

Bid Specifications
for
Renovation of Renewable energy exhibits at Sidhu-
Kanu State Level
Energy Park, Ranchi, Jharkhand
(JREDA)
Government of Jharkhand

Tender Reference No. 17/JREDA/SPV/Sidhu-Kanu/19-20



Jharkhand Renewable Energy Development Agency (JREDA)

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

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CONTENTS

Sl. No.	Description	Page No.
1	e-Procurement Notice	03
2	Section-1: List of Important dates & details of Bids	04
3	Section-2 : Instruction to Bidders	05
4	Section-3 : Notice Inviting Bid	06
5	Section-4 : Instruction to Bidders	08
6	Section-5 : General Terms & Conditions	17
7	Section-6 : Technical Specifications	19
8	Annexure-1 Covering Letter)	37
9	Annexure-1a (Undertaking by MSEs of Jharkhand for availing preferential treatment)	38
10	Annexure-2 (Information about the Bidding Firm)	39
11	Annexure-3 (Declaration by the Bidder)	40
12	Annexure-4 (Annual Turn Over)	41
13	Annexure-5 (Net Worth)	42
14	Annexure-6 (Power of Attorney for Signing Bid)	43
15	Annexure-7 (Details of Work Experience)	44
16	Annexure-8 (Technical Details)	45
17	Annexure-9 (Technical Detail Form Warrantee Card)	46
18	Annexure-10 (Price Bid format)	47
19	Annexure-11 (Bank Guarantee format for EMD)	49
20	Annexure-12 (Proof of compliance by the Supplier)	51
21	Annexure-13 (Certificate of Renovation).	52
22	Annexure-14 (Format for Quarterly O&M and CMC Report).	53
23	Annexure-15 (Contact Person for the NIB).	54

Govt. of Jharkhand
Energy Department
Jharkhand Renewable Energy Development Agency (JREDA)
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e-Procurement Notice

Tender reference no.: 17/JREDA/SPV/Sidhu-Kanu/19-20

Dated: 24.10.2019

1	Name of the work	Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand
2	Work completion period	04 (Four) Months
3	Date of publication of NIT on website: http://jharkhandtenders.gov.in	25.10.2019 (Friday)
4	Last date & time for receipt of online bids	18.11.2019 (Monday) upto 05:00 PM
5	Submission of original copies of Bid fee & EMD (Offline)	18.11.2019 and 19.11.2019 up to 5.00 P.M.
6	Technical Bid Opening Date	20.11.2019 (Wednesday) at 03:00 PM
7	Name & address of office inviting tender	Director, Jharkhand Renewable Energy Development Agency(JREDA) 3 rd Floor, SLDC Building, Kusai, Doranda, Ranchi- 834002 (Jharkhand)
8	Contact no. of procurement officer	0651-2491167/68/61
9	Helpline no. of e-procurement	0651-2491167/68/61

Any corrigendum/addendum 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

**Director,
JREDA, Ranchi**

Section -1

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

List of Important dates & details of Bids

1.	Name of work	Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand	
2	Tender reference no.	17/JREDA/SPV/Sidhu-Kanu/19-20	
3	Mode of submission of tender	Online through www.jharkhandtenders.gov.in	
4	Cost of Bid document (Non-refundable)	❖ For General Bidder: Rs. 5,000/- (Rupees ten thousand) only. ❖ For MSE of Jharkhand: Nil	
5	Earnest Money Deposit	❖ For General Bidder: Rs. 1.91 Lakh ❖ For MSE of Jharkhand: Nil	
6	Publishing on website	25.10.2019 (Friday)	
7	Period of downloading of bidding documents	Start date: 26.10.2019	Time: 10.00 PM
8		End date: 18.11.2019	Time: 05.00 PM
9	Bid online submission	Start date: 08.11.2019	Time: 10.00 AM
		End date: 18.11.2019	Time: 05.00 PM
	Technical bid opening date	20.11.2019 (Wednesday) at 03:00 PM	
10	Authority inviting bids	Director, Jharkhand Renewable Energy Development Agency(JREDA)	
11	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@jreda.com	

Note: The tender fee and Earnest Money Deposit (EMD) in original must be submitted between all working days from 18.11.2019 and 19.11.2019 up to 5.00 P.M. If tender fee and EMD are not received before mentioned due 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

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

Instructions to Bidders

A. Detailed instructions & documents to be furnished for online bidding

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 mentioned 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. 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. GST certificate.
 - iv. PAN Card
 - v. Firm's registration certificate/ Registration certificate of MSE of Jharkhand.
 - vi. Certificate issued by Industry Dept. or MNRE for system manufacturing or Registration Certificate issued from Department of Energy, Govt. of Jharkhand.
 - vii. Audited Balance sheet of last three years.
 - viii. IEC/IS certificate of Electronics
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 Turn over.
 - 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/Similar nature of work 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 Equipments to be supplied.
 - ix. Annexure-10 : Bank Guarantee Format for EMD
 - X. Annexure-15 : Contact Person for the NIB
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 though 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, can not participate in the tender.

Section-3

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

Notice Inviting Bid

Sub: Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand

Preamble:

As part of Solar Photovoltaic Programme, JREDA invites bid for "**Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, 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:

1. The bidder should fulfill the following Technical eligibility conditions: -
A registered manufacturing company/Firm/ Corporation in India (including MSEs of Jharkhand) having adequate experience in Solar/RE system **Authorized dealers' companies/firms/ corporations and subcontractors are not eligible to participate.**
2. "Micro & Small Enterprises (MSEs) of Jharkhand should be registered with the Directorate of Industries/District Industries Centre, Industrial Area Development Authority and National Small Industries Corporation Limited or any other body specified by Directorate of Industries, Jharkhand Govt. from time to time and other industrial units/enterprises which have submitted IEM and been issued Date of Production (DOP) certificate by GM, DIC/MD, Industrial Area Development Authority/Director, Industries, GoJ
or
MSEs having Udyog Aadhar Number issued by Ministry of Micro, Small and Medium Enterprises, GoI duly verified, whether unit is existing/functional and doing regular production at what capacity by GM,DIC/MD, Industrial Area Development Authorities/Director, Industries, GOJ"
3. MSEs units/bidder has to submit relevant document to substantiate above claim.
4. MSEs of Jharkhand State availing preferential treatment should fulfill all the criteria as per Clause-3.0 (Applicability) of Jharkhand Procurement Policy 2014 and its amendment thereof and shall submit an undertaking with respect to (i) to (iv) of Clause 3.0 including a categorical statement that the products/services being supplied to JREDA has been manufactured/created by the unit located in Jharkhand only, giving details of batch no./date or any other identifiable tag as per prevalent established practice and will have to submit compulsorily duly signed copy of Form GSTR-9C (For units having aggregate yearly turnover of more than 2 Crores) as prescribed under JGST Act-2017.The bidder should be a functional organization. To substantiate this claim, the bidder should submit the copy of Audited Accounts for last 3 years along with Income Tax Return (ITR) complete set. These audited accounts should be duly certified by the Statutory Auditor with his stamp.
5. Registered Micro & Small Enterprises (MSEs) of Jharkhand should submit the attested copy of Registration certificate/ Udyog Aadhar issued by the Industry Department, Govt. of Jharkhand.
6. The bidder should be a functional organization. To substantiate this claim, the bidder should submit the copy of audited account for last 3 years ending 31.03.2018/2019, whichever is applicable. These audited accounts should be duly certified by the Statutory Auditor with his stamp.
7. Registered Micro & Small Enterprise (MSE) of Jharkhand should submit the attested copy of Registration given by the Industry Department, Govt. of Jharkhand. The MSE should be functional & having running production unit of the Jharkhand and should fulfill all the criteria as fixed in Jharkhand Procurement Policy 2014. The corporate office or the head office of the MSE must be located in the State of Jharkhand. The manufacturing unit of the MSE must be located in Jharkhand State.
8. 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 standard make, specifications of any reputed brand approved and certified by MNRE. The bidder has to supply the battery of same make, specification and manufacturing brand for which test reports submitted in the tender otherwise the work order & agreement shall be terminated, the security deposit shall be forfeited and the bidder firms shall be black listed. Bidder may submit test certificate of battery of three makes of batteries of MNRE approved and has to submit the authorization from each of the manufacturer along with the test certificate.
9. The Participant should have valid GST No.
10. 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.
11. 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 18.11.2019 and 19.11.2019 up to 5.00 P.M. in the office of JREDA.

12. 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. The EMD fee in original must be submitted from 18.11.2019 and 19.11.2019 up to 5.00 P.M. in the office of JREDA.
13. **Allocation of work:** The lowest rate i.e. L1 received would be the appropriate rate for awarding the work.

SECTION-4

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

INSTRUCTIONS TO BIDDERS Table of Clauses

A. General

1. Scope of Bid
2. Source of Funds
3. Eligible Bidders
4. Qualification of the Bidder
5. One Bid per Bidder
6. Cost of Bidding
7. Site Visit

B. Bidding Documents and Evaluation

8. Content of Bidding Documents
9. Clarification of Bidding Documents
10. Amendment of Bidding Documents

C. Preparation of Bids

11. Language of Bid
12. Documents Comprising the Bid
13. Bid Prices
14. Currencies of Bid and Payment
15. Bid Validity
16. Earnest Money
17. Alternative Proposals by Bidders

D. Submission of Bids

18. Sealing and Marking of Bids
19. Deadline for Submission of Bids

E. Bid Opening

20. Bid Opening
21. Process to be Confidential
22. Clarification of Bids and Contracting the JREDA
23. Examination of bids and
24. Correction of Errors
25. Evaluation and Comparison of Bids
26. Preference for Domestic Bidders

F. Award of Contract

27. Award Criteria
28. JREDA Right to Accept any Bid
29. Notification of Award
30. Security Deposit
31. Advances
32. Corrupt or Fraudulent Practices
33. Timeline/ Completion Period

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

The JREDA has decided to undertake the works of "**Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand.**" through funds from the Government of Jharkhand 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 for bidding.
 - 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 with certificates from the concerned officer or competent authority.
 - e) Audited reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the last three years along with ITR.
 - f) Authority to seek references from the Bidder's bankers;
 - g) 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;
- 4.3 Bids from joint venture are not allowed.

4.4.A To qualify for award of the Contract, each bidder should meet the following criteria:

1. **Turnover Requirement:**

For General Bidder: Bidder should have the minimum average Annual Turnover of not less than **25 Lakhs** derived from the last three financial years ending on 31.03.2018/19 on the basis of audited annual accounts.

For MSE of Jharkhand: should have the minimum average Annual Turnover of not less than **10 Lakhs** derived from the last three financial years ending on 31.03.2018/19 on the basis of audited annual accounts.

The certificate should be issued by CA who has performed audit of accounts with UDIN as per the Performa given at **Annexure-4**

2. **Net worth Requirement:**

For General Bidder: Bidder should have Positive Net Worth of not less than **10 Lakhs** as on 31.03.2018/19 on the basis of audited annual accounts.

For MSE of Jharkhand: Bidder should have Positive Net Worth of not less than **5 Lakhs** as on 31.03.2018/19 on the basis of audited annual accounts.

Net worth certificate should be issued by CA who has performed audit of accounts with UDIN as per the Performa given at **Annexure-5**

3. **Experience Requirement:**

For General/MSEs Bidder: The bidder must have **satisfactorily completed at least one work of similar nature** in any SNA/Govt. Organization / PSU in the last seven years ending up to date of advertisement of this tender.

The copies of work orders and corresponding performance certificate issued by procuring authorities indicating its successful execution and performance certificate must be enclosed as per the Annexure 7.

4.4.B Each bidder must produce:

- i) 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.

4.4.C 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 and financial failures.
- iii) Participated in the previous bidding for the same work and had quoted unreasonably high or low bid prices and could not submit rational justification for it to JREDA.

5 One Bid per Bidder

Each Bidder shall submit only one Bid. A Bidder who submits more than one Bid will be disqualified.

6 Cost of Bidding

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

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 on Bid Documents and Pre-bid Meeting:

Void

10 Amendment of Bidding Documents

- 10.1 Before the deadline for submission of bids, the JREDA may modify the bidding documents by issuing addenda/corrigendum.
- 10.2 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 Bids

11 Language of Bid

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

12 Documents Comprising the Bid

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

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.

2) 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.

3) 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) PAN Card
- b) GST certificate.
- c) Proof of completion of similar works during the last 7 years and list of similar works in hand in the prescribed formats duly signed by the competent authority of the issuing Department.
- d) List of works for which bids already submitted.
- e) Audited financial Report for the last 3 years (upto 31/3/2018/19) certified by chartered Accountant.
- f) Annual Turn over Details certified by Chartered Accountant.
- g) Net worth certificate certified by Chartered Accountant.
- h) List of current litigant cases in which the bidder is involved.
- i) An affidavit for non-engagement of related persons.
- j) Proof of test certificates of batteries and latest test certificate should confirm as per MNRE specifications which are available on MNRE website. The valid test certificate should be submitted along with bid.
- k) Authorized address & contact numbers of the bidder as per instruction in the Notice Inviting Bid duly digitally signed.
- l) Undertaking of Bidder that he is able to invest minimum of cash upto 10% as defined in ITB.
- m) Undertaking for validity of bid for 180 days.

B – 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.

12.2 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

13 Bid Prices

- 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.
- 13.6 Tenderers should quote their rates considering wide variation of site conditions, variation in price of different components during the year 2019-20 and keeping the quantum and quality of work in mind. If JREDA anticipates that rate is abnormally low or high, tender may be cancelled.

14 Currencies of Bid

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 180 (One hundred Eighty) 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 to the bidders for extension of 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.
- 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 Security Deposit.
- 16.6 The Earnest Money may be forfeited:
- a) if the Bidder withdraws the Bid after bid opening 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 and Security Deposit.

17 Alternative Proposals by Bidders

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: 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 20.2 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 12.3 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, 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

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 process of bidding 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 security deposit set forth in Clause 30 of ITB be increased at the expense of the successful Bidder to a level sufficient to protect the interest of JREDA against financial loss in the event of default of the successful Bidder under the Contract. The amount of the increased security deposit shall be decided at the sole discretion of JREDA, which shall be final, binding and conclusive on the bidder.

26 Price Preference

There will be no price preference to any bidder; however any price preference shall be in line with Jharkhand Procurement Policy 2014 for MSE bidders.

F. Award of Contract

27 Award Criteria

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

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 email and 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 NIT document, Work order & subsequent amendments between JREDA and the successful Bidder. It will be signed by the JREDA and the successful Bidder after the security deposit is submitted.

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 MSE bidders shall be required to deposit only 10% of security deposit (General Bidder) i.e. @1% of the allotted work order value in the form of Bank Guarantee valid for one year as per Jharkhand Procurement Policy.

30.3 The Security Deposit shall be refunded / released to the bidder after expiry of 60 days from the actual date of successful completion of work.

30.4 The Security Deposit will have to be maintained by the bidder with JREDA till the satisfactory completion of the work. If the work extends beyond the expiry date of Bank Guarantee, bidders shall submit fresh or extend the period of validity of Bank Guarantee as per the direction of JREDA, otherwise JREDA may terminate the work order and blacklist the contractor.

31. Performance Guarantee:

31.1 Successful General bidder shall submit a performance guarantee @5% of the allotted work order value in the form of Bank Guarantee valid for five years on or before release of any payment.

31.2 Successful MSME bidders shall submit a Performance Guarantee @2.5% of the allotted work order value in the form of bank guarantee before release of payment.

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 work order.

31.6 If Bidder/MSE unit fails to carry out the work allotted to him as per the provisions of the tender documents then such Bidder/MSE unit may be black listed for future awards of work.

32 Five Years Comprehensive Maintenance Contract (CMC) with operation:

32.1 The contract price includes the provision of 5 years mandatory Comprehensive Maintenance Contract (CMC). To ensure long term sustainability of the renewable energy attributes, 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.

32.2 Preventive/Routine Maintenance:

This shall be done by the supplier/contractor at least once in every three months and shall include activities such as, cleaning and checking the health of the SPV system, cleaning of module surface, tightening of all electrical connections, regular checks to identify any leakage of current and any other activity that may be required for proper functioning of the systems.

32.3 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 all the renewable energy attributes 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. 500 per day per system beyond three days of reporting of such complaint.

32.4 Operation:

The Agency shall help in operation of renewable energy exhibits for 5 years and shall have to deploy minimum 3 Nos. of manpower as per the followings: -

- | | | |
|----|--|-------|
| 1. | Technician (Diploma/ITI degree holder) | 1 no. |
| 2. | Semi-Skilled manpower | 1 no. |
| 3. | Helper | 1 no. |

Attendance report of all the manpower deployed for operation must be submitted on monthly basis duly verified by representative of JREDA posted at Solar Energy Park.

33. Advances

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

34 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.

35. Timeline/ Completion Period:

The time of completion shall be adhered as per the timeline defined in the table below:

Sr. No.	Particular	Timeline (in Days)
1	Issuance of Work order	X Day
2	Completion of Renovation work of Sidhu-Kanu State Level Energy Park, Ranchi	X+90 Days

Section-5

General Terms & Conditions

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

1.0 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.

2.0 Scope of work:

Renovation of **Sidhu-Kanu State Level Energy Park** in line with the status mentioned in the **Table 1: Status of Sidhu-Kanu State Level Energy Park, Ranchi**. Of **Technical Specification** of Section- 6 of NIB.

3.0 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.

4.0 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 & charges 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.

5.0 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.

6.0 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.
 - 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. Geo-tagged Photographs of materials at Site.
- (b) **20%** 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-13**.
 - iii) Certificate for minimum seven days of satisfactory performance.
- (c) Rest **20%** of the Contract Price shall be paid @**4%** of the Contract Price on completion of every one-year period of 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 quarterly reports of CMC undertaken and monthly attendance of manpower deployed for operation by the contractor **as per**

Annexure-14.

8.0 Liquidated Damages for Delay in Completion:

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.

9.0 Risk & Cost:

If the contractor fails to complete the awarded work 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.

10.0 Insurance:

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

11.0 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.

12.0 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.

13.0 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.

14.0 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 within 7 (Seven) days with required Security Deposit.

15.0 Income Tax:

Without prejudice to the obligations of the supplier under law, any income tax 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.

17.0 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.

18.0 Jurisdiction of the Court:

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

Section-6
Technical Specification
NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

A. Technical Specification of existing Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand

T4.1 PHYSICS OF SOLAR PHOTOVOLTAIC POWER

T4.1.1 OBJECTIVE

Solar Energy can be directly converted to electricity through photovoltaic cell. The output of the Photovoltaic cell depends on the intensity of the incident radiation and active area of the cell. This phenomenon has to be explained through this exhibit.

T4.1.2 TECHNICAL SPECIFICATION

The exhibit shall comprise of a table, a light source consisting of 4 Nos. 230 V, 50 Hz, 500 W Halogen lamps with reflector type fittings, suitable Solar Photovoltaic module of rating 12 V nominal, 70 Wp to 120 Wp with shutter to close part of the module and some low power consuming electrical home appliance as follows:

- Car Fan
- FM Radio
- 10-15 W, 12 V Incandescent filament lamp with holder
- Suitable size Current Controlling variable resistance
- A small heating element.

The exhibit shall have provision to tilt the Photovoltaic module in order to vary the light input from the light source. The light beam of light incident to module surface can be varied from 0° to 90°. The output of the Photovoltaic module shall be brought to a source terminal through the following devices purpose of protecting, controlling and measuring the Photovoltaic power:

- A fuse with fuse holder
- 5A, 220 V single pole switch
- Suitable size current controlling potentiometer
- 5A analogue type Moving Iron DC ammeter
- 25 V analogue type Moving Iron DC voltmeter.

The electrical appliances shall be suitably fitted on a wooden table. The table shall be well decorated and made of good quality ply board of minimum thickness 1" pasted with good quality sun mica. The light source shall have to be suitably placed on the table. The module shall be fixed in between tabletop surface & light source in such a way the module can be tilted freely. The frame of the light source should have adequate openings for natural cooling and also shall have forced cooling system so designed that the light would not be affected for continuous 10 minutes glow. Inputs of individual appliances shall be brought to different load terminals and all the load terminals shall be marked individually. A pair of connecting cord shall be arranged in such a way that each load terminal would be connected with source terminal to operate from the Photovoltaic source.

The shuttering arrangement shall be such that the incident radiation can be changed linearly. There shall be cooling arrangement for the Photovoltaic module. The light source shall also have fuse protection and controlling arrangement.

The tabletop size will be 750mm X 1500mm & height 36". The light source and the module mounting arrangement shall also be introduced with the table. A flexible cord of at least 120" length, appropriate size 3-pin male plug has to be provided with the exhibit for powering the exhibit

T4.2 FLAT SCREEN TV WITH AUDIO VISUAL

The system will consist of a Flat Screen TV with DVD Player for showing films, videos and games related to solar energy, solar system, astronomy, astrophysics, green house effect and photosynthesis etc. The TV and the DVD will be of well-reputed brands like Videocon, LG, Sony, Samsung and Philips etc.

T4.3 SOLAR COOKER (outdoor)

T4.3.1 Solar Parabolic Cooker

The capacity of solar parabolic cooker shall be 12 liter and 14 kg. by weight and shall be suitable for cooking rice, dal (pulses), vegetarian & non-vegetarian dishes, roasting chapattis and boiling eggs. The cooker shall conform to latest Ministry of New & Renewable Energy (MNRE)'s specifications. The heat output shall be equivalent to 600 watt nominal power.

T4.3.2 Solar Box Type Cooker

The solar box type cooker shall have advanced glazing system for high heat retention. Wheels shall be provided for easy movement. The body of the cooker shall be climate friendly FRP with one touch center locking system. Optional electrical backup facility will be provided for cooking in absence of solar radiation.

T4.4 REFRIGERATOR

Refrigerator of capacity 80 liter shall be one of the following make: Godrej,/Videocon/ Electrolux/L.G.,Whirlpool, Voltas or similar good make. The Refrigerator should operate at 230 V, 50 Hz supply. One stand made of super quality PVC shall have to be supplied along with the refrigerator. Before supply of this item all technical catalogs are to be produced for obtaining approval for make and model. There shall be an authorized dealer and servicing center for this supplied item in Ranchi city.

T4.5 WEIGHING MACHINE

The weighing machine shall be suitable to measure height & weight of a visitor on insertion of five-rupee coin. The machine shall provide instant printed token showing both height & weight of the rider in cm & kg respectively. The machine shall be suitable to measure 10 kg to 150 kg. Salient features of the weighing machine shall be as follows:

- Weighing System: Strain Gauge Load Cell
- Weighing Range: 10 kg to 150 kg in steps of 100 gm
- Least count: 100 gms.
- Pan size: 295 mm x 295 mm
- Base: Rugged casting
- Display Type: Large & clear LCD
- Printer Type: Line Thermal Printer, Graphics Capability,
High Speed
(4 lines/sec)
- Ticket Cutter: Automatic Guillotine with motor
- Coin Acceptor Type: Twin Mechanical
- Language: English
- Measuring System: Kg & Cm
- Operating Voltage: 240 V, 50 Hz, AC
- Power Consumption: 200 VA

Necessary software and hardware are to be supplied with the weighing machine. Detailed technical literature of manufacturer containing specification along with name of manufacture etc. is to be submitted along with the offer.

T4.6 COMPUTER FOR QUIZ & GAMES

The Computer based quiz and game is an interactive audio-visual exhibit designed to impart knowledge related to solar energy and solar system. The visitor can participate by inserting a 'five rupee' coin. The computer system will be turned on immediately on insertion of the coin and remain active for 15 minutes. The Computer system will consist of PC wide wide flat screen assembled in a suitable wooden cabinet. The Computer can be operated in two modes; namely 'information mode' and 'quiz mode'. In the information mode, it will supply information about different aspects of solar energy. In the 'quiz mode' the Computer will give both questions and answers in an interactive way. The system will automatically switch off after 15 minutes and there will be time counting display on the screen.

T4.7 SOLAR REPLICA

A solar replica model shall be installed inside the exhibition hall suitable for explaining the solar system to the children. Detailed drawings showing the details of the solar system replica to be submitted along with the tender.

T4.8 PANELS & BLOW UPS

The panels and blow ups for depicting drawings, diagrams and pictures related to solar energy will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 910 mm (4'x3') each.

T4.9 SOLAR EDUCATIONAL KIT FOR SCHOOL CHILDREN

The kit will be designed to educate students on the application of Solar Power and shall be provided with easy to understand study notes. The solar educational kit will consist of solar cell with voltmeter, ammeter and other components as per standard product manufactured by TATA BP or equivalent by other reputed manufacturers.

T4.10 SOLAR PV MODULE 12 VOLT, 10 Wp FOR DEMONSTRATION

The declared output of the module should be 10 Wp. Module shall conform to IEC 61215 or IEE 1662 or CCEC 503 or equivalent International Standard. This module is meant only for physically showing it to the students/ children.

Cell Technology – Mono/poly crystalline Silicon/amorphous silicon.
Efficiency – 13 – 14% or more.

T4.11 SOLAR WATER DISTILLATION UNIT (Outdoor)

Approved quality Solar Distillation Plant of 1000 mm x 1000 mm shall be installed on suitable GI structure. Supply of Solar Distillation Plant includes construction of suitable foundation for the distillation plant. At least two numbers of plastic pots and one funnel are to be supplied along with the Solar Water Distillation Plants.

T5. WIND POWER CENTRE

T5.1 WIND BLOWER & WIND ELECTRIC GENERATOR MODELS

This exhibit will be indoor type. The exhibit will display different types of windmills both vertical & horizontal. All the windmills should be operational through artificially created wind from a WIND BLOWER. The blower should not be visible. All windmills shall be fitted on a table made of good quality wood of appropriate size.

Specification

Tabletop should be at least 96" X 48" (LXB). Height of the table shall be 36". The table shall be well decorated and made of good quality ply board of minimum thickness 1" pasted with good quality sun mica. Different types of windmills as follows are to be demonstrated in working condition.

- Horizontal axis – two-blade system
- Horizontal axis – three-blade system
- Horizontal axis – multi blade system
- Vertical axis – Darrius type system
- Vertical Axis – Savories type system

The small power, which will be obtained from the wind power generating models, shall be utilized for glowing of LED's, Voltmeter etc. On the table a model depicting a village located near the seashore should be developed. Some hutments should be shown which would be lighted through windmill power. The models are to be made of aluminum, polystyrene, acrylic whichever is suitable and applicable. All rotating parts are to be attached with suitable size ball bearings. The seashore and wind farm shall be demonstrated with proper landscaping. Proper write-up explaining the exhibit should also be provided.

The exhibit will be placed on a table & also be enclosed with 8mm size glass cover. Dimension of the enclosure shall be at least 96" X 48" X 36".

The backside of the enclosure shall be made of 1" thickness ply board & a suitable brief write-up on wind power generation shall have to be provided. Opening of the hidden blower shall be located in the back side of the enclosure in such a way that all the wind power models would run while the blower will be activated by pressing a single pushbutton switch. The push button switch will be located in front of the exhibit for demonstration purpose. The capacity of blower will be adequate to run all the wind power models & to be operated at 230 V AC, 50Hz.

T5.2 FLAT SCREEN TV WITH AUDIO VISUAL

The system will consist of a Flat Screen TV with DVD Player for showing films, videos and games related to wind energy, basic meteorology and different types wind power producing plants etc. The TV and the DVD will be of well-reputed brands like Videocon, LG, Sony, Samsung and Philips etc.

T5.3 COMPUTER BASED QUIZ & GAMES

The Computer based quiz and game is an interactive audio-visual exhibit designed to impart knowledge related to wind and wind energy systems. The visitor can participate by inserting a '*five rupee*' coin. The computer system will be turned on immediately on insertion of the coin and remain active for 15 minutes. The Computer system will consist of PC wide wide flat screen assembled in a suitable wooden cabinet. The Computer can be operated in two modes; namely 'information mode' and 'quiz mode'. In the information mode, it will supply information about different aspects of solar energy. In the 'quiz mode' the Computer will give both questions and answers in an interactive way. The system will automatically switch off after 15 minutes and there will be time counting display on the screen.

T5.4 PANELS & BLOW UPS

The panels and blow ups for depicting drawings, diagrams and pictures related to wind power will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 910 mm (4'x3') each.

T6. HYDEL POWER CENTRE

T6.1 WATER FALL ANIMATION (artificial waterfall – outdoor)

An artificial water fall will be created from a suitable point in the existing hillock to be modified to accommodate it of about 1 meter width and it will be illuminated with coloured LED lamps. Water will be allowed fall from the top of the existing rocky hillock by making necessary modification with cement concrete and rock. The water will be pumped up with a 2 HP centrifugal surface pump from a water reservoir created at the base of artificial hillock. The waterfall shall be 1000 mm wide and the existing water tank on the hillock will be modified for this purpose.

T6.2. WORKING MODEL OF PELTON TURBINE (Outdoor)

Normally Pelton turbines are very high head turbines with a heads of more than 100 meters... It is not possible to have high head in the Energy Park so a model similar to Pelton known as "Harris Pelton" Turbine will be installed for demonstration purpose, which can operate at comparatively lower head. The machine output is 1.5 kW and it can operate at a low head of 8 meters. The system should be complete with a small pump with required pipe length, which will supply water at the top level for feeding the turbine.

T6.3 WORKING MODEL OF FRANCIS TURBINE (Outdoor)

Normally Francis turbines are medium head turbines where head of water lies between 30 to 100 meters. It is not possible to have 30-meter head in the Energy Park so a model similar to Francis known as "Nautilus" Turbine may be installed for demonstration purpose, which can operate at comparatively lower head of about 3.1 meters and generate power. The system should be complete with a small pump with required pipe length, which will supply water at the top level for feeding the turbine.

T6.4 MODEL OF KAPLAN TURBINE (Outdoor)

Kaplan turbines are low head turbines but require huge flow of water for running the machine. It is not possible to have such flow in the Energy park so a model similar to Kaplan known as "Niade": turbine may be installed for demonstration purpose which can operate at a head between 2 to 4 ft with a flow of about 60 to 100 liters of water and generate 125 watt of power. The system should be complete with a small pump with required pipe length, which will supply water at the top level for feeding the turbine.

T6.5 WORKING MODEL OF UNDER WATER BULB TURBINE (Outdoor)

A small model of under water Bulb Turbine known as "AQUW – Aquair 12 V under Water Turbine Generator" may be installed. This machine can generate 8 amps at 12 volt with a flow velocity of 10 kmph through a suitable pipe. The system should be complete with a small pump with required pipe length, which will supply water at the top level for feeding the turbine.

T6.6 WATER SUPPLY SYSTEM FOR EXHIBITS

In order to facilitate smooth and uninterrupted operation of Hydroelectric energy related exhibits, it is essential to ensure a proper water management system feeding all the main water supply lines connected to the exhibits.

- i. This work will involve installation of a small water reservoir on the top of existing rocky hillock inside the park.
- ii. Repair and capacity expansion of water reservoir at the base of the hillock.
- iii. Repair and reconditioning/replacement of existing deep tube well pumps for ensuring water supply.
- iv. Provision for storing water available from the new solar water pump unit for demonstration purpose in the lower level reservoir.
- v. Providing necessary pipes, valves and fittings for the whole system.
- vi. Water will be recycled and the system will be designed in such a way that it should be complimentary to the 'Rain water Harvesting system' being taken up separately.

T6.7 MUSICAL FOUNTAIN

T6.7.1 DESCRIPTION

The Musical fountain shall have array of individually articulated nozzles to create highly impressive effect. The water will jump, twist, sway and swirl in beautiful movements synchronized with recorded music. The waltzing waters shall be custom designed and manufactured to dance (work) according to tune of Indian music (selected classical and Hindi film music).

T6.7.2 SPECIFICATION

Length:	10 meters
Spray Height:	7 to 10 meters
Pump:	Minimum 37 stainless steel submersible.
Light:	100 Nos. (Minimum) with 500 watt halogen lamps with Diachronic filters.
Nozzles:	As required to give a proper show along with music.

In addition to the above, the following accessories shall be provided:

- i) **Pool Filter** – The Pool Filter will maintain the water quality. The filter size shall be based on pool capacity and the shall be calculated to ensure clear water by the manufacturer/supplier.
- ii) **Fountain Effect** – Spray jets should be properly selected to give the pattern and effect desired.
- iii) **Lighting** –The size, wattage and height of water effect and colour lenses are to be properly designed to an impressive show.
- iv) **Pumps** – Pumps of proper size and capacity to be used as per requirement. Both dry and submersible pumps may be used depending on requirement.
- v) **Junction Boxes** – Waterproof junction boxes complete with watertight cord shall be used. The type of junction boxes shall be determined by number of lights and electrical circuits.
- vi) **Control Panel** – Control Panel shall be designed to incorporate the controls for pumps, lights, water level and music playing equipment of the complete system.
- vii) **Wind Controller** – A sensing head mounted up-wind from the fountain with control mechanism.
- viii) **Suction Drains & Debris Screen** – Suction drains with debris screen shall be provided to prevent damage to pumps and clogging of spray jets.
- ix) **Overflow Drains** – Overflow drains shall drain out excess water brought by rainfall or accidental overflowing of the fountain.
- x) **Water level Controller** – Water level sensors monitoring water make up valve and low water shutdown will replenish the water lost due to evaporation.

- T6.8 FLAT SCREEN TV WITH AUDIO VISUAL**
The system will consist of a Flat Screen TV with DVD Player for showing films, videos and games related to hydroelectric power and power plants etc. The TV and the DVD will be of well-reputed brands like Videocon, LG, Sony, Samsung and Philips etc.
- T6.9 COMPUTER BASED QUIZ & GAMES**
The Computer based quiz and game is an interactive audio-visual exhibit designed to impart knowledge related to hydroelectric energy systems. The visitor can participate by inserting a '*five rupee*' coin. The computer system will be turned on immediately on insertion of the coin and remain active for 15 minutes. The Computer system will consist of PC wide flat screen assembled in a suitable wooden cabinet. The Computer can be operated in two modes; namely 'information mode' and 'quiz mode'. In the information mode, it will supply information about different aspects of solar energy. In the 'quiz mode' the Computer will give both questions and answers in an interactive way.
The system will automatically switch off after 15 minutes and there will be time counting display on the screen.
- T6.10 PANELS & BLOW UPS**
The panels and blow ups for depicting drawings, diagrams and pictures related to Tidal power, Ocean Thermal power, Wave power, Rain water harvesting and cross sections of three types of hydro turbines will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 910 mm (4'x3') each.
- T7. BIO ENERGY CENTRE**
- T7.1 BIOMASS GASIFIERS**
Two non-working models will be displayed, the first one will be a 'Cross section of a Down Draft Type Biomass Gasifier and the Second Model will show how Producer gas generated by the gasifier can be used for generating electric power or produce heat energy.
- T7.2 BIOGAS PLANT (Cut Models)**
One of the two cut models will be that of a Gobar Gas Plant used in rural areas and the other will be Biomethanation plant for Municipal Waste.
- T7.3 DIFFERENT MODELS OF CHULHAS**
Different types non-working models of different types of smokeless chullahs will be displayed.
- T7.4 FLAT SCREEN TV WITH AUDIO VISUAL**
The system will consist of a Flat Screen TV with DVD Player for showing films, videos and games related to different types of biomass, bio-diesel and biomass power and power plants etc. The TV and the DVD will be of well-reputed brands like Videocon, LG, Sony, Samsung and Philips etc.
- T7.5 COMPUTER BASED QUIZ & GAMES**
The Computer based quiz and game is an interactive audio-visual exhibit designed to impart knowledge related to hydroelectric energy systems. The visitor can participate by inserting a '*five rupee*' coin. The computer system will be turned on immediately on insertion of the coin and remain active for 15 minutes. The Computer system will consist of PC wide flat screen assembled in a suitable wooden cabinet. The Computer can be operated in two modes; namely 'information mode' and 'quiz mode'. In the information mode, it will supply information about different aspects of biomass fuel; bio-diesel and biomass based power plants. In the 'quiz mode' the Computer will give both questions and answers in an interactive way. The system will automatically switch off after 15 minutes and there will be time counting display on the screen.
- T7.6 PANELS & BLOW UPS**
The panels and blow-ups for depicting drawings, diagrams and pictures related to photosynthesis, biomass gasifier based power plant, biomethanation plant, biomass combustion based power plant and bio- diesel technology. The panels will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 910 mm (4'x3') each.
- T7.7 ILLUSTRATIVE DISPLAY CHART**
The illustrative display chart depicting drawings, diagrams and pictures related to Jatropha oil, Karanj oil and comparison with mineral Diesel oil. The panels will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.
- T8. ENERGY INFORMATION CENTRE**
The Energy Information Centre will function as reception, library, guidance, shop and information center to visitors. On entering the visitor will first come to this center and then proceed to see other exhibits. Important books, periodicals and other items may be sold from this centre. This will also act as Control and Monitoring Cell of the Park. The Music-cum-Public Address system (considered separately) will be operated from here.
Three Computers, CD Banks, Books, Magazines on Energy, IREDA Publications, Government of Jharkhand publications/Circulars and MNES Publications/Circulars will be available from this centre either free of cost or on payment including soft and hard copies other publications. The Computers shall be connected to Internet.

T8.1 COMPUTERS WITH RELEVANT SOFTWARE

The Computer shall be Desk Top type shall consist of the following:

PROCESSOR	Intel Core 2 Duo Processor 2.4GHz
CACHE	2MB
CHIPSET	Intel 945 chipset
FSB	1066MHz
SYSTEM	
MEMORY/MAX	256MB DDR2 Up to 2GB
SUPPORT	
DIMM Slots	2
DEVICE TYPE	ULTRA ATA IDE HDD, CD ROM Serial ATA HDD
	Supported
HARD DISK DRIVE	80GB Serial ATA HDD
MULTIMEDIA (OPTIONAL)	52X CD ROM DRIVE or DVD DRIVE/ COMBO DRIVE /SPEAKERS / MIC
PORTS	1 x RS-232C SERIAL 1 x Parallel 4 USB ports
SLOTS	4 PCI Express slots
GRAPHICS/MEMORY	Intel Graphics Media Accelerator 950
GRAPHICS PORTS	1 No (16X PCI Express Slot)
FLOPPY DRIVE	1.44MB FDD
DISPLAY	15 NON INTERLACED DIGITAL COLOR MONITOR
KEYBOARD	104 KEYS WINDOWS KEYBOARD
MOUSE	PS/2 MOUSE
CABINET WITH SMPS	P4 ATX TOWER CHASSIS
	Designed for Windows XP, DMI 2.0 compliant, NSTL
CERTIFICATION	Certified, ISO Certified

The PC shall have to be HCL/ Wipro/Compaq/Samsung/Dell or similar reputed make.

T8.2 LCD PROJECTORS

The projectors resolution will be SVGA 600x800 with high contrast ratio of minimum 400:1 or higher and capable of providing crystal clear images and digital sound quality. This will be a high definition projector with brightness of more than 1500 lumens and suitable for technical presentation in a 50 seat hall. The listed lamp life should be atleast 2000 hours.

The projector will have high connection flexibility and connects to PCs, DVDs, Camcorders etc. This will be complete with wall-mounted screen. This equipment will be used in the Seminar Hall.

T8.2.1 INTERNET ENABLED COMPUTERS, ETC.

The Computers will be Internet connected and visitors may see energy related sites through the Internet. A list of web site addresses of a number of web sites from which information regarding renewable energy may be obtained will be displayed. In addition to these, a number of CDs, books, literature, MNRE publications and other energy related books & publications would be available here including the softwares mentioned below

T8.2.2 COMPUTER INTERACTIVE SOFTWARE-I

Computer Interactive software on (i) How electricity is made, electrical distribution basics, AC & DC electricity and other basic knowledge about electricity for school level students.

T8.2.3 COMPUTER INTERACTIVE SOFTWARE-II

Computer Interactive software about earth, moon, planets, solar radiation and space etc.

T8.3 MUSIC-CUM-PUBLIC ADDRESS SYSTEM

T8.3.1 OBJECTIVE

The Public address system will be operated for making announcement to visitors and staff of the Energy Park also for running musical cassettes at low db level for entertainment of visitors.

T8.3.2 DESCRIPTION

One Microphones of the system will be located at the office near the Main gate and the other will be located in the Energy Information Centre table. The main amplifier and control system shall be installed in Energy information center and 8 (eight) Nos. of Speakers shall be located in the different areas of the Park.

T8.3.3 SPECIFICATION

The Music-cum-Public Address System shall consist of 75 watt public address amplifier with auto-reverse cassette player with replaceable module, 6 pre-set AM/FM tuner, 2 Mic, 1 Aux/CD & Telephone inputs, built in switch able monitor speaker & headphone output, line output to a booster amplifier for more system power, speaker matching: 4 Ω , 8 Ω , 16 Ω and 100 V. suitable for 230 volt, 50 Hz supply. The equipment should be Ahuja radio or Philips make.

The system shall be complete with 4 (four) Nos. of speakers located at 4 different locations, microphone with table stand.

T8.3.4 ILLUSTRATIVE DISPLAY CHART - I

The illustrative display chart depicting drawings, diagrams and pictures related to basic electricity, current, voltage, kW, kWh, MW, GW, kV, KVA, MVA and KVAR etc. made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T8.3.5 ILLUSTRATIVE DISPLAY CHART - II

The illustrative display chart depicting drawings, diagrams and pictures related to Nuclear Fission, Nuclear fusion, proton, neutron, electron and atomic structure for school level students made with 3

mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T8.3.6 ILLUSTRATIVE DISPLAY CHART - III

The illustrative display chart showing common energy units and their inter-relation, like relation between kW and joule, Kcal and kW etc. made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T8.3.7 ILLUSTRATIVE DISPLAY CHART - IV

The illustrative display chart depicting Kyoto protocol, CDM and Climate change etc. made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T.8.3.8 ILLUSTRATIVE DISPLAY CHART - V

The illustrative display chart depicting "What human activities contribute to climate change?" made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T8.3.9 ILLUSTRATIVE DISPLAY CHART - VI

The illustrative display chart depicting chronological history of Electrical inventions, made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T8.3.10 ILLUSTRATIVE DISPLAY CHART - VII

The illustrative display chart depicting chronological history of solar energy, made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T8.3.11 ILLUSTRATIVE DISPLAY CHART - VIII

The illustrative display chart showing comparison between incandescent lamps, fluorescent tubes, CFL, sodium vapour, metal halide, mercury vapour and LED lamps etc. made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T8.3.12 ILLUSTRATIVE DISPLAY CHART ABOUT IMPORTANCE OF RENEWABLE ENERGY IN OUR FUTURE

The illustrative display chart depicting why Renewable Energy is Important for our Future? The panel is made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each

T8.3.13 DIGITAL CLOCK

The Digital Clocks will be displayed at different locations in the Energy Park. There will be two types of Digital Clocks:

- a) This Digital clock shall be wall mounted and will show both Indian Standard & Greenwich time simultaneously in the Energy Information Center, 2 (two). other exhibition rooms.
- b) The digital Clocks mounted outside the building including main gate will only show Indian standard time.

All the digits shall show in seven segment display system either in LED & LCD. The clock shall show hours, minutes & seconds. There shall be suitable time adjustment device. The size of the digits will be 250 mm and 100 mm. The clock shall operate at 230 V, 50 Hz supply with standby battery backup for uninterrupted operation.

T9. EXHIBIT ON ENERGY TRANSFORMATION

T9.1 Objective

The objective of this exhibit is to educate the visitors/students on energy conversion and energy conservation. They should understand energy could only be transformed from one form.

T9.2 Description

The exhibit shall comprise of a floor mounted octagonal display table. The tabletop shall have eight compartments, where different types of conversion of energy in working conditions shall be demonstrated. Each compartment shall have glass cover in such a way that any visitor can run & activate each conversion technique by pressing a pushbutton, which will be suitably placed on the tabletop. Different type of transformation of energy shall also be suitably described. Each compartment earmarked for each conversion shall be suitably illuminated.

T9.3 Specification

The exhibit shall be of a well-decorated floor mounted tabletop exhibit made of good quality ply board of minimum thickness 25 mm pasted with good quality sun mica. Height of the table shall be 900 mm & each side of the octagon shall be at least 600 mm. The transformation technique shall be described through scientific reasoning. The exhibits will include following energy transformation phenomenon.

- Chemical to electrical (Battery)
- Electricity to light (LED)
- Mechanical to electrical (Dynamo)
- Electrical to mechanical (motor)
- Electrical to sound (Audio)
- Electrical to heat (Heating filament)
- Wind energy to electricity (WEG)

The size of the compartment on the tabletop shall be adequate enough to place the above transformations technique in such a way that visitors can understand the mechanism. The exhibit shall have provision for easy repair or replacement of the defective parts. The exhibit shall be well-decorated floor mounted and made of good quality plywood of minimum thickness 25 mm pasted with good quality sun mica.

Proper write -ups should be given on the top of the exhibit. It should be made in bigger font size of at least 16 No. So that it should be readable by any visitor including children.

T10. EXHIBIT ON STORAGE OF ENERGY**T10.1 Objective**

The exhibit will be an explanatory cum working model type. The model will describe the different technique of storage of energy as given below:

- Potential energy by lifting a mass.
- Kinetic energy by moving a mass.
- Kinetic energy by rotating a mass.
- Magnetic energy stored in a magnetic field.
- Electrical energy stored in a capacitor.
- Electrical energy stored in a battery.
- Energy stored in compressed gas.
- Energy stored in a spring (potential energy).
- Energy stored in a hot mass.

T10.2 Technical Specification

The potential energy gained by a mass while it is displaced from a reference point to higher point, the stored energy – mgh (where m = mass, g = gravitational acceleration & h = height) has to be suitably demonstrated in such a way that the stored energy can perform work.

Kinetic energy gained by a mass while it is in motion, the stored energy – $\frac{1}{2}mv^2$ (where m = mass of the body under motion, v = velocity of the moving body) has to be suitably demonstrated in such a way that the stored energy can perform work.

Kinetic energy gained by a rotating mass while it is in motion, the stored energy – $\frac{1}{2}J\omega^2$ (where J = moment of inertia & ω = angular velocity of the moving body) has to be suitably demonstrated in such a way that the stored energy can perform work.

While a current passing through a solenoid wound on a magnetic material, stored magnetic energy in the magnetic material is expressed by – $\frac{1}{2}Li^2$, where L = magnetic inductance of the coil & i = current passing through the solenoid. The working principle of storage of energy in a magnetic field & existence of that stored magnetic energy has to be suitably demonstrated.

While a condenser having capacitance C is charged at a voltage V , energy is stored in the capacitor, which is expressed by $\frac{1}{2}CV^2$. The working principle of storage of energy in a magnetic field & existence of that stored magnetic energy has to be suitably demonstrated.

Battery is an energy storage device for a large quantum of energy. The storage principle has to be suitably demonstrated through a charge & discharge circuit.

Air can be compressed in a closed vessel by a compressor & by this way potential energy can be stored. Releasing the compressed air by a suitable regulator, potential energy can be utilized to do some work. The working principle of stored energy & existence of that stored energy have to be suitably demonstrated.

Potential energy can be stored in spring. The technique of storage of energy & its existence is to be suitably demonstrated by a working exhibit.

T11. DIFFERENT TYPES OF BATTERIES ON DISPLAY

There are many different types of batteries to meet the demands of individual appliances and their users. Different devices operate at different voltages and power levels. They all require batteries that provide the necessary power output at a minimum discharging voltage. The voltage of a given battery depends on the number of single cells connected in series and on their electrochemical system.

T11.1 Series-Parallel Connections of Batteries.

Simple series and parallel connection concept will be shown in an illustrative display chart depicting the simple connection diagrams. The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T11.2 Chart Showing Different Types of Batteries

There are many types of batteries in addition to lead-acid type for various uses. A chart showing some important varieties will be shown as detailed below. The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

BATTERY TYPE	VOLTAGE	APPLICATIONS	REMARKS
Zinc carbon and zinc chloride	1.5	Toys, torches, clocks, flash lamps etc.	Low purchase cost. Best with Intermittent mode of use. Zinc carbons are the longest established standard cell type. An improved version of the zinc carbon battery was introduced in 1988. Zinc chloride, that is better suited to motorized appliances.
Alkaline Manganese	1.5	Radios, torches, cassette players, cameras, toys	Radios, torches, cassette players, cameras, toys
Button Cells			
Silver Oxide	1.55	Cameras, pocket calculators.	Relatively high purchase cost. Flat discharge. Continuous or Intermittent mode of use.
Zinc air	1.4	Hearing aids and pocket paging devices	Flat discharge, Continuous or intermittent mode of use.
Lithium manganese	3	Pocket calculators	Relatively high purchase cost. Flat discharge. Continuous or intermittent mode os use
Rechargeable			
Nickel cadmium	1.2	Power tools and emergency lighting and other heavy duty motor driven appliances	High initial purchase cost but can be recharged many hundreds of times. Often manufactured as packs supplied with appliances.
Nickel metal hydride	1.2	Mobile phones, camcorders and laptop computers	High initial purchase cost but can be recharged many hundreds of times. Often manufactured as packs supplied with appliances. Increased energy density offers longer service life between charges.
Lithium ion	4	Mobile phones, camcorders and laptop computers	High initial purchase cost but can be recharged many hundreds of times. Often manufactured as packs supplied with appliances. High-energy content (3.6v) and long cycle life lead to low overall energy cost.

T12. FUEL CELL

Fuel cells have several benefits over conventional combustion-based technologies currently used in many power plants and passenger vehicles. They produce much smaller quantities of greenhouse gases and none of the air pollutants that create smog and cause health problems. If pure hydrogen is used as a fuel, fuel cells emit only heat and water as a byproduct.

T12.1 Diagram on what Is a Fuel Cell?

In principle, a fuel cell operates like a battery. Unlike a battery, a fuel cell does not run down or require recharging. It will produce energy in the form of electricity and heat as long as fuel is supplied. The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each.

T12.2 DIFFERENT TYPES OF FUEL CELLS.**T12.2.1 Alkali Fuel Cells**

Alkali fuel cells operate on compressed hydrogen and oxygen. They generally use a solution of potassium hydroxide (KOH) in water as their electrolyte. Efficiency is about 70 percent, and operating temperature is 150 to 200 degrees C. Cell output ranges from 300 watts (W) to 5 kilowatts (kW) . Alkali cells were used in Apollo spacecraft to provide both electricity and drinking water. They require pure hydrogen fuel, however, and their platinum electrode catalysts are expensive. And like any container filled with liquid, they can leak.

The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each

T12.2.2 MOLTEN CARBONATE FUEL CELLS (MCFC)

Molten Carbonate fuel cells (MCFC) use high-temperature compounds of salt (like sodium or magnesium) carbonates (chemically, CO_3) as the electrolyte. Efficiency ranges from 60 to 80 percent, and operating temperature is about 650 degrees C (1,200 degrees F). Units with output up to 2 megawatts (MW) have been constructed, and designs exist for units up to 100 MW. Also, carbonate ions from the electrolyte are used up in the reactions, making it necessary to inject carbon dioxide to compensate.

The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each

T12.2.3 PHOSPHORIC ACID FUEL CELLS (PAFC)

Phosphoric Acid fuel cells (PAFC) use phosphoric acid as the electrolyte. Efficiency ranges from 40 to 80 percent, and operating temperature is between 150 to 200° C. Existing phosphoric acid cells have outputs up to 200 kW, and 11 MW units have been tested. PAFCs tolerate a carbon monoxide concentration of about 1.5 percent, which broadens the choice of fuels they can use. If gasoline is used, the sulfur must be removed. Platinum electrode-catalysts are needed, and internal parts must be able to withstand the corrosive acid.

The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each

T12.2.4 PROTON EXCHANGE MEMBRANE

Proton Exchange Membrane (PEM) fuel cells work with a polymer electrolyte in the form of a thin, permeable sheet. Efficiency is about 40 to 50 percent, and operating temperature is about 80°C. Cell outputs generally range from 50 to 250 kW. The solid, flexible electrolyte will not leak or crack, and these cells operate at a low enough temperature to make them suitable for homes and cars. But their fuels must be purified, and a platinum catalyst is used on both sides of the membrane, raising costs.

The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each

T12.2.5 SOLID OXIDE FUEL CELL (SOFC)

Solid Oxide fuel cells (SOFC) use a hard, ceramic compound of metal (like calcium or zirconium) oxides (chemically, O_2) as electrolyte. Efficiency is about 60 percent, and operating temperatures are about 1,000°C.

The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 600 mm (4'x2') each

T12.3 OTHER PANELS & BLOW UPS

T12.3.1 Geothermal Power – Panel

Geothermal Energy, which has been used to generate electricity since the early 1900s, is a wide spread resource found throughout the World. Its potential as an energy source is substantial. In geological terms, Geothermal Energy is defined as the heat above the mean ambient temperature of earth's solid core, which is about 8×10^{30} joules. The amount of Geothermal Energy is enormous, however, only a tiny fraction of natural heat can be extracted from the earth's crust, mainly for economic reasons, which limits exploitation to a maximum depth of 5 km. To this depth, the temperature of the crust increases at an average rate of 30°C to 35°C per kilometers. Size 1200 mm x 910 mm (4'x3') each.

T12.3.2 Geothermal Power Plants

In *geothermal power plants* steam, heat or hot water from geothermal reservoirs provides the force that spins the *turbine generators* and produces electricity. The used geothermal water is then returned down an *injection well* into the reservoir to be reheated, to maintain pressure, and to sustain the reservoir.

There are three kinds of *geothermal power plants*. The kind we build depends on the temperatures and pressures of a reservoir.

The panels and blowups for geothermal power plants will show drawings, diagrams and pictures. The panels will be made with 3 mm thick aluminum plates fixed with digitally printed material on it.

Size 1200 mm x 910 mm (4'x3') each.

T12.3.3 PANELS & BLOW UPS ABOUT NUCLEAR POWER

The panels and blow-ups for depicting most simple nuclear power plants just to give some idea to school level students. The panel will be made with 3 mm thick aluminum plates fixed with digitally printed material on it. Size 1200 mm x 910 mm (4'x3') each.

T13. SURVEILLANCE SYSTEM

With safety & security of human lives & property being our top most priority, a suitable Security System tailor made for the Energy Park must be provided. The surveillance equipment consisting of Computer, remote controlled CCTV cameras fitted at important locations from security point of view, LCD display units etc. should be best available in the market. It is proposed to have Cameras installed at following locations with viewing and recording at the Exhibition Hall.

- a) Two gates of the Energy Park.
- b) Inside Exhibition Hall.
- c) Inside Seminar Hall
- d) Near Musical Fountain
- e) Near Artificial Waterfall.
- f) Four different locations inside Energy Park.
- g) Spare 1 No.

T14... MUSCLE POWER EXHIBIT/DYNAMO PADDLE**T14.1 Description**

An exercising cycle will be fitted with a DC dynamo by a V-belt for converting muscle power to electricity. Any rider can paddle the cycle, which will drive the dynamo and electricity will be generated. The generated electrical energy will be used to run a tri-colour visual indicating system. The padding speed will change the brightness and colour of light generated.

A standard HERO make exercising paddle cycle shall be rested on a 50 mm X 50 X 6 mm MS angle fabricated structure covered by 18 SWG MS sheet & minimum 1 mm thick Aluminum checker plate over the MS sheet. Front wheel of the cycle shall be fitted with 12V, 20W permanent magnet DC dynamo by a V-belt. There shall be an indicator mounted on a separate frame just in front of the cycle. The frame shall be fitted with the base platform. The indicator shall comprise of 3 X 12 W. coloured lamp (Red, Yellow & Green) with reflector. There shall be an electronic controller for glowing the lamps in such a way that intensity, colour & number of lamps, which will glow, shall depend on number of paddling per min. The exhibit shall be painted with colourful anti-corrosive paint. There will be a blue coloured revolving alarm mounted on the indicating lamppost. The alarm will operate when the cycling speed will be excessively high and just after glowing red indicator lamp. There shall also be an analogue type Speedo meter suitably fitted on the cycle.

T14.2 Specification

Length Breadth and Height of the platform will be minimum 1800 mm, 900 mm and 150 mm respectively. Indicator board will be located suitable in front of rider of the exhibit at a height of about 1050 mm from base platform.

T15. FURNITURES & FIXTURES**T15.1 Inkjet Printer-cum-Scanner**

HP make Inkjet Printer-cum-Scanner shall be purchased at manufacturers price as per technical literature.

T15.2 Web Camera

Windows compatible web Camera will be procured as per manufacturer's price list and only from reputed MNC manufacturer.

T15.3 Computer Table (Workstation Type – I)

Computer Table with 1(one) terminal table & printer table attached with fixed Keyboard & 3 drawers on one side. Size - 48"x30"x30".

T15.4 Computer Table (Workstation Type – II)

Computer Table with 1(one) terminal table with sliding Keyboard & 3 drawers on one side. Size - 30"x24"x30"

T15.5 COMPUTER CHAIR

Computer Chair with arms, Godrej or equivalent good make.

T15.6 Executive Table

Executive table, 60"x36"x30"with 3 drawers & one cupboard, Godrej or equivalent good make.

T15.7 Shelves

Enclosed shelves with glass cover, Size - 66"x33"x12

T15.8 Steel Almirah

Steel Almirah - Size 78" x 35" x 19' with 1 locker and 4 compartments. Steel sheet thickness -19 SWG, Godrej make or equivalent reputed make.

T16. POWER GENERATING DRUM**T16.1 Description**

The exhibit is a cylindrical drum made of FRP/NFTC body of about 1700 mm diameter and 1200 mm length with 2 Nos. of circular MS rails fitted along the outer surface of the drum in such a way that the drum can rotate freely on its axis for demonstrating generation of electricity from muscle power. Walking or jogging along the inside periphery results in rotation of the drum. One pair of the wheels fitted with a DC dynamo through gear assembly, which will rotate the dynamo. The Dynamo will generate power, which in turn shall be utilized for Audio – Visual effect to demonstrate the production of electrical energy from muscle power through a joy ride. The total system shall have to be set on brick foundation with MS fabricated base.

T16.2 Specification

Diameter of Drum	1700 mm
Breadth of Drum	1200 mm
Length of Base Platform	1900 mm
Breadth of Base platform	800 mm
Platform material	100 X 50 X 5 mm MS Channel
Diameter of Rail Material	32 mm Bright Rod
Rail Support Ring	150 X 6 mm MS Flat Bar
Number of Spacer Plate	16
Spacer Plate Materials	50 x 6 mm MS Flat Bar 235 mm (made of Hard Polymer)
Wheel diameter	

Wheel Thickness	100 mm
Shaft Diameter	40 mm
Diameter of Hand Rail	32 mm (SS Pipe)
Height of Handrail Support	minimum 1200 mm, should be made of Black pipe.
Display Board	600 mm X 300 mm X 100 mm
Visual display	2 X 100 mm diameter LED display Unit 8 X High Intensity LED
Audio System	100 mm diameter 12 V brass less Fan 2 x 15 W Stereophonic auto reverse Cassette Player
Dynamo	60W, 12 V, Permanent Magnet
Dynamo Drive	Grooved Pulley & V-belt

All dimensions are approximate.

T17. SOLAR TOY CAR FOR CHILDRE

T17.1 Description

The solar car shall be of 4 wheels (two at the back side and two in the front side) suitable for riding children up to the age of 10 years. The car shall be fitted with a module of capacity not less than 50Wp with suitable Charge Controller and 12V 30AH rechargeable maintenance free battery. The car shall be driven by a DC motor of rating not less than 12V, 6A, through suitable controller. The car shall be provided with mechanical arrangement to move forward and backward in such a way that the rider can easily handle the car. The car shall also be provided with low powered horn & head light with controlling switches. The body of the car shall be made of fiberglass. The car shall have electronic breaking arrangement. The car shall have back horn, sidelight etc. The wheels of the car shall be made of molded PVC having diameter 8" approx. Provision for charging the battery from external sources should also be provided. Over all dimensions will be 1335mm X 700 mm X 670 mm (LXWXH).

T17.2 Specification

- i) Working head lights and turning signals
- ii) Forward and reverse driving
- iii) High and slow speed control
- iv) Two-seater capacity
- v) Brake, battery charge indicator
- vi) Speed: 5 to 7 kmph
- vii) 50 Wp Solar panel integrated with the car.
- viii) Spring type shock absorber for comfort
- ix) Realistic bumpers
- x) Safety Seat belts
- xi) Toy cellular phone, floor carpet and working stick shift
- xii) Moulded PVC body.
- xiii) Overall size: 1335 mm (L) x 700 mm (W) x 670 mm (H).
- xiv) Openable door, hood & trunk
- xv) Colour; Red or Green
- xvi) Provision shall be made for charging the battery from outside power source at 230 Volt AC.

T18. BATTERY OPERATED BICYCLE

T18.1 Description

A standard cycle fitted with a battery driven motor. A small charger for the battery will be installed in a convenient place in the Energy Park. The cycle will be made available to Visitors on rental basis for joy ride.

T18.2 Specification

- i) Cycle size: 26"
- ii) Motor: 24 Volt DC, 300 watts.
- iii) Drive: Rear Wheel direct drive.
Rechargeable sealed Lead-Acid 12 volt, 17 Ah - 2
- iv) Battery: 2
- v) Riding Range; 30 – 50 kms.
- vi) Gradient: 8 Degree.
- vii) Speed: 25 kmph (max^m)
- viii) Light: Fitted in both front and rear.

T19. ENERGY SLIP

T19.1 Description

The Energy Slip is made of a robust soft endless conveyor belt fitted with suitable metallic wheels. The conveyor belt is inclined at a suitable angle with respect to horizontal axis. When a rider tries to come down from top most point the inclined conveyor belt moves due to gravitational pull. The conveyor belts rotate the upper drum, which is coupled to a DC dynamo through a gear assembly. During sliding electricity is generated due to rotation of the upper drum. The electricity thus produced may be used to produce audio effect through a musical system. A staircase made of GI angle or GI pipe shall be made for going up to the top point of the Energy Slip. The staircase shall be provided with proper handrail and chequered plates for stepping.

T19.2 Specification

- i) Total length: 7500 mm
- ii) Total breadth: 670 mm
- iii) Point of conveyor slide: 3900 mm
- iv) Breadth of conveyor belt: 500 mm
- v) Top edge height of slide: 2400 mm
- vi) Dynamo; 12 Volt, 15 watt
- vii) Diameter of Idler Drum: 200 mm
- viii) No. Of rollers: 12
- ix) Display unit LED display unit with logo – ‘ENERGY SLIP’
- x) Dynamo rating 12 volt, 1 Amp.
- xi) Dynamo drive DC dynamo shall be fitted with top edge wheel by means of 75 mm dia rubber pulley.
- xii) Foundation The structure shall be fitted with RCC foundation by nuts & bolts. All dimensions are approximate.

T20. SOLAR TROLLEY BUS (MINI)

T20.1 Description

The Solar Trolley Bus will be a ten-seater bus of fiberglass body. This will operate on a concrete pathway as shown in the layout drawing. The Bus will cover 400 meter distance in about 15 minutes with a brief stop at the ‘‘Station’’. This bus will operate within the park over the internal roads to be modified and overhead line erected on GI supports made out of GI pipes.

The trolley bus will collect power from current carrying conductor through a current collecting system and a trolley cable. The trolley bus will be fitted with back-up battery system for short run upto 5 kms. And also for taking u-turn etc. A 72 volt DC traction system suitable for operation of two buses with 5.5 kW (approx.) motors each. The current carrying trolley wire shall be made of copper of appropriate size. The trolley conductor shall be fitted on MS cross arms fitted on small RCC poles with proper insulator, stays and guys etc. as required to complete the system. There will be two buses and one will follow the other.

TECHNICAL SPECIFICATIONS OF SOLAR TROLLEY BUS

Speed	50 mtrs/minutes.
Motor	D.C. Series Motor.
Capacity	5.5 kW (Approx.)
Motor control System	MOSFET based Electronic controller
Body	Transparent Fiber Glass.
Comfort & luxury	Large and rooms interior with excellent visibility. No clutch and gear. The Bus will have desert cooler inside.
Length (Approx)	3500 mm.
Width (Approx)	1600 mm.
Ground Clearance	160 mm(Approx)
Power Connection	Flexible cable with copper Bus

T21. SOLAR OUTDOOR LIGHTING SYSTEM WITH LED LAMPS (street light type)

The broad performance specifications of a white Light Emitting Diode light source based Solar Street Light system are given below:

T21.1 Broad Performance Parameters

- | | | |
|----|-------------------------------|---|
| a) | Light Source | White Light Emitting Diode (W-LED) |
| b) | Light Output | White colour, minimum 6 lux when measured from a height of about 3.66 m and illuminated over an area equal to atleast 2.5 m. Higher light output will be preferred. |
| c) | Mounting Height | 4.6 m high pole with extended arm to hold luminaries. |
| d) | PV Module | 37 Wp under STC, measured at 16.4 V as Vload Module Voc minimum 21 V. |
| e) | Battery | Flooded lead acid tubular plate, 12 V – 40 Ah @ C/10, Max. DOD 75%. |
| f) | Electronic Circuit Efficiency | Minimum 72% |
| g) | Average Duty Cycle | Dusk to Dawn |
| h) | Autonomy | Minimum 3 days. |

T21.2 Duty Cycle

The LED street lighting system shall be designed to operate from dusk to dawn under average daily insolation of 4.9 kWh/sq.m on horizontal surface.

T21.3 Light Source

- a) The light source shall be of white LED type. Single or multiple lamps can be used. Wider view angles preferred. The luminous performance of LEDs used should not be less than 30 lumen/watt. Use of LEDs, which emit ultraviolet light, shall be avoided.
- b) The light source shall remain constant with variation of battery voltage.
- c) The lamps shall be housed in an assembly suitable for outdoor use. While fixing the assembly, the lamp should be held in a base up configuration.
- d) The test report on the technical characteristics of LEDs conducted in a Test laboratory approved by MNRE should be furnished.

T21.4 PV Module

- a) The PV Module shall contain crystalline silicon solar cells.
- b) The Operating voltage corresponding to the power output mentioned above shall be 16.4 Volt.
- c) The open circuit voltage of the PV modules under STC shall be atleast 21.0 Volts
- d) The terminal box on the module shall have provision for opening for replacing the cable, if required
 - e) A strip containing the following details shall be laminated inside the module so as to be clearly visible from the front side:
 - i) Name of manufacturer or distinctive logo.
 - ii) Model or Type No.
 - iii) Serial No.
 - iv) Year of make.

T21.5 Battery

- a) Flooded lead acid battery maintenance free battery. It shall conform to latest BIS standards or equivalent international standards.
- b) 75% of the rated capacity of the battery shall be between fully charged & load cut off conditions.

T21.6 Electronics

- a) The total electronic efficiency should be at least 72%.
- b) The electronic system shall operate at 12 volt and shall have temperature compensation for proper charging of the battery through out the year.
- c) The light output shall remain constant with variations in the battery voltages.
- d) Necessary lengths of wire/cables, switches suitable for DC use and fuses shall be provided.
- e) The PV Module will be used to sense the ambient light level for switching ON and OFF the lamp.

T21.7 Electronic Protections

- i) Adequate protection is to be incorporated under no load conditions e.g. when the lamp is removed and the system are switched ON.
- ii) The system should have protection against battery overcharge and deep discharge conditions. The numerical values of the cut-off limits must be specified.
- iii) A blocking diode should be provided as part of the electronics, to prevent reverse flow of current through the PV module(s), in case such a diode is not provided with the solar module(s).
- iv) Full protection against open circuit, accidental short circuit and reverse polarity should be provided.

T21.8 Mechanical Hardware

- i) A metallic frame structure (with corrosion resistance paint) to be fixed on the top of the pole to hold the SPV module. The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45, so that the module(s) can be oriented at the specified tilt angle.
- ii) The design of Structure is enclosed herewith. The pole should be made of mild steel pipe with a height of 4 meters above the ground level, after grouting and final installation. The pole should have the provision to hold the weatherproof lamp housing with a metallic arm of 1.25 m length.
- iii) A vented, acid proof and corrosion resistant painted metallic box for outdoor use should be provided for housing the battery.

T21.9 Other Features

The system should be provided with 2 LED indicators: a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged. There will be a Name Plate on the system, which will indicate:

- (a) Name of the Manufacturer or Distinctive Logo.
- (i) Serial Number. Components and parts used in the solar street lighting systems should conform to BIS specifications, wherever such specifications are available and applicable

T21.10 Charging Indication

One green and another red LED indicators will be provided. The green light will indicate charging in progress and the red LED will indicate deep discharge condition of the battery. The green light will glow only when the battery will be actually charged.

T21.11 Quality & Warranty

The components of the lighting system should conform to latest BIS or International specifications of an advanced country. The warranty period for Solar PV Module will be 10 (ten) years from the date of supply and the warranty for the balance of system will be for at least 5 (five) years from the date of supply.

T22. SOLAR PHOTOVOLTAIC PUMP (Surface) WITH SPRINKLER

The solar water pumping system shall consist of 1800 Wp SPV Array with structure, cabling and associated equipment along with DC 2 HP centrifugal pump of Rotomag or equivalent good make. The pump shall be designed for high head and medium flow multi stage high efficiency pump with microcomputer based Inverter. The Inverter will optimize the power input and enhance overall system efficiency.

Specification:

AC, Three phase, Submersible Pump

Array capacity – 1800 Wp.

Total Dynamic Head (TDH) – 50 m (166 ft.)

Water discharge per day – 35,000 liters

Unlike drippers, micro sprinklers spray water over a wide area when low volume overhead irrigation is desired. They are designed for areas where drippers are not practical, such as large areas of ground cover or small flowerbeds, and for oddly shaped areas. Like all low volume irrigation systems, they require a pressure regulator and filter, and are available in variety of flow rates and diameters

T23. 500 LPD SOLAR WATER HEATER**T23.1 Description**

The solar water heating system shall be of thermo siphon type conforming to IS: 12933 and shall consist of tilted collectors with selectively coated all -copper absorbers. The collectors are to be arranged in series-parallel connection to minimize the pressure drop. Natural convection circulates the water in the heating system. A non-return valve shall be provided before the collector array inlet to avoid the hot water back flow from the system to the cold-water storage tank.

T23.2 Specification

a)	System Capacity –	500 LPD
b)	Average water inlet temperature –	30(C. 65(C
c)	Average outlet water temperature –	1000 mm x 2100 mm
d)	Nominal dimension –	Aluminum
e)	Housing material –	Selectively coated all
f)	Absorber –	copper absorber. Material – 4 mm thick tempered / Toughened glass. Transmissivity – 0.85 (Min.) Resin bonded pads/PU Foam
g)	Glazing –	5 kg/cm ²
h)	Bottom side insulation	
i)	Hydraulic test pressure –	Hot-dip galvanized MS angle.
j)	Collector support material –	
k)	Water storage tank –	Material – 500 liter MS tank. Corrosion protection – Epoxy coating inside the tank. Insulation material – resin bonded pad/ Spintex 300. Cladding material – 24 SWG Aluminum.
l)	Instrumentation	Water Meter – reputed make Thermometers – Dial type, 0 to 100°C
m)	Non-return valve –	Reputed make.
n)	Internal piping –	GI class 'B' as per IS: 1239 Insulation – PU pipe section/resin bonded pads.

T23A ALTERNATIVE SPECIFICATION

Alternatively, water heaters of same capacity with more advanced design may be considered for acceptance if justification for technology may be explained with supporting technical documents at a competitive price.

T24. SOLAR CABINET DRYER

The solar cabinet dryer shall be of 1500 mm x 600 mm x 600 mm size. The outside body will be made of aluminum sheets and the inside shall be made with MS sheets.

The chamber of the dryer shall be provided with double glass top, through which sunlight will fall directly on vegetables/fruits, which will get dried. A solar exhaust fan will drive out the liberated water vapour

The principal components of the drier are:

- i) Transparent cover of glass sheet or plastic film
- ii) Frame work made of MS sheets
- iii) Outside cover made with aluminum sheets
- iv) Glass wool insulation 4 Nos. of perforated racks.

B. Status of Sidhu-Kanu State Level Energy Park, Ranchi.

Table 1: Status of Sidhu-Kanu State Level Energy Park, Ranchi.

Outdoor Exhibits				
SI No	DESCRIPTION	STATUS	UNIT	QTY
1	Power Generating Drum	Totally damaged, base not found	Set	1
2	Solar Toy Car	Car is running, but replacement of battery and body of car to be repaired.	Set	1
3	Battery Operated Bicycle	Three bicycle & battery totally damaged	sets	3
4	Energy Slip	Motor not found, Display not working. To be repaired & Painted.	sets	1

5	Solar Photovoltaic Street Light	Battery box broken, battery totally dry, Charge controller & light fitting not working. Will have to be replaced	sets	25
6	Solar Garden Light	Will be replaced & cable will be checked. 2 Nos of light found, but not working.	Sets	15
7	Solar photovoltaic pump (Surface Pump)with sprinkler	1 No Module found broken, pump is not working. Will be replaced & Painted.	Sets	1
8	Solar Pump set for water supply 1800wp for water supply with	1 No Module found broken, will be replaced & Painted.	sets	1
9	Water Heating Systems	In Working conditions. But reserve empty. Will be painted & rewashed	sets	1
10	Solar Toy Train	Both the train are damaged, repair required. 500 nos. wooden Slipper will be replaced & Painting shall be done.	Sets	2
11	Solar Cabinet Dryer	Fan not working. Will be repaired & Painted	Sets	1
12	Solar water Distillation unit	Painting rewash & repairing shall be done.	Sets	1
13	Water Fall Animation (outdoor)/Artificial water fall	Pump not working cable & light fitting not found	Sets	1
14	Working model of turbine (outdoor) (Pelton, Francis, Kaplan, Bulb & Stream Flow Turbine -each)	Replace selenide valve, repairing & Painting shall be done for all turbines	Sets	5
15	Water Supply System for Hydroelectric Energy related exhibits- Lot.	Motor replaced & reworked & Painted	Sets	1
16	Musical Fountain replacing the existing fountain	3 Nos. pump, nozzle, light fitting, cable not found, Control panel & sound box damaged, shall be repaired.	Sets	1
Indoor Exhibits				
SI No	DESCRIPTION	STATUS	UNIT	QTY
1	Flat Screen Tv with Audio Visual (without Films/Video Disk)	Damaged, shall be repaired or replaced	Sets	4
2	solar Parabolic Cooker	Repaired & Painted	Set	1
3	Solar Box type Cooker	Mirror broken to be replaced	set	1
4	Refrigerator	Repaired	Set	1
5	Weighing Machine	Sensor not working will be repaired	Set	1
6	Music system/ Public address cum music system (without U/G Cable	Damaged part may be repaired or replaced	Set	1
7	Computer for Quiz & Games	Damaged part may be repaired or replaced	Sets	9
8	Solar PV Module for Display 12V, 10 Wp	To be supplied	Sets	2
9	Internet Enabled three computer / other equipments	Damaged part may be repaired or replaced	set	1
10	Computer interactive software No. -1	Damaged part may be repaired or replaced	Sets	3
11	Computer interactive software No. -III	Damaged part may be repaired or replaced	Sets	3
12	Digital Clock - digit size 250 mm for outdoor display	Replaced	Sets	4
13	Digital Clock - digit size 100 mm for outdoor display	Replaced	sets	2
14	Exhibits on Energy Transformation	Damaged part may be repaired or replaced	Sets	1
15	Exhibits on Storage of Energy	Damaged part may be repaired or replaced	Set	1

16	Different types of Batteries for Physical Display	Found damage will be Repaired	Set	1
17	Surveillance System	Damaged part may be repaired or replaced	Set	1
18	Muscle Power Exhibits /Dynamo Paddle Cycle	Damaged part may be repaired or replaced	Set	1
19	Inject Printer cum Scanner	Repaired or Replaced	Sets	2
20	Web Camera Windows Compatible resolution 640 X 480	Damaged part may be repaired or replaced	Sets	2
	20 kWp BIPV Solar Power Plant	Damaged part may be repaired or replaced		
1	Solar Inverter 25 kVA, 3 Ø, 50 Hz, 240 V DC input and 415 V, 3 Ø, 50 Hz AC Input			
2	Battery Bank 2 V, 600 AH			

Installation and commissioning

- Detailed project execution plan should be submitted along with the offer.
- The bidder should quote for installation and commissioning.
- The bidder is responsible for arranging all the accessories and measuring instruments required to properly commission the system.
- In case of non-availability of items in line with " **A. Technical specifications of existing Sidhu Kanu State level Energy park of Technical Specification/(Section 6)**" Contractor shall take JREDA's Consent to supply a suitable substitute for that item.

Format for Covering Letter

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

(To be submitted in the official letterhead of the company)

To,

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

Sub: Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, 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 Tender Fee in the form of Demand Draft & "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:

Note: MSE bidders of Jharkhand must submit necessary documents for claiming exemption of EMD and Bid fee.

Undertaking by MSEs of Jharkhand for availing preferential treatment
NIB No: 06/JREDA/LED/SSLS/19-20

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

I/We _____ (here in after referred to as MSE bidder) being desirous of tendering for the 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

- i. The Manufacturing or Services unit is located at.....District.....in the State of Jharkhand.
- ii. The Head office or Corporate Office of the unit/company/enterprise is at within the territorial jurisdiction of Jharkhand.
- iii. The unit/company/enterprise is registered with (tick):-
 - a. Directorate of industries/District Industries Center, (Copy attached).
 - b. Khadi and Village Industries Board, (Copy attached).
 - c. Directorate of Handloom, Sericulture and Handicraft of Jharkhand Govt., (Copy attached).
 - d. Industrial Area Development Authorities, (Copy attached).
 - e. National Small Industries Cooperation Ltd, (Copy attached).
 - f. Other body specified by Directorate of Industries, Jharkhand Govt. from time to time and other industrial units/enterprises which have submitted IEM and been issued Date of Production (DOP) certificate by GM, DIC/MD, Industrial Area Development Authorities Director, Industries, GoJ.
 - g. MSE having Udyog Adhar Number..... issued by Ministry of Micro, Small and Medium enterprises, Gol and has been duly verified, whether unit is existing / functional and doing regular production at(Specify capacity) by GM, DIC/MD, Industrial Area Development Authorities / Director, Industries, GoJ", (Copy attached).
- iv. The unit/company/enterprise is registered under Jharkhand Goods and Services Tax (JGST) Act-2017 or The Central Goods & Services Tax (CGST) Act 2017, (Copy attached).
- v. The unit/company/enterprise have encouraged local people in employment.
- vi. The unit/company/enterprise complies with all statutory and legal formalities of concerned regulators/ Act.
- vii. That the product/services being supplied to JREDA has been manufactured/created by the unit located in Jharkhand only and agree to submit details of batch number/date or any other identifiable tag as per prevalent practice.
- viii. That GSTR-9C (For unit having aggregate yearly turnover of more than 2 crores) as prescribed under JGST Act-2017 is attached.

(Signature of Authorized Signatory)

Name:
Designation:
Company Seal:

(This bid Performa must be submitted duly signed in case separate sheet is submitted)

Information About The Bidding Firm**NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20**

(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) (Attach proof)	
10.	Firm's Registration Number (Attach proof)	
11.	GST Number (Attach proof)	
12.	Details of in-house testing facility (Attach Proof)	
13.	Office/ Dealer and Service network in Jharkhand (Give details)	
14.	Particulars of Earnest Money and Bid fee	
15.	Place where Materials will be Manufactured	
16.	Place where Materials will be Available for Inspection	
17.	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: 17/JREDA/SPV/Sidhu-Kanu/19-20

(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/blacklisted 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: 17/JREDA/SPV/Sidhu-Kanu/19-20

[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: Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, 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 31.03.2018/19.

Sl. No.	Financial Year	Turnover (in Rupees)
1.	2015-16	
2.	2016-17	
3.	2017-18	
4.	2018-19	
	Average Annual Turnover	

UID No.:

Authorised Signatory
(Power of Attorney holder)

Statutory Auditor
(Stamp & Signature)

Date:

Format For Financial Requirement - Net Worth Certificate

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

[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: Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand.

This is to certify that Net worth of _____ {insert the name of Bidding Company}, as on 31st March 2018/19 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 2018/19	

UID No.:

Authorised Signatory
(Power of Attorney holder)

Statutory Auditor
(Stamp & Signature)

Format of Power of Attorney for Signing Bid

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

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 all tenders notified by Jharkhand Renewable Energy Development Agency during 2019-20, 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: 17/JREDA/SPV/Sidhu-Kanu/19-20

Details of Orders Received & Executed by the Manufacturer/Supplier for Supply of **similar items** to any Govt. Organization during Last Seven Years.

SL. No.	Name of Agency/ Organization	Purchase Order No., Date & Ordered Qty.	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: 17/JREDA/SPV/Sidhu-Kanu/19-20

Sub: Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand.

S. No	Particulars	Details	Make
1	Name of item (Give serial wise details of all the items)		

Undertaking

- a) We agree to supply, installation & commissioning, renovation, the Power Plant as per NIT specifications.
- b) We agree to give performance guarantee as specified and to abide by the scope of the guarantee as prescribed under the tender document.
- c) 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:

- 1. 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: 17/JREDA/SPV/Sidhu-Kanu/19-20

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

Warrantee 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 the Items(Give serial wise details of all the items)	
5.	Designation & Address of the Person to be Contacted for Claiming Warrantee Obligations	

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

Filling Instructions:

1. The Warrantee card to be supplied with the system must contain the details of the system supplied as per format given above.
2. 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: 17/JREDA/SPV/Sidhu-Kanu/19-20

Sub: Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand.

A. Outdoor Exhibits

SI No	DESCRIPTION	QTY	UNIT	Rate including all taxes(Rs.)	AMOUNT(Rs.)
1	Power Generating Drum	1	Set		
2	Solar Toy Car	1	Set		
3	Battery Operated Bicycle	3	sets		
4	Energy Slip	1	sets		
5	Solar Photovoltaic Street Light	25	sets		
6	Solar Garden Light	15	Sets		
7	Solar photovoltaic pump (Surface Pump)with sprinkler	1	Sets		
8	Solar Pump set for water supply 1800wp for water supply with	1	sets		
9	Water Heating Systems	1	sets		
10	Solar Toy Train	2	Sets		
11	Solar Cabinet Dryer	1	Sets		
12	Solar water Distillation unit	1	Sets		
13	Water Fall Animation (outdoor)/Artificial water fall	1	Sets		
14	Working model of turbine (outdoor) (Pelton, Francis, Kaplan, Bulb & Stream Flow Turbine - each)	5	Sets		
15	Water Supply System for Hydroelectric Energy related exhibits- Lot.	1	Sets		
16	Musical Fountain replacing the existing fountain	1	Sets		

B. Indoor Exhibits

SI No	DESCRIPTION	QTY	UNIT	Rate including all taxes(Rs.)	AMOUNT
1	Flat Screen TV with Audio Visual (without Films/Video Disk)	4	Sets		
2	solar Photovoltaic Cooker	1	Set		
3	Solar Box type Cooker	1	set		
4	Refrigerator	1	Set		
5	Weighing Machine	1	Set		
6	Music system/ Public address cum music system (without U/G Cable	1	Set		
7	Computer for Quiz & Games	9	Sets		
8	Solar PV Module for Display 12V, 10 Wp	2	Sets		
9	Internet Enabled three computer / other equipments	1	set		

10	Computer interactive software No. -1	3	Sets		
11	Computer interactive software No. -III	3	Sets		
12	Digital Clock - digit size 250 mm for outdoor display	4	Sets		
13	Digital Clock - digit size 100 mm for outdoor display	2	sets		
14	Exhibits on Energy Transformation	1	Sets		
15	Exhibits on Storage of Energy	1	Set		
16	Different types of Batteries for Physical Display	1	Set		
17	Surveillance System	1	Set		
18	Muscle Power Exhibits /Dynamo Paddle Cycle	1	Set		
19	Inject Printer cum Scanner	2	Sets		
20	Web Camera Windows Compatible resolution 640 X 480	2	Sets		
C	20 kWp BIPV Solar Power Plant				
	Solar Inverter 25 kVA, 3 Ø, 50 Hz, 240 V DC input and 415 V, 3 Ø, 50 Hz AC Input				
	Battery Bank 2 V, 600 AH				
D	5 Years CMC with operation of Renewable energy exhibits at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand.				
E	Operation of the Renewable exhibits including cost for manpower				
	Total				
	Total(In words)				

- 1 Above quoted price for are complete in all respect as per Technical Specifications inclusive of all Central/State/Local applicable taxes & duties, packing, forwarding, transit insurance, loading & unloading, transportation & other charges etc. FOR destination in Jharkhand and inclusive of installation, testing, commissioning, operation & maintenance for five years, performance testing and training.
- 2 Certified that rates quoted for above mentioned all components are as per specifications, terms & conditions mentioned in the bid document.
- 3 Price should be quoted in complete numeric figure and words.

(Signature of Authorized Signatory)

Name:

Designation:

Company Seal:

Format for Submitting Bank Guarantee for Earnest Money

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

(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.:" **17/JREDA/SPV/Sidhu-Kanu/19-20**.
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. : **17/JREDA/SPV/Sidhu-Kanu/19-20** 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 the work as Proof of Compliance by the Contractor

[On the letterhead of Bidding Company]

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

The details of materials for **Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand:**

SI No	DESCRIPTION (Give serial wise details of all the items)	QTY	UNIT	Details
1				

Signature & Seal of the contractor

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

Signature of Consignee:.....

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 Project In-charge

Annexure-13

Certificate of Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand In all respect as Proof of Compliance by the Supplier

[On the letterhead of Bidding Company]

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

Certified that I/We, M/s have successfully performed renovation work of Sidhu-Kanu State Level Energy Park, Ranchi. All the items/ appliances are in working condition. The status of the Sidhu-Kanu State Level Energy Park, Ranchi after renovation is in the following table:

SI No	DESCRIPTION (Give serial wise details of all the items as per B. Status of Sidhu-Kanu State Level Energy Park, Ranchi of Section 6)	QTY	UNIT	Status in line with B. Status of Sidhu-Kanu State Level Energy Park, Ranchi of Section 6	Status after renovation work of Sidhu-Kanu State Level Energy Park, Ranchi
1					

Signature & Seal of the contractor

Certified that M/s have successfully performed renovation work of Sidhu-Kanu State Level Energy Park, Ranchi. The status of the Sidhu-Kanu State Level Energy Park, Ranchi is in line with the above table. All the items/ appliances are in working condition since seven days.

Date.....
Signature of Consignee along with Seal:.....

Certificate of JREDA Representative

Certified that renovation work of Sidhu-Kanu State Level Energy Park, Ranchi. Have been performed successfully and all the items/ appliances are in working conditions.

Signature & Seal of Supplier

Signature & Seal of JREDA Representative

Format for Quarterly O&M and CMC Report

NIB No: 06/JREDA/LED/SSLS/19-20

[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: **Renovation of Renewable Energy Exhibits with CMC and operation for 5 years at Sidhu-Kanu State Level Energy Park, Ranchi, Jharkhand.**

Date of Installation.....

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

Place of Supply.....

Name of Technicians:.....

Period of CMC:.....

S. N.	Place of Installed System	Give serial wise details of all the items as per B. Status of Sidhu-Kanu State Level Energy Park, Ranchi of Section 6	Date of Site Visit/CMC	Fault observation	Fault repaired	Status of the system

(Signature of Consignee)

Name:

Designation:

Seal:

Signature of Agency with Seal

Signature of JREDA Representative

Contact Person for the NIB

NIB No: 17/JREDA/SPV/Sidhu-Kanu/19-20

[On the letterhead of Bidding Company]

1	Contact Person name for the NIB	
2	Designation	
3	Contact No. (phone & mobile)	
4	Fax No.	
5	e-mail ID	
6	Corresponding address with pin code	
7	Remarks	

(Signature of Authorized Signatory)

Name:

Designation:

Company Seal: