

**Bid Specifications for
Rate Contract
for Design, Manufacture, Testing, Supply,
Installation & Commissioning of
Grid connected Rooftop SPV Power Plants
of different capacities
including five years Comprehensive Maintenance
Contract (CMC) on Turnkey basis on government
buildings anywhere
in the state of Jharkhand**

(JREDA)

Government of Jharkhand

NIB No.:-33/JREDA/ROOFTOP/GOV/16-17



Jharkhand Renewable Energy Development Agency (JREDA)

3rd Floor, S.L.D.C. Building, Kusai Colony, Doranda, Ranchi-834002.

Ph.: 0651-2491161, Fax: 0651-2491165,

E-mail: info@jreda.com; Website: www.jreda.com

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Govt. of Jharkhand
Energy Department
Jharkhand Renewable Energy Development Agency (JREDA)
3rd Floor, S.L.D.C. Building, Kusai Colony, Doranda, Ranchi-834002.
Ph.: 0651-2491161, Fax: 0651-2491165,
E-mail: info@jreda.com; Website: www.jreda.com

e-Procurement Notice

Tender reference no.: 33/JREDA/ROOFTOP/GOV/16-17,

Dated 31.10.2016

1	Name of the work	Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid Connected Rooftop SPV Power Plants of different capacities of 5000 kWp including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.
2	Estimated cost (Rs.)	Rs. 55,00,00,000/-
3	Contract Period	12 (Twelve) months
4	Date of publication of NIT on website: http://jharkhandtenders.gov.in	04.11.2016 (Friday)
5	Date & time of Pre-bid meeting	17.11.2016 (Thursday) at 1.00 P.M.
6	Last date & time for receipt of online bids	28.11.2016 (Monday) upto 05:00 PM
7	Submission of original copies of Bid fee & EMD (Offline)	28.11.2016 and 29.11.2016 up to 5.00 P.M.
8	Technical Bid Opening Date	30.11.2016 (Wednesday) at 03:00 PM
9	Name & address of office inviting tender	Director, Jharkhand Renewable Energy Development Agency(JREDA) 3 rd Floor, SLDC Building, Kusai, Doranda, Ranchi- 834002 (Jharkhand)
10	Contact no. of procurement officer	0651-2491163/61
11	Helpline no. of e-procurement	0651-2491163/61

Any change can be seen on website: <http://jharkhandtenders.gov.in> & www.jreda.com
Further details can be seen on website: <http://jharkhandtenders.gov.in> & www.jreda.com

Sd/-
Director,
JREDA, Ranchi

Section -1: List of Important dates & details of Bids
NIB No: 33/JREDA/ROOFTOP/GOV/16-17

1.	Name of work	Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.											
2	Tender reference no.	33/JREDA/ROOFTOP/GOV/16-17											
3	Time of completion	4 months for up to 50 kWp & 6 Months for above 50 kWp											
4	Mode of submission of tender	Online through www.jharkhandtenders.gov.in											
5	Tentative Quantity	Grid Connected Rooftop SPV Power Plants of different capacities at anywhere in the state of Jharkhand: 5000 kWp approx. The quantity mentioned above is tentative and subject to increase or decrease depending on the actual requirement at the time of placing order and resources available.											
6	Cost of Bid document (Non-refundable)	❖ For General Bidder/ New Entrepreneurs: Rs. 10,000/- (Rupees ten thousand) only. ❖ For MSME of Jharkhand: Rs. Nil											
7	Earnest Money Deposit	❖ For General Bidder/ New Entrepreneurs: <table border="1"> <thead> <tr> <th>Item Description</th> <th>Amount (in Rs.)</th> </tr> </thead> <tbody> <tr> <td>Category "A" 1 to 10 KW</td> <td>Rs. 2,00,000/-</td> </tr> <tr> <td>Category "B" 11 to 50 KW</td> <td>Rs. 4,00,000/-</td> </tr> <tr> <td>Category "C" 51 to 100 KW</td> <td>Rs. 6,00,000/-</td> </tr> <tr> <td>Category "D" above 100KW</td> <td>Rs. 8,00,000/-</td> </tr> </tbody> </table> ❖ For MSME of Jharkhand: Rs. Nil		Item Description	Amount (in Rs.)	Category "A" 1 to 10 KW	Rs. 2,00,000/-	Category "B" 11 to 50 KW	Rs. 4,00,000/-	Category "C" 51 to 100 KW	Rs. 6,00,000/-	Category "D" above 100KW	Rs. 8,00,000/-
Item Description	Amount (in Rs.)												
Category "A" 1 to 10 KW	Rs. 2,00,000/-												
Category "B" 11 to 50 KW	Rs. 4,00,000/-												
Category "C" 51 to 100 KW	Rs. 6,00,000/-												
Category "D" above 100KW	Rs. 8,00,000/-												
8	Publishing on website	Date. 04.11.2016 (Friday)											
9	Period of downloading of bidding documents	Start date: 05.11.2016	Time: 11.00 AM										
		End date: 28.11.2016	Time: 05.00 PM										
10	Last date for giving pre-bid suggestions, comments at info@ireda.com	Up to 17.11.2016 (Thursday)											
11	Bid online submission	Start date: 22.11.2016	Time: 11.00 AM										
		End date: 28.11.2016	Time: 05.00 PM										
12	Technical bid opening date	Date. 30.11.2016 (Wednesday) Time: 03.00 PM											
13	Authority inviting bids	Director, Jharkhand Renewable Energy Development Agency(JREDA)											
14	Address	Jharkhand Renewable Energy Development Agency(JREDA) 3 rd Floor, SLDC Building, Kusai, Doranda, Ranchi- 834002. Ph.No: 2491161,Fax No: 0651-2491165 Web site: www.jreda.com E-mail: info@ireda.com											

Note: The tender fee and Earnest Money Deposit (EMD) in original must be submitted between all working days from 28.11.2016 to 29.10.2016 by 5.00 PM. If tender fee and EMD are not received before mentioned date and time, tender shall not be accepted.

Place for receiving tender fee & EMD

Jharkhand Renewable Energy Development Agency (JREDA), 3rd Floor, SLDC Building, Kusai, Doranda, Ranchi- 834002.

Section-2: Instructions to Bidders

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

1. The guidelines to submit bid online can be downloaded from website <http://Jharkhandtenders.gov.in>
 2. The interested bidders can download the bid from the website "<http://Jharkhandtenders.gov.in>".
 3. To participate in bidding process, bidders have to get 'Digital Signature Certificate (DSC)' as per Information Technology Act-2000 to participate in online bidding. This certificate will be required for digitally signing the bid. Bidders can get above mention digital signature certificate from any approved vendors (CCA). Bidders, who already possess valid Digital Certificates, need not to procure new Digital Certificate.
 4. The bidders have to submit their bids online in electronic format with digital Signature. The bids without digital signature will not be accepted. No proposal will be accepted in physical form.
 5. Bids will be opened online as per time schedule mentioned in Section 1
 6. Bidders should get ready with the scanned copies of cost of documents & EMD as specified in the tender document. Before submission of online bids, bidders must ensure that scanned copy of all the necessary documents have been attached with bid.
 7. Bidder have to produce the original D.D. towards tender fee & EMD in approved form to the authority "Director, Jharkhand Renewable Energy Development Agency, Ranchi" on the date & time as mentioned in the NIT failing which bidder will be disqualified. The details of cost of documents, EMD specified in the tender documents should be the same as submitted online (scanned copies) otherwise tender will summarily be rejected.
 8. Uploaded documents of valid successful bidders will be verified with the original before signing the agreement. The valid successful bidder has to provide the originals to the concerned authority.
 - i. The department will not be responsible for delay in online submission due to any reason.
 9. All the required information for bid must be filled and submitted online.
 10. Other details can be seen in the bidding documents.
- B. Details of documents to be furnished for online bidding
1. Scanned copies of the following documents to be up-loaded in pdf. format on the website <http://Jharkhandtenders.gov.in>.
 - i. D. D. towards Tender fee.
 - ii. Duly pledged EMD (Annexure)
 - iii. CST/VAT certificate.
 - iv. PAN Card
 - v. Firm's registration certificate/ Registration certificate of MSME of Jharkhand.
 - vi. Certificate issued by Industry Dept. or MNRE for system manufacturing.
 - vii. Audited Balance sheet of last three years.
 - viii. IEC/IS certificate of Solar PV module.
 - ix. Test certificate of Battery.
 - x. IEC/IS certificate of Electronics & test certificate of PCU.
 2. Scanned Copies of the Annexure as per the enclosed formats should be uploaded after converting the same to .pdf format.
 - i. Annexure-1: Covering letter.
 - ii. Annexure-2: Information about the bidding firm.
 - iii. Annexure-3: Declaration by the bidder.
 - iv. Annexure-4: Annual Turnover.
 - v. Annexure-5: Net Worth certificate.
 - vi. Annexure-6: Format for power of attorney for signing of bid.
 - vii. Annexure-7: Proof of supply/execution of SPV Items/systems in any SNA/Govt. organization/PSU in the last seven years. Attach copy of orders & its satisfactory completion certificate.

- viii. Annexure-8: Technical details & make of the Equipment's to be supplied.
 - ix. Annexure-9: Technical detail form.
 - x. Annexure-10: Bank Guarantee Format for EMD
-
- 3. Duly filled in & digitally signed Price Bid.
 - 4. Uploaded documents of valid successful bidders will be verified with the original before signing the agreement. The valid successful bidder has to provide the originals to the concerned authority on receipt of such letter, which will be sent through registered post.
 - 5. SBD is not to be uploaded by the bidder. The bidder has to give affidavit stating agree / disagree on the conditions in the SBD. The bidders, who disagree on the conditions of SBD, cannot participate in the tender.

Section-3: Notice Inviting Bid

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

Sub: Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.

Preamble:

As part of Solar Photovoltaic Programme, JREDA invites bid for **"Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand."** for short listing of experienced & eligible bidders to whom work shall be allocated for successful execution of the project in a defined time frame.

Part -I:-The Technical Conditions:

The bidder should fulfill the following Technical eligibility conditions:-

1. The bidder should be MNRE approved Channel Partner/ MNRE approved channel under category of New Entrepreneurs/ MNRE approved manufacturer/ MNRE approved PV System integrator/A registered manufacturing company/Firm/Corporation in India (Including MSME of Jharkhand/ New MSME of Jharkhand) of at least one of the major sub systems namely SPV Cells/ Modules or Battery or PV System Electronics (Conforming to relevant National/ International Standards). The bidder shall furnish either relevant MNRE certificate or concerned Industry Department certificate clearly indicating that they are manufacturers of SPV Cells/ Modules or Battery or PV System Electronics/ MSME certificate or MNRE Channel Partner for New Entrepreneurs as applicable. **Authorized dealers and subcontractors are not eligible to participate.**
2. The bidder should be a functional organization. To substantiate this claim, the bidder should submit the copy of audited balance sheet with profit & loss account for last 3 years or from the date of establishment to 31.03.2015/2016, whichever is applicable. For New Entrepreneurs category (MNRE Channel Partner), the bidder should submit the copy of audited balance sheet with profit & loss account for last 1 year or from the date of establishment to 31.03.2015/2016, whichever is applicable. These audited balance sheets should be duly certified by the Statutory Auditor with his stamp.
3. Registered Micro, Small & Medium Enterprise (MSME) of Jharkhand should submit the attested copy of Registration given by the Industry Department, Govt. of Jharkhand.
4. **Experience Requirement:**

For General Bidder: Bidder should have cumulative experience of executing contracts of supply & installation of at least **25% of Bid capacity of SPV Power Plant** to any SNA / Govt. Organization / PSU in the last seven years ending up to date of advertisement of this tender.

For MSME of Jharkhand: Bidder should have cumulative experience of executing contracts of supply & installation of at least **10% of Bid capacity of SPV Power Plant** to any SNA / Govt. Organization / PSU in the last seven years ending up to date of advertisement of this tender.

For New Entrepreneurs: Bidder should be MNRE channel partner included under category of New Entrepreneurs or MSME of Jharkhand manufacturing at least one of the major sub systems namely SPV Cells/ Modules or Battery or PV System Electronics.

The copy of work order and certificate indicating its successful execution should be enclosed.

5. The offered PV Modules should be as per IEC61215 edition II / BIS 14286 from an NABL or IECQ accredited laboratory standards having test certificates prescribed by MNRE. The valid test certificate with authorization letter

of the manufacturer should be uploaded as annexure. The offered PV Modules should be Crystalline Silicon PV Modules as per IEC 61215 Standards or IS14286 and having test certificates prescribed by MNRE. In addition, the modules must conform to IEC 61730 part I – requirement for construction and part – II requirement for testing, for safety qualification or equivalent IS. The offered modules shall be of standard make, specifications of any reputed brand approved by MNRE having test certificates issued from **MNRE specified** test laboratories. Bidder can supply PV Modules of standard makes and specifications of any reputed brand approved and certified by MNRE and have to submit the authorization from the manufacturer along with the test certificate.

6. The bidder must be in possession of valid test report of PCU & Battery from any of the following test centers:-

- Solar Energy Centre Gwalpahari – Gurgaon, Haryana (SEC)
- Electronics Regional Test Laboratory (East) Bidhan Nagar, Kolkata (ERTL)
- Central Power Research Institute, Bangalore (CPRI).
- Any other test centre approved by MNRE.

The valid test certificate should be submitted along with bid. Bidder can supply PCU of standard makes and specifications of any reputed brand approved and certified by MNRE and have to submit the authorization from the manufacturer along with the test certificate.

7. Batteries should fulfil the requirement as per specification given at Technical Specification for Capacity Test Charge/Discharge efficiency Self-Discharge as per MNRE requirements and valid test reports with authorization letter of the manufacturer should be uploaded as annexure. The certificate should be in a form of an undertaking letter from the manufacturer complying all the technical specifications of battery. The offered batteries shall be of standard make and specifications of any reputed brand approved and certified by MNRE. Bidder can supply batteries of standard makes and specifications of any reputed brand approved and certified by MNRE and have to submit the authorization from the manufacturer along with the test certificate.

8. The Participant should have valid CST/VAT/PAN/TAN No of Jharkhand State. If the bidder is not from Jharkhand state, they will have to submit JVAT at the time of agreement. However, the current VAT of their State should be submitted with the tender document.

9. The Bidder should confirm that they have the resources and capability to supply the offered quantity within the scheduled period in the form of an undertaking.

10. **Turnover Requirement:**

For General Bidder: Bidder should have the minimum average Annual Turnover of **25% of Bid Capacity** derived from the last three financial years ending on 31.03.2015/2016 on the basis of audited annual accounts.

For MSME of Jharkhand: Bidder should have the average Annual Turnover of **10% of Bid Capacity** derived from the last three financial years ending on 31.03.2015/2016 on the basis of audited annual accounts.

The certificate should be as per the Performa given at [Annexure-4](#)

11. **Net worth Requirement:**

For General Bidder: Bidder should have Positive Net Worth of minimum 10% of Bid Capacity as on 31.03.2015/2016 on the basis of audited annual accounts.

For MSME of Jharkhand: Bidder should have Positive Net Worth of minimum 5% of Bid Capacity as on 31.03.2015/2016 on the basis of audited annual accounts.

Net worth certificate should be as per the Performa given at [Annexure-5](#)

12. Bidders have to download the bid document from website (www.jharkhandtenders.gov.in) and submit the scan copy of the cost of the bid document to be submitted in shape of demand draft of requisite value as mentioned in Section-1 (List of Important dates & details of Bids) in favour of "Director, JREDA" on any Indian Nationalized

Bank/Scheduled Bank, payable at "Ranchi". The tender fee in original must be submitted from **28.11.2016 to 29.11.2016 by 05.00 PM** in the office of JREDA.

13. Bidders should submit in Part – I (Technical Bid) the earnest money in the form of Bank Guarantee of requisite value as mentioned in "Section-1 (List of Important dates & details of Bids)". The Bank Guarantee shall be made in favour of "Director, JREDA" payable at Ranchi from any Indian Nationalized bank/Scheduled bank. The bank guarantee shall remain valid for 12 months. Only Original Bank Guarantee shall be accepted.
14. Empanelment Procedure after opening of Financial Bid: The lowest rate i.e. L1 received would be the appropriate rate for awarding the work. The bidders shall be ranked as L1, L2, L3 and so on based on financial bids for each category. Moreover 20% of the tendered capacity or capacity bided by L1, whichever is lower shall be awarded to L1 bidder from General Bidder or MSME of Jharkhand category. In case there is less numbers of qualified bidders allocated capacity may increase to achieve the target.

JREDA shall empanel New Entrepreneurs and New MSME at the discovered lowest rate for each category. Maximum 10% of the tendered capacity can be awarded to successful New Entrepreneur category bidders and capacity shall be allocated equally to all the successful bidders under this category. New Entrepreneurs/ New MSME shall have to qualify all the criteria except work experience as criteria fixed for general/MSME bidders.

Allocation of the quantity to MSME registered in Jharkhand will be made as per the provisions of section 18.1 (ii) (d) of Jharkhand Industrial Policy 2012 & Jharkhand Procurement Policy 2014. The MSME should be functional & having running production unit of the Jharkhand and should fulfill all the criteria as fixed in Jharkhand Procurement Policy 2014.

JREDA will empanel more than one vendor for each category and will allot the quantum of work to bidder on the basis of his financial & technical competence. The financial competence of the bidder will be evaluated on the basis of **average annual turnover** of Rs. 50.00 Lakh per 100 kWp for general bidder (Rs. 20.00 Lakh per 100 kWp for MSME of Jharkhand/New Entrepreneur) from the last three years ending 31.03.2015/2016 & **Net Worth** of Rs. 20.00 Lakh per 100 kWp for general bidder (Rs. 10.00 Lakh per 100 kWp for MSME of Jharkhand/New Entrepreneur) as on 31.03.2015/2016 on the basis of audited annual accounts.

Technical competence of the bidder will be evaluated on the basis of 25 kWp of SPV Power Plant per 100 kWp for general bidder (10 kWp of SPV Power Plant per 100 kWp for MSME of Jharkhand) from the cumulative experience of executing contracts of SPV Power Plants during last seven years. Technical competence of the bidder will be evaluated on the basis of copy of order and corresponding certificate indicating its successful execution of SPV Power Plant.

Section-4: Instructions to Bidders

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

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Instructions to Bidders (ITB)

A. General

1. Scope of Bid

- 1.1. The JREDA invites bids for the work as described in these documents and referred to as "the works". The name and identification number of the works is provided in the Notice Inviting Bid.
- 1.2. The successful Bidder will be expected to complete the Works by the Intended Completion Date specified in the Part (I)- General Conditions of Contract.
- 1.3. Throughout these documents, the terms "bid" and "tender" and their derivatives (bidder/ tenderer, bid/ tender, bidding/ tendering) are synonymous.

2. Source of Funds

- 2.1. The JREDA has decided to undertake the works of **"Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand"** through funds from the Government of India, Government of Jharkhand & Beneficiary, to be implemented through JREDA.

3. Eligible Bidders

- 3.1. This Invitation for Bids is open to all bidders as defined in the Notice Inviting Bid.
- 3.2. Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices by the Central Government, the State Government or any public undertaking, autonomous body, authority by whatever name called under the works.

4. Qualification of the Bidder

- 4.1. All bidders shall provide in Section 3, Forms of Bid and Qualification information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.
- 4.2. All bidders shall include the following information and documents with their bids in Section 3, Qualification Information unless otherwise stated in the Notice Inviting Bid/ITB.
 - a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business.
 - b) Copy of written power of attorney of the signatory of the Bid to commit the Bidder.
 - c) Total monetary value of the similar nature of the works performed for each of the last seven years;
 - d) Experience in works of a similar nature and size for each of the last seven years, and details of works in progress or contractually committed with certificates from the concerned officer or competent authority.
 - e) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the last three years for General Bidder and MSME of Jharkhand category only.
 - f) An undertaking that the bidder will be able to invest a minimum of cash up to the 10 percentage of the contract price of works, during the implementation of the works;
 - g) Evidence of access to line(s) of credit and availability of other financial resources/ facilities (10 percent of the contract value) certified by banker (the certificate being not more than 3 months old.)
 - h) Authority to seek references from the Bidder's bankers;

- i) Information regarding any litigation or arbitration during the last seven years in which the Bidder is involved, the parties concerned, the disputed amount, and the matter;
 - j) The proposed methodology and programme of construction, backed with equipment and material planning and deployment, duly supported with broad calculations and Quality Management Plan proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications and within the stipulated period of completion.
- 4.3. Bids from joint venture are not allowed.
- 4.4. To qualify for award of the Contract, each bidder should have in the last seven years:
- a) **Annual Turn Over:**

For General Bidder: Bidder should have the minimum average Annual Turnover of **25% of Bid Capacity** derived from the last three financial years ending on 31.03.2015/2016 on the basis of audited annual accounts.

For MSME of Jharkhand: Bidder should have the average Annual Turnover of **10% of Bid Capacity** derived from the last three financial years ending on 31.03.2015/2016 on the basis of audited annual accounts.

The certificate should be as per the Performa given at [Annexure-4](#)
 - b) **Net worth Requirement:**

For General Bidder: Bidder should have Positive Net Worth of minimum 10% of Bid Capacity as on 31.03.2015/2016 on the basis of audited annual accounts.

For MSME of Jharkhand: Bidder should have Positive Net Worth of minimum 5% of Bid Capacity as on 31.03.2015/2016 on the basis of audited annual accounts.

Net worth certificate should be as per the Performa given at [Annexure-5](#)
 - c) **Experience:**

For General Bidder: Bidder should have cumulative experience of executing contracts of supply & installation of at least **25% of Bid capacity of SPV Power Plant** to any SNA / Govt. Organization / PSU in the last seven years ending up to date of advertisement of this tender.

For MSME of Jharkhand: Bidder should have cumulative experience of executing contracts of supply & installation of at least **10% of Bid capacity of SPV Power Plant** to any SNA / Govt. Organization / PSU in the last seven years ending up to date of advertisement of this tender.

For New Entrepreneurs: Bidder should be MNRE Channel Partner for Rooftop (Grid) under category of New Entrepreneurs or MSME of Jharkhand manufacturing at least one of the major sub systems namely SPV Cells/ Modules or Battery or PV System Electronics.

The copy of order and certificate indicating its successful execution should be enclosed with the check list as at [Annexure-7](#).
- 4.5. Each bidder must produce:
- i) The income-tax return/PAN.
 - ii) An affidavit that the information furnished with the bid documents is correct in all respects; and
 - iii) Such other certificates as defined in the Notice Inviting Bid. Failure to produce the certificates shall make the bid non-responsive.

- 4.6. To qualify for a package of contracts made up of this and other contracts for which bids are invited in the Notice Inviting Tender, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.
- 4.7. Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:
- i) made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirements; and/or
 - ii) record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures
 - iii) Participated in the previous bidding for the same work and had quoted unreasonably high or low bid prices and could not furnish rational justification for it to JREDA.

5. One Bid per Bidder

- 5.1. Each Bidder shall submit only one Bid for one work. A Bidder who submits more than one Bid will cause the proposals with the Bidder's participation to be disqualified.

6. Cost of Bidding

- 6.1. The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the JREDA will, in no case, be responsible or liable for those costs.

7. Site Visit

- 7.1. The Bidder, at his own cost, responsibility and risk, is encouraged to visit, examine and familiarize himself with the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for supply & installation of the Works. The costs of visiting the Site shall be at the Bidder's own expense. He may contact the person whose contact details are given in the Notice Inviting Bid.

B. Bidding Documents

8. Content of Bidding Documents

- 8.1. The set of bidding documents comprises the documents listed below and addenda issued in accordance with Clause 10 of ITB.

- 1. Notice Inviting Tender
- 2. Instructions to Bidders
- 3. Qualification Information
- 4. Conditions of Contract
- 5. Specifications
- 6. Bill of Quantities
- 8. Form of Bid
- 9. Form of Bank Guarantee.

- 8.2. The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms and specifications, bill of quantities, forms in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder's own risk. Pursuant to clause 23 hereof, bids, which are not substantially responsive to the requirements of the Bid Documents, shall be rejected.

9. Clarification of Bidding Documents and Pre-bid Meeting

- 9.1. A prospective Bidder requiring any clarification of the bidding documents may notify the JREDA in writing at the JREDA's address indicated in the Notice Inviting Tenders. The JREDA will respond to any request for clarification received earlier than 10 days prior to the deadline for submission of bids or as per date mentioned in the bid.

Copies of the JREDA's response will be forwarded or uploaded on our website www.jreda.com to all purchasers of the bidding documents, including a description of the inquiry, but without identifying its source.

- 9.2. JREDA decides to hold a pre-bid meeting on **17.11.2016 (Thursday) at 1.00 PM**, the bidder or his authorized representative shall be invited to attend it.
- 9.3. The purpose of such a meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 9.4. The bidder is requested to submit any questions in writing or by cable so as to reach the JREDA not later than two days before the meeting.
- 9.5. Minutes of the meeting, including the text of the questions raised and the responses given will be transmitted without delay to all purchasers of the bidding documents. Any modifications of the bidding documents listed in Clause 8.1 of ITB, which may become necessary as a result of the pre-bid meeting shall be made by the JREDA exclusively through the issue of an Addendum pursuant to Clause 10 of ITB and not through the minutes of the pre-bid meeting.
- 9.6. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

10. Amendment of Bidding Documents

- 10.1. Before the deadline for submission of bids, the JREDA may modify the bidding documents by issuing addenda.
- 10.2. Any addendum thus issued shall be part of the bidding documents and shall be communicated in writing by registered post or by cable to all purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum by cable to the Employer.
- 10.3. To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the JREDA shall extend, if necessary, the deadline for submission of bids, in accordance with Clause 19.2 of ITB.

C. Preparation of Bid

11. Language of Bid

- 11.1. All documents relating to the Bid shall be in the language specified in the Notice Inviting Bid.

12. Documents Comprising the Bid

12.1. Technical Bid – (Fee/Pre-Qualification/Technical Cover)

12.1.1. EMD & Tender Fee

- a) Scanned Copy of Demand draft drawn in favour of "DIRECTOR, JREDA", payable at Ranchi towards Cost of Tender Fee and Earnest Money Deposit as specified in the Notice Inviting Bid.

12.1.2. Pre-Qualification Details

- a) Scanned Copy of Certificate for availability of Credit Facility for 10% of Tendered Amount from any Scheduled Commercial Bank.

12.1.3. Technical Details & Declaration

- a) Proposed work programme (work method, time schedule and financial flow), description, and charts as necessary (Duly to be signed digitally) to comply with the requirement of the Bidding Document.
- b) Scanned copy of an Affidavit by the Bidder that he/she has accepted the S.B.D.

12.1.4. Technical Details of documents

Scanned copies/Prescribed Formats of Documents to be attached in "My Document" in .pdf format file duly digitally signed by the bidder.

- a) Income Tax clearance certificate/PAN Card

- b) Sale Tax/VAT clearance certificate.
- c) Proof of completion of similar works during the last 7 years and list of similar works in hand in the prescribed formats in the ITB duly signed by the competent authority of the issuing Department (in format given in ITB)
- d) List of works for which bids already submitted (in format given in ITB)
- e) Financial Report for the last 3 years (up to 31/3/2015/2016) certified by chartered Accountant.
- k) Annual Turn over Details certified by Chartered Accountant.
- L) Net worth certificate certified by Chartered Accountant.
- l) List of current litigant cases in which the bidder is involved (in format given in ITB).
- m) An affidavit for non-engagement of related persons.
- n) Proof of test certificates solar PV module, batteries and latest test certificate should confirm that Rooftop SPV Power Plants are as per MNRE specifications which are available on MNRE website. The valid test certificate should be submitted along with bid.
- p) Authorized address & contact numbers of the bidder as per instruction in the Notice Inviting Bid duly digitally signed.
- r) Bid Capacity
- s) Undertaking of Bidder that he is able to invest minimum of cash upto 10% as defined in ITB.
- t) Undertaking for validity of bid for 365 days.

12.2. Financial Bid – (Finance Cover)

- I. Duly Quoted & digitally signed Bill of Quantity (BOQ) in the file supplied by JREDA in .xls format shall be uploaded.
- II. Declaration by Bidder in the format Section – 6 form of Bid in .pdf format.

NOTE: a) All the documents should be digitally signed.

12.3. The following documents, which are not submitted with the bid, will be deemed to be part of the bid.

Section Particulars

- i. Notice inviting Tender
- ii. Instruction to the bidders
- iii. Conditions of Contract
- iv. Contract Data
- v. Specifications
- vi. Drawings if any

13. Bid Price

- 13.1. The Contract shall be for the whole Works, as described in Clause 1.1 of ITB.
- 13.2. The Bidder shall adopt the Item Rate Method as specified in the Notice Inviting Bid only the same option is allowed to all the Bidders.
- 13.3. All duties, taxes, royalties and other levies payable by the Contractor under the Contract, or for any other cause, shall be included in the rates, prices, and total Bid price submitted by the Bidder.

- 13.4. The rates and prices quoted by the Bidder shall be fixed for the duration of the Contract and shall not be subject to adjustment.
- 13.5. Quoted price for grid connected rooftop SPV power plants are complete in all respect as per Technical Specifications inclusive of all Central/State/Local taxes & duties, packing, forwarding, transit insurance, loading & unloading, transportation & other charges etc. FOR destination at any site in Jharkhand and inclusive of installation, testing, commissioning, performance testing, training and Comprehensive Maintenance Contract for five years.
- 13.6. Tenderers should quote their rates considering wide variation of site conditions, variation in price of different components during the year 2016-17 and keeping the quantum and quality of work in mind. If JREDA anticipates that rate is abnormally low or high, tender may be rejected.

14. Currencies of Bid

- 14.1. The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees (INR).

15. Bid Validity

- 15.1. Bids shall remain valid for a period of 365 (Three hundred Sixty Five) days after the deadline date for bid submission specified in Clause 19 of ITB. A bid valid for a shorter period shall be rejected by the JREDA as non-responsive.
- 15.2. In exceptional circumstances, prior to expiry of the original time limit, the JREDA may request that the bidders may extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by cable. A bidder may refuse the request without forfeiting his Earnest Money. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his earnest money for a period of the extension, and in compliance with Clause 16 of ITB in all respects.

16. Earnest Money

- 16.1. The Bidder shall furnish, as part of the Bid, Earnest Money, in the amount specified in the Notice Inviting Bid.
- 16.2. The Earnest Money shall, at the Bidder's option, be in the form of Bank Guarantee/Demand Draft of a scheduled commercial bank, issued in favour of the name given in the Notice Inviting Bid. The Bank Guarantee shall be valid for 12 months or more after the last date of receipt of bids. Other forms of Earnest Money acceptable to the JREDA are stated in the Notice Inviting Bid.
- 16.3. Any bid not accompanied by an acceptable Earnest Money, unless exempted in terms given in the Notice Inviting Bid, shall be rejected by the JREDA as nonresponsive.
- 16.4. The Earnest Money of unsuccessful bidders will be returned within 30 days of the end of the Bid validity period specified in Clause 15.1 of ITB.
- 16.5. The Earnest Money of the successful Bidder will be discharged when the Bidder has signed the Agreement and furnished the required Performance Security.
- 16.6. The Earnest Money may be forfeited:
- a) if the Bidder withdraws the Bid after bid opening (technical bid) during the period of Bid validity;
 - b) in the case of a successful Bidder, if the Bidder fails within the specified time limit to
 - i. sign the Agreement; and/or
 - ii. Furnish the required Performance Security.

17. Alternative Proposals by Bidders

- 17.1. Bidders shall submit offers that comply with the requirements of the bidding documents, including the Bill of Quantities and the basic technical design as indicated in the drawings and specifications. Alternative proposals will be rejected as non-responsive.

D. Submission of Bids

18. Sealing and Marking of Bids

- 18.1. The Bidder shall place the two separate files (File I) marked "Technical Bid" and "Financial Bid" (File -II). The file will have markings as follows:

Technical Bid: To be opened on (date and time of Technical Bid opening as per clause 20.1 of ITB.)

Financial Bid: Not to be opened except with the approval of JREDA.

The contents of the Technical and Financial Bids shall be as specified in clause 12.1of ITB. All documents are to be signed digitally by the bidder.

- 18.2. The first and second files containing the Technical and Financial Bids shall a) be addressed to the JREDA at the address provided in the Notice Inviting Bid b) bear the name and identification number of the Contract as defined in clause 1.1 of ITB; and c) provide a warning not to open before the specified time and date for Bid opening as defined in clause 20.1 of ITB.

19. Deadline for Submission of Bids

- 19.1. Complete Bids (including Technical and Financial) must be received by the JREDA at the address specified in the Notice Inviting Bid not later than the date and time indicated in the Notice Inviting Bid.
- 19.2. The JREDA may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10.3 of ITB, in which case all rights and obligations of the JREDA and the bidders previously subject to the original deadline will then be subject to the new deadline.

E. Bid Opening and Evaluation

20. Bid Opening

- 20.1. The JREDA will open the bids received (except those received late). In the event of the specified date for the submission of bids being declared a holiday for JREDA, the Bids will be opened at the appointed time and location on the next working day.
- 20.2. The files containing the technical bid shall be opened. The document marked "cost of bidding document" will be opened first and if the cost of the bidding documents is not there, or incomplete, the remaining bid documents will not be opened, and bid will be rejected.
- 20.3. In all other cases, the amount of Earnest Money, forms and validity shall be announced. Thereafter, the bidders' names and such other details as the JREDA may consider appropriate, will be announced by the JREDA at the opening.
- 20.4. The JREDA will prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Clause 20.3 of ITB.
- 20.5. Evaluation of the technical bids with respect to bid security, qualification information and other information furnished in Part-I of the bid in pursuant to Clause 12.1 of ITB, shall be taken up and completed and a list will be drawn up of the responsive bids whose financial bids are eligible for consideration
- 20.6. The JREDA shall inform, by email, telegram or fascimal, the bidders, whose technical bids are found responsive, date, time and place of opening as stated in the Notice Inviting Bid. In the event of the specified date being declared a holiday for the JREDA, the bids will be opened at the appointed time and location on the next working day through they or their representative, may attend the meeting of opening of financial bids.
- 20.7. At the time of the opening of the 'Financial Bid', the names of the bidders whose bids were found responsive in accordance with clause 20.5 of ITB will be announced. The financial bids of only these bidders will be opened. The remaining bids will be returned unopened to the bidders. The responsive bidders' names, the Bid prices, the total amount of each bid, and such other details as the JREDA may consider appropriate will be announced by

the JREDA at the time of bid opening. Any Bid price which is not read out and recorded, will not be taken into account in Bid Evaluation

20.8. The JREDA shall prepare the minutes of the opening of the Financial Bids.

21. Process to be Confidential

21.1. Information relating to the examination, clarification, evaluation, and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any attempt by a Bidder to influence the JREDA's processing of bids or award decisions may result in the rejection of his Bid

22. Clarification of Bids and Contacting the JREDA

22.1. No Bidder shall contact the JREDA on any matter relating to its bid from the time of the bid opening to the time the contract is awarded.

22.2. Any attempt by the bidder to influence the JREDA's bid evaluation, by any means, bid evaluation, bid comparison or contract award decision may result in the rejection of his bid.

23. Examination of Bids and Determination of Responsiveness

23.1. During the detailed evaluation of "Technical Bids", the JREDA will determine whether each Bid (a) meets the eligibility criteria defined in Clauses 3 and 4; (b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the bidding documents. During the detailed evaluation of the "Financial Bids", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications and drawings.

23.2. A substantially responsive "Financial Bid" is one, which conforms to all the terms, conditions, and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the bidding documents, the JREDA's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

23.3. If a "Financial Bid" is not substantially responsive, it will be rejected by the JREDA, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

24. Corrections of Errors

24.1. Bids determined to be substantially responsive, will be checked by the JREDA for any arithmetic errors. Errors will be corrected by the JREDA as follows:

- a) where there is a discrepancy between the rates in figures and in words, the rate in words will govern; and
- b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.

24.2. The amount stated in the Bid will be adjusted by the JREDA in accordance with the above procedure for the correction of errors and shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, the Bid will be rejected, and the Earnest money shall be forfeited in accordance with Clause 16.6(b) of ITB.

25. Evaluation and Comparison of Bids

25.1. The JREDA will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 23 of ITB.

25.2. In evaluating the bids, the JREDA will determine for each Bid the evaluated Bid price by adjusting the Bid price by making correction, if any, for errors pursuant to Clause 24 of ITB.

25.3. If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the contract, the JREDA may require the Bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the JREDA may require that the amount of the performance security set forth in Clause 32 of ITB be increased at the expense of the successful Bidder to a level sufficient to protect the JREDA against financial loss in the event of default of the successful Bidder under the Contract. The amount of the increased performance security shall be decided at the sole discretion of the Employer, which shall be final, binding and conclusive on the bidder.

25.4. After its evaluation, the JREDA may require that the amount of the performance security set forth in Clause 30 be increased at the expense of the successful Bidder to a level sufficient to protect the JREDA against financial loss in the event of default of the successful Bidder under the Contract. The amount of the increased performance security shall be decided at the sole discretion of the JREDA, which shall be final, binding and conclusive on the bidder.

26. Price Preference

26.1. There will be no price preference to any bidder.

F. Award of Contract

27. Award Criteria

27.1. Subject to Clause 29 of ITB, the JREDA will award the Contract to the Bidder whose Bid has been determined:

- i. to be substantially responsive to the bidding documents and who has offered the lowest evaluated Bid price, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of Clause 3 of ITB, and (b) qualified in accordance with the provisions of Clause 4 of ITB; and as per clause 14 of Notice Inviting Bid (Section-3).

28. JREDA's Right to accept any Bid and to reject any or all Bids

28.1. Notwithstanding Clause 27 above, the JREDA reserves the right to accept or reject any Bid, and to cancel the bidding process and reject all bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the JREDA's action without any reason.

29. Notification of Award and Signing of Agreement

29.1. The bidder whose Bid has been accepted will be notified of the award by the JREDA prior to expiration of the Bid validity period by cable, email, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the Part I - General Conditions of Contract called the "Letter of Acceptance") will state the sum that the JREDA will pay to the Contractor in consideration of the execution and completion of the Works (hereinafter and in the Contract called the "Contract Price").

29.2. The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause 30.

29.3. The Agreement will incorporate all agreements between the JREDA and the successful Bidder. It will be signed by the JREDA and the successful Bidder after the performance security is furnished.

29.4. Upon the furnishing by the successful Bidder of the Performance Security, the JREDA will promptly notify the other Bidders that their Bids have been unsuccessful.

30. Security Deposit

30.1. Successful General bidder shall submit a security deposit @10% of the allotted work order value in the form of Bank Guarantee valid for one year on or before 15 days from issuing work order. If Bank Guarantee will not be submitted within stipulated period from the date of issue of work order then JREDA shall cancel the work order.

- 30.2. Successful MSME bidders shall be required to deposit only 10% of security deposit required for general bidder as per Jharkhand Procurement Policy.
- 30.3. Successful New Entrepreneurs bidders shall be required to deposit only 5% of security deposit of the allotted work order value in the form of Bank Guarantee for one year on or before 15 days from issuing work order. If Bank Guarantee will not be submitted within stipulated period from the date of issue of work order then JREDA shall cancel the work order.
- 30.4. The Security Deposit shall be refunded / released to the bidder after expiry of 60 days from the actual date of successful completion.

31. Performance Guarantee

- 31.1. Successful General bidder shall submit a performance guarantee @10% of the allotted work order value in the form of Bank Guarantee valid for five years on or before release of payment of installation & commissioning.
- 31.2. Successful MSME bidders shall submit a Performance Guarantee @5% of the allotted work order value in the form of bank guarantee before release of payment of installation & commissioning.
- 31.3. The Performance Guarantee will have to be maintained by the bidder with JREDA till the completion of warrantee period.
- 31.4. The Security Deposit/Performance Guarantee shall be submitted in the form of bank guarantee in favour of "Director, JREDA" payable at Ranchi from any Indian Nationalized bank/Scheduled bank.
- 31.5. Non submission of Security Deposit/Performance Guarantee within the time frame, shall lead to forfeiture of EMD and cancellation of LOI/LOA.
- 31.6. If Bidder/MSME unit fails to carry out the work allotted to him as per the provisions of the tender documents then such Bidder/MSME unit may be black listed for future awards of work.

32. Plant Performance Evaluation

- 32.1. The successful bidder shall be required to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning and related Capacity Utilization Factor as per the GHI levels of the location during the O&M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning acceptance to qualify for release of payment. Minimum CUF of 15% should be maintained for a period of 5 Years for fulfilling one of the condition for release of PBG. The bidder should send the periodic plant output details to JREDA for ensuring the CUF. The PR will be measured at inverter output level during peak radiation conditions. The PR and CUF will be calculated as per the methods mentioned in [Annexure-17](#).

33. Five Years Comprehensive Maintenance Contract (CMC)

- 33.1. The Grid Connected Rooftop SPV Power Plant contract price includes the provision of 5 years mandatory Comprehensive Maintenance Contract (CMC). To ensure long term sustainability of the system, the bidder must provide his representatives name, full address, mobile number and photographs to JREDA with one hard copy as well as the names and contact details of all technicians must also be provided. Failure to do shall invite penalty and action.
- 33.2. The Comprehensive Maintenance Contract shall include servicing & replacement guarantee for parts and components (such as battery, electronics, Inverter, PV modules and other hardware) of Grid Connected Rooftop SPV Power Plant for five years from the date of installation. **PV modules shall be warranted for 25 years.** Battery should be warranted for a minimum life of 5 years. The date of CMC maintenance period shall begin on the date of actual commissioning of Grid Connected Rooftop SPV Power Plant. It is mandatory for the contractor to carry out CMC regularly and submit report to JREDA quarterly. Failure to submit quarterly CMC reports timely shall invite penalty and action.
- 33.3. For any issue related to operation & maintenance, a contact number shall be made available to the concerned departments to resolve immediately, if the bidder do not attempt the rectification of any such defect within

three days of communication of such complaint to the bidders, the bidder will be liable for a penalty of Rs. 100 per day beyond three days of reporting of such complaint. Further if the outage of the plant is more than 30 days continuously, then the 50% PBG amount shall be encashed by JREDA and if the outage is exceeding more than 60 days than complete PBG amount shall be encashed by JREDA. This will be applicable till 5 years of O&M as per the scope of the RFP. Bidder shall monthly O&M report as per the [Annexure- 13](#).

34. Preventive/Routine Maintenance

This shall be done by the supplier/contractor at least once in every month and shall include activities such as, cleaning and checking the health of the SPV system, cleaning of module surface, topping up of batteries, tightening of all electrical connections, regular checks to identify any leakage of electricity, changing of tilt angle of module mounting structure, cleaning & greasing of battery terminals and any other activity that may be required for proper functioning of the Solar Photovoltaic Power Plant. The maintenance record should be kept properly and to be submitted at JREDA office time to time. CMC documents should be certified by Beneficiary.

35. Breakdown / corrective Maintenance

Whenever a complaint is lodged by the user the bidder shall attend the same immediately. It is clarified that effective CMC means that the bidder should ensure smooth working of solar power plant throughout the CMC period and therefore, if any complaint in this level of service is found by the JREDA officials and if the bidder do not attempt the rectification of any such defect within three days of communication of such complaint to the bidders, the bidder will be liable for a penalty of Rs. 100 per day beyond three days of reporting of such complaint.

36. Advances

The JREDA will not provide Mobilization Advance and Advance against the security of equipment as provided in Part I - General Conditions of Contract.

37. Corrupt or Fraudulent Practices

The JREDA requires the bidders/Contractors to strictly observe the laws against fraud and corruption in force in India, namely, Prevention of Corruption Act, 1988.

Section-5: General Terms & Conditions

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

1. Introduction:

The instruction/information contained in the bid documents are for guidance and compliance of the intending bidder. Bidders are advised to obtain clarification from JREDA, if any, prior to submission of their bid, failing which it will be deemed that the stipulation made in the bid documents have been read, understood and are acceptable to the bidder.

Bidder shall bear all costs associated with the preparation and submission of the bid, journeys undertaken by them and subsequent bidding process till the award of the order to successful bidder and the JREDA shall in no case, shall be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

2. Scope of work:

The Scope of work for **Grid Connected Rooftop SPV Power Plant** includes **Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis anywhere in the state of Jharkhand** complete set in all respects along with one set of operational instruction cum maintenance manual (both English and Hindi) for each set and delivery on FOR destination/site (door delivery) basis across the State of Jharkhand as per the direction of JREDA. The list of destinations/consignees will be given to the successful bidder by JREDA before the start of dispatch.

3. Bid documents:

Tender documents shall comprise of all the documents mentioned in this Bid. In addition to these any other documents/amendments/revisions or instructions issued by JREDA from time to time to bidders till due date of opening of the offers, shall also be deemed to be integral part of the bid document.

4. Price:

The bidder shall quote his price as per schedule of items of work. The contract price rates shall be firm and binding and shall not be subject to any variation except for statutory variation of taxes and duties during the contractual completion period. ***The price shall be inclusive of all taxes, duties and levies including Jharkhand VAT and 5 years CMC etc. as on the opening date of tender.*** The price shall also include designing, manufacturing, inspection, supply, transport, insurance, handling etc. All applicable charges for taking necessary clearance such as commercial tax, road permit etc. wherever required are also deemed to be included in the contract price.

5. Inspection of the factory and Tests:

JREDA reserves the right to inspect manufacturer's works/factory to ascertain the capability/availability of necessary equipment and infrastructure required for manufacture of the items offered. JREDA shall have the access and right to inspect the work or any part thereof at any stage and to test the goods to confirm their conformity to the technical specifications. Successful bidder shall inform JREDA at least 15 days in advance of schedule dispatch for technical sample audit.

6. Payment terms and conditions:

Subject to any deduction which JREDA may be authorized to make under this contract, the contractor shall be entitled to payment as follows:

- (a) **60%** of the Contract Price shall be paid against supply and delivery of goods in full and in good condition as certified by Consignee & JREDA Officials after submission of following documents:
 - i. Original Commercial invoice raised from the state of Jharkhand for the supply made in triplicate (1+2).

- ii. Copy of duly raised delivery challan / transportation challan /lorry receipt/dispatch clearance.
 - iii. Duly filled [Annexure-12](#) should be submitted in three sets (one for Consignee record, one for JREDA Hq. and one for JREDA's field Executive Engineer).
 - iv. Photographs of all the equipment (materials) at destination with signature& seal of Consignee/JREDA Officials. This record should be kept in the office of Consignee for verification.
 - v. Copy of Insurance Policy.
- (b) **30%** of the Contract Price shall be paid against Installation, Testing & Commissioning after submission of following documents:
- i) Copy of Original Commercial invoice raised at the time of supply in triplicate (1+2).
 - ii)Duly filled [Annexure-15](#).
 - iii) Certificate for minimum seven days of satisfactory performance with photographs of the each installed Grid Connected Rooftop SPV Power Plant with GPS Co-ordinates in Soft copy(CD).
 - iv) Joint commissioning report of JREDA officials and Agency.
- (c) Rest **10%** of the Contract Price shall be paid @**2%** of the Contract Price on completion of every year for the 5 year CMC period, after submission of following documents::
- i) Copy of Original Commercial invoice raised at the time of supply in triplicate (1+2).
 - ii) Submission of monthly reports of CMC undertaken by the contractor as per [Annexure-13](#).

The payment for the items to be procured/installed will be released on receipt of the corresponding share as has been provided in the approved scheme of JREDA either from MNRE, Govt. of Jharkhand, beneficiary or other concerned.

"The efforts will be made by JREDA to make available the 100% due payment to the agency within three months against satisfactory completion of the work."

7. Dispatch Instructions:

All items/equipments shall be subject to **Pre-Dispatch Inspection (PDI)** by JREDA or its authorized representatives at the manufacturing site before their dispatch. The manufacturing site must have sufficient testing facilities. The manufacturer will submit **test report** with regard conformity to technical specifications for the items to be dispatched to work site of JREDA. However, equipments will be dispatched from the manufacturing site only after the receipt of "**Dispatch Clearance**" from JREDA after acceptance of test report. No consignment shall be dispatched without the receipt of dispatch clearance from JREDA. No PDI shall be done at any site other than the concerned manufacturing site. Successful bidders have to arrange necessary equipments for testing the materials to be supplied during the pre-dispatch inspection by JREDA at their manufacturers unit. Failure to fulfill the PDI conditions shall lead to cancellation of work order and forfeiture of security deposit.

The items which are being procured through this bid have to be installed on the basis of demand to be received by JREDA. Therefore, JREDA does not take responsibility that it will procure 100% quantity as has been indicated in the bid. Further, as JREDA will receive the demand, the supply order shall be placed to the successful bidder for execution in due time.

After finalization of the tender JREDA authority will first empanel bidders and take decision for issuing work order for the work under scope to the successful bidder; and thereafter on the basis of demands received in the JREDA office, request for supply/ installation will be communicated. Then within 2 months period the supplier will have to ensure pre dispatch inspection from JREDA and within next 15/30 days JREDA will issue Dispatch instruction. Accordingly the work of supply & installation will be completed by the vendor within 45/90 days period from the date of issue of dispatch instruction. The bidders shall have no claim regarding economy

of scale, choice of district/s or choice of region in the state, for the purpose of transportation of items/materials to the demand/work sites.

8. Liquidated Damages for Delay in Completion & CMC:

If the supplier fails in the due performance of the contract to deliver any part of the equipment or complete the work within the time fixed under the contract or any extension thereof granted to him by JREDA and/or to fulfill his obligations in time under the contract, he shall be liable to pay to JREDA @0.5% per week maximum up to 10% of work value delayed beyond contract period. The same will be applicable if monthly CMC report will not be submitted within a week of due date.

9. Risk & Cost:

If the contractor fails to complete the awarded work up to extended period of one year from the scheduled date of completion then JREDA will be at liberty to cancel the said work order and will get the full or part of left over work to be completed by way of engaging alternate contractor and completion of the said work shall be got completed at risk & cost of the failed contractor and failed contractor shall be liable to pay all the dues to JREDA.

10. Insurance:

The supplier shall arrange for transit and erection insurance of the materials & equipments for setting up of Solar Photovoltaic System. In case of any theft or damage of equipment during erection period the same will be responsibility of supplier to get it rectify at their own cost.

11. Assignment/ Sub-letting:

The Manufacturer shall not assign or sublet, manufacture, shop testing, packing & forwarding, transportation, transit insurance, supply in whole or part, and its obligations to any third party to perform under the order/contract.

In the event the manufacturer contravenes this condition, JREDA reserves the right to reject the equipment/work contract and procure the same from elsewhere at manufacturer's risk and cost. The Manufacturer shall be solely liable for any loss or damage which JREDA may sustain in consequence or arising out of such replacing of the contract work.

12. Completeness of Tender:

All fittings, assemblies, accessories, hardware items etc. & safety and protection devices as required shall be deemed to have been included in the tender, whether such items are specifically mentioned in the BoM or not.

13. Compliance with Regulations:

The supplier/contractor shall comply with all applicable laws or ordinances, codes approved standards, rules and regulations and shall procure all necessary municipal and/or other statutory bodies and government permits & licenses etc. at his own cost. The contractor shall leave the purchaser, Director, JREDA harmless as a result of any infractions thereof.

14. Agreement:

The successful qualified suppliers shall have to enter into an agreement in the office of the Director, JREDA, in prescribed format before commencement of supply.

15. Income Tax / VAT:

Without prejudice to the obligations of the supplier under law, any income tax and VAT which JREDA may be required to deduct by law/statute, shall be deducted at source and shall be paid to income tax authorities on account of the supplier. JREDA shall provide the supplier a certificate for such deductions of tax.

16. Training Program, After Sales Service and Availability of Spare Parts:

- 16.1. The responsibility of organizing training program for Solar Power Plant will rest on the successful bidder. The training program will be organized in consultation with JREDA/Consignee. The training program will focus on operation and maintenance of Solar Power Plant. Printed leaflet/literature should be made available in Hindi by the Supplier regarding the operation and maintenance of their Solar Power Plant.
- 16.2. The Supplier shall depute authorized Service Engineer within 7 days from the date of the intimation of fault, and establish sufficient inventory of spares in the State in consultation with JREDA to provide satisfactory and uninterrupted services during the warrantee period.

17. Force Majeure conditions:

In the event of either party being rendered unable by force majeure to perform any obligation required to be performed by them under this agreement, relative obligation of the party affected by such force majeure shall be treated as suspended during which force majeure condition last.

The term force majeure shall have herein mean riots (other than among the contractor's employee), civil commotion, war (whether declared or not), invasion, act of foreign enemies hostilities, rebellion, insurrection, military coup to usurp power, act of god such as earthquake, lightening, floods, fires not caused by contractor's negligence and other cause which the contractor has no control and accepted as such by the Director, JREDA, whose decision shall be final and binding.

If the work is suspended by force majeure conditions lasting for more than 45 days, the purchasers shall have the option of canceling this contract in whole or part thereof, at its discretion. The contractor shall not claim for compensation for force majeure conditions.

18. Jurisdiction of the Court:

All disputes would be settled within Ranchi jurisdiction of court of law only.

Section-6: Technical Specification

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

Technical Specifications for Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.

1. General Description & Configuration:

The brief technical details for the various Rooftop SPV power plants are as follow:

S. N.	SPV Power Plant Capacity (KW)	SPV Capacity (kWp)	Battery Bank Size (AH/Volt)	PCU Rating (KVA)	Module Mounting Structure (MMS)	Balance of System (BOS)
1	Category "A" 1 to 10 KW	1 to 10 KWp	4.8VAH/Wp	30%higher than SPV Capacity	As per design	As per design
2	Category "B" 11 to 50 KW	11 to 50 KWp	4.8VAH/Wp	30%higher than SPV Capacity	As per design	As per design
3	Category "C" 51 to 100 KW	51 to 100 KWp	4.8VAH/Wp	30%higher than SPV Capacity	As per design	As per design
4	Category "D" Above 100 KW	Above 100 KWp	4.8VAH/Wp	30%higher than SPV Capacity	As per design	As per design

S. N.	SPV Power Plant Capacity (KW)	SPV Capacity (kWp)	Battery Bank Size (AH/Volt)	PCU Rating (KVA)	Module Mounting Structure (MMS)	Balance of System (BOS)
1	Category "A-1" 1 to 10 KW	1 to 10 KWp	Without Battery Bank	Same as SPV Capacity	As per design	As per design
2	Category "B-1" 11 to 50 KW	11 to 50 KWp	Without Battery Bank	Same as SPV Capacity	As per design	As per design
3	Category "C-1" 51 to 100 KW	51 to 100 KWp	Without Battery Bank	Same as SPV Capacity	As per design	As per design
4	Category "D-1" Above 100 KW	Above 100 KWp	Without Battery Bank	Same as SPV Capacity	As per design	As per design

The rooftop installation of Solar Power Plant consisting of crystalline solar module, mounting systems and hybrid solar power conditioning unit with battery back-up or pure grid tie central/string inverter without battery back-up. The Hybrid PCU in addition to battery charging during sunny hours the loads are fed from SPV Power Plant. The Solar Photovoltaic Power Plant shall cater the electricity demand as per the proposed hours or duration per day. The system shall have the provision of charging battery bank through mains as well. It should be designed such that during sunny hours the loads are fed from SPV Power Plant in addition to battery charging. If the power produced from the Power Plant is not sufficient to feed the loads then the balanced power will be taken from the grid and battery simultaneously according to the available source. The Power Plant shall provide a reliable and independent power supply at a voltage and frequency levels to suit the grid voltage and frequency.

2. Working of the Hybrid PV System:

Rooftop Based Solar Power Plant is planned to meet the energy requirements of the concerned Building at any places in Jharkhand from solar power to ensure reliability and reduce dependence on grid power. The system is required to power the lights, fans, computer and other electrical appliances during office hours as well as during night time and holidays. The system is expected to work in the following way:

- 2.1. During day time when sufficient sun light is available, the connected load should be powered from the solar electricity generated and any excess solar energy produced should be used to charge the storage batteries.
- 2.2. If the storage battery is fully charged, the power generated from the solar plant will be connected to the load, and if the load consumption is lesser than the SPV plant production then the extra power exported to the utility grid through the bidirectional meter which records the net energy exported to the grid.
- 2.3. During day time when sufficient solar electricity is not available to power the load, the balance energy should be drawn from the Utility Grid/storage battery provided.
- 2.4. During night time, when no solar energy is available, the load should be powered from the Utility Grid/ storage battery provided.
- 2.5. Normally, battery storage needs to be charged from the solar array. But there should be a provision available to charge the battery from utility grid, if the battery voltage is lower than a preset voltage.
- 2.6. In general, the priority of usage of input energy sources should be in the following order.

First Priority: Solar

Second priority: Mains

Third Priority: Storage Battery

- 2.7. There should be no break in the supply while changing from one mode to another mode of operation.

3. Major Components of the system:

The following are the major components of the system:

- Solar PV Array
- Array Mounting Structure
- Junction Box
- Power Conditioning Unit
- Storage Battery
- Data Logger
- Cables
- Bi-Directional Meter

3.1. Solar PV Module / Array

- 3.1.1. Solar Photo Voltaic (SPV) modules/ array shall be of high efficiency made of crystalline silicon solar PV cells and shall also satisfy the **MINIMAL TECHNICAL REQUIREMENTS / STANDARDS FOR SPV SYSTEMS**
- 3.1.2. The terminal box on the module should have a provision for opening for replacing the cable, if required.
- 3.1.3. The rating of each individual module should not be less than **250Wp** at Standard Test conditions (Higher ratings can be used) and shall meet following minimum requirement:

Efficiency of module \geq 14%

Fill factor shall be greater than 70%.

General requirements for PV module:

- a. Module shall be made up of mono or poly crystalline silicon cells.
- b. The interconnected cells shall be laminated in vacuum to withstand adverse environmental conditions
- c. The module frame is made of corrosion resistant materials, preferably having aluminium anodized finish
- d. The minimum clearance between the lower edge of the modules and the developed ground level shall be 300 mm.
- e. Surge arresting device to be provide at junction box and module shall be provided with bypass diode.
- f. The SPV module must be IEC 61215 and IEC 61730 Part I and Part II certified from any of the accredited certifying agencies.
- g. Each solar PV module shall be warranted by the manufacturer for at least 90% of its rated power after initial 10 years and 80% of its rated power after 25 years from the completion of the trial run.
- h. Each PV module deployed must use a RF identification tag. The following information must be mentioned in the RFID used on each module. (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).
 - Name of the manufacturer of the PV module
 - Month & year of the manufacture(separate for solar cells and modules)
 - Country of origin (separately for solar cells and module)
 - I-V curve for the module
 - Wattage, I_m , V_m and FF for the module
 - Unique Serial No and Model No of the module
 - Date and year of obtaining IEC PV module qualification certificate
 - Name of the test lab issuing IEC certificate
 - Other relevant information on traceability of solar cells and module as per ISO 9001.

3.2. Module Mounting Structure

- 3.2.1. The structure shall be provided on terrace of the building.
- 3.2.2. The structure shall be designed in accordance with the latitude of the place of installation. The support structure should be designed so that the load on buildings does not cross the limit of 40 Kg / sq. m, for roof mounted type. The array mounting structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. Structure shall be designed for simple mechanical and electrical installation.
- 3.2.3. The array structure shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly.
- 3.2.4. The mounting structure shall be of anodised aluminium and shall be as per relevant standards and shall withstand wind speeds of 150 KM/hour. The support structure angle should be of dimension 50x50x5mm. The minimum thickness of galvanization shall be at least 80 microns. Fixing fasteners shall be of Stainless steel, all nuts & bolts stainless steel. Legs assembly shall be of MS Hot Dip galvanized pipes after fabrication/Anodised Aluminium. Mounting structure shall of anodized aluminium /MS hot dip galvanized GI/ C Channel etc. The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.
- 3.2.5. The minimum clearance of the lowest part of the module / module structure and the terrace shall not be less than 300 mm or as approved by JREDA based on site condition.

- 3.2.6. The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m². **No drilling is allowed on the terrace.**
- 3.2.7. The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.

3.3. Junction Boxes

- 3.3.1. The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminium /cast aluminium alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.
- 3.3.2. Copper bus bars/terminal blocks housed in the junction box with suitable termination threads conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single / double compression cable glands. It should be placed at 5 feet height or above for ease of accessibility.
- 3.3.3. Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.
- 3.3.4. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.
- 3.3.5. All fuses shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers

3.4. Power Conditioning Unit (Hybrid PV)

Power Conditioning Unit (PCU) provides an un-interrupted AC power using battery bank. Array output will be fed to PCU which consists of MPPT based Charge Controller, Inverter, Voltage Stabilizer and distribution panel along with necessary Displays, Indicators and Alarms and major protections and should conforming to IEC 61683/ IS 61683 Standard for efficiency measurement should conform to IEC 60068-2(1, 2, 14, 30) or equivalent BIS standard for environmental testing. The power conditioning unit shall convert DC Power by SPV modules and store in battery bank and good quality AC Power output is delivered. Bidder should ensure that the PCU supplied conform the performance as per MNRE requirements/specifications.

The Hybrid PCU in addition to battery charging during sunny hours the loads are fed from SPV Power Plant. The Solar Photovoltaic Power Plant shall cater the electricity demand as per the proposed hours or duration per day. The system shall have the provision of charging battery bank through mains as well. It should be designed such that during sunny hours the loads are fed from SPV Power Plant in addition to battery charging. If the power produced from the Power Plant is not sufficient to feed the loads then the balance power shall be fed by Utility Grid/Battery bank. The Power Plant shall provide a reliable and independent power supply at a voltage and frequency levels to suit the grid voltage and frequency.

The power conditioning unit should be an integrated unit comprising MPPT solar charger and bidirectional inverter. The details of solar charge controller & bidirectional inverter should be as under:

A. **SOLAR CHARGE CONTROLLER:**

Solar Charge controller should be an MPPT based charge controller which tracks the maximum power point of PV panels all the time.

The MPPT based solar charge controller should guarantee below minimum features:

- 3 stage battery charging (float, boost & equalize stages) for long life of the battery
- Battery current limiting feature to avoid over charge into the batteries
- Battery & PV reverse polarity protection (no use of blocking diodes which reduces overall efficiency of the system)

- Rated MCCB/MCB on all PV inputs & battery inputs.
- MOV type surge arrestors on all PV inputs for overvoltage protection against lightening induced surges
- Individual KWH meters showing PV Voltage, PV Amps, Instantaneous PV Power, Daily PV generated & cumulative PV generated.
- All the parameters from KWH meters of PV channels should be available through an industry standard protocol for remote access.

B. BIDIRECTIONAL SINGLE/THREE PHASE INVERTER:

It should be a bidirectional inverter unit such that the same circuit elements are used for performing inverting and battery charging (through mains) operation. It should be an IGBT/MOSFET based; microprocessor/DSP controlled inverter & should incorporate PWM technology and all the desired safety features for reliable running of PCU.

The below minimum features should be ensured in the inverter unit:

- Operation without any derating from 0 to 50 degrees of ambient temperature
- Overloads of 110% for 60 sec, 125% for 30 sec and 150% for 5 sec.
- Inverter should be able to sustain load imbalance between the phases.
- Automatic reset of all non critical faults such as overloads, AC over voltage/ under voltage etc. once the fault has been cleared
- Facility to export excess PV power to grid incase consumption of loads is less than the generation. This is a futuristic feature and provision should be there to enable & disable this export feature.

The same bidirectional inverter should act as a battery charger (using 3 phase grid supply) incase solar PV power is not available and battery is discharged below a predefined level. The mains based battery charger should incorporate below minimum features:

- Facility to bypass grid to loads and charge batteries at the same time
- Should be IGBT based for rugged operation.
- Should use AC supply of all the three phases and not single phase.
- Should have a peak efficiency of at least 85% for AC to DC conversion.
- 3 stage battery charging for long life of the battery.
- Facility to enable/ disable charging of battery through mains by controlling the import power from mains.

TECHNICAL SPECIFICATIONS

PARAMETERS	SPECIFICATIONS
Output Voltage	230Volts ± 1% single phase, 2 wire output /415Volts ± 1% three phase, 4 wire output. Nominal voltage could be adjusted ± 5% via system set points.
Output Frequency	50Hz ± 0.5% during stand alone inverter operation. Inverter to follow generator frequency up to ± 3 Hz of the nominal output frequency during synchronized operation
Continuous Rating	As per system rating

Voltage Synchronization Range	-20% to +15% of the nominal output voltage
Frequency Synchronization Range	±5% of Nominal output Frequency
Surge Rating	Up to 150% of the continuous rating for a minimum of 30 seconds
Waveform	Sine wave output
THD	Less than 3%
Efficiency	At 25% load > 85% At 50% load > 90% At 75 % load and above > 92%
Regulation	≤ 2%
Phase Load imbalance	At least 30% between phases
Internal Protection System	<ul style="list-style-type: none"> • Inverter continuous overload • Short circuit protection • Over/under AC voltage protection • Over/under frequency protection • Over/under battery voltage protection
Display (Inverter/ MPPT Charger)	<ul style="list-style-type: none"> • Inverter O/P Voltage, Current, Frequency • Mains Voltage, Current, Frequency • Battery Voltage, Current • Mode of Operation, Active Faults • PV Voltage, Current, Instantaneous Power, Daily Generation, Total Generation(for each Solar Charger channel separately)
MCBs	<ul style="list-style-type: none"> • PV (each Channel) • Battery • Mains • Load
Environmental	
Operating Temperature Range	0-50 degrees ambient
Humidity	0-90% non condensing
Enclosure	IP-30

REMOTE MONITORING

All the relevant parameters of PCU should be available for remote monitoring over internet using GPRS based monitoring solution. PCU shall have GPRS in ability based on SIM card which shall be provided by the bidder. The monthly charge of SIM card will be borne by bidder. The list of parameters should include:

Solar Charge Controller	PV Voltage, PV Current, PV Power, Daily Generation, Total Generation. (All above parameters to be included for all MPPT channels individually)
Inverter/ Mains Charger	<ul style="list-style-type: none">• Inverter Voltage, Current, Frequency• Mains Voltage, Current, Frequency• Battery Voltage, Current• Active Faults

Grid-Tied String or Central Inverter:

- a. Grid Connected Inverters shall convert DC energy produced by the solar array to AC energy such that it synchronizes with the existing AC power sources on site. The AC power output of the inverter shall be fed to the rated AC distribution board (metering panel & isolation panel), which also houses the energy meter. The system should always work in solar priority mode such that power drawn from other sources (Grid or DG) is minimum depending upon the load requirement.
- b. The inverter shall have inbuilt MPPT (Maximum Power Point Tracker) feature so as to extract maximum power from PV modules at any moment of time.
- c. The system shall have inbuilt shut down/ wake feature such that it automatically wakes-up in the morning and supply power, provided there is sufficient solar energy and the grid voltage and frequency are in range. Similarly once the Solar is down it should automatically go in to sleep mode to minimize the losses.
- d. The Inverter can be of either Central or String type.
- e. The inverter shall have inbuilt Anti-Islanding feature such that whenever the grid voltage and/or frequency go out of pre-set range, the inverter shall be immediately disconnected from the grid. The inverter will reconnect after a pre-determined time when the grid is back in the range. The same shall be applicable when there is a power cut.
- f. The unit shall be able to synchronize with Diesel Generators (DG) or Hybrid PCU of similar or higher capacity as well, and supply solar power to loads in solar priority mode. The quality of DG or Hybrid PCU shall be such that voltage and frequency output is within the stipulated limits.
- g. The Inverter shall provide 1 Phase/ 3 phase output, 230V/ 415V (with grid tracking of -20% to +15 %/), 50 Hz (with grid tracking of $\pm 5\%$ i.e. 47.5 to 52.5 Hz) supply on AC side.
- h. At rated power, the inverter output's current THD shall be less than 3%.
- i. Also, the Inverter should perform at 100% capacity throughout the operating temperature range (i.e. 0-50 degrees ambient). There should be no de-rating of output power within the operating temperature range.
- j. It shall be capable of complete automatic operation, including wakeup, synchronization and shut down.

- k. Ingress protection: For outdoor installation Minimum IP-65 and for indoor installation minimum IP-20 degree of protection is required. This is valid for both string and central type inverter. For outdoor installation inverter is to be placed under shade.
- l. MPPT controller, inverter and associated control and protection devices, etc. all shall be integrated into the PCU.
- m. PCU shall have the facility to display the basic parameters of the system. Typically it could be a 4 line by 20 characters type LED/LCD display. Displays of a bigger size can also be provided.
- n. PCU includes ground lugs for equipment and PV array groundings. The DC circuit ground shall be a solid single point ground connection.
- o. To allow maintenance of the PCU, means of isolating the PCU from the DC side and the AC side shall be provided.
- p. Since net metering may not be permitted at the time of installation at some places, facility to prevent generated PV power into the Grid (beyond utility meter) would be preferred. This should not be implemented via shut down of solar inverter or Reverse power relay. Instead, inverter should have the facility of export power control.
- q. In PCU/Inverter, there shall be a direct current isolation provided at the output by means of a suitable isolating transformer. If Isolation Transformer is not incorporated with PCU/Inverter, there shall be a separate Isolation Transformer of suitable rating provided at the output side of PCU/PCU units for capacity more than 100 kW.
- r. The PCU/ inverter generated harmonics, flicker, DC injection limits, Voltage Range, Frequency Range and Anti-Islanding measures at the point of connection to the utility services should follow the latest CEA (Technical Standards for Connectivity Distribution Generation Resources) Guidelines.
- s. The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068-2 (1,2,14,30)/ Equivalent BIS Std.
- t. The MPPT units environmental testing should qualify IEC 60068-2 (1, 2, 14, 30)/ Equivalent BIS std. The junction boxes/ enclosures should be IP 65 (for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
- u. The PCU/ inverters should be tested from the MNRE approved test centres/ NABL/ BIS/ IEC accredited testing-calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

Technical Parameters of Pure Grid-Tied String or Central Inverter

PARAMETERS	SPECIFICATIONS
Switching devices	IGBT/MOSFET
Control	Microprocessor /DSP
Output Voltage/ Frequency	230V/ 415V for 1-Phase/ 3 phase systems & 50Hz
Voltage Synchronization Range	-20% to +15% of the nominal output voltage
Frequency Synchronization Range	±5% of Nominal output Frequency
Continuous Rating	As per the site but without any de rating from 0-50 degrees
Inverter Type	String/ Central Inverters
Galvanic Isolation	Must for both String and Central Inverters above 100 kW.

THD	Less than 3%
Regulation	≤ 2%
Internal Protection System	Array ground fault protection Input reverse polarity protection Grid Over/ Under Voltage & Frequency Anti-islanding Protection
Indications/ Displayed parameters	Inverter ON Grid ON Inverter under voltage/over voltage Inverter over-temperature Earth Fault/ Low Insulation Resistance
Circuit Breakers	<ul style="list-style-type: none"> ➤ PV ➤ Mains
Environmental	
Operating Temperature Range	0-50 degrees ambient
Humidity	95% non-condensing
Enclosure	IP-20/ IP-65 for Indoor and outdoor inverters respectively
Standards	
Efficiency Measurement	IEC 61683
Environmental testing	IEC 60068-2 (1,2,14,30)
Interfacing with utility grid	IEC 61727 or Equivalent
Islanding Prevention Measurement	IEC 62116 or Equivalent
General Electrical data	
Efficiency	> 95% at nominal voltage & power as per IEC 61683 or equivalent international efficiency standards
No load losses	Less than 1% of rated power
Overload feature	150% for 1 minute
Cooling	Forced air cooling with temperature controlled cooling fan
Display	
Display type	LCD / LED Display
Display parameter	
DC	Voltage Current Power
On grid connected mode	Line status Grid voltage

	Grid frequency Export Power Cumulative Export Energy
Interface (Communication protocol)	Suitable port to be provided in the inverter. i) On site upgrade of Software ii) On site dumping data from the memory iii) Web based remote monitoring system
Web monitoring	Matched with the monitoring and data logging system
Protection	
DC Side	Input over voltage Reverse-polarity protection Reverse current to PV array protection, over voltage, Under voltage protection Over current
AC side	i) DC inject protection to grid ii) Over voltage and Under voltage iii) Over current iv) Over and under grid frequency protection v) Anti-Islanding protection
Isolation Switch	PV array Isolation switch (DC)
Safety	IEC 62109 Part 1 & 2
Environmental Testing	As per IEC 60068-2

DATA ACQUISITION SYSTEM/PLANT MONITORING/REMOTE MONITORING:

Data Acquisition System shall be provided for each of the solar PV plant above 10 kWp capacity.

Data Logging Provision for plant control and monitoring, time and date stamped system data logs for analysis with the high quality, suitable PC. Metering and Instrumentation for display of systems parameters and status indication to be provided.

Solar Irradiance: An integrating Pyranometer / Solar cell based irradiation sensor (along with calibration certificate) provided, with the sensor mounted in the plane of the array. Readout integrated with data logging system.

Temperature: Temperature probes for recording the Solar panel temperature and/or ambient temperature to be provided complete with readouts integrated with the data logging system.

The following parameters are accessible via the operating interface display in real time separately for solar power plant:

- a. AC Voltage.
- b. AC Output current.
- c. Output Power
- d. Power factor.
- e. DC Input Voltage.
- f. DC Input Current.

- g. Time Active.
- h. Time disabled.
- i. Time Idle.
- j. Power produced
- k. Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage).

All major parameters available on the digital bus and logging facility for energy auditing through the internal microprocessor and read on the digital front panel at any time) and logging facility (the current values, previous values for up to a month and the average values) should be made available for energy auditing through the internal microprocessor and should be read on the digital front panel.

PV array energy production: Digital Energy Meters to log the actual value of AC/ DC voltage, Current & Energy generated by the PV system provided. Energy meter along with CT/PT should be of 0.5 accuracy class.

Computerized DC String/Array monitoring and AC output monitoring shall be provided as part of the inverter and/or string/array combiner box or separately.

String and array DC Voltage, Current and Power, Inverter AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency shall be monitored.

Computerized AC energy monitoring shall be in addition to the digital AC energy meter.

The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form.

All instantaneous data shall be shown on the computer screen.

Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant.

Provision for instantaneous Internet monitoring and download of historical data shall be also incorporated.

Remote Server and Software for centralized Internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants and the data of the solar radiation and temperature monitoring system.

Ambient / Solar PV module back surface temperature shall be also monitored on continuous basis.

Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided.

Remote Monitoring and data acquisition through Remote Monitoring System software at the owner/JREDA location with latest software/hardware configuration and service connectivity for online/real time data monitoring/control complete to be supplied and operation and maintenance/control to be ensured by the bidder.

The bidders shall be obligated to push real-time plant monitoring data on a specified intervals (say 15 minute) through open protocol at receiver location (cloud server) in XML/JSON format, preferably. Suitable provision in this regard will be intimated to the bidders.

All the relevant parameters of Inverter should be available for remote monitoring over internet using GPRS based monitoring solution. The monthly charge of SIM card and server will be borne by bidder. The list of parameters should include:

PV Side	PV Voltage, PV Current, PV Power, total Generation etc.
Grid Side	<ul style="list-style-type: none"> ➤ Inverter Voltage, Current, Frequency ➤ Mains Voltage, Current, Frequency ➤ Active Faults

3.5. Battery Bank

The batteries shall be for SPV application Lead Acid type AGM-VRLA or Tubular Gel, Battery Bank voltage will be 24V/48V/96V/120V/240V or as per design.

The batteries shall use 2V battery capacity to be designed for C10 rate. Charging instructions shall be provided along with the batteries. A suitable battery rack with interconnections & end connector shall be provided to suitably house the batteries in the bank. Battery shall conform as per IEC 61427 and / relevant IS specifications as per MNRE requirements. Undertaking letter of the above specifications must be submitted along with the consignment. The Battery should be warranted for a period of 5 years.

Features:

- The batteries shall be for SPV application and shall be Lead Acid type AGM-VRLA or tubular Gel.
- The batteries shall use 2V battery capacity to be designed for C10 rate.
- Charging instructions shall be provided along with the batteries.
- A suitable battery rack with interconnections & end connector shall be provided to suitably house the batteries in the bank.
- The batteries shall be suitable for recharging by means of solar modules via incremental / open circuit regulators.
- Battery interconnecting links shall be provided for interconnecting the battery in series and in parallel as needed and shall be Lead coated heavy duty copper strips.
- Connectors for inter cell connection (series / parallel) shall be maintenance free screws. Front covers shall be provided for each battery bank.
- The operating range will be 0°C to +55/60°C.
- AH Efficiency: >95% and WH Efficiency: >85%
- Recombination Efficiency shall be >98%
- Self Discharge of battery shall be <0.5% per week at 27°C.
- The minimum warranty of the Battery should be 5 years.

3.6. DC Distribution Board (DCDB)

DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors

DCDB shall consist of MCBs of suitable specifications which can withstand respective flow of current, with the purpose of providing the option for isolating the battery bank & SPV arrays. Best quality Ah meter has to be installed to measure the cumulative charging & discharging status of battery bank. If charge & discharge AH meter is available in PCU then no need of AH meter separately in DCDB.

3.7. AC Distribution Board (ACDB)

- 3.7.1. AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.
- 3.7.2. All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III.
- 3.7.3. The changeover switches, cabling work should be undertaken by the bidder as part of the project.
- 3.7.4. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz
- 3.7.5. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.
- 3.7.6. All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better. Should conform to Indian Electricity Act and rules (till last amendment).
- 3.7.7. All the 415 AC or 230 volts devices / equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance.

3.8. Cables and accessories

Cables of appropriate size to be used in the system shall have the following characteristics:

- a. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
- b. Temp. Range: -10oC to +80oC.
- c. Voltage rating 660/1000V
- d. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- e. Flexible
- f. Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum (2%)
- g. For the DC cabling, XLPE or, XLPO insulated and sheathed, UV-stabilized single core multi-stranded flexible copper cables shall be used; Multi-core cables shall not be used.
- h. For the AC cabling, PVC or, XLPE insulated and PVC sheathed single or, multi-core multi-stranded flexible copper cables shall be used; Outdoor AC cables shall have a UV-stabilized outer sheath.
- i. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. Outer sheath of cables shall be electron beam cross-linked XLPO type and black in colour.
- j. The DC cables from the SPV module array shall run through a UV-stabilized PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5mm.
- k. Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers
- l. All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm; the minimum DC cable size shall be 4.0 mm² copper; the minimum AC cable size shall be 4.0 mm² copper. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires.
- m. Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified. In addition, cable drum no. / Batch no. to be embossed/ printed at every one meter.

- n. Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.
- o. All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including High temperatures, UV radiation, rain, humidity, dirt, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. DC cables used from solar modules to array junction box shall be solar grade copper (Cu) with XLPO insulation and rated for 1.1kV as per relevant standards only.
- p. The ratings given are approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant shall be provided by the bidder. Any change in cabling sizes if desired by the bidder shall be approved after citing appropriate reasons. All cable schedules/ layout drawings shall be approved prior to installation.
- q. Multi Strand, Annealed high conductivity copper conductor PVC type 'A' pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS /IEC 69947.
- r. The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%.
- s. The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%.

3.9. Earthing and Lightning Protection

Each array structure of the PV system should be grounded/earthed properly using adequate number of earthing kits as per IS: 3043-1987. In addition the lightning arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of Department/JREDA as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly.

Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential. The earthing resistance values shall conform to relevant IS/ Indian electricity rules.

The SPV power plants shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per IEC 62305 standards. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

Based on available roof area solar PV panels will be installed on the roof of the building. The output of the panels (DC electricity) connects to the power conditioning unit / inverter which converts DC to AC. The inverter output will be connected to the control panel or distribution board of the building to utilize the power. The inverter synchronizes with grid and also with any backup power source to produce smooth power to power the loads with preference of consuming solar power first. If the solar power is more than the load requirement, the excess power is automatically fed to the grid. For larger capacity systems connection through step up transformer and switch yard may be required to feed the power to grid. In case of grid failure, there should provision of protection for isolating the SPV plant from the grid.

4. Battery Room and Control Room

The control room & the battery room shall be provided by the end users.

5. Quality and adaptability of the equipment

Interested Companies must verify the grid behavior, solar insolation levels and general site conditions on their own before bidding. The bidder shall accordingly ensure that the equipment and the design submitted shall be able to perform as per guaranteed performance levels in the available site conditions. The design of the plant and the equipment offered shall be evaluated for its quality and adaptability to the site conditions.

6. Tools & Tackles and Spares:

After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the bidder for maintenance purpose. List of tools and tackles to be supplied by the bidder for approval of specifications and make from JREDA/ owner.

A list of requisite spares in case of PCU/Inverter comprising of a set of control logic cards, IGBT driver cards etc. Junction Boxes. Fuses, MOVs / arrestors, MCCBs etc. along with spare set of PV modules be indicated, which shall be supplied along with the equipment. A minimum set of spares shall be maintained in the plant itself for the entire period of warranty and Operation & Maintenance which upon its use shall be replenished.

7. Danger Boards and Signage:

Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date. Three signage shall be provided one each at battery –cum- control room, solar array area and main entry from administrative block. Text of the signage may be finalized in consultation with JREDA/ owner.

8. Fire Extinguishers:

The fire fighting system for the proposed power plant for fire protection shall be consisting of:

- a. Portable fire extinguishers in the control room for fire caused by electrical short circuits
- b. Sand buckets in the control room
- c. The installation of Fire Extinguishers should confirm to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have been installed.

11. Drawings & Manuals:

Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied. Bidders shall provide complete technical data sheets for each equipment giving details of the specifications along with make/makes in their bid along with basic design of the power plant and power evacuation, synchronization along with protection equipment.

Approved ISI and reputed makes for equipment be used.

For complete electro-mechanical works, bidders shall supply complete design, details and drawings for approval to SECI/owners before progressing with the installation work

12. Planning and Designing:

The bidder should carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labour. The bidder should submit the array layout drawings along with Shadow Analysis Report to SECI/Owner for approval.

JREDA reserves the right to modify the landscaping design, Layout and specification of sub-systems and components at any stage as per local site conditions/requirements.

The bidder shall submit preliminary drawing for approval & based on any modification or recommendation, if any. The bidder submits three sets and soft copy in CD of final drawing for formal approval to proceed with construction work.

13. DRAWINGS TO BE FURNISHED BY BIDDER AFTER AWARD OF CONTRACT:

The Contractor shall furnish the following drawings Award/Intent and obtain approval:

- a. General arrangement and dimensioned layout
- b. Schematic drawing showing the requirement of SV panel, Power conditioning Unit(s)/ inverter, Junction Boxes, AC and DC Distribution Boards, meters etc.
- c. Structural drawing along with foundation details for the structure.
- d. Itemized bill of material for complete SV plant covering all the components and associated accessories.
- e. General Arrangement of Solar Power Plant
- f. Single Line Diagram
- g. Earthing Layout of Solar Power Plant
- h. Shadow analysis of the roof

14. Safety Measures:

The bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines etc.

15. Display Board

The bidder has to display a board at the project site (above 25 kWp) mentioning the following:

Plant Name, Capacity, Location, Type of Renewable Energy plant (Like solar wind etc.), Date of commissioning, details of tie-up with transmission and distribution companies, Power generation and Export FY wise.

The size and type of board and display shall be approved by Engineer-in-charge before site inspection.

16. Manpower Training

The supplier/contractor shall train the users for the operation & maintenance of the plant.

Format for Covering Letter

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

(To be submitted in the official letter head of the company)

To,

The Director,
Jharkhand Renewable Energy Development Agency
3rd Floor, S.L.D.C. Building,
Kusai Colony, Doranda,
Ranchi - 834002.

Sub: Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.

Sir,

We are hereby submitting our offer in full compliance with the terms and condition of the above NIB No. We have submitted the requisite amount of "Earnest Money" in the form of Bank Guarantee, valid for twelve months.

The tender is uploaded on www.jharkhandtenders.gov.in as per the requirement of the website separately Technical Bid & Financial Bid.

(Signature of Authorized Signatory)

Name:

Designation:

Company Seal:

Information About The Bidding Firm
NIB No: 33/JREDA/ROOFTOP/GOV/16-17
(To be submitted in the official letter head of the company)

SL. No.	Particulars	
1.	Name of the Bidder	
2.	Address of Bidder with Telephone, Fax, email	
3.	Address of the Registered Office	
4.	Address of the works	
5.	GPS Co-ordinate of Registered Office	
6.	GPS Co-ordinate of Factory Campus	
7.	Name & Designation of Authorized Signatory for Correspondence (Attach Power of Attorney as per Annexure-6)	
8.	Nature of Firm (Proprietorship/Partnership /Pvt. Ltd./Public Ltd. Co./Public Sector)	
9.	Permanent Account Number (PAN)/TIN (Attach proof)	
10.	Firm's Registration Number (Attach proof)	
11.	Sales Tax/Value Added Tax Registration Number (Attach proof)	
12.	Specify the Item Originally Manufactured (SPV module/Electronics/Battery) (Attach copy of Registration Certificate of Industry Department)	
13.	Details of in-house testing facility (Attach Proof)	
14.	Office/ Dealer and Service network in Jharkhand with TIN No.(Give details)	
15.	Quoted quantity	
16.	Particulars of Earnest Money	
17.	Place where Materials will be Manufactured	
18.	Place where Materials will be Available for Inspection	
19.	Other details and remarks, if any	

Yours faithfully,

(Signature of Authorized Signatory)
Name :
Designation :
Company seal :

(Separate sheet may be used for giving detailed information duly signed)

Declaration by the Bidder

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

(To be submitted in the official letter head of the company)

I/We _____ (here in after referred to as the Bidder) being desirous of tendering for the rate contract for work under the above mentioned tender and having fully understood the nature of the work and having carefully noted all the terms and conditions, specifications etc. as mentioned in the tender document, DO HEREBY DECLARE THAT

1. The Bidder is fully aware of all the requirements of the tender document and agrees with all provisions of the tender document.
2. The Bidder is capable of executing and completing the work as required in the tender.
3. The Bidder accepts all risks and responsibilities directly or indirectly connected with the performance of the tender.
4. The Bidder has no collusion with any employee of JREDA or with any other person or firm in the preparation of the bid.
5. The Bidder has not been influenced by any statement or promises of JREDA or any of its employees, but only by the tender document.
6. The Bidder is financially solvent and sound to execute the work.
7. The Bidder is sufficiently experienced and competent to perform the contract to the satisfaction of JREDA.
8. The information and the statements submitted with the tender are true.
9. The Bidder is familiar with all general and special laws, acts, ordinances, rules and regulations of the Municipal, District, State and Central Government that may affect the work, its performance or personnel employed therein.
10. The Bidder has not been debarred from similar type of work by any SNA/ Government Dept. /PSU.
11. This offer shall remain valid for Six months from the date of opening of the tender.
12. The Bidder gives the assurance to execute the tendered work as per specifications terms and conditions.
13. The Bidder confirms the capability to supply and install required no. of systems per month.
14. The Bidder accepts that the earnest money be absolutely forfeited by JREDA if the Bidder fails to undertake the work or sign the contract within the stipulated period.

(Signature of Authorized Signatory)

Name:

Designation:

Company Seal:

Format For Financial Requirement – Annual Turnover

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

[On the letterhead of Bidding Company]

To,

The Director,
Jharkhand Renewable Energy Development Agency
3rd Floor, S.L.D.C. Building,
Kusai Colony, Doranda,
Ranchi - 834002

Dear Sir,

Sub: Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.

We certify that the Bidding Company had an average Annual Turnover of Rs. ----- based on audited annual accounts of the last three years ending 31.03.2015/ 2016 for SPV system.

Authorised Signatory
(Power of Attorney holder)

Statutory Auditor
(Stamp & Signature)

Date:

Format For Financial Requirement - Net Worth Certificate

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

[On the letterhead of Bidding Company]

To,

The Director,
Jharkhand Renewable Energy Development Agency
3rd Floor, S.L.D.C. Building,
Kusai Colony, Doranda,
Ranchi - 834002

Dear Sir,

Sub: Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.

This is to certify that Net worth of _____ {insert the name of Bidding Company}, as on 31st March 2015/2016 is Rs _____. The details are appended below.

Particulars	Amount (In Rs.)
Equity Share Capital	
Add: Reserves	
Subtract: Revaluation Reserve	
Subtract: Intangible Assets	
Subtract: Miscellaneous Expenditure to the extent not written off and carried forward losses	
Net Worth as on 31 st March 2015/2016	

Authorised Signatory
(Power of Attorney holder)

Statutory Auditor
(Stamp & Signature)

Format of Power of Attorney for Signing Bid

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

POWER OF ATTORNEY

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

Know all men by these presents, we.....(name and address of the registered office) do hereby constitute, appoint and authorize Mr. / Ms.....(name and residential address) who is presently employed with us and holding the position of.....

as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our bid for **NIB No.:33/JREDA/ROOFTOP/GOV/16-17** including signing and submission of all documents and providing information / Bids to Jharkhand Renewable Energy Development Agency, representing us in all matters before [Insert Name], and generally dealing with Jharkhand Renewable Energy Development Agency in all matters in connection with our bid for the said Project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

For
_____Signature

Accepted by

..... (Signature)

(Name, Title and Address of the Attorney)

Note: The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, lay down by the applicable law and the charter documents of the executants (s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.

Details of Orders Received and Executed in Last 7 Years

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

Details of Orders Received & Executed by the Manufacturer/Supplier for Supply of **SPV Power Plant** to SNA/ Govt. Organization during Last Seven Years.

SL. No.	Name of Agency/ Organization	Purchase Order No., Date & Ordered Qty.	Capacity of SPV Power Plant	Delivery Schedule	Qty. Supplied Within Delivery Schedule	Qty. Supplied After Delivery Schedule	Date of Full Supply

Yours faithfully,

(Signature of Authorized Signatory)

Name:

Designation:

Company Seal:

Note:

- (a) Attach Photocopies of Work Orders
- (b) Attach Photocopies of Certificate of Satisfactory Performance Issued by Concerned Nodal Agency/*PSU*/ Govt. Organization
- (c) Separate sheet may be used for giving detailed information in seriatim duly signed. This bid Performa must be submitted duly signed in case separate sheet is submitted

Format for Technical Details**NIB No: 33/JREDA/ROOFTOP/GOV/16-17**

Sub: Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.

S. N	Particulars	Details	Make
1	Mounting arrangement for Solar module		
2	Solar module frame material		
3	Module type		
4	No. of solar cells per module		
5	Make of Solar module (Attach IEC Certificate)		
6	Country		
7	Weather resistant HDPE junction Box (IP55)		
8	Max. Temperature rise of solar cells under severe working condition over max. ambient temperature		
9	Nominal voltage		
10	Operating voltage of solar module (nom)		
11	Peak power voltage (Vmp)		
12	Peak Power current (Imp)		
13	Open circuit voltage (Voc)		
14	Short circuit current (Isc)		
15	Make of PCU and Origin		
16	Make of Battery and Origin		
17	Type of Battery		
18	No. of Battery		
19	Each Battery Voltage		
20	Each Battery Ah		
21	Battery Bank rating (Voltage & Ah)		

Undertaking

- We agree to manufacture and supply quality Solar Power Plant as per NIT specifications.
- We agree to give performance guarantee as specified and to abide by the scope of the guarantee as prescribed under the tender document.
- We agree to operate as per the terms & conditions of the tender.

We undertake to supply quality products for promoting energy efficiency in the era of lighting systems.

(Signature of Authorized Signatory with Name Designation & Company Seal)

Filling Instructions:

- The **SPP** components will be generally guaranteed as per General Terms & Conditions. The manufacturer can also provide additional information about the system and conditions of Guarantee as necessary. The Guarantee card to be supplied with the system must contain the details of the system supplied as per format given above.
- During the Guarantee period JREDA/users reserve the right to cross check the performance of the systems for their minimum performance levels specified in the MNRE specifications.

Technical Detail Form**NIB No: 33/JREDA/ROOFTOP/GOV/16-17**

(To be submitted in the official letter head of the company)

Warranty Card

1.	Name & Address of the Manufacturer/ Supplier of the System	
2.	Name & Address of the Purchasing Agency	
3.	Date of Supply of the System	
4.	Details of PV Module(s) Supplied in the System	
	(a) Name of the Manufacturer	
	(b) Make	
	(c) Model	
	(d) Serial No.	
	(e) Wattage of the PV Module(s) under STC	
	(f) Guarantee Valid Up To	
5.	Details of Battery	
	(a) Name of the Manufacturer	
	(b) Make	
	(c) Model	
	(d) Batch/Serial No(s).	
	(e) Month & Year of Manufacture	
	(f) Rated V & AH Capacity at C/20 or C/10 Rated at 27°C	
	(g) Guarantee Valid Up To	
6.	Details of PCU & Other BOS Items	
	(a) Name of the Manufacturer	
	(b) Make	
	(c) Model	
	(d) Serial No(s).	
	(e) Month & Year of Manufacture	
	(f) Guarantee Valid Up To	
7.	Designation & Address of the Person to be Contacted for Claiming Warranty Obligations	

(Signature of Authorized Signatory with Name Designation & Company Seal)

Filling Instructions:

- The Rooftop SPV Power Plants components will be generally guaranteed as per General Terms & Conditions. The manufacturer can also provide additional information about the system and conditions of Guarantee as necessary. The Guarantee card to be supplied with the system must contain the details of the system supplied as per format given above.
- During the Guarantee period JREDA/users reserve the right to cross check the performance of the systems for their minimum performance levels specified in the MNRE specifications.

Price Bid

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

Sub: Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis anywhere in the state of Jharkhand.

S. N	SPV Power Plant Capacity (KW)	SPV Capacity (kWp)	Battery Bank Size (AH/Volt)	PCU Rating (KVA)	Quoted quantity (KWp)	Quoted Rate per KW (In Rs.)
1	Category "A" 1 to 10 KW	1 to 10 KWp	4.8VAH/Wp	30% higher than SPV Capacity		
2	Category "B" 11 to 50 KW	11 to 50 KWp	4.8VAH/Wp	30% higher than SPV Capacity		
3	Category "C" 51 to 100 KW	51 to 100 KWp	4.8VAH/Wp	30% higher than SPV Capacity		
4	Category "D" Above 100 KW	Above 100 KWp	4.8VAH/Wp	30% higher than SPV Capacity		

S. N	SPV Power Plant Capacity (KW)	SPV Capacity (kWp)	Battery Bank Size (AH/Volt)	PCU Rating (KVA)	Quoted quantity (KWp)	Quoted Rate per KW (In Rs.)
1	Category "A-1" 1 to 10 KW	1 to 10 KWp	Without Battery Bank	Same as SPV Capacity		
2	Category "B-1" 11 to 50 KW	11 to 50 KWp	Without Battery Bank	Same as SPV Capacity		
3	Category "C-1" 51 to 100 KW	51 to 100 KWp	Without Battery Bank	Same as SPV Capacity		
4	Category "D-1" Above 100 KW	Above 100 KWp	Without Battery Bank	Same as SPV Capacity		

- Above quoted price for **Solar Power Plants** are complete in all respect as per Technical Specifications inclusive of all Central/State/Local taxes & duties, packing, forwarding, transit insurance, loading & unloading, transportation & other charges etc. FOR destination at any places in Jharkhand and inclusive of installation, testing, commissioning, 5 year operation & maintenance, performance testing and training.
- Certified that rates quoted for **Solar Power Plants** are as per specifications, terms & conditions mentioned in the bid document.
- Price will be quoted in complete numeric figure and words.
- For each category more than one vendor will be empanelled.
- The offered rate should be valid for one year which may be extended further one year as per requirement of JREDA with mutual consent.

(Signature of Authorized Signatory)

Name:

Designation:

Company Seal:

Note: JREDA will empanel more than one vendor for each category and will allot the quantum of work to bidder on the basis of his financial & technical competence. The financial competence of the bidder will be evaluated on the basis of **average annual turnover** of Rs. 50.00 Lakh per 100 kWp for general bidder (Rs. 20.00 Lakh per 100 kWp for MSME of Jharkhand/New Entrepreneur) from the last three years ending 31.03.2015/2016 & **Net Worth** of Rs. 20.00 Lakh per 100 kWp for general bidder (Rs. 10.00 Lakh per 100 kWp for MSME of Jharkhand/New Entrepreneur) as on 31.03.2015/2016 on the basis of audited annual accounts.

Technical competence of the bidder will be evaluated on the basis of 25 kWp of SPV Power Plant per 100 kWp for general bidder (10 kWp of SPV Power Plant per 100 kWp for MSME of Jharkhand) from the cumulative experience of executing contracts of SPV Power Plants during last seven years. Technical competence of the bidder will be evaluated on the basis of copy of order and corresponding certificate indicating its successful execution of SPV Power Plant.

Format for Submitting Bank Guarantee for Earnest Money

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

(To be submitted in Rs. 100/- Non-Judicial Stamp Paper to be purchased in the name of the issuing bank)

To,

The Director,
Jharkhand Renewable Energy Development Agency
3rd Floor, S.L.D.C. Building,
Kusai Colony, Doranda,
Ranchi - 834002.

WHEREAS (Supplier's name) (hereinafter referred to as "Supplier"), a company registered under the Companies Act, 1956 and having its registered office at is required to deposit with you, the Purchaser, by way of Earnest Money Rs. (Rupees only) in connection with its tender for the work with reference to Notice Inviting Bid (NIB) No. dated as per specification and terms and conditions enclosed therein.

WHEREAS the Supplier as per "Notice Inviting Bid, point no. 3 Earnest Money" has agreed to establish a Bank Guarantee in Your favour through us valid up to (date) instead of deposit of earnest money in cash.

WHEREAS you have agreed to accept a Bank Guarantee from us in instead of earnest money in cash from the Supplier.

1. We (Bank) hereby agree and undertake to pay you on demand the said amount of Rs. (Rupees only) without any protest or demur in the event the Supplier/Tenderer after submission of his tender, resiles from or withdraws his offer or modifies the terms and conditions thereof in a manner not acceptable to you or expresses his unwillingness to accept the order placed and/or letter of intent issued on the Supplier/Tenderer for the work under "Notice Inviting Bid Ref. No.:" **33/JREDA/ROOFTOP/GOV/ 16-17**".
2. Your decision as to whether the Supplier/Tenderer has resiled from or has withdrawn his offer or has modified the terms and conditions thereof in a manner not acceptable to you or has expressed his unwillingness to accept the order placed and/or Letter of Intent issued by you on the Supplier/Tenderer for the work under "Notice Inviting Bid Ref. No. : **33/JREDA/ROOFTOP/GOV/16-17** in this regard, shall be final and binding on us and we shall not be entitled to question the same.
3. Notwithstanding anything contained in the foregoing, our liability under this Guarantee shall be restricted to Rs. (Rupees only).
4. This Guarantee shall remain valid and in full force and effect up to (Date) and shall expire thereafter unless an intimation is given to the Bank by you earlier in writing discharging us from our obligation under this Guarantee.
5. We shall not revoke this Guarantee during its currency except by your consent in writing.
6. This Guarantee shall not be affected by any change in the constitution of the Supplier/Tenderer or yourselves or ourselves but shall ensure to your benefit and be enforceable against our legal successors or assignees by you or your legal successors.

7. Notwithstanding anything contained herein above unless a demand or claim under this Guarantee is made on us in writing within six months from the date of expiry of this Guarantee we shall be discharged from all liabilities under this Guarantee thereafter.
8. We have power to issue this Guarantee under our Memorandum and Articles of Association and the undersigned who is executing this Guarantee has the necessary power to do so under a duly executed Power of Attorney granted to him by the Bank.

Signed and Delivered
For and on behalf of Bank.
(Banker's Name)

Name of Bank Manager:

Address

.....

Certificate of Delivery of Grid Connected Rooftop SPV Power Plant received by the Consignee as Proof of Compliance by the Supplier

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

Certificate

Name of Consignee:....., Designation:-.....

Name of Department:.....

Address of Department:.....

.....

Certified that we have received following materials for installation of Grid Connected Rooftop SPV Power Plants under JNNSM:

1. Nos. & Capacity of SPV Modules:-----
2. Nos. & Capacity of Batteries:.....
3. Nos. & Capacity of PCUs:.....
4. Balance of Systems:.....

Above materials have been supplied by M/s.....

Signature of Consignee along with Seal/ JREDA Official:.....

Date.....

Certificate of JREDA Representative

Certified that above mentioned materials have been inspected as per the specification and above materials handed over to the Consignee.

Signature & Seal of Supplier

Signature & Seal of JREDA Representative

Format for Monthly O&M and CMC Report**NIB No: 33/JREDA/ROOFTOP/GOV/16-17**

[On the letterhead of Bidding Company]

To,

The Director,
 Jharkhand Renewable Energy Development Agency
 3rd Floor, S.L.D.C. Building, Kusai Colony, Doranda,
 Ranchi – 834002.

Dear Sir,

Sub: Rate Contract for Design, Manufacture, Testing, Supply, Installation & Commissioning of Grid connected Rooftop SPV Power Plants of different capacities including five years Comprehensive Maintenance Contract (CMC) on Turnkey basis on government buildings anywhere in the state of Jharkhand.

Date of Installation.....

JREDA Dispatch Order No..... Dated.....

Place of Supply.....

Project Capacity:

Address of the site:

Component	Activity	Description	Date	Name / Signature	*Remarks
PV Module	Cleaning	Immediately clean any Bird droppings / Dark spots on module.			
	Cleaning	Clean PV modules with plain water or mild dishwashing detergent.			
	Inspection (for plants > 50 kWp)	Infrared camera inspection for hot spots; bypass diode failure.			
PV Array	Inspection	Check the PV modules and rack for any damage.			
	Inspection	If any new objects, such as Vegetation growth etc., are causing shading of the array. Remove if any.			
	Vermin Removal	Remove bird nests or vermin from array and rack area.			
Junction Boxes	Inspection	Inspect electrical boxes for corrosion, intrusion of water or vermin. Check position Of switches and breakers.			

		Check status of all protection devices.			
Wiring	Inspection	Inspect cabling For signs of cracks, defects, loose connections, corrosion, overheating, arcing, short or open circuits, and ground faults.			
Inverter	Inspection	Observe instantaneous operational indicators on the faceplate. Inspect Inverter housing or shelter for any physical maintenance. Check for connection tightness.			
Inverter	Service	Clean or replace any air filters.			
Instruments	Validation	Verify monitoring instruments (pyranometer etc.) with standard instruments to verify their operation within tolerance limits.			
Transformer	Inspection	Inspect transformer oil level, temperature gauges, breather, silica gel, meter, connections etc.			
Plant	Monitoring	Daily Operation and Performance Monitoring.			
Spare Parts	Management	Manage inventory of spare parts.			
Log Book	Documentation	Maintain daily log records.			
Tracker (if any)	Inspection	Inspect gears, gear boxes, bearings, motors.			
	Service	Lubricate bearings, gear as required.			

Date	Generation kWh	Grid outage (hh:mm)	Inverter down period (hh:mm)	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Total generation for the month in kWh:

Cumulative generation since commissioning in kWh:

CUF for month in %:

Cumulative CUF since commissioning in %:

(Signature of Authorized Signatory)
 Name:
 Designation:
 Company Seal:

*Provide details of any replacement of systems/components, damages, plant/inverter shut down (planned/forced), breakdown, etc. under remarks.

*Daily register is to be maintained by the bidder at each location greater than 50 kWp. The same may be inspected by JREDA or its authorised representative at any time 5 years of O&M period. The Register will have the information about the daily generation, Inverter downtime if any, Grid outages.

Project Report Format**NIB No: 33/JREDA/ROOFTOP/GOV/16-17****Format for Summary Project Report for Grid Connected Rooftop and Small SPV Power Plants**

1. Name of Bidder :-----
2. Rfs no. :-----
3. Project details (Site location & Address) :-----
4. Brief about the Rooftop Solar Power Generation System :-----
5. Details of the beneficiary :-----
6. Specifications of the Components and Bill of Material/ Quantities

Sl. no	Component	Specifications	Quantity	Make
A	Solar PV module			
A.1	Aggregate Solar PV capacity (kWp)			
B	Grid Tie inverter (Type and Capacity)			
B.1	Aggregate Inverter capacity (kVA)			
C	Module mounting structure (Certified by a Structural Engineer(Mandatory for 101 kWp to 500 kWp)			
D	Array Junction Box			
E	AC Distribution Board			
F	Cable (All type)			
G	Earthing Kit(maintenance free)			
H	Meters			
I	Online monitoring System			
J	Any other component			
K	Transformer			

7. Unit cost of solar power generation
8. Cost benefit analysis, payback period
9. Expected output/annum
10. Respective drawings for layout, electrical wiring connections, earthing, components etc.
11. Connectivity details with grid and metering arrangement (with sketch diagram)
12. Copy of electricity bill of the beneficiary and consumer number
13. Any other information
11. Documentary proof regarding beneficiary type as per clause 1.2 of the RfS

(The above information should be limited up to 2-3 pages only)

Project Completion Report for Grid-Connected Rooftop**NIB No: 33/JREDA/ROOFTOP/GOV/16-17**

Financial year * :			
Approval No. * :			
Proposal Title :			
Installed by agency :			
Project initiated by :			
Technology Description & System Design /Specification			
(Compliance to BIS/IEC Standards is mandatory)			
1. Module			
Capacity/Power of each PV Module(Wp)* :	1. Capacity/Power 2. Capacity/Power		1. Nos: 2. Nos:
Cumulative Capacity of Modules(KWp):			
Solar cell technology :			
Module efficiency (in Percentage) :			
2. Inverters			
Type of inverter :			
Make of inverter :			
Capacity/Power of each PCU/inverters (VA)* :		Capacity/Power Nos.	
Capacity/Power of PCU/inverters (KVA) :			
Inverter efficiency (Full load) :(in percentage)			
3. Metering Arrangement			
Details of Metering			
Type of Meter* :			
Make of Meter :			
4. Other informations			
Units of electricity generated by the solar plant as per meter (in KWh):			
Monitoring Mechanism :			
No. of personnel to be trained in O&M :			
Task & Expected Schedule(in Months):			

Grid connectivity level:			
Grid connectivity level phase* :		Grid connectivity level Voltage* :	
Costing of Project			
Hardware cost :	Rs.	Total Cost of Installation :	Rs.

Operation and Maintenance Guidelines of Grid Connected PV Plants

NIB No: 33/JREDA/ROOFTOP/GOV/16-17

For the optimal operation of a PV plant, maintenance must be carried out on a regular basis.

All the components should be kept clean. It should be ensured that all the components are fastened well at their due place.

Maintenance guidelines for various components viz. solar panels, inverter, wiring etc. are discussed below:

1. SOLAR PANELS

Although the cleaning frequency for the panels will vary from site to site depending on soiling, it is recommended that

The panels are cleaned at least once every fifteen days.

- Any bird droppings or spots should be cleaned immediately.
- Use water and a soft sponge or cloth for cleaning.
- Do not use detergent or any abrasive material for panel cleaning.
- Iso-propyl alcohol may be used to remove oil or grease stains.
- Do not spray water on the panel if the panel glass is cracked or the back side is perforated.
- Wipe water from module as soon as possible.
- Use proper safety belts while cleaning modules at inclined roofs etc.
- The modules should not be cleaned when they are excessively hot. Early morning is particularly good time for module cleaning.
- Check if there are any shade problems due to vegetation or new building. If there are, make arrangements for removing the vegetation or moving the panels to a shade-free place.
- Ensure that the module terminal connections are not exposed while cleaning; this poses a risk of electric shock.
- Never use panels for any unintended use, e. g. drying clothes, chips etc.
- Ensure that monkeys or other animals do not damage the panels.

2. CABLES AND CONNECTION BOXES

- Check the connections for corrosion and tightness.
- Check the connection box to make sure that the wires are tight, and the water seals are not damaged.
- There should be no vermin inside the box.
- Check the cable insulating sheath for cracks, breaks or burns. If the insulation is damaged, replace the wire.
- If the wire is outside the building, use wire with weather-resistant insulation.
- Make sure that the wire is clamped properly and that it should not rub against any sharp edges or corners.
- If some wire needs to be changed, make sure it is of proper rating and type.

3. INVERTER

- The inverter should be installed in a clean, dry, and ventilated area which is separated from, and not directly above, the battery bank.
- Remove any excess dust in heat sinks and ventilations. This should only be done with a dry cloth or brush.

- Check that vermin have not infested the inverter. Typical signs of this include spider webs on ventilation grills or wasps' nests in heat sinks.
- Check functionality, e.g. automatic disconnection upon loss of grid power supply, at least once a month.
- Verify the state of DC/AC surge arrestors, cable connections, and circuit breakers.

4. SHUTTING DOWN THE SYSTEM

- Disconnect system from all power sources in accordance with instructions for all other components used in the system.
- Completely cover system modules with an opaque material to prevent electricity from being generated while disconnecting conductors.
- To the extent possible, system shutdown will not be done during day time or peak generation.

INSPECTION AND MAINTENANCE SCHEDULE

Component	Activity	Description	Interval	By
PV Module	Cleaning	Clean any bird droppings/ dark spots on module	Immediately	User/Technician
	Cleaning	Clean PV modules with plain water or mild dishwashing detergent. Do not use brushes, any types of solvents, abrasives, or harsh detergents.	Fortnightly or as per the site conditions	User/Technician
	Inspection (for plants > 100 kWp)	Use infrared camera to inspect for hot spots; bypass diode failure	Annual	Technician
PV Array	Inspection	Check the PV modules and rack for any damage. Note down location and serial number of damaged modules.	Annual	User/Technician
	Inspection	Determine if any new objects, such as vegetation growth, are causing shading of the array and move them if possible.	Annual	User/Technician
	Vermin Removal	Remove bird nests or vermin from array and rack area.	Annual	User/Technician
Junction Boxes	Inspection	Inspect electrical boxes for corrosion or intrusion of water or insects. Seal boxes if required. Check position of switches and breakers. Check operation of all protection devices.	Annual	Electrician
Wiring	Inspection	Inspect cabling for signs of cracks, defects; loose connections, overheating, arcing, short or open circuits, and ground faults.	Annual	Electrician
Inverter	Inspection	Observe instantaneous operational indicators on the faceplate of the inverter to ensure that the amount of power being generated is typical of the conditions. Inspect Inverter housing or shelter for physical maintenance, if required.	Monthly	Electrician
Inverter	Service	Clean or replace any air filters.	As needed	Electrician
Instruments	Validation	Spot-check monitoring instruments (Pyranometer etc.) with standard instruments to ensure that they are operational and within specifications.	Annual	PV Specialist

Transformer	Inspection	Inspect transformer oil level, temperature gauges, breather, silica gel, meter, connections etc.	Annual	Electrician
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Quality Certification, Standards and Testing for Grid-connected Rooftop Solar PV Systems/Power Plants:

Quality certification and standards for grid-connected rooftop solar PV systems are essential for the successful mass-scale implementation of this technology. It is also imperative to put in place an efficient and rigorous monitoring mechanism, adherence to these standards. Hence, all components of grid-connected rooftop solar PV system/ plant must conform to the relevant standards and certifications given below:

Solar PV Modules/Panels:	
IEC 61215/ IS 14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61853- Part 1/ IS 16170: Part 1	Photovoltaic (PV) module performance testing and energy rating – : Irradiance and temperature performance measurements, and power rating
IEC 62716	Photovoltaic (PV) Modules – Ammonia (NH3) Corrosion Testing (As per the site condition like dairies, toilets)
IEC 61730-1,2	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing
IEC 62804	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation. IEC TS 62804-1: Part 1: Crystalline silicon (mandatory for applications where the system voltage is > 600 VDC and advisory for installations where the system voltage is < 600 VDC)
IEC 62759-1	Photovoltaic (PV) modules – Transportation testing, Part 1: Transportation and shipping of module package units
Solar PV Inverters	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems – Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems Part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
IEC/IS 61683 (as applicable)	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions)
BS EN 50530 (as applicable)	Overall efficiency of grid-connected photovoltaic inverters: This European Standard provides a procedure for the measurement of the accuracy of the maximum power point tracking (MPPT) of inverters, which are used in grid-connected photovoltaic systems. In that case the inverter energizes a low voltage grid of stable AC voltage and constant frequency. Both the static and dynamic MPPT efficiency is considered.
IEC 62116/ UL 1741/ IEEE 1547 (as applicable)	Utility-interconnected Photovoltaic Inverters - Test Procedure of Islanding Prevention Measures
IEC 60255-27	Measuring relays and protection equipment – Part 27: Product safety requirements
IEC 60068-2 (1, 2, 14, 27, 30 & 64)	Environmental Testing of PV System – Power Conditioners and Inverters a) IEC 60068-2-1: Environmental testing - Part 2-1: Tests - Test A: Cold b) IEC 60068-2-2: Environmental testing - Part 2-2: Tests - Test B: Dry heat c) IEC 60068-2-14: Environmental testing - Part 2-14: Tests - Test N: Change of temperature d) IEC 60068-2-27: Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock e) IEC 60068-2-30: Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) f) IEC 60068-2-64: Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance

IEC 61000 – 2,3,5 (as applicable)	Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) testing of PV Inverters
Fuses	
IS/IEC 60947 (Part 1, 2 & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): a) Low-voltage Switchgear and Control-gear, Part 1: General rules b) Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers c) Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units d) EN 50521: Connectors for photovoltaic systems – Safety requirements and tests
IEC 60269-6	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems
Surge Arrestors	
IEC 62305-4	Lightening Protection Standard
IEC 60364-5-53/ IS 15086-5 (SPD)	Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control
IEC 61643-11:2011	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
Cables	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)/ IEC69947	General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltages up to and including 1100 V, and UV resistant for outdoor installation)
BS EN 50618	Electric cables for photovoltaic systems (BT(DE/NOT)258), mainly for DC Cables
Earthing/Lightning	
IEC 62561 Series (Chemical earthing)	IEC 62561-1 Lightning protection system components (LPSC) - Part 1: Requirements for connection components IEC 62561-2 Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes IEC 62561-7 Lightning protection system components (LPSC) - Part 7: Requirements for earthing enhancing compounds
Junction Boxes	
IEC 60529	Junction boxes and solar panel terminal boxes shall be of the thermo-plastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use
Energy Meters	
IS 16444 or as specified by the DISCOMs	A.C. Static direct connected watt-hour Smart Meter Class 1 and 2 – Specification (with Import & Export/Net energy measurements)
IS 2062/IS 4759	Material for the structure mounting
Solar PV Roof Mounting Structure	
IS 2062/IS 4759	Material for the structure mounting

Note- Equivalent standards may be used for different system components of the plants after due consultation with Engineer-in charge of work.

Procedure for Performance Testing Operational Acceptance Test Procedure

NIB No.:33/JREDA/ROOFTOP/GOV/16-17

Part A: Performance Ratio (PR) - Test Procedure

1. Performance Ratio as determined through the PR Test Procedure specified here should not be less than 0.75 for Operational Acceptance Test.
2. The Performance Ratio Test to prove the guaranteed performance parameters of the power plant shall be conducted at site by the Contractor in presence of the Company. The Contractor's Engineer shall make the plant ready to conduct such tests. The Operational Acceptance Test shall be commenced, within a period of one (1) month after successful Commissioning and, there will be continuous monitoring of the performance for 30 days. Any extension of time beyond the above one (1) month shall be mutually agreed upon. These tests shall be binding on both the parties to the contract to determine compliance of the equipment with the guaranteed performance parameters. This monitoring will be performed on the site under the supervision of the Company/ Company's engineer.
3. The test will consist of guaranteeing the correct operation of the plant over 30 days, by the way of the efficiency rate (performance ratio) based on the reading of the energy produced and delivered to the grid and the average incident solar radiation.
4. PR shall be demonstrated against the installed DC Capacity.
5. The Efficiency or performance ratio (PR) of the PV Plant is calculated as follows (according to IEC 61724)

Performance Ratio (PR) = Y_A / Y_R

Where;

Y_A = Final (actual measured) PV system yield in kilo-watt hours at the point of measurement during the testing period, and

Y_R = Reference yield calculated as the product of the insolation on the plane of the collector (i.e. PV modules) in kWh/ m² during the testing period and the installed DC capacity of the plant in kW.

Monitoring System for PR Verification

The following instrumentation will be used to determine the Solar Plant Performance:

- Power Meter at the delivery point.
- Power Meter for each inverter for reference only.
- One nos. calibrated pyranometer to determine irradiance on the plane of array (with a target measurement uncertainty of ± 2).
- One nos. calibrated pyranometer to determine irradiance on horizontal plane (with a target measurement uncertainty of ± 2)
- Two nos. thermocouples to measure module temperature with a measurement uncertainty of ± 1 °C.
- Shielded ventilated thermocouple with a measurement accuracy of ± 1 °C.

- Data measurement shall be witnessed in the format mutually agreed before the start of PR test by the employer and the contractor jointly for the said period.
- The Contractor shall show the specified PR for Operational Acceptance.

Part B: The procedure for Performance Guarantee Test (PGT) - cum- Final Acceptance Test- shall be as follows:

1. A weather station with a calibrated pyranometer shall be installed by the Contractor at the location mutually agreed by the Contractor and JREDA. The test report for the calibration shall be submitted by the Contractor for approval by JREDA. The calibration should be traceable to a national/international laboratory. The output of this pyranometer for shall be logged in the Data Logger system.
2. In case the pyranometer is found to be working erratically then immediately the Contractor shall take necessary steps to rectify and/or recalibrate the instrument to the satisfaction of JREDA. However, for the dispute period for which such error has occurred and until the instrument is recalibrated to the satisfaction of JREDA, data from any one of the following list of sources as decided by JREDA will be used:
 - i. A separate pyranometer installed by the Company near the site, if available
 - ii. Average of two closest solar power projects, as identified by JREDA
 - iii. Nearest MNRE weather station
3. "Actual Delivered Energy" from the plant supplied by the Contractor shall be noted for every month and summed up for entire year. For this purpose, the net delivered energy at the metering point shall be taken into account.
4. Further, if the plant is not able to achieve the *CUF of 15%* during PGT and O&M period and there is a shortfall in energy generation, then the Contractor shall be penalized as per relevant Clause of the Tender.
5. The Contractor shall share with JREDA all the radiation, generation, etc. parameters details and all other factors necessary for JREDA to corroborate the estimate. JREDA has the right to cross verify data submitted by the Contractor by all possible means/sources.

Following factors may be noted for computing the Base CUF:

6. Effect due to variation in annual insolation shall only be considered for computing the Base CUF.
7. Effect due to variation of meteorological parameters e.g. ambient temperature, wind speed, humidity etc. shall not be considered.
8. **Generation loss due to grid outage (or power evacuation system which is not in the scope of the Contractor):** The measured global solar radiation of the period of the outage of the power evacuation system shall be excluded to calculate average global solar radiation for the period of PGT and O&M.