	Supply of SPVPP system at the site Cap.- 50.0 KW/ 240V/ 800 Ah with LMLA Battery	
	Installation and Commissioning at site	
	Total cost(1 to 6)	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date:**

PRICE BID – E

Schedule of Rates for SPV Power Plants with LMLA Batteries

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(Only For SI Category –C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 100.0 KW/ 240V/ 1000 Ah with LMLA Battery	
	Installation and Commissioning at site	
	Total cost	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date:**

PRICE BID – F

Schedule of Rates for SPV Power Plants with Hybrid Inverters

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(For all category of SI i.e. A, B & C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 5.0 KW/ 96V/ 300 Ah with LMLA Battery	
	Installation and Commissioning at site	
2	Supply of SPVPP system at the site Cap.- 6.0 KW/ 96V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
3	Supply of SPVPP system at the site Cap.- 8.0 KW/ 120V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
4	Supply of SPVPP system at the site Cap.- 10.0 KW/ 120V/ 600 Ah with LMLA Battery	
	Installation and Commissioning at site	
5	Supply of SPVPP system at the site Cap.- 15.0 KW/ 240V/ 400 Ah with LMLA Battery	
	Installation and Commissioning at site	
6	Supply of SPVPP system at the site Cap.- 20.0 KW/ 240V/ 400 Ah with LMLA Battery	
	Installation and Commissioning at site	
	Total cost(1 to 6)	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date:**

PRICE BID – G

Schedule of Rates for SPV Power Plants with Hybrid Inverters

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(For all category of SI i.e. A, B & C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 4.8 KW/ 96.6V/ 100 Ah with LTO Battery	
	Installation and Commissioning at site	
2	Supply of SPVPP system at the site Cap.- 06 KW/ 96.6V/ 200 Ah with LTO Battery	
	Installation and Commissioning at site	
3	Supply of SPVPP system at the site Cap.- 7.2 KW/ 96.6V/ 250 Ah with LTO Battery	
	Installation and Commissioning at site	
4	Supply of SPVPP system at the site Cap.- 09 KW/ 119.6V/ 150 Ah with LTO Battery	
	Installation and Commissioning at site	
5	Supply of SPVPP system at the site Cap.- 10.5 KW/ 119.6V/ 300 Ah with LTO Battery	
	Installation and Commissioning at site	
	Total cost(1 to 5)	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date:**

PRICE BID – H

Schedule of Rates for SPV Power Plants with Hybrid Inverters

(As per Specifications & Scope of Work of Bid no. 10371/CREDA/HOR/RE-III/SPVPP/2018 Date 25-07-2018)

Design, Supply, Installation and Commissioning of **SPV Power Plants** with five years on site unconditional warrantee at Chhattisgarh State as per list given in scope of work. as per following details –

(For all category of SI i.e. A, B & C)

No.	Description of work System	Unit rate In Rs. (Without GST)
1	Supply of SPVPP system at the site Cap.- 4.8 KW/ 96V/ 100 Ah with LFP Battery	
	Installation and Commissioning at site	
2	Supply of SPVPP system at the site Cap.- 06 KW/ 96V/ 200 Ah with LFP Battery	
	Installation and Commissioning at site	
3	Supply of SPVPP system at the site Cap.- 7.2 KW/ 96V/ 250 Ah with LFP Battery	
	Installation and Commissioning at site	
4	Supply of SPVPP system at the site Cap.- 09 KW/ 121.6V/ 150 Ah with LFP Battery	
	Installation and Commissioning at site	
5	Supply of SPVPP system at the site Cap.- 10.5 KW/ 121.6V/ 300 Ah with LFP Battery	
	Installation and Commissioning at site	
	Total cost(1 to 5)	

Certified that rates quoted above are as per the requirement, specifications, and terms & condition mentioned in the bid document.

Above rates are FOR anywhere in the State of Chhattisgarh inclusive of roadworthy packing, loading, unloading, all types of incidental expenses, insurance, duties and any other job required to properly execute the work with 5 years warrantee as mentioned in the bid document. The GST payable on the bill produced for payment to CREDA shall be paid in addition to above quoted price as per rate of GST applicable at the time of billing.

(No other cost will be claimed above the price quoted)

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company: **Date**

M.Completion cum Performance Certificate

This is to certify that M/s _____ (With Full Address), has successfully completed the work of design, Supply, Installation and Commissioning of SPV Off-grid System (Type of System-SPVPP/HLS/High Mast, Etc)_____) with (LMLA Battery /Lithium - battery_____)in _____ State, as per following details :-

S. No.	Location/Site	District	Work Order No. & Date	Cap. Of System	Number of systems	Installation Date
Total						

This certificate is being issued against the request of **M/s** _____**.,** for their intent for participation in the following Bid:-

S. No.	Bid Number
1	10371/CREDA/HOR/RE-3/SPVPP/2018 DATED 25-07-2018 (CREDA)

The Workmanship and performance of the installed systems are found satisfactory.

Seal & Signature of Concern Department/ Govt. Organization