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Jharkhand Renewable Energy Development Agency

Plot No. 328/B, Road No. 4, Ashok Nagar, Ranchi 834002

Phone No. 0651-2246970, FAX: 0651-2240665,

Web-site: www.jreda.com, Email: info@jreda.com

NOTICE INVITING TENDER

NIT No: JREDA/RVE/BM-01/2007-08

Date 06/12/2007

Sealed **TWO PART** tenders are invited by JREDA from resourceful, reputed and experienced contractors and having experience in setting up of at least two 10 kWe capacity 100% producer gas fired Biomass Gasifier based power plants in remote rural areas in India.

Name of Work: Design, manufacture, supply, installation, testing, commissioning & 5 yrs Comprehensive Maintenance Contract (CMC) of 5 (five) Nos. of 10 kWe and 5 (five) Nos. 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state.

Time of completion 120 days.

The salient features of the Tender Document are as follows:

1.0 TENDER DOCUMENTS

The tender documents shall comprise of all the documents mentioned in Table of Contents of this document. In addition to these any other document(s) /amendment(s) or revisions/ instructions issued by JREDA from time to time to the bidders till the due date of opening of the offers, shall also be deemed to be integral part of the tender document. Failure to furnish all information as per bid document in every respect will be at bidder's risk.

2.0 COST OF TENDER DOCUMENT

- a. The Tender Document can be purchased from the office of the JREDA against payment by Demand Draft drawn in favour of "The Director, Jharkhand Renewable Energy Development Agency" on any nationalized bank/ scheduled bank payable at Ranchi of requisite value and within the time and period as specified in the NIT.
- b. The bidders may download the tender Document from the web site www.jreda.com and submit the cost of Tender Document as specified along with Part – I of the offer, in a separate envelope failing which the bid will be summarily rejected.

3.0 EARNEST MONEY

- 3.1 Tender must be accompanied with 2% of the tendered value as earnest money by a Demand Draft drawn in favour of "The Director, Jharkhand Renewable Energy

Development Agency” on any nationalized bank/ scheduled bank payable at Ranchi. This shall be enclosed with Part -1, of the tender, i.e. The Techno-commercial bid

- (i) A Bank Guarantee drawn in favour of “The Director, Jharkhand Renewable Energy Development Agency” on any nationalized bank/ scheduled bank payable at Ranchi and valid for a period of 180 days may be submitted against earnest money in lieu of Demand Draft as per format enclosed as Annexure No.6.
- (ii) The request for adjustment of earlier dues against earnest money shall not be entertained.
- (iii) Earnest money shall be returned to the unsuccessful bidders within 60 (sixty) days from the date of issue of Letter of Intent/Firm order on the successful bidder.
- (iv) In case the tender of any party is rejected during scrutiny of the ‘Technical bid’ the earnest money will be returned to such bidder(s).
- (v) The earnest money will be forfeited if any bidder withdraws his offer during the validity period and if the successful bidder fails to furnish his acceptance of order letter within specified time or fails to start the work and execute it within specified time frame.

4.0 SUBMISSION OF OFFER

- a. After procurement of tender documents the bidders must go through carefully all the terms and conditions and technical specification, seek clarification wherever necessary, before submission of tender. The intending bidders should also visit the site before submission of the Tender.
- b. The offer shall be prepared by typing or printing in English language with black ink on white paper or printed ‘letter head’ of the contractor in consecutively numbered pages duly signed by the authorized signatory of the contractor with seal of the firm affixed on each page.
- c. Original copy of the Tender Document, amendments/ revisions to Tender Documents issued by JREDA, (if any) shall be signed and submitted along with the bid.
- d. The Tender Document shall comprise of all documents/drawings/information as stated in the offer. The checklist shall be duly filled up and signed by the contractor to specify and confirm submission of documents with the offer.
- e. The offer shall be free from overwriting but if any corrections are made, the same should be initialed by the person signing the offer

5.0 MODE OF TENDER SUBMISSION

(a) The Part – I : The Techno-commercial Bid shall be submitted complete with the following: -

- i. Complete Tender Documents as purchased from JREDA or unloaded in full from www.jreda.com duly filled in and signed; except the price part of the tender.
- ii. Cost of Tender Document (non-refundable), if unloaded from website:www.jreda.com by Demand Draft drawn in favour of Director, JREDA on a scheduled/nationalized bank of India.

- iii. Earnest Money deposit in one of the acceptable forms as specified.
- iv. Documentary evidence showing that the Bidder has set up at least two Nos. of 10 kWe capacity 100% producer gas fired biomass gasifier based power plants in remote villages of India which are delivering power daily for at least one year.
- v. Any other supplementary details required for the evaluation of the tenders such as drawings, technical literature/catalogues and data etc.
- vi. A Bar Chart indicating completion schedule for various items involved in the work within the stipulated completion period.
- vii. Deviations, if any from tender specifications and or tender conditions, with reasons therefore. It is open to JREDA whether or not to accept them.
- viii. Duly filled up Check List shall be enclosed.

5.2 Each tender will have to be submitted in a sealed envelope addressed to The Director, Jharkhand Renewable Energy Development Agency, Plot No. 328/B, Road No. 4, Ashok Nagar, Ranchi – 834 002 duly marked on the envelope as “PART – 1, TECHNO-COMMERCIAL BID: Design, manufacture, supply, installation, testing, commissioning & 5 yrs Comprehensive Maintenance Contract (CMC) of 10 kWe and 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state”

Quantity – 5 Nos. of 10 KWe and 5 Nos. of 20 kWe power generating units. Due on 27-12-2007.

5.3 The Part – II: The Price Bid shall be submitted complete with the following: -

Part – II: PRICE BID. Design, manufacture, supply, installation, testing, commissioning and 5 yrs Comprehensive Maintenance Contract (CMC) of 10 kWe and 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state

. Quantity – 5 Nos. of 10 KWe and 5 Nos. of 20 kWe power generating units.”

- i. The price schedule should be duly filled up both in figures and in words. Each page to be duly signed by authorized person with seal of the firm.
- ii. In case of any discrepancy between the price mentioned in figures and words, the price mentioned in words will be considered as final.
- iii. The price bid should not contain any technical matter or other matter except those related to price. The date of opening of price bid shall be notified after opening of techno-commercial bid.

5.4 The envelopes containing Technical Bid and the Price Bid shall be put inside a third envelope along with a forwarding letter. The Cover should be duly marked as “Design, manufacture, supply, installation, testing, commissioning & 5 yrs Comprehensive Maintenance Contract (CMC) of 10 and 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state

Quantity – 5 Nos. of 10 KWe and 5 Nos. of 20 kWe power generating units.

6.0 ELIGIBILITY AND QUALIFICATION CRITERIA FOR BIDDERS

The bidder is required to submit the supporting documents for the following:

- a. The tender specification describes in detail the biomass gasifier system for power generation in standalone mode in different remote villages of Jharkhand State with a 5 year Comprehensive Maintenance Contract including a warranty period of 2 years. During the guarantee period, the CMC will cover only consumables and labour charges. The CMC charges for last 3 years will be inclusive of spares and all other expenses.
- b. The tenderer should have supplied and commissioned atleast two gasifier systems for village electrification. The tenderer shall have valid approval certificate as manufacturer of gasifier systems from MNRE/ IISc, Bangalore / TERI, New Delhi. The tenderer shall submit certificate for operation of atleast two systems for a continuous period of atleast 1000 hours from State Nodal Agencies/ clients.
- c. The bidder must be Ministry of New & Renewable Energy approved manufacturer having adequate experience is setting up of 100% producer gas fired biomass gasifier based power generating units, which are operating daily for rural power supply for at least one year.
- d. List of works completed in the last 3 (three) financial years giving description of work, name of client, value of contract, date of award, schedule of completion, actual date of starting and actual date of completion should also be given.
- e. List of works on hand indicating description of work, contract value, approximate value of balance work yet to be done and the date of award of contract.
- f. The average annual turnover during the last three years as per ITCC should be minimum of Rs.1.0 crore.
- g. Registration certificate of the firm.
- h. Certificate of conduct from main/lead Banker certifying status of operation of account.
- i. Photocopy of Partnership Deed in case of Partnership firm.
- j. Power of Attorney for Authorized Signatory in case of companies.

7.0 SCOPE OF WORK

- 7.1 The scope of works shall be as indicated in Technical Specification, General Conditions of Contract and Schedule of Items of Work
- 7.2 The Director, JREDA reserves the right amend the scope of work, accept or reject any or all offers, in full or in part or in full or cancel or withdraw the NIT for bids without assigning any reason whatsoever and in such case the bidder or intending bidder shall have no claim arising out of such action.

7.3 The tenderer shall carefully study the technical specification, general conditions of contract and the schedule of items of work and shall satisfy him regarding technical and all other aspects of the work before submitting his offer.

8.0 PRICE

8.1 The tenderer shall quote his price as per 'Schedule of Items of Work'. The price 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.

8.2 The price shall be inclusive of all taxes, duties and levies etc. as on the date of opening of tender.

9.0 PAYMENT TERMS

Payments for execution shall be made as per Clause No. G14 of this contract subject to any deductions related to work, which the purchaser may be authorized to make as per terms and conditions of the contract and Income Tax or any other tax deductions as per prevailing rules and acts applicable at the time of payment.

10.0 AUTHORIZATION FOR SIGNING THE OFFER.

10.1 The person signing the offer shall have a Power Attorney duly solemnized before a Magistrate giving him authority to sign the offer on behalf of the firm/company on Non-judicial Stamp Paper of Rs.10.00 only.

10.2 In case the authorized signatory of the contract is not in a position to attend the bid opening, he may authorize another person to attend the bid opening on his behalf by issuing an authority letter on the printed letterhead of the firm as per proforma enclosed in Annexure – 5. This will be valid only for attending the bid opening.

11.0 NO CLAIM OR COMPENSATION FOR SUBMISSION OF TENDER

The tenderer, whose offer is not accepted shall not be entitled to claim any costs, charges, expenses of and incidental to or incurred by him through or in connection with his submission of Bid, even though JREDA may elect to withdraw the Invitation to Bid.

12. VALIDITY OF OFFER

Unless otherwise specified, the Tenderer shall keep his tender valid initially for a period of 120 days from the due date of submission of the offer.

13.0 OTHER TERMS & CONDITIONS

13.1 Insertion, post-script, addition and alteration shall not be recognized unless confirmed by tenderer's signature and stamp. Incomplete tender or tenders not submitted as per requirement of the NIT may be rejected.

- 13.2 In case of any deviation in design, the tenderer must submit a statement of deviation indicating technical and commercial implications. The decisions of the Director, JREDA shall be final and binding regarding acceptance or rejection of such items.
- 13.3 If at any time any of the documents/ information submitted by the bidder is found to be incorrect, false or untruthful, the bid and/ or the resultant order may be summarily rejected/ cancelled at the risk of the bidder.
- 13.4 Failure to furnish all information and documentary evidence as stipulated in the bid document or submission of an offer that is not substantially responsive to the bid document in all respects shall be summarily rejected.
- 13.5 All bids will be received in duly Sealed Cover within the due date and time. Bids received after the due date and time shall be rejected outright.
- 13.6 If the scheduled date of final submission and opening of the bid happens to be holiday on then the bids shall be submitted/ opened on next working day at the same time & at the same venue.
- 13.7 Issuance of bid documents shall not construe that the bidders would be automatically considered qualified.
- 13.8 The Director, JREDA reserves the right to postpone the date of receipt and opening of the bids or cancel the bid without bearing any liability, whatsoever, consequent upon such decision.
- 13.9 The undersigned reserves the right not to accept the lowest tender and may reject any or all the tenders without assigning any reason whatsoever.

14. FORMATS

The Formats for various purpose related to submission of this tender are enclosed as Annexure 1 to Annexure 7.

**DIRECTOR,
JHARKHAND RENEWABLE ENERGY DEVELOPMENT AGENCY**

CHECK LIST OF DOCUMENTS TO BE ENCLOSED WITH OFFER DOCUMENT

- C.1 Envelope – I: Containing Part – 1 of the offer. Any offer submitted without the following mandatory documents will be liable for rejection:**
- C.1.1 Photocopy of receipt issued by JREDA for purchase of offer document or Demand Draft (non-refundable) for Rs.10,000.00 (Rupees ten thousand) only in favour of Director, JREDA ob a nationalized/scheduled bank of India for those who have downloaded the offer document from JREDA website.
 - C.1.2 Covering letter on Company's letterhead duly signed by authorized signatory giving details of name and designation of authorized signatory.
 - C.1.3 Certificate in support of meeting Eligibility Criteria along with following supporting documents:
 - 8 Bidder has set up at least two Nos. of 20 kWe capacity 100% producer gas fired biomass gasifier based power plants in remote villages of India which are delivering power daily for at least one year.
 - 9 The bidder must be MNRE approved manufacturer and must have adequate experience of manufacturing biomass gasifiers for both dual fuel and 100% producer gas based systems.
 - 10 List of works completed in the last 3 (three) financial years giving description of work, name of client, value of contract, date of award, schedule of completion, actual date of starting and actual date of completion should also be given.
 - 11 List of works on hand indicating description of work, contract value, approximate value of balance work yet to be done and the date of award of contract.
 - 12 The average annual turnover during the last three years as per ITCC should be minimum of Rs.1.0 crore.
 - 13 Registration certificate of the firm.
 - 14 Certificate of conduct from main/lead Banker certifying status of operation of account.
 - 15 Photocopy of Partnership Deed in case of Partnership firm.
 - 16 Power of Attorney for Authorized Signatory in case of companies.
- C.2 Envelope – II: Containing Part – II of the offer document.**
- C.2.1 Covering letter on Company's letterhead duly signed by authorized signatory giving details of name and designation of authorized signatory.
 - C.2.2 Schedule of Items indicating rates quoted.

ANNEXURE –1

Format for Covering Letter

(To be submitted by the Tenderer in official letterhead of the Company)

No.....

Date.....

To
The Director
Jharkhand Renewable Energy Development Agency
328/B, Road No. 4, Ashok Nagar,
Ranchi 834002

Sub: Offer in response to Notice Inviting Tender No.....for

Sir,

We are hereby submitting our offer in compliance with the terms and conditions of the Notice Inviting Tender No.....As specified the offer has been submitted in two envelopes duly marked and sealed.

We further declare:

That, we are submitting this offer under the abovementioned NIT after having fully read and understood the nature of work and having carefully noted all the specifications, terms and conditions laid down in the offer documents.

That, we have never been debarred from executing similar type of work by any Central/ State/ Public Sector Undertakings/ State Nodal Agencies/Departments.

That, we shall execute the work offered as per specification, terms and conditions of the offer on award of work.

That our offer shall remain valid for placement of order for a period of 120 days from the date of opening of the tender.

(Authorized Signatory)

Name
Designation
Company seal

ANNEXURE – 2

Format for Confirmation of Basic Eligibility Criteria
(To be submitted by the Tenderer in official letterhead of the Company)

No.....

Date.....

To
The Director
Jharkhand Renewable Energy Development Agency
328/B, Road No. 4, Ashok Nagar,
Ranchi 834002

Sub: Confirmation of meeting the Basic Eligibility Criteria.

Tender No. Your NIT No...

Sir,

Having examined the tender documents No....., we hereby confirm the following towards minimum eligibility conditions to participate in the aforesaid tender:

- 10 We are MNRE approved manufacturers of biomass gasifier based power generating systems.
- 11 We have supplied & installed at least 2 (two) Nos. Bidder has set up at least two Nos. of 10 kWe capacity 100% producer gas fired biomass gasifier based power plants in remote villages of India which are delivering power daily for at least one year.
- 12 We confirm that the equipment quoted by us conforms to best engineering practices and are appreciated by users.

(Authorized Signatory)

Name
Designation
Company seal

ANNEXURE – 3

INFORMATION IN SUPPORT OF MEETING MINIMUM ELIGIBILITY CRITERIA

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

We hereby confirm that we have supplied and installed the following Biomass gasifier based systems for which orders placed by State Nodal Agencies/ other organizations during last three financial years.

Year	Name of SNA/ Department/ Organization	Purchase Order No. & Date	Type of Power System	Quantity Supplied
2004-05				
2005-06				
2006-07				

(Authorised Signatory)

Name
Designation
Company seal

Filling Instructions

1. Please give details of supplies made only in support of meeting eligibility criteria specified in the NIT.
2. Please submit legible photocopies of atleast 2 (two) purchase orders for systems mentioned above.
3. Please do not use this format for giving complete reference list of supplies made to SNAs.
4. Please submit legible photocopies of certificates of satisfactory performance issued by SNAs/ Purchasers.

FORMAT FOR GENERAL PARTICULARS OF BIDDER

1. Name of the Firm
2. Postal Address
3. Telephone, Fax, Website & E-mail
4. Name & designation of the authorized signatory of the bidder to whom all references shall be made.
5. Nature of the Firm (Proprietary, Partnership, Private Limited, Public Ltd./ Public Sector) with attested copy of Registration & Partnership deed/ memorandum & Articles of Association.
6. Financial capacity of the contractor/ firm for carrying out the work. (Please attach certificate of conduct from lead Banker)
7. Name & address of Indian / Foreign collaborator, if any.
8. Income Tax Clearance Certificate (Please attach certified copy)
9. Has the bidder been ever debarred by any Government Department/ PSU for undertaking any work?
10. Reference to any other information attached by the Bidder (please mention page No. and drawing No.)

(Authorized Signatory)

Name
Designation
Company seal

ANNEXURE – 5

Format for authorization for attending Tender Opening Meeting
(To be submitted by the Tenderer in official letter head of the Company)

No.....

Date.....

To
The Director
Jharkhand Renewable Energy Development Agency
328/B, Road No. 4, Ashok Nagar,
Ranchi 834002

Sub: Offer in response to Notice Inviting Tender No.....for

Sir,

We are hereby authorize(Name & designation) to attend the Tender Opening meeting to be held onat JREDA Office, Ranchi on behalf of our company.

The specimen signature of the authorized person is given below:

(Specimen Signature)

(Authorized Signatory)

Name
Designation
Company seal

PROFORMA FOR BANK GUARANTEE IN LIEU OF EARNEST MONEY DEPOSIT

(To be executed on non-judicial stamp paper of appropriate value)

WHEREAS.....(hereinafter called the bidder) have submitted their bid dated.....against NIT No.....for the work of:

KNOW ALL people by these presents that we.....having our registered office at(hereinafter called "the bank") are bound unto(hereinafter called the employers representative) in the sum of for which payment well and truly to be made to the Employers representative the bank binds itself, his successors and assign these presents.

SEALED with the common seal of the bank this

THE CONDITIONS of this obligation are:

If after Bid opening the bidder withdraws or modifies his bid during the period of validity specified in the Bid/Tender document, or

If the bidder having notified of the acceptance of his Bid/ Tender by the employer during the period of bid validity:

Fails to execute the Form or Agreement in accordance with the Instructions to Bidders, if required, or.....

Fails or refuses to furnish the Performance Security, in accordance with instructions to the bidders.

Does not accept the correction of the Bid Price pursuant to clause G40 of the general terms and Conditions of Contract.

We undertake to pay the Employers Representative up to the above amount upon receipt of his first written demand, without the Employers Representative having to substantiate his demand, provided that in his demand the Employers Representative will note that the amount claimed by him is due to him owing to the occurrence of one or both of the two conditions specifying the occurred condition(s).

This guarantee will remain in force unto and including the dateafter the deadline for submission of bids as such deadline is stated in the instructions to bidders or as it may be extended by the employer, notice of which extensions of the Bank is hereby waived. Any demand in respect of this guarantee should reach the bank not later than the above date.

Notwithstanding anything contained therein:-

- a) Our liability under this guarantee shall not exceed.....

- b) This Guarantee shall be valid upto.....

- c) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and if you serve upon us a written claim or demand on or before.....

Date

Signature of the Authorized Officer of
The Bank

Name:

Designation.....

Seal

PROFORMA FOR BANK GUARANTEE TOWARDS PERFORMANCE GUARANTEE

(To be executed on non-judicial stamp paper of appropriate value)

To,

WHEREAS,(hereinafter called the “Contractor”) has undertaken, in pursuance to Letter No.....dt.....to execute(hereinafter called the “Contract”)

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sums specified therein as security for compliance with obligations in accordance with the contract

AND WHEREAS we have agreed to give the Contractor with such a bank Guarantee;

Now therefore we hereby affirm that we are the guarantor and responsible to you, on behalf of the Contractor, upto a total of.....

....such sum being payable in the types and proportions of currencies in which the contract price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument any sum or sums within the limits ofas aforesaid without your needing to prove or show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modifications of the terms of the contract or of the works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

Notwithstanding anything contained therein:-

- a) Our liability under this guarantee shall not exceed.....
- b) This Bank Guarantee shall be valid upto.....
- c) We are liable to pay the guaranteed amount or any part thereof under this bank Guarantee only and if you serve upon us a written claim or demand on or before.....

Date

Signature of the Authorized
Officer of the Bank

Name
Designation
Seal

(Abridged copy of NIT for publication in press)

NOTICE INVITING TENDER

NIT No: JREDA/RVE/BM-01/2007-08

Date 06/12/2007

Sealed tenders are invited from reputed and experienced Indian firms for the followings works:

Sl. No.	Description	Details
1.	Tender No.	JREDA/RVE/BM-01/2007-08, dt. 06/12/2007
2.	Name of Work	Design, manufacture, supply, installation, testing, commissioning 5 yrs Comprehensive Maintenance Contract (CMC) of 5 (five) Nos. of 10 kWe and 5 (five) Nos. 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state.
3.	Period of sale of Tender Documents	Date: 6/12/2007 to 26/12/2007 Time : 10-30 hrs. To 16-30 hrs. on all working days.
4.	Last date & time of submission of tender.	27/12/2007 upto 12.00 hours.
5.	Date of opening of Part -1, the Techno-commercial bid.	27/12/2007 at 14-30 hrs.
6.	Cost of Tender Document (Non-refundable)	Rs. 10,000.00 (Rupees ten thousand) only
7.	Place of issue & submission of Tender Documents and address for communication.	Jharkhand Renewable Energy Development Agency Plot No. 328/B, Road No. 4, Ashok Nagar, Ranchi 834002 Phone No. 0651-2246970, FAX: 0651-2240665, Web-site: www.jreda.com , Email: info@jreda.com

Interested parties may download the Tender Documents from our website:www.jreda.com

**Director
JREDA, Ranchi**

GENERAL TERMS & CONDITIONS OF CONTRACT

G1.0 DEFINITIONS OF TERMS

In the contract the following expression shall, unless the context otherwise requires have the meanings thereby respectively assigned to them.

G1.1 The **“Government”** shall mean the Government of Jharkhand or the Government of India, as may be the case.

G1.2 **“JREDA”** means Jharkhand Renewable Energy Development Agency with its head office located at present at 328/B, Road No.4, Ashok Nagar, Ranchi, PIN : 834 002.

G1.3 **“Contract”** means the document forming the tender, acceptance thereof and the formal agreement executed between the JREDA and the Contractor, together with documents referred to therein otherwise it shall mean the Notice Inviting Tender, information and instructions to bidder. Accepted tender (including the warranty “schedule of quantities and prices” and other schedule attached thereto) general conditions of contract, special conditions, if any, specifications, designs, drawings and letter of award thereof will form the agreement.

G1.4 **“Contract Price”** Means the price payable to the Contractor under the contract for full and proper performance of its contractual obligations.

G1.5 **“Contractor”** shall mean the person or corporation or firm who’s tender for the work has been accepted and his/its executors, administrations, or permitted assigns.

G1.6 **“Works”** Means the materials to be supplied and the work to be executed as defined and set out in the specifications and includes all extra work, additions, deletions, substitutions and variations ordered by the Director, JREDA in accordance with the provisions of the contract.

G1.7 **“Project-in-Charge”** Means the Director, JREDA to sign or cause to sign, the contract agreement on behalf of the JREDA and the Engineering officer duly authorized by the Director, JREDA to direct, supervise and be in-charge of the works for the purpose of the contract.

G1.8.1 **“The Consultant”** means the firm or person as may be duly appointed by the Purchaser to act as Consulting Engineer for the purpose of work covered in the contract.

G1.9 **“Specifications”** Means collectively all the terms and stipulations contained in this document including the conditions of contract, technical provisions, drawings and attachments thereto and list of corrections and amendments.

G1.10 **“Site”** Means the land on, under in or through which the works are to be executed or carried out. In this case 10 kWe and 20 kWe 100% producer gas mode biomass gasifier based power generating units will be installed in 10 (ten) Nos. remote unelectrified villages in the state of Jharkhand. The exact location will be intimated at the time of erection depending on site requirement.

- G1.11 **“Tests on Completion”** means all such tests as are prescribed by the specification of the 10 kWe and 20 kWe power plant to be made by the contractor to the satisfaction of JREDA before the building, plant and equipment are taken over by the JREDA and this also includes those tests not specifically mentioned in the specification but required under various BIS codes, relevant Acts and rules.
- G1.12 **“Commissioning”** means the satisfactory, continuous and uninterrupted operation of the equipment/ work as specified after all necessary initial tests, checks and adjustments required at site for a period of at least 30 days to the satisfaction of the Director, JREDA.
- G1.13 **“Commercial use”** means that use of the work, which the contract completes or which is commercially capable of.
- G1.14 **“Approval”** means the written approval of the Director, JREDA and of the statutory authorities, wherever such authorities are specified by any codes or otherwise.
- G1.15 **“Drawings”** means collectively all the accompanying general drawings as well as all detailed drawings, which may be used from time to time.
- G1.16 **“Tender drawings”** to be furnished by the Consultant/JREDA/Contractor for execution of the work and they will form part of the contract.
- G1.17 **“Detailed drawings”** to be furnished by Consultant/ JREDA/ Contractor for execution of the work and they will fill the part of the contract.
- G1.18 **“Labourer”** means all categories of labour engaged by the contractor, his sub-contractors and his piece workers for work in connection with the execution of the worked covered by the specifications. All these labourers will be deemed to be employed primarily by the contractor.
- G1.19 **“Fiscal year”** means year beginning on the first day of April and ending on 31st March in the succeeding year.
- G1.20 **“Day”** means a calendar day beginning and ending midnight.
- G1.21 **“Month or Calendar month”** means not only the period from the first of a particular month, but also any period between a date in a particular month, and the date previous to the corresponding date in subsequent month unless specifically stated otherwise.
- G1.22 **“Week”** means seven consecutive calendar days.
- G1.23 **“JREDA Stores”** means the stores owned by the JREDA.
- G1.24 **“Security Deposit”** means all deposits whether in Government Securities, Fixed deposit receipts or Bank Guarantee from a Nationalized Bank of India, amounts deducted from interim payments or in any other form pledged to JREDA for due performance of the contract and shall be adjusted in case of compensations, or penalties and which may stand either in part or whole as the situation demands.
- G1.25 **“Urgent Works”** means any urgent measures, which in opinion of the Director, JREDA, become necessary at the time of execution and/or during the progress of work to obviate any risk of damage to the structure, or required to accelerate the

progress of work or which become necessary for security or for any other/reason the Director, JREDA may deem expedient.

- G1.26 *“Project”* refers to Design, manufacture, supply, installation, testing, commissioning of 10 and 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state
- G1.27 *“Manufacturer”* refers to the party proposing to Design and construct the 100% producer mode biomass gasifier based power plants as specified complete or in part.
- G1.28 *“Plant, Equipment, Stores”* mean and include plant and materials to be provided under the contract.
- G1.29 *“Delivery of Plant/ Equipment”* shall be deemed to take place on delivery of the plant/ equipment in accordance with the terms of contract complete in all respects after approval by the Director, JREDA on report of the Project-in-charge.
- G1.30 *“Letter of intent” (LOI)* means the letter from the Director, JREDA conveying his acceptance of the tender subject to such reservations as may have been stated therein.
- G1.31 *“Sub-Contractors”* refers to a party or parties having direct contact with the contractor and to whom any part of the contract has been sublet by the contractor with the consent in writing of the Project-in-charge.
- G1.32 *“Tonne (M.T)”* Where used in these specifications shall mean metric tonne of 1000 Kg.
- G1.33 The terms and expressions not herein defined shall have the same meaning as assigned to them in the Indian Sale of Goods Act, 1977 or any such Act as the case may be.

G2.0 SCOPE OF WORK

The scope of work against the tender includes Design, manufacture, supply, installation, testing, commissioning and comprehensive maintenance for 5 years of 10 and 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state

G3.0 ELIGIBILITY AND QUALIFICATION CRITERIA FOR BIDDERS

The eligibility and qualification criterion for the bidder has been specified in Sec.6.0 of the Notice Inviting Tender. Information of meeting eligibility criteria to be furnished as per format given in Annexure- 3.

G4.0 TECHNICAL SPECIFICATION

The Technical Specification for the work has been furnished in detail in the ‘Technical Specification’ section.

G5.0 EARNEST MONEY DEPOSIT (EMD)

The tenderer shall submit the EMD in the form of a Demand Draft drawn in favour of "Director, JREDA" payable at Ranchi from any Indian Nationalized Bank/ Scheduled Bank or as a Bank Guarantee as per prescribed format given in Annexure - 6 along with Part –I, The Technical Bid.

G6.0 VALIDITY OF OFFER

The offer and the prices quoted therein shall remain valid for the period as 120 days from the scheduled date of opening of the Tender.

G7.0 OPENING AND EVALUATION OF OFFER

G7.1 Part-I : The Technical Part will be opened on the date and time mentioned in NIT at the office of Director, JREDA at Plot No. 328/B, Road No. 4, Ashok Nagar, Ranchi in the presence of bidders, or their authorized representative. The authorized representative should produce letter of authorization to attend the bid opening meeting as given at Annexure - 5. The representative who does not produce such authorization will not be allowed to attend the bid opening.

G7.2 The bidder's name, prices, discounts and the presence or absence of the requisite bid security and such other details as the Purchaser, at its discretion, may consider appropriate will be announced at the opening.

G7.3 To assist in the examination, evaluation and comparison of the offers, the Purchaser may at its discretion, may ask the tenderer for clarification of his offer prior to price bid opening. The request for clarification and the response shall be in writing and no change in price or substance of the offer shall be sought, offered or permitted.

G7.4 Any effort by a Bidder to influence the purchaser in the Purchaser's bid evaluation or contract award decisions may result in rejection of his bid.

G7.5 The tender evaluation will take into account the bidder's technical, financial, past experience and capability. It will be based upon the examination of documentary evidence of Bidder's qualification submitted by the bidder in Techno-commercial Part (Part – 1) of the offer.

G7.6 Part-II of the tender, i.e. the Price Bid only of those bidders, whose offers are technically and commercially found to be acceptable after evaluation of the Technical and Commercial Part, will be opened and evaluated. The date & time for opening of Part-II: The Price Bid will be intimated in JREDA web site. Bidders are requested to visit the web site www.jreda.com regularly and keep themselves informed. The Price Part will be opened at the office of Director, JREDA at 328/B, Road No. 4, Ashok Nagar, Ranchi 834002 as intimated, in the presence of eligible bidders or their

authorized representative(s). The authorized representative will be allowed to attend the price bid opening on production of authorization letter from the Bidder.

G7.7 The Director, JREDA, if required, may at his own discretion extend the scheduled date of opening of Price Bid.

G7.8 The intending tenderers should have all relevant licenses and permits etc. from competent Government authorities as required for executing the contract.

G7.9 The Director, JREDA reserves the right to cancel any or all tenders without assigning any reasons thereof and not bound to accept the lowest tender.

G8.0 AWARD OF CONTRACT/ LETTER OF INTENT

G8.1 The successful tenderer shall be required to enter into a contract agreement for execution of the work under the terms and conditions stipulated in the tender document and also any other special terms & conditions that may be mutually settled before awarding the contract.

G8.2 After the issue of the Letter of Intent, the Purchaser shall prepare the agreement based on accepted offer, rates, specification, terms and conditions and the same shall be executed by the contractor.

G9.0 TIME PERIOD FOR SIGNING THE AGREEMENT

The suppliers have to enter into an agreement within two weeks, in the office of the Director, JREDA in prescribed format before commencement of supply, construction and services

G10.0 PERFORMANCE GUARANTEE

G10.1 Within 30 days from the date of issue of Letter of Intent, the contractor shall furnish a Bank Guarantee from a Nationalized Bank /Scheduled Bank on the format given in enclosed as Annexure No. 7 for an amount equal to ten percent (10%) of the order value by way of Bank Guarantee for the due and faithful performance of the agreement and for the due and faithful performance of the Letter of Intent along with other terms and conditions.

G10.2 Such agreement shall be valid and binding, notwithstanding such variations, alterations or agreed under these general conditions during the entire warranty period as per Clause No.G.24 of the General Conditions of Contract. The contractor shall, at his own cost, get the validity period of the Bank Guarantee furnished by him, extended from time to time till completion of warranty period, as per provisions of the contract and shall furnish the extended Bank Guarantee to the Purchaser before expiry date of original Bank Guarantee or any extension thereof. In case the extended Bank Guarantee is not received by the Purchaser 15 days before the expiry date, the purchaser, entirely at his discretion shall be at liberty to encash the aforesaid Bank Guarantee.

G10.3 On due completion of work in all respects and on expiry of the Guarantee Period as per relevant clause the earnest Money and all payments due to him will be returned to the contractor without any interest on presentation of an absolute 'NO DEMAND CERTIFICATE' from JREDA and up on return, in good condition, of any specifications, drawings, technical literature, samples, tools and tackles or any property belonging to the purchaser which may have been issued to the contractor. Provided always that JREDA shall be entitled to retain, set off, deduct or adjust any claim against the contractor from the money deposited with or becoming payable to JREDA.

G11.0 EFFECTIVE DATE OF CONTRACT

The effective date of commencement of execution of the order by the Contractor shall be the date of issue of the Letter of Intent or Work Order whichever is earlier.

G.12 CONTRACT PRICE

G12.1 Contract Price and unit rates shall remain firm and binding and shall not be subject to any variation, whatsoever, on any account except for statutory variation on taxes & duties during contractual completion period.

G12.2 The Contract price & unit rates includes and covers the cost of all royalty & fees for all articles & processes, protected by letters, patent or otherwise incorporated in or used in connection with the work, also all royalties, rents and other payments in connection with obtaining all the materials for the work and the supplier shall indemnify and keep indemnified the JREDA, which indemnity, the contractor hereby gives against all actions, proceedings, claims, damages, costs and expenses arising from the incorporation in or use of work of any such articles, processes or supplies.

G12.3 During the period of the contract, JREDA may order addition / deletion in quantities which supplier shall comply. The adjustment in Contract Price shall be made at the same unit rate as per Price Schedule.

G12.4 All applicable charges for taking statutory clearances, wherever necessary, are included in the contract price.

G13.0 MOBILIZATION ADVANCE

No Mobilization advance will be made.

G14.0 TERMS & CONDITIONS OF PAYMENT

The terms of payment for the contract shall be as given below:

Subject to any deduction which the Purchaser may be authorized to make under this contract, and or to any additions or deductions provided for in this contract, the contractor shall be entitled to payment as follows:

- G14.1 All payments shall be made in Indian Rupees, unless otherwise specified in the contract.

- G14.2 80% of the contract price for each system shall be paid against delivery of goods in full and in good condition, installation, testing, commissioning and completion of electrical, mechanical and civil works and also after verification by JREDA representative. The following documents in duly bound report in the form of booklet for each system separately shall be furnished indicating village name, block name, system details regarding power plant, LT lines, service connection and house hold wiring etc.**
 - G14.2.1 Commercial invoice in triplicate.
 - G14.2.2 Copy of receipted Delivery Challan/ Transportation Challan /Lorry Receipt.
 - G14.2.3 Certificate of delivery of the system and delivery of Use's Instruction-cum-Maintenance Manual both in English and Hindi as per terms and conditions of the offer duly issued by Village Energy Committee/JREDA representative.
 - G14.2.4 Certificate of installation, testing and commissioning of Biomass Gasifier system, civil works, LT lines, service connection and house wiring as per terms and conditions of contract issued by Village Energy Committee / JREDA representative.
 - G14.2.5 Proof of full compliance certificate from Village Energy Committee.
 - G14.2.6 Utilization Certificate from Village Energy Committee.
 - G14.2.7 Biomass Gasifier Serial No., Serial No. of electrical generating set along with Manufacturer's Test Certificate.
 - G14.2.8 Geographical Co-ordinates and altitude of project location along with digital photographs of each installation.

G14.3 10% of the contract price shall be paid on third party verification at site, completion of training & awareness programme at various locations and on submission of following documents.

G14.3.1 Commercial Invoice in Triplicate.

G14.3.2 Format for training of User's personnel.

G14.4 2% of the contract value shall be paid on completion of every one-year period of the 5 year Comprehensive Maintenance Period after submission of the following documents:

G14.4.1 Commercial Invoice in triplicate.

G14.4.2 Certificate from Village Energy Committee for satisfactory service provided for the previous year duly verified by JREDA's authorized representative.

G14.4.3 Photocopy of Logbook.

G14.5 All payments shall be released by JREDA within 30 days from the date of receipt of claim along with complete supporting documents stipulated against each payment. Only mere submission of Delivery Challan/ Transportation Challan/ Lorry receipt will not be considered for payment.

G14.6 All payments shall be made by JREDA through 'Account Payee' cheque issued in favour of the supplier and payable at any Indian Nationalized / Scheduled Bank.

G15.0 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 the Income Tax authorities on account of the Supplier. JREDA shall provide the Supplier a certificate for such deduction of tax.

G16.0 STATUTORY VARIATION IN TAXES AND DUTIES

G16.1 The adjustment in the Contract Price towards imposition of new taxes or abrogation of existing taxes due to statutory variation shall be applicable only if the new tax is enacted or existing tax is abrogated within Contractual delivery/execution period.

G16.2 The Supplier shall bear and pay all liabilities in respect of statutory variations in taxes and duties and imposition of new taxes and duties that may be imposed after the execution of the particular item(s) of work though new tax may be imposed during the currency of the contract.

G17.0 INSPECTION OF THE FACTORY AND TESTS

G17.1 JREDA reserves the right to inspect the power plant manufacturer's works/factory to ascertain the capability/availability of necessary equipment & infrastructure required for manufacture of the item offered before opening of the price offers of the bidders.

G17.2 JREDA shall have access and right to inspect the work or any part thereof at any stage.

G17.3 JREDA shall have the right to inspect and test the goods to confirm their conformity to the technical specifications after delivery of goods to consignee directly or through the Consultant or may get it examined/tested by B.I.T., Mesra.

G17.4 Successful bidder shall inform JREDA at least 10 days in advance of schedule dispatch materials required for both 10 kWe & 20 kWe power plants.

G18.0 DESPATCH INSTRUCTIONS

G18.1 The manufacturer's test report will be submitted for equipment dispatched to site for setting up of 10 & 20 kWe biomass gasifier based power plants. Manufacturer's Test Report for items to be dispatched will be submitted to JREDA before dispatch. JREDA reserves the right to get the material tested by Consultant or by BIT, Mesra.

G19.0 ROAD PERMIT

Road permits shall be issued from the bidders Registered Office or Manufacturing Unit (as indicated by the bidder in the bid) to Ranchi in Jharkhand. Request for road permit from the place other than above will not be entertained.

G20.0 INSURANCE

G20.1 Insurance for Materials

The contractor shall arrange for transit and erection insurance of the materials required for setting up of 10 & 20 kWe biomass gasifier based power plants and other materials required for civil, sanitary and electrical works at his own cost. JREDA shall, in no case be held responsible for any loss, damage or theft of materials/equipment so long the site continues to remain under the custody of the contractor.

G20.2 Insurance for Workmen

The contractor should arrange for providing insurance cover to his workmen under Workmen's Compensation Act or similar Rules/Acts as applicable during the pendency of the contract for covering risk against any mishap to his workmen. JREDA will not be responsible for any such loss or mishap.

G21.0 WORKMAN'S PAYMENT & COMPLIANCE TO LABOUR LAWS

The contractor shall comply with all labour rules and regulations of the State & Central Government and these rules shall be strictly followed. All labour licenses and other formalities required for this purpose must be carried out in time. Payments to all workmen engaged for this work will be paid wages as Minimum Wages Act of Jharkhand State. Labour disputes, if any shall be solved entirely by the contractor himself and JREDA will not be responsible for any such dispute.

G22.0 TRAINING PROGRAMME, AFTER-SALES SERVICE AND AVAILABILITY OF SPARES

G22.1 The contractor will organize training programme for JREDA and other persons engaged for operation and maintenance of the specified power generating units. Printed leaflet/ literature shall be made available in English and Hindi by the contractor regarding the operation and maintenance of power plants.

G23.0 COMPLETION SCHEDULE

The contractor shall submit a Completion Schedule of Work along with a **BAR CHART** as per the terms and conditions of the contract/order within 180 days as specified from the date of issue of the Letter of Intent or Work Order, whichever is earlier.

G.24. GUARANTEE PERIOD AND COMPREHENSIVE MAINTENANCE CONTRACT

G24.1 Guarantee Period

G24.1.1 The contractor shall provide guarantee, which include servicing, & replacement guarantee for parts and components of the 10 kWe and 20 kWe 100% producer gas mode biomass gasifier based power generating system, plant housing and distribution systems. The replacement guarantee is for ten years from the date of commissioning the power plant at site & demonstration of performance to JREDA.

G24.1.2 The manufacturers shall provide additional information about the system and condition of guarantee as necessary.

G24.1.3 Supplier shall without prejudice to any other clauses of the order repair/replace the defective parts and restore the system to satisfactory working/performance within 10

days of intimation of fault without any additional cost to JREDA within the period of guarantee.

G.24.2 Comprehensive Maintenance Contract (CMC)

G24.2.1 The comprehensive Maintenance Contract (CMC) shall be comprehensive which shall include servicing and replacement of all system components for specified period of 5 (five) years, which may be extended by another 5 years after the completion of the contract period. The maintenance service shall not only include power plants but also all other functions including maintenance of building and other services in the building. All preventive, routine, breakdown and corrective services are to be provided. The CMC shall have the following components as described below:

- a) During Warranty Period, all replacement of defective components will be made by manufacturer free of cost. So, this factor will be taken into account while quoting the price for CMC.
- b) The contractor will depute at least one staff on regular basis on duty for normal operation and maintenance of the plant, machineries and the building.
- c) **Preventive/Routine Maintenance:** This shall be carried out by the contractor at least once every three months and shall include activities like cleaning & checking the health of the gasifier, engine, alternator, accessories, LT distribution system and the housing.
- d) **Breakdown / Corrective Maintenance:** Whenever a complaint is lodged by the user, the contractor shall attend within reasonable period of time and in case of any major breakdown, it will be corrected within a period not exceeding seven days.
- e) The contractor shall maintain trained manpower for carrying out the CMC services.
- f) The contractor shall maintain Logbook of event related to CMC in bound register with recordings of time and date.
- g) The contractor will maintain a separate Logbook in proper format for all the power plants under this contract.
- h) The starting date of CMC maintenance period will be the date of commissioning of the power plant.

G25.0 ASSIGNMENT/ SUB-LETTING

G25.1 The contractor shall not without the prior consent in writing of the Purchaser, assign or sublet or transfer his contract, or a substantial part thereof other than raw materials, or for any part of the work of which makers are named in the contract, provided that any such consent shall not relieve the Contractor from any obligation, duty or responsibility under the contract.

G25.2 JREDA reserves the right to reject the equipment/Work sub-contracted and procure the same from elsewhere at Contractor's Risk and Cost. The Vendor 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.

G26.0 TIME OF COMPLETION

The contractor shall provide full programme of the execution of work. Strict adherence to schedule mentioned in contract conditions shall be the essence of the contract and must be maintained. The work must be completed, within 4 (four) months from the date of acceptance of order or date of handing over of site, whichever is earlier.

G.27 DELAY IN EXECUTION OR FAILURE TO SUPPLY

G27.1 If the work is delayed on account of: -

- 6 Increase in quantity of work.
- 7 Suspension of work as ordered by the JREDA.
- 8 Force Majeure conditions.
- 9 Any other causes which, in absolute discretion of the Director, JREDA are beyond the contractor's control.

The contractor shall appeal to JREDA in the form of a written application before expiry of the contract period, bringing out the causes responsible for the delay, for granting suitable time extension.

G27.2 The Director, JREDA, if satisfied, that the delay is not attributable to the fault of the Contractor, may grant suitable time extension. However if the contractor is found responsible for any delay completion of the work, formal time extension shall also be granted by the JREDA but reserving its right to recover a sum towards liquidated damage, for late completion of this contract.

G27.3 However, if the contractor fails to execute the work or fails to start the work within specified time frame after the receipt of work order or leave the work site after partial execution of the work, JREDA may without prejudice to the right of the purchaser to recover damages for breach of trust of the contract may impose the following penalties:

G.28 LIQUIDATED DAMAGE

Scheduled date of completion shall be treated as the essence of the contract. Liquidated damage shall be imposed at the rate of 0.5% of the unexecuted value per week of delay up to a maximum of 5% at the sole discretion of the Director, JREDA. If there is any valid and acceptable reason for delayed execution supported with details of hindrances, the Director, JREDA may, at his discretion consider lowering down the penalty rate or even waiving off the penalty on having written application from the contractor.

G29.0 BREACH & CANCELLATION OF THE CONTRACT

G.29.1 In case of non-performance in any form or change of the covenants and conditions in this contract by the contractor, Director, JREDA shall have the power to annul, rescind, cancel or terminate the contract and upon its notifying in writing to the contractor that it has so done, this contract shall absolutely determine. The decision of Director, JREDA in this regard shall be final and binding.

G.29.2 JREDA may cancel the contract or a portion thereof and if so purchase or authorized purchase of the plant/ equipment not so delivered or order exhibit/ equipment of similar description (opinion of the Director, JREDA shall be final) at the risk and cost of the contractor. If the contractor had defaulted in the performance of the original contract, the purchaser shall have the right to ignore his tender for risk purchase even though lowest.

G.30 FORCE MAJEURE CONDITIONS

G.30.1 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 the force majeure clause last.

G.30.2 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, civil war, rebellion, revolution, insurrection, insurrection, military coup to usurp power, damage from aircraft, nuclear fission, acts of god such as earthquake (above 7.0 magnitude on Richter scales), lightning, unprecedented floods, fires not caused by contractors negligence and other causes which the contractor has no control and accepted as such by the Director, JREDA whose decision shall be final and binding.

G30.3 Time for performance of the relative obligation suspended by the force majeure shall stand extended by the period for which such clause lasts.

G.30.4 If works are suspended by force majeure conditions lasting for more than two months, the Purchaser shall have the option of canceling this contract in whole or part thereof, at its discretion.

G30.5 The Contractor shall not claim or compensation for 'Force Majeure conditions' and shall take appropriate steps to insure men and materials utilized by him under the contract well in time.

G31.0 PROGRESS REPORT OF WORK

The Contractor shall submit weekly and monthly progress report on execution of works conforming to bar chart. In case of any slippage(s) or the contractor along with modified Bar Chart will submit reasons for delay in execution of work along with details of hindrances.

G32.0 CONTRACTOR TO INFORM HIMSELF FULLY

G32.1 The contractor shall be deemed to have carefully examined the general conditions, specifications and schedules and also to have satisfied himself as to the nature and character of the plant and equipment to be supplied and the site conditions and all relevant matters & details.

G32.2 If he shall have any doubt as to the meaning of any portion of the contract/work order, he shall, before signing/accepting it, set forth the particulars thereof and submit them to the Director, JREDA/Engineer-in Charge in writing in order to remove such doubts.

G33.0 COMPLETENESS OF TENDER

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connection etc. and for civil works, all necessary fittings, assemblies, accessories, hardware items, shuttering utilities and safety devices as required shall be deemed to have been included in the tender, whether such items are specially mentioned in the BOQ or not.

G34.0 WORKS TO BE DONE BY THE CONTRACTOR

Unless otherwise mentioned in the tender document, the following works shall be deemed to be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost: -

- Construction of power plant, which includes the power plant housing, electrical distribution system, design, supply, installation, testing and commissioning of the power plant on turnkey basis including CMC for 5 years.
- Foundation for exhibits/equipments and components where required including foundation bolts.
- Cutting of walls and floors and making good all damages caused during installation and restoring the same to their original finish.
- Sealing of all floor openings provided for pipes and cables from fire safety and water leakage point of view, after installation of the same.
- Painting at site of all exposed metal surfaces of the installation other than pre-painted items, if any. Damages to the finished surfaces of pre-painted items while handling and erection shall, however be rectified to the satisfaction of Director, JREDA.
- Temporary shed, if required over the storage space and locking arrangements thereof, watch and ward of materials and installations till completion of work.
- Water and power as may be required for installation, curing and testing.

- Testing and commissioning of the 10 kWe and 20 kWe 100% producer gas mode biomass gasifier based power generating units.

G35.0 TOOLS AND PLANTS REQUIRED FOR CONSTRUCTION.

All tools and plants required for the work shall be the responsibility of the contractor.

G.36 CONTRACT DRAWINGS

G36.1 The drawings enclosed with the tender document shall form a part off the agreement. The bidder, in case his bid is accepted, will submit detailed construction drawings for approval before starting construction work. The construction/ installation work will be carried out as per approved drawings. The contractor may also submit drawings with the tender giving details about his equipment, layout, control circuit and diagrams etc. with reasons. These drawings will also form part of agreement, if accepted by JREDA.

G36.2 In case, contractor wants some modifications or change in layout or drawings, the same should be clearly indicated in a drawing showing sufficient overall dimensions, clearances and space requirements of all apparatus to be furnished, to enable the consultant/JREDA to take a final decision in the matter.

G36.3 No extension of time shall be allowed on account of the time consumed in submission and examination of defective drawings and resubmission of corrected drawings.

G36.4 Any drawing suggesting modification or change in original drawings, technical data or correspondence which form the basis of an order or contract, as aforesaid, or which may be furnished by the contractor for JREDA's approval, or information, as provided under the said order or contract, shall be in English and if it is in any other language, a complete translation in English should be duly furnished.

G36.5 The contractor shall be responsible for and shall pay for any alterations of the work due to any discrepancies, errors and omissions in the drawings or other particulars supplied by him whether such drawings or particulars have been approved by the purchaser or not, provided that such discrepancies, errors or omission are due to inaccurate information or particulars furnished to the contractor by the Purchaser. The Purchaser shall pay for any alterations, in the work necessitated by reasons of such inaccurate information of particulars.

G.37 PATENT RIGHTS

In the event of any claim or demand being made or action being brought against the purchaser for infringement or alleged infringement of patent rights in respect of any exhibit, machine, work or things used or supplied by the contractor in respect of using or working by JREDA, such exhibit, machine, work or thing, the contractor shall indemnify JREDA from and against such claims whatsoever or demand and costs and expenses arising from or incurred by reasons of such claim or demand. JREDA shall notify the contractor immediately on receipt of any claim and that contractor shall be at liberty, if he desires with the assistance of JREDA, if required, but at the contractor's own expense to conduct all negotiations for the settlement of the same/or any litigation that may arise there from provided that no such machine, plant,

work or things shall be used by JREDA for any purpose in any manner other than that for which have been supplied by the contractor and specified under the contract.

G.38 MATERIALS AND WORKMANSHIP

G.38.1 All materials shall be of the best quality and workmanship capable of satisfactory operation under the operating and climatic conditions as may be specified. Unless otherwise specified, they shall conform in all respect to the latest edition of the relevant BIS specification wherever Indian specifications apply.

G38.2 The Contractor at site shall supply all materials required for construction. The contractor shall also arrange for transportation, loading/unloading and safe storage of materials at site.

G38.3 If the contractor offers equipments manufactured in accordance with other international well recognized standards, he shall, in case, supply a copy in English of the Standard specification adopted and shall clearly mention in what respect such standard differs from Indian Standard Specification.

G39.0 PACKING AND MARKING

G39.1 The Contractor shall be responsible for security protecting and packing the plant and equipment as per prescribed standards in force to withstand the journey and ensuring safety of materials and also arrival of materials at destination in original conditions and good for contemplated use. Packing case size and weight shall take into consideration the remoteness of the goods final destination and absence of heavy material handling facilities at all points in transit.

Each bundle or the package shall have the following markings on it:
The name and address of the consignee
Destination
Relevant marks, reference numbers etc. for identification

G39.2 Packing lists of materials shall be provided in each package to facilitate checking up of the contents at the destination.

G.40 POWER TO VARY/OMIT WORK

G40.1 No alterations, amendments, omissions, additions, subtractions or variations of the work (hereinafter referred to as 'variation') under the contract shall be made by the contractor except as directed by the Director, JREDA. The Director, JREDA shall have full power, subject to provisions hereinafter contained from time to time during execution of the contract by notice in writing to instruct the contractor to make such variations up to $\pm 10\%$ of the scheduled quantity and be bound by the same conditions though the said variations occurred in the contract.

G40.2 If any suggested variations would, in the opinion of the contractor, if carried out, prevent him from fulfilling any of his obligations or guarantees, under the contract, he shall notify the Director, JREDA thereof in writing, and the Director, JREDA shall decide forthwith whether or not the same shall be carried out, and if Director, JREDA confirms his instruction, the contractor shall carryout the work as per instruction.

G40.3 The differences in cost, if any, occasioned by such variations, shall be added to or deducted from the contract price, as the case may be.

G40.4 In the event of Director, JREDA requiring any variations, reasonable and proper notice shall be given to the contractor as well to enable him to make arrangements accordingly, and in case where goods or materials are already prepared or procured, or any designs, drawings or patterns made or work done that required to be altered, a reasonable sum in respect thereof shall be allowed by the Director, JREDA.

G40.5 In every cases in which the contractor shall receive instructions from the Director, JREDA for carrying out any work, which either then or later, will in the opinion of the contractor involve a claim for additional payment, the contractor shall as soon as reasonably possible after the receipt of such instructions, inform in writing the Director, JREDA of such claim for additional payment.

G.41 NEGLIGENCE

G41.1 If the contractor shall neglect to carry out the work or shall refuse or neglect to comply with any reasonable order given to him in writing by the Director, JREDA or shall contravene any provisions of the contract, the purchaser may give seven days notice in writing to the contractor, to make good the failure, neglect or contravention complained of any if the contractor shall fail to comply with the notice within reasonable time from the date of serving thereof in the event of failure, neglect or contravention capable of being made good within that time, then in such case if the Purchaser shall think fit, it shall be lawful for him to take the work wholly or in part, out of the contractor's hand and give it to another person on contract at a reasonable price and the Purchaser shall be entitled to retain and supply any balance which may be otherwise due on the contract by him to the contractor or such part thereof as may be necessary, to the payment of the cost of manufacture or supply of such plant as aforesaid.

G41.2 If the cost of executing the work as aforesaid shall exceed the balance due to the contractor and the contractor fails to make good such deficiency, the Purchaser shall take action in the manner it may consider deem fit in terms of the contract.

G42.0 COMPLIANCE WITH REGULATIONS

G42.1 The Contractor shall comply with all applicable laws or ordinances, codes, approved standards, rules and regulations and shall procure all necessary Municipal, other statutory bodies and Government permits & licenses etc. at his own cost. The contract shall leave the Purchaser and the Director, JREDA harmless as a result of any infractions thereof.

G.43 DEATH, INSOLVENCY AND BREACH OF CONTRACT

The Purchaser may at anytime by notice in writing summarily determine the Contract without compensation to the contractor in any of the following events:

G43.1 If the contractor being an individual or if a firm, any partner thereof shall at any time, be adjudged insolvent or shall have a receiving order or order from administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any conveyance or assignment with his creditors or suspend payment or if the firm be dissolved under Partnership Act, or

G43.2 If the contractor being a Company is wound up voluntarily or by the order of a court or a Receiver, Liquidator or manager on behalf of the Debenture holder is appointed

or circumstances have arisen which entitle the Court or debenture holder to appoint a Receiver, Liquidator or Manager, or

G43.3 If the contractor commits any breach of the contract not herein specifically provided for provided always that such determination shall not prejudice any right of action or remedy which shall have accrued or shall accrue thereafter to the Purchaser and provided also that the contractor shall be liable to pay to the Purchaser. The contractor shall under no circumstances be entitled to pay again or repurchase.

G44.0 PROGRESS REPORT OF WORK

The Contractor shall submit weekly and monthly progress report on execution of works conforming to bar chart. In case of any slippage(s) or the contractor along with modified Bar Chart will submit delay in execution of work reasons for such delay along with details of hindrances.

G45.0 STATUTORY ACTS, RULES AND STANDARDS

The work shall be executed in conformity with the relevant standard of Bureau of Indian Specification (or equivalent International standards), National Building code of India, Indian Electricity rules 1956 (as amended up to date), Indian Electricity Act and relevant Rules in vogue at the time of execution.

G46.0 SAFETY MEASURES

The contractor shall have to provide necessary measures for providing adequate safety measures and precautions to avoid any accident, which may cause damage to any equipment/material or injury to workmen. JREDA, shall not be responsible for any such accidents.

G47.0 STOPPAGE OF WORK

JREDA shall not be responsible for any damage or loss caused due to 'force majeure' conditions. The contractor should make provisions for adequate insurance cover against such loss or damages. JREDA shall not be responsible and not liable to pay any compensation due to stoppage of work as a reaction from local public due to any undue action on the part of the contractor causing annoyance to local people.

G48.0 HINDRANCE REGISTER

The contractor may also maintain a Hindrance Register where reasons for delay may be recorded from time to time and at the time of occurrence of the hindrance and get it duly certified by the Director, JREDA or his authorized representative.

G49.0 RESPONSIBILITY OF THE CONTRACTOR

The contractor shall guarantee and be entirely responsible for the execution of the contract in accordance with the specification, schedules and appendices. He shall further guarantee and be responsible for the quality and workmanship of all materials and completed works, correct designs and drawings, correct delivery of material, civil construction, plant erection, testing and commissioning: within the guaranteed completion and warranty period of 60(sixty) months from the date of commissioning.

G50.0 RIGHT OF JREDA TO MAKE CHANGE (S) IN DESIGN

JREDA shall have the right to require the contractor to make any change in the design, which may be necessary in the opinion of the Director, JREDA to make the plant and materials conform to the provisions and contents of the specification without extra cost to the purchaser.

G51.0 DRAWINGS AND MANUALS

The contractor shall supply all necessary erection/ construction, drawings, erection, testing and commissioning of manuals etc. as and when required. Four sets of drawings; manuals etc. for each plant shall be submitted by the contractor on commissioning of power plants.

G52.0 INSPECTION AND TESTING

G52.1 The Director, JREDA and his duly authorized representative shall have, at all reasonable time access to the Contractor's premises, and shall have the power, at all reasonable times, to inspect and examine the materials and workmanship during execution of the work during its manufacture, shop assembly and test and if part of the plant is being manufactured in another premises, the contractor shall obtain for the Director, JREDA or his duly authorized representative, necessary permission to inspect it as if the plant was manufactured at Contractor's own premises.

G52.2 The Director, JREDA shall, on giving seven days' notice in writing to the Contractor, setting out any grounds of objections which he may have in respect of the work, be at liberty to reject all or in part or workmanship connected with such work, which, in his opinion defective for any reason whatsoever; provided that, if such notice be not sent to the Contractor within reasonable time after the grounds on which notice is based have come to reject the said plant or workmanship on such grounds. Unless specifically provided otherwise, all tests shall be made at the Contractor's works before shipment.

G52.3 The contractor shall, if required, give the Director, JREDA notice of any equipment being ready for testing, and the Director, JREDA or his authorized representative, if so desired, shall on giving twenty four hour's previous notice in writing to the contractor attend at Contractor's premises within 15 days of the date on which the material is notified as being ready failing which or alternatively if JREDA at its own discretion waives the inspection and testing, the contractor may proceed with the tests which shall be deemed to have been made in the presence of Director, JREDA and he shall forthwith forward six sets of duly certified copies of test results and certificated to the Director, JREDA for the approval of JREDA. The contractor shall dispatch the equipment only after receiving the test certificates in writing by JREDA.

G52.4 In all cases where the contract provides for tests whether the premises of the Contractor or any sub-contractor, the contractor except where otherwise specified, shall provide free of charge such labour, materials, electricity, fuel, water, stores, apparatus and instruments as may reasonably be demanded to carry out efficiently such tests in accordance with the contract, and shall give facilities to the Director, JREDA or his authorized representative, to accomplish such testing.

G52.5 If the inspection is done through an independent authority, at the option of JREDA, the purchaser shall pay the inspection fee, if any.

G52.6 When the inspection and tests have been satisfactorily completed at the contractor's work, the Director, JREDA or his authorized representative shall issue a certificate to that effect.

G52.7 Neither the waiving inspection nor acceptance after inspection by JREDA shall, in any way, relieve the contractor of responsibility of supplying the plant and equipment strictly in accordance with specification and drawings etc.

G53.0 DELIVERY OF EQUIPMENTS

G53.1 The Contractor shall deliver the materials in accordance with the terms and conditions of the contract at the time/times at the place/places and in the manner specified in the contract. The contractor shall comply with instructions that may be given by the purchaser from time to time regarding the transit of the plant and material.

G53.2 Notification of delivery or dispatch in regard to each and every consignment shall be made to JREDA immediately after dispatch or delivery. The supplier shall supply the consignee Invoice in triplicate and packing account of all stores delivered or dispatched by him.

G53.3 In case of any occurrence of loss or damage in transit up to destination, it shall be liability of the contractor to initiate or pursue the claim with insurance company. He should take immediate steps to repair the damaged apparatus or replacement thereto. JREDA on merit will consider any time limit extension in such contingency.

G54.0 DIRECTOR'S DECISION

In respect of all matters which are left to the decision of the Director, JREDA, including the granting or withholding certificates, the Director, JREDA shall if required to do so by the contractor, give in writing a decision there on. If the decision is not accepted by the contractor the matter will, at the request of the contractor be referred to arbitration under the provision for arbitration hereinafter contained but, subject to the right of reference to arbitration; such decision shall be final and binding on the contractor.

G55.0 LIABILITIES FOR ACCIDENTS AND DAMAGES DURING TRANSIT

The Contractor shall be responsible for loss, damages or depreciation to goods or of plant/equipment up to delivery at site.

G56.0 DEDUCTION FROM CONTRACT PRICE

G56.1 All costs, claims, damages or expenses which the JREDA. may have paid for, which under the contract the contractor is liable, may be deducted by the JREDA. from the running bill or earnest Money /or from any money due or which become due by him to the contractor under this contract.

G56.1 Any sum of money due and payable to the contractor under this contract may be appropriated by the JREDA. and set off against any claim of the JREDA, for the payment of a sum of money arising out of or under any other contract made by the Contractor with JREDA.

G56.2 It is an agreed term of the contract that the sum of money withheld or obtained under this clause by JREDA. will be kept withhold or retained as such by JREDA. or till this

claim arising out of in the same contract is either mutually settled or determined by the arbitrator, or by competent court, as the case may be, and that the contractor shall have no claim for interest or damages whatsoever on this account or any other account in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

G57.0 TEST ON COMPLETION

For 10 kWe and 20 kWe 100% producer gas mode biomass gasifier based power plants, all shop tests shall be carried out before shipment. It will be necessary for the final tests as to performance and guarantees to be held over until the plant is erected at site: the test shall be carried out in the presence of contractor's representatives within reasonable time of completion of erection. If the results of these tests are not within the margin specified, the tests shall, if required be repeated after re-tests, and the contractor shall bear all reasonable expenses to which he may be put by such tests.

G58.0 REJECTION OF DEFECTIVE WORK

G58.1 If the completed work or any portion thereof, before it is taken over, be found to be defective, or fail to fulfill the requirements of the contract, the Director, JREDA shall give to the contractor notice stating the particulars of such defects or failure and the contractor shall forthwith make the defect good, or alter the same to make it comply with the requirements of the contract. If the contractor fails to do so within a reasonable time, the Purchaser may reject and replace, at the cost of the contractor, the whole or any portion of the wall, as the requirement of the contract. Such replacement shall be carried out by the Purchaser within a reasonable time and a reasonable price and where possible to the same specifications under competitive conditions. In cases of such replacement by JREDA, the contractor shall be liable to pay to the Purchaser the extra cost, if any of such replacement, be delivered and /or erected as provided for in the contract agreement. The extra cost may be ascertained as the difference between the prices paid by the Purchaser for such replacement and the contract price of the plant/equipment so replaced as also any sum paid by JREDA to the contractor in respect of defective plant. If JREDA does not so replace the defective plant within a reasonable time, the contractor shall be liable only to repay to JREDA all money paid by JREDA to him in respect of such plant.

G59.0 GUARANTEE

G59.1 The contractor must ensure that the goods supplied are new, unused and have most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in contract.

G59.2 The guarantee period of the 10 kWe and 20 kWe power plants will be 60 (sixty) calendar months from the date of commissioning. The contractor shall remain liable to replace any defective parts that may develop in his own manufacture or that of his sub-contractors under the conditions provided by the contract under proper use, and arising solely from faulty design, materials or workmanship, provided always that such defective parts are not, repairable at site and are not essential in the meantime to the maintenance in commercial use of the park are promptly returned to the contractor's works at the expense of the contractor unless otherwise arranged.

G59.2 If it becomes necessary for the contractor to replace or renew any defective parts of the power plant or other equipment under this clause, the provisions of the first paragraph of this clause shall apply to the parts of the power plant and other

equipment supplied by the contractor. So he will replace or renew the defective parts until the expiration of six months from the date of such replacement or renewal or until the end of the above-mentioned period of 60 months whichever is later.

G59.3 If any defects not remedied within a reasonable time, JREDA may proceed to do work at the contractor's risk and expense, but without prejudice to other rights, which JREDA may have against the contractor in respect of such defects.

G59.4 At the end of guarantee period, the contractor's liability shall cease. In respect of goods not covered by the first paragraph of this clause, JREDA shall be entitled to the benefit of such guarantee given to the contractor by the original supplier or manufacturer of such goods.

G60.0 OPERATION AND MAINTENANCE OF THE 10 kWe & 20 kWe 100% PRODUCER GAS MODE BIOMASS GASIFIER BASED POWER PLANTS.

The contractor will be responsible for operation and maintenance of the 10 kWe and 20 kWe biomass gasifier based power plants, other equipments supplied by him and repair and maintenance of plants as per details furnished in relevant clauses of Technical Specification.

G61.0 ARBITRATION

G61.1 Except where otherwise provided, if at any time, any question, dispute or difference, whatever shall arise between the contractor and JREDA upon or in the relation to or in connection with this contract with either of the parties may give to other notice in writing of the existence of such a question on rejection of the matter, the dispute or difference shall be referred to the sole arbitrator appointed by JREDA at the time of dispute after ascertaining the terms of reference mutually.

G61.2 The arbitrator will preferably be a member of Arbitration Council and arbitration proceedings will take place as per provisions of Arbitration Act, 1940 or any statutory modifications or re-enactment thereof, and the rules made there under and for the time being in force shall apply.

G61.3 The contractor will ensure that the work under this contract shall continue during arbitration proceedings and dispute and no payments due from or payment by the purchaser shall be withhold on account of such proceedings except to the extent which may be in dispute.

G62.0 COURT OF COMPETENT JURISDICTION

Only the Judicial Courts of Ranchi have jurisdiction in case of dispute between JREDA and the contractor.

G63.0 CONSTRUCTION OF CONTRACT

The contract shall in all respect be construed and operated as a contract as defined in the Indian Contracts Act, 1972, and all the payments hereunder shall be made in Indian Rupees unless otherwise specified.

G64.0 ADDRESS OF THE CONTRACTOR AND NOTICES AND COMMUNICATIONS ON BEHALF OF THE PURCHASER

G64.1 For all purpose of the contract, including arbitration hereunder, the address of the contractor mentioned in the tender shall be the address to which all communications addressed to the contractor shall be sent, unless the contractor has notified a change

by a separate letter containing no other communication and sent by registered post acknowledged by JREDA. The contractor shall be solely responsible for the consequence of an omission to notify a change of address in the manner aforesaid.

G64.2 Any communication or notice on behalf of the Purchaser in relation to the contract may be issued to the contractor by engineer and all such communication and notice may be served on the contractor either by registered post or under certificate of posting or by ordinary post or by hand delivery at the option of the officer.

G65.0 CONTRACT DOCUMENTS & MATTERS TO BE TREATED AS CONFIDENTIAL

All documents, correspondence, the contractor shall consider decision and other matters concerning the contract as confidential and restricted nature and he shall not divulge or allow access thereto un-authorized person of any kind.

G66.0 FINAL BILL

The final bill relating to the contract shall be prepared only when the equipment have been installed and tested for final acceptance and it will include the adjustments of all claims against the contractor by Director, JREDA and awarded in his favour by the arbitrator up to the date of preparation of the final bill.

TECHNICAL SPECIFICATIONS

T.1.1 AIMS & OBJECTIVES OF TENDER

This tender calls for design, fabrication, supply, installation and commissioning of 100% producer gas based biomass gasifier-engine-alternator power generation system.

T.1.2 CONSTRUCTION POWER

Construction power will not be available at site and the Contractor will make his own arrangement for construction power, if required at site.

T.1.3 GASIFIER & PLANT HOUSING

The gasifier shall be installed inside an open shade made with roof made with CGI sheet on a steel truss made out MS angle steel sections. However, the Engine-Alternator assembly will be housed inside a room with suitable brick walls including proper doors and windows as required. The dimension of the building will be such that there will no space problem for maintenance staff for operation. A covered biomass storage room suitable for storage of at least 15 days fuel shall be provided separately with proper fire protection measures. The construction work of these buildings will be carried out in conformity with the provisions of national Building Code and National Electrical Code of India unless otherwise specified.

A staircase including a small platform shall be provided of MS structurals for movement of workers engaged in loading of biomass fuel. Proper ventilation must be ensured, as one of the main components of producer gas is carbon monoxide.

T.2 TECHNICAL SPECIFICATION FOR GASIFIER SYSTEM

T.2.1 SCOPE OF THE PROJECT

T.2.1.1 Gasifier System

The scope of the project covers design, supply, erection, testing and commissioning with two years warranty for equipment and AMC for 5 years of 10 kWe and 20 kWe biomass gasifier systems for power generation with 100% producer gas comprising of the following:

Biomass handling, preparation, drying & storage facility.

Biomass gasifier with gas cleaning & cooling sub-systems.

100% producer gas engine-alternator sub-system.

T.2.1.2 Electrical Distribution System

Village electrification scheme comprising of the following:

Standalone Mini-grid at 400 volt AC.

LT cable laying.

Electrification of house holds and micro-industries like pumps, atta making mill etc.

Street lighting.

Associated civil works.

T.3 BROAD SCOPE OF SUPPLY & SERVICES

T.3.1 Biomass Handling, Preparation, Drying and Storage Facility

Wood Cutter.

Wood Drier using waste heat from engine exhaust.

Storage shed for cut to size and dried biomass.

Handling equipment-pulley, ladder, weighing equipment & accessories etc. as required.

T.3.2 Biomass Gasifier with Gas Cleaning and Cooling Sub-systems.

- a) Gasifier-feed hopper, reactor, nozzles and bottom hopper.
- b) Gas cleaning system.
- c) Gas cooling system
- d) Cooling water/re-circulation system
- e) Control Panel.

T.3.3 Producer Gas Engine-Alternator System

- i) Spark ignition engine suitable for 100% producer gas.

- ii) 415 volt, 3 phase Alternator
- iii) Control panel and switchgear for generation system.
- iv) Engine & gasifier housing including control room.

T.3.4 Village Electrification Scheme

- i) Stand alone mini-grid at 400 volt.
- j) LT Service connections.
- k) Street lighting
- l) Electrification of house holds, pumps and atta chakki etc.

T.3.5 Supporting Steel Work

This consists of steel works, platforms, ladders and railings etc.

T.3.6 Insulation & lagging etc.

This will involve providing insulation and lagging for hot surfaces of ducting and piping.

T.3.7 Electrical Items

The electrical items will include drive motors, local push button stations, LT switchgear and LT cabling etc.

T.3.8 Painting

This involves application of primer and final painting.

T.3.9 Miscellaneous Items

This includes foundation bolts, chemicals, lubricants, tools and tackles etc. and all items, which may not be specifically mentioned but required for completion of the project.

T.3.10 Maintenance Spares for 2000 Operating Hours

The list of spares that will be required for repair and maintenance of power plants for 2000 operating hours.

T.4.0 SCOPE OF SERVICES

The tenderer shall render the following services for the project:

- Prepare layout of the mini-grid at 400 volt, 3 phase for village energy distribution systems.
- Preparation of bill of materials for the mini-grid mentioned above.
- Transportation of materials to site including packing and forwarding.
- Erection at site covering electrical, mechanical and civil works.
- Testing and commissioning of the system.
- Trial run in conformity with specification.
- Documentation and preparation of Operation & maintenance manuals in English and Hindi languages.
- Training of local operating personnel
- Comprehensive service contract for 5 years.

T.5.0 EXCLUSIONS

The following works are excluded from the scope of supply of the Tenderer for this contract package. The Village Energy Committee will take necessary action about these items of work.

Energy Plantation.

Collection, handling, supply and storage of biomass.

Personnel for normal operation of the plant and power distribution system.

T.6.0 DETAILED SPECIFICATIONS

T.6.1 Gasifier System

Type of gasifier : Down draft type

T.6.2 Capacity for 10 kWe (net output) System:

Suitably rated biomass gasifier for operation with modified gas engine for electrical output of 11 kW while operating on 100% producer gas mode.

T.6.3 Capacity for 20 kWe (net output) System:

Suitably rated biomass gasifier for operation with modified gas engine for electrical output of 22 kW while operating on 100% producer gas mode.

T.6.4 Material for fabricating the Gasifier

Appropriate materials shall be used for fabrication of the equipment. The main shell shall be made of stainless steel while other structural components like support structure, load taking cones, hopper top and feed door may be made out of appropriately thick MS plates with effective processing and painting.

In the reaction zone, critical sections of nozzles and throats will be made from appropriate grade of stainless steel sheets.

Appropriate materials shall be used for fabrication of the equipment. The main shell shall be made of stainless steel while other structural components like support structure, load taking cones, hopper top and feed door may be made out of appropriately thick MS plates with effective processing and painting.

In the reaction zone, critical sections of nozzles and throats will be made from appropriate grade of stainless steel sheets.

T.6.5 Average Calorific Value

The average calorific value of the gas is 1000 to 1100 Kcal/Nm³.

T.6.6 Biomass Consumption over Turndown Ratio

<1.1. ± 0.1 kg./kWh (woody biomass)

T.6.7 Type of Fuel & Recommended size

Woody biomass fuel of the sizes mentioned hereunder will be used in the gasifier.

Recommended Size of Biomass:

Min^m Length – 10 mm

Max^m Length – 50 mm

Min^m Diameter 10 mm

Max^m Diameter 50 mm

T.6.8 Moisture Content of Biomass

The maximum allowable moisture content of woody biomass fuel is 20%.

T.6.9 Minimum Capacity for Continuous Operation

The plant shall be capable for continuous operation for at least 12 hours non-stop.

T.6.10 Hopper Capacity

The biomass fuel holding capacity of the hopper shall be 85 kg at a time.

T.6.11 Tar Cracking & Particulate Content of the Gas

The Gasifier shall be capable of complete tar cracking. The hot gas leaving the gasifier should be generally tar free over the operating range of the Gasifier.

- a) Maximum allowable Tar content :: 50 mg/Nm³
- (b) Maximum allowable Particulate :: 25 mg/Nm³

T.6.12 Scrubber & Filter etc.

Proper scrubber, cleaner, check filter and fine filter shall be provided to ensure tar free clean gas so that no engine parts have any harmful effect due to contamination from gas.

T.6.13 Painting

All exposed steel/iron parts of the gasifier system shall be suitably treated for prevention of corrosion and painted with anti-corrosive paint of approved colour.

T.6.14 Biomass Fuel Feeding

The biomass fuel will be fed manually as the systems are very small but each gasifier unit will be provided with ladder and platforms fabricated with MS sections suitable for operational requirement and biomass fuel feeding.

T.6.15 GAS CLEANING AND COOLING SYSTEM

- a) Filter material life: 1000 hours.
- b) Interval of cleaning: 50 hours (minimum)
- c) Gas quality: Tar – not more than 50 mg/Nm³
Particulate – not more than 25 mg/Nm³
- d) Cooling system: The gas temperature at engine inlet not to exceed ambient temperature by $\pm 5^{\circ}\text{C}$ or 40°C , whichever is less. The cooling system shall consist of a single deck sprays where hot water coming out of scrubber is allowed to flow through a system of sprays exposed to

atmosphere and then it gets accumulated in the cooling water pond below for recycling with the help of a small pump.

T.6.16 CONDITIONUNG OF PRODUCER GAS

The gas cleaning and cooling must be accomplished to a high degree with the help of a properly designed Cyclone, a gas cooler and scrubber and suitably designed filter. Wet scrubbers are to be used to remove gaseous pollutants and solids while cooling the gas at the same time.

The manufacturer of gasifier shall furnish technical details about tar and particulate content in the cooled and filtered gas for feeding the diesel engines. The list of useful gases and destructive gases elements generally present in producer gas are shown in the table given below:

T.6.17 GASIFIER CONTROL PANEL

A suitable instrumentation and panel made with CRCA sheets with Indicators related to operation of blower, pumps, and vibrator motors, temperature and allied sensing devices shall be provided in this panel.

T.6.18 SYSTEM ASSEMBLY & AUXILIARIES

T.6.18.1 Couplings, flanges, anti-vibration pads, foundation bolts, fasteners etc as required for the installation of the complete plant shall be provided along with the main equipment. this will also include necessary gaskets, washers and seals, erection accessories and consumables required for erection.

T.6.18.2 Suitable ladder fabricated with MS angle sections and a small platform to facilitate loading of biomass fuel.

T.6.18.3 Suitable provision for gas flaring shall be made.

T.6.18.4 Set of spares, tools, gaskets, washers and seals etc. as required for 2000 hours of operation shall be provided.

T.6.19 GUARANTEE FOR GASIFIER SYSTEM

The gasifier system shall be supplied with a warranty/guarantee for three years from the date of commissioning. Any failure and improper functioning/operation shall have to be rectified by the supplier free of cost. In case, the system fails to perform satisfactorily despite rectification by the suppliers, the supplier shall have to replace the same by a new system and cost towards dismantling, packing, transporting and replacement by a new system, fresh erection and commissioning, trial run and handing over etc. will have to be met by manufacturer/supplier. In such case, a warranty/guarantee of the system shall be considered from the date of replacement. The purchaser will enter into an AMC agreement with the manufacturer for five years.

T.7 AUXILIARY EQUIPMENT SPECIFICATION

T.7.1 Blower

The blower should be of appropriate rating suitable for 11/22 kW (net electrical output) Gasifier. The body and the impeller should be made of SS-316. The blower should be totally compatible with the Biomass gasifier and the components should be capable of operating for a period of at least 10 years. The blower shall be suitable for regulating flow of gas and for flaring the gas as and when necessary.

T.7.2 Vibrator

A Vibrator shall be provided to prevent clinker formation. The rating of the vibrator motor shall be suitable and sufficient for trouble free operation.

T.7.3 WATER COOLING SYSTEM

The cooling water system is one of the most important sub-systems of the gasifier plant. The spray cooling pond system will be adopted for the gasifier plant, as this is one of the simplest methods of cooling and suitable for small systems. The hot water coming out of the scrubber shall be sprayed through the nozzles to expose maximum surface area of water to atmospheric air for effective cooling.

The following principles may be adopted for the design of cooling pond:

- The long dimension should be placed as broad side to the normally prevailing wind direction.
- The system shall be single deck open pond provided with Brick wall around the pond with ventilation holes instead of louver fence to reduce cost.
- The spray nozzles shall be placed atleast 1000 mm above the water surface for maximum cooling effect.
- The nozzles should be such that there is no interference between the different sprays produced.
- The spacing of the nozzles with respect to the edge of the pond should be such that there is no excessive spray loss.
- The system shall be provided with necessary electric motor driven pump.

T.7.3 Pumps

Single-phase small pumps of suitable rating shall be provided for cooling water spray system, re-circulation and for cleaning of Ash pond.

T.7.4 Biomass Feed Handling System

The plant sizes are very small and the quantity of fuel required is also very small, so installation of mechanical fuel handling devices will not be required.

T.7.5 Ash & Char Handling System

The quantity of char & ash likely to be generated will be very small. Further, it will not contain any harmful material, as only woody biomass will be used as fuel. So, no precaution will be necessary for this purpose.

T.7.6 Affluent Treatment

As only woody biomass will be used as fuel, the affluent from the plant is not likely to cause any harm to the environment.

T.8 TECHNICAL SPECIFICATION OF THE POWER GENERATING UNIT

T.8.1 NOMINAL RATING OF THE 10 kWe SYSTEM

i)	Gross Electrical Output	11 kWe
ii)	Net Electrical output	10 kWe
iii)	Auxiliary Consumption	1 kWe
iv)	Alternator	15 KVA, 415 Volt, 3-phase, 4-wire, 50 Hz, PF- 0.8 (lag) and should be of reputed make.
v)	Coupling	The Gas Engine and Alternator shall be coupled through a flexible coupling
vi)	Control Panel	Suitable Control Panels shall be provided for both generator and gasifier control.
vii)	Control and Power Cables	All control and power cables required for the plant will be provided. The power cable shall be 3.5 Core, PVC insulated PVC sheathed aluminium conductors. The Control Cables shall be PVC insulated PVC sheathed singled or multi-core cable

viii)	Engine Details	Should be of reputed make suitable for net electrical output of 11 kW.
ix)	Mounting	The Engine-Alternator assembly should be fitted on a fabricated MS frame with proper foundation bolts. Anti-vibration damper shall be provided.

T.8.2 NOMINAL RATING OF 20 kWe SYSTEM

i)	Gross Electrical Output	22 kWe
ii)	Net Electrical output	20 kWe
iii)	Auxiliary Consumption	2 kWe
	Alternator	30 KVA, 415 Volt, 3-phase, 4-wire, 50 Hz, PF- 0.8 (lag) and should be of reputed make.
	Coupling	The Gas Engine and Alternator shall be coupled through a flexible coupling
	Control Panel	Suitable Control Panels shall be provided for both generator and gasifier control.
	Control and Power Cables	All control and power cables required for the plant will be provided. The power cable shall be 3.5 Core, PVC insulated PVC sheathed aluminium conductors. The Control Cables shall be PVC insulated PVC sheathed singled or multi-core cable
	Engine Details	Should be of reputed make suitable for net electrical output of 22 kW.
	Mounting	The Engine-Alternator assembly should be fitted on a fabricated MS frame with proper foundation bolts. Anti-vibration damper shall be provided.

T.8.3 CLIMATIC CONDITIONS

The climatic conditions will slightly vary from site to site for all the 10 locations but the generating sets shall operate normally under the following climatic conditions:

- | | |
|--------------------------------|-----------------------|
| a) Outside maximum temperature | 40°C. |
| b) Height above mean sea level | Less than 1000 meter. |
| c) RH | 60% (average) |

T.8.4 ENGINE SPECIFICATION

T.8.4.1 Engine Rating

The engine shall be natural gas fired engine suitably modified for operating with producer gas as fuel. The modified engine shall develop suitable BHP for generating electrical output as specified at 1500 RPM at ambient temperature of 40°C for a height of 1000 Meter above MSL and at 60% RH.

The engine shall be capable of delivering specified prime mover rating at variable loads for 0.8 power factor (lag) with 105 overload available in excess of specified output for one hour every 12 hours. The average load factor of the engine over a period of 24 hours shall be 85% for prime mover output.

T.8.4.2 Necessary manufacturer's Certificate indicating compliance of the above capacity requirement for the engine along with compliance for noise and emission norms as per latest central Pollution Control Board guidelines shall be furnished.

T.8.4.3 The engine shall be fitted with the following accessories subject to the design of the manufacturer:

- Dynamically balanced flywheel.
- Necessary flexible coupling and guard for alternator and engine (applicable only for double bearing alternator).
- Air cleaner.
- Mechanical Governor to maintain engine speed at all conditions of load.
- Dry exhaust with suitable exhaust residential grade silencer to reduce noise level.
- Suitable 'Self starter' for 12 Volt DC.
- Battery charging alternator unit & voltage regulator, suitable for starting batteries with interconnecting leads and terminations.
- Necessary gear driven oil pump oil pump for lubricating oil as per manufacturer's recommendations.
- Lubrication oil filters with replaceable elements.
- Crank case heater as per manufacturer's recommendations.
- Fuel injection system.
- Engine Control Panel: having analog or digital display for the following:
- Start/Stop key switch.

- Lube oil pressure indicator.
- Water temperature indicator
- RPM Indicator
- Engine running hour indicator.
- Battery charging indicator.
- Low lube oil trip indication.
- High water temperature indication
- Over speed indication.
- All moving parts of the engine shall be mechanically guarded in such a manner that a human finger cannot touch any moving part.
- Water-cooled radiator.
- Any other item not included/ specified but is a standard design of the manufacturer.

T.8.4.4 Frequency variation

The engine speed shall be so maintained that frequency variation at constant load including no load shall remain within a band of 1% of rated frequency.

T.8.4.5 Fuel System

The starting fuel of the engine shall be preferable LPG or petrol but after starting it will operate on 100% producer gas. Preference will be given to petrol-based system. The producer gas will be supplied by the gasifier system of the plant.

T.8.4.6 Lubricating System

It shall be so designed that when the engine starts after a long shutdown lubrication failure does not occur.

T.8.4.7 Starting System

The starting system shall comprise of heavy-duty 12 volt DC (as per manufacturer's standard), suitable starter motors and axial type gear to match with the toothed ring on the flywheel. A timer will be provided in the Control Panel to protect the starter motor from excessively long cranking runs shall be suitable integrated with the engine protection system. The battery capacity shall be suitable for meeting the needs of starting system as well as requirement of the control panel, indicators and auxiliaries. The system shall be capable of starting the engine within 30 seconds even in winter condition with an ambient temperature down to 08C.

T.8.4.8 Battery Charger

The battery charger shall be suitable to charge required battery at 12 volt DC complete with transformer, rectifier, charge rate selector switch and indicating instruments. Connections between the battery charger and batteries shall be provided with suitable copper leads with lugs etc.

T.8.4.9 Piping Work

All pipe lines; fittings and accessories required for both gasifier and engine including exhaust piping shall be supplied by the contractor.

T.8.4.10 Common Bed Plate for Engine-Alternator Assembly

Engine and Alternator shall be coupled by means of flexoplate/flexible coupling as per manufacturer's standard design and both the units will be mounted on a common bedplate together with all auxiliaries to ensure perfect alignment of engine and alternator with minimum vibrations. The bedplate shall be suitable for anti-vibration mounting system.

T.8.4.11 Exhaust System

All MS pipes for exhaust system shall conform to relevant BIS standard. The runs forming part of factory assembly on the engine flexible connection upto silencer shall be exclusive of exhaust piping item.

The work includes necessary cladding of exhaust pipe with 50 mm thick glass wool/mineral wool/rock wool, density not less than 46 kg/m² and aluminium cladding (0.80 mm thick) for the complete portion. The exhaust piping system shall be provided with necessary supports including foundation etc. to avoid any load and stress on engine exhaust pipe.

The exhaust system shall be made considering points mentioned hereunder:

- The exhaust system should create minimum backpressure.
- Number of bends should be minimum and smooth bends shall be used to minimize backpressure.
- Exhaust piping inside the generating set room shall be lagged with asbestos rope along with aluminium sheet cladding to avoid heat input into the room.
- The exhaust outlet shall be in the direction of the prevailing winds and shall not allow exhaust gases to enter air inlet/windows etc.
- When the exhaust pipe is horizontal, 45° downward cut should be given at the end to prevent rainwater entry into the exhaust piping. Horizontal run of exhaust pipe shall slope downwards away from the engine to the condensate trap. The silencer shall be installed with drain plug at bottom.
- When the tail end is vertical, rain cap may be used. The distance between the exhaust pipe end and rain cap shall be higher than the diameter of the pipe.

T.8.4.12 Optimum Silencer Location

The preferred silencer locations are shown in the Table below, where L is length of the total exhaust system measured from exhaust manifold in meters.

	In line Engine	'V' Engine
Best	2L/5	(4L – 1.5)/5
Second best	4L/5	2L – 4.5)/5
Worst Location of Silencer	L/5 or 3L/5 or at tail end of Exhaust piping.	(3L – 10)/5 or at the tail end of exhaust piping.

T.8.4.13 Exhaust Stack Height

In order to dispose exhaust above building height, minimum exhaust stack height shall be as per formula given below:

$$H = h + 0.2 \times \sqrt{KVA}$$

Where H = height of exhaust stack; and
h = height of building

T.9 ALTERNATOR

T.9.1 Self-excited synchronous alternator shall be screen protected, self-regulated, brush less type. The alternator shall conform to the following:

Rated voltage	415 Volts
Rated frequency	50 Hz
No. of phases	3
Rated power factor	0.8 (lag)
Enclosure	SPDP
Degree of protection	IP-23
Ventilation	Self ventilated
Ambient temperature	42°C Maximum.
Insulation class	F/H
Temperature rise	Within class F/H limits at rated load
Voltage regulation	± 1%
Voltage variation	± 5%
Overload duration/capacity	10% for one hour in every 12 hours of continuous operation
Standard	IS 4722 & IEC: 34 as amended upto date.

T.9.2 Excitation

The alternator shall be self-excited and brush less type. The exciter unit shall be mounted on the alternator assembly. The rectifier shall be suitable for operation at high ambient temperature at site.

T.9.3 Automatic Voltage Regulator (AVR)

In order to maintain output terminal voltage within regulation limits, AVR will be provided as per standard practice of the manufacturer.

T.9.4 Fault Tripping

In the event of fault, e.g. over voltage, over current, high winding temperature and short circuit etc, the AVR shall remove the excitation voltage to the exciter and the MCCB emergency trip shall be provided.

T.9.5 Manufacturing Standards

The alternator shall conform to the following standards:

IS: 4722 / BS: 2613/1970: Performance of rotating electrical machines.

IS: 4889 / BS: 269 Rules for method for declaring efficiency of electrical machines.

T.9.6 Performance

The voltage dip shall not exceed 20% of the rated voltage for any steep load or transient load as per ISO: 8528 (part – 1). The winding shall not develop hot spots exceeding safe limits due to imbalance of 20% between any two phases from no load to full load.

The generator shall be capable of withstanding a current equal to 1.5 times the rated current for a period of not more than 15 seconds as required vide clause No.14.1.1 of IS: 4722.

The performance characteristics of the alternator shall be as follows:

- | | | |
|-----|-----------------------------------|--|
| (a) | Efficiency at full load, 0.8 P.F. | Not less than 82% |
| (b) | Total harmonic distortion | Less than 3%. |
| (c) | Overload | |
| | i) 10% overload | One hour every 12 hours of continuous operation, |
| | ii) 50% overload | 15 seconds. |

T.9.7 Terminal Boxes

The terminal boxes shall be suitable for UG cables and shall be capable of withstanding mechanical and thermal stresses developed due to any short circuit at the terminals.

T.9.8 Earth Terminals

2 Nos. of earth terminals shall be provided on opposite sides with vibration proof connections.

T.10 CONTROL PANEL, BATTERIES & ELECTRICAL SYSTEM

T.10.1 The generator control panel shall be fabricated out of 1.6 mm thick sheet steel, front operated, totally enclosed, dust, damp and vermin proof free standing floor mounted type conforming to IP-53 degree of protection. Each control panel shall consist of the following instruments:

Composite meter for digital display of:

- Voltage;
- Current;
- Frequency
- Energy meter (kWh)
- Switch Fuse Unit
- ON/ OFF Switch for ON and OFF positions.
- Battery charger complete with voltage regulator, voltmeter and ammeter for charging battery from external mains in addition to the battery charging alternator or dynamo fitted with the engine.

T.10.2 System Operation

The above-mentioned facilities shall be used for system operation as per description given below:

T.10.2.1 Manual Mode

- In the manual mode, it shall be feasible to start-up the generating set by the operator on pressing the 'start' push button.
- Three attempts starting facility shall be operative for the start-up function.
- Alternator circuit breaker closing and trip operations shall also be through operator only by pressing appropriate button on the panel and closure shall be feasible only after alternator has built up full voltage. If the load is already on 'mains', pressure on 'close' push button shall be ineffective.
- Engine shutdown, otherwise due to faults, shall be manual by pressing a 'stop' button.

T.10.2.2 Test Mode

- When under 'test mode', pressing of test button shall complete the start up sequence simulation and start up the engine. The simulation will be that of mains failure.
- Engine shall build up voltage but shall not take load by closing of alternator circuit breaker.
- If during test mode, the power supply has failed, the load automatically gets transferred to alternator.

T.10.3 Engine Shutdown & Alternator Protection

The following shutdown and protection system shall be integrated in the control panel:

- a) Engine:
 - Low lubricating oil pressure shutdown: this shall be inoperative during start up and shut down.
 - High coolant water temperature shutdown.
 - Engine over speed shutdown.
- (b) Alternator Protection: The following protection arrangements shall be made:
 - Over load
 - Short circuit
 - Earth fault
 - Over voltage

T.10.4 Monitoring & Metering Facilities

The following monitoring and metering facilities shall be provided in the control panel:

- a) Necessary energy analyser unit for visual monitoring of mains, alternator and load voltage, current, frequency and kWh etc.
- b) A set of visual monitoring lamp indication for:
 - Load on generating set.
 - Load on mains
 - Set on test (alternator on load, alternator on standby)
 - Set of LED indication lamps for engine shutdown for over speed, low lub oil pressure, high coolant temperature, over load trip, earth fault trip, engine lock out and failure to start etc. all these indications shall have audio and visual alarm. When operator accepts the alarm, the hooter will be silenced and the fault indicator will become steady until reset by the operator.

T.10.5 Operating Devices

A set of operating devices shall be incorporated in the front of the panel as mentioned hereunder:

- Master Engine Control Switch: This control switch shall cut off in “OFF” position DC control to the entire panel, thus preventing start-up of engine due to any reason. However, battery charger and lamp test button for testing healthiness of indication lamps, DC voltmeter etc. shall be operative. It shall be possible to lock the switch in ‘OFF’ position for maintenance and shutdown purposes.
- Operation of selector switch – OFF/AUTO/MANUAL/TEST positions.
- Energy analyser unit for display of various electrical parameters like voltage, current, frequency, kW and power factor etc.
- A set of push buttons as specified.
- Relays, contactors, circuit breakers etc. as required.
- Battery charger with DC voltmeter and DC ammeter.

T.11 BATTERY/ ELECTRICAL SYSTEM

T.11.1 The batteries shall be lead acid type and the initial charging shall be done for 72-80 hours or as prescribed by the manufacturer.

T.11.2 The battery capacity and copper cable sizes of maximum 2 m length are shown below. If the cable length is more, cable size shall be selected in such a way so that voltage drop does not exceed 2 V.

- Battery capacity = 100 AH
- Cable size – 35 sq.mm (Copper)
- Voltage = 12 volt DC.

T.11.3 1.5 sq. mm copper wire shall be used for control panel wiring.

T.12 CABLING

T.12.1 Power cable between alternator and control panel and between control panel and feeder shall be made with cable sizes indicated below:

Description of Item	10 kWe Unit	20 kWe Unit
Power Cable	4 core, 6 sq.mm,	4 core, 10 sq.mm
Insulation grade	1100 volts	1100 volts
Operating voltage	415 volts	415 volts

T.12.2 While terminating R, Y, B phase sequence shall be maintained in the alternator, control panel and feeder ends.

T.12.3 Cable ends crimped with lugs of proper size shall be connected to control panel through compression type non-ferrous cable glands.

T.13 MACHINE FOUNDATION

- The generator assembly shall not be installed on loose sand or clay.
- The machine foundation shall be designed considering safe bearing capacity of soil. Anti-vibration dampers shall be provided to reduce vibration transmission to the surrounding structure.
- Depth of M-20 grade plain cement concrete (PCC) for typical soil condition with bearing capacity of more than 5000 kg/sq.m shall be atleast 200 mm for both 10 kWe and 20 kWe units.
- Foundation level shall be checked diagonally as well as across the length for even flatness. The foundation should be within ± 0.5 Degree (angle) of horizontal plane.

T.14 EARTHING

The earthing for distribution system & Power Plant Equipment shall be made with GI earth plate 600 mm x 600 mm x 6 mm thick including accessories, providing masonry enclosure with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS: 3043. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.

T.14.1 The generating set, all associated non-current carrying parts, control & switchgear panels must be earthed before the set is put into operation.

T.14.2 Four Nos. of earth sets are required for each generating set, as mentioned hereunder:

- 2 Nos. of earthing sets for generating sets and control panel body etc.
- 2 Nos. of earthing sets for neutral.

T.14.3 Test joints shall be provided for testing the earthings as and when required.

In case there are more than one generating unit in a location, two numbers of independent earthing sets shall be provided for each unit. However, two Nos. of common earthing sets may be used for generator and control panel etc. provided the value of earth resistance is within allowable limit as per IS: 3043.

T.15 AC. DISTRIBUTION PANEL BOARD

The AC distribution board shall be wall mounted cubicle type and shall be factory fabricated from 2.0 mm thick CRCA sheet and powder coated after 7 tank treatment process. This shall be fabricated with IP-42 degree of protection. It shall be suitable for termination of incoming cables from bottom.

T.15.1 AC Distribution Board for 10 kWe system shall consist of following components:

- a) Voltmeter, 0 to 500 volt, AC with Phase Selector switch – 1 No.
- b) Ammeter, 0 to 50 Amps. AC with Phase Selector switch – 1 No.
- c) kW Meter – 1 No.
- d) Energy Meter (kWh) – 1 No.
- e) Indication lamps – R, Y & B for three phases.
- e) Incoming Feeder – 32 Amps. MCCB – 1 No.
- f) Outgoing Feeder – 16 AMP Switch-fuse units – 3 Nos.

T.15.2 AC Distribution Board for 20 kWe system shall consist of following components:

- a) Voltmeter, 0 to 500 volt, AC with Phase Selector switch – 1 No.
- b) Ammeter, 0 to 50 Amps. AC with Phase Selector switch – 1 No.
- c) kW Meter – 1 No.
- d) Energy Meter (kWh) – 1 No.
- e) Indication lamps – R, Y & B for three phases.
- e) Incoming Feeder – 63 Amps. MCCB – 1 No.
- f) Outgoing Feeder – 32 AMP... Switch-fuse units – 3 Nos.

T.15.3 Each incoming circuit shall be connected with 50 A capacity Al Bus-bar. The bus bars shall be isolated by an appropriate rated isolating switch, which shall normally be open to facilitate supply of power to two individual feeder circuits. There will be an opening covered by glass/ fiber sheet for viewing energy meters reading

T.16 DANGER PLATES

The contractor shall provide at least 6 Danger Notice Plates of 200 mm x 150 mm made of mild steel sheet, minimum 2 mm thick, and vitreous enameled white on both sides and with inscription in signal red color on front side as required. The inscriptions shall be in Hindi and English.

T.17 SPARE PARTS

Adequate spares shall be supplied with the equipment for 2000 hours of operation. It is for supplier to decide and indicate the details and quantities of spares. However, if the items are found to be inadequate, either quantity wise or item wise during actual operations, extra spares shall have to be provided for all installation free-of-charges by the supplier(s) within 72 hours of intimation by the users.

T.18 INSTRUCTION & MAINTENANCE MANUALS

Operation and Maintenance Manuals with Trouble Shooting chart, Diagnostic Operational Attention Chart, Chart for Safety Precautions to be adopted and the Guarantee Card should be handed over to the purchaser immediately on completion of installation & commissioning work. It is preferably to have a set of Manuals in the Hindi language in addition to the English version.

T.19 DRAWINGS & SPECIFICATIONS

The general layout at site, foundation drawings, specification for civil works related foundation and machine installation to be supplied by the supplier/manufacturer immediately on receipt of the Letter of Intent/Supply order for the equipment.

T.20 NAME PLATES TO BE DISPLAYED

Name plates on the equipment shall be fitted/displayed at a prominent place on the equipment and should contain the following:

Main specification of the system indicating rating of the system in Kcal/kWe etc.

Name & address of manufacturer, unique Sl. No. of the system.

Date/month/year of manufacture.

Chart displaying “Do’s” and “Don’ts” near the Gasifier system.

T.21 ERECTION, COMMISSIONING AND SERVICE ENGINEERS

The erection, commissioning and service engineers of the equipment manufacturers/suppliers will train the some local villagers for operation and maintenance of the plant during erection, commissioning, trial run & commercial operation. However, the manufacturer/supplier will maintain the plant under a comprehensive maintenance contract for five years.

T.22 O & M REQUIREMENT

The post-commissioning O & M requirement may be divided in three categories and these are:

- Services;
- Fuel for the plant; and
- Spare parts.

**SCHEDULE OF TECHNICAL PARTICULARS TO BE FURNISHED BY SUPPLIER/
MANUFACTURER**

I. GASIFIER

- i) Make
- ii) Type of Gasifier – whether up draft or down draft
- iii) Capacity
- iv) Thermal rating
- v) Rated gas flow
- vi) Material of construction
- vii) Average calorific value of gas -
- viii) Gasification efficiency-
- ix) Gasification temperature-
- x) Temperature at gasifier outlet
- xi) Gas cleaning & cooling system
- xii) Filter material life-
- xiii) Interval of cleaning-
- xiv) Gas quality – tar & particulate level
- xv) Specific biomass consumption-
- xvi) Biomass feeding interval
- xvii) Period of continuous operation
- xviii) Starting time-

II. ENGINE

- i) Make
- ii) Model/ BIS reference-
- iii) Rated RPM
- iv) Method of starting
- v) No. of cylinders
- vi) Aspiration Method
- vii) Rated BHP of original gas engine-
- viii) BHP of engine modified for operation with producer gas
- ix) Specific fuel consumption before modification-
- x) Specific fuel consumption after modification (producer gas)
- xi) Lub oil recommended-
- xii) Quantity of lub oil required-
- xiii) Time required for starting-

- xiv) Lub oil sump capacity-
- xv) Exhaust pipe details
- xvi) Whether CPCB norms for emission-
- xvii) Fuel consumption at full load-
- xviii) Any other data-

III. ALTERNATOR

- i) Make-
- ii) Enclosure details-
- iii) Full load output in KVA
- iv) Full load output in kW at 0.8 PF.
- v) Designed over load capacity at max^m ambient temperature
- vi) Efficiency at full load.
- vii) Class of insulation for rotor
- viii) Class of insulation for stator

IV. CONTROL PANEL

- i) Make
- ii) Type
- iii) Overall dimension (LxBxH)
- iv) Finish

V. POWER PLANT HOUSING

- i) CGI Shed with structurally sound truss & columns made out of MS sections of adequate size.
- ii) Engine & control room made of 250 mm brick wall & RCC roof with one 12'x12' room for staff on duty.

VI. GENERAL

- i) Overall length of generating set
- ii) Overall weight of the generating set
- iii) Noise level

VII. TECHNICAL DOCUMENTS TO SUBMITTED WITH THE TENDER

- a) General arrangement drawing of the power package.
- b) Proposed civil layout of the power plant.
- c) Complete specification sheet
- d) Technical literature giving clear idea about equipment including operation and maintenance methods.
- e) Single line diagram of the electrical generation system

ANNEXURE – 9

LIST OF TECHNICAL LITERATURE, CATALOGUE & ANY OTHER INFORMATION

The tenderer shall furnish the list of technical literature and catalogues of the equipment offered

Sl. No.	Description of technical literature/information	Remarks

(Authorized Signatory)

Name
Designation
Company seal

MAKES OF EQUIPMENT TO BE SUPPLIED

Sl.No.	Items	Make
1	Gasifier	
2.	Engine	
3.	Alternator	
4.	Pumps	
5.	Relays	
6.	Contactors	
7.	M.S. pipes	
8.	Anti-vibration mountings	
9.	Battery	
10.	Power & control cables	
11.	MCB, MCCB	
12.	Switch fuse units	
13.	Voltmeter, Ammeter, kW & kWh meter	
14.	Glass wool	

(Authorized Signatory)

Name
Designation
Company seal

PRICE SCHEDULE

PRICE SCHEDULE FOR SUPPLY, INSTALLATION, TESTING, COMMISSIONING & 5 YRS COMPREHENSIVE MAINTENANCE CONTRACT (CMC) OF 10 kWe 100% PRODUCER GAS FIRED BIOMASS GASIFIER BASED POWER PLANTS INCLUDING LOCAL LT DISTRIBUTION SYSTEM IN REMOTE RURAL AREAS OF JHARKHAND STATE

Price schedule for supply, installation, testing, commissioning & 5 yrs Comprehensive Maintenance Contract (CMC) of 10 kWe 100% producer gas fired biomass gasifier based power plant including LT three phase line and LT single phase line & service connections and house wiring.

Sl. No.	Description of Items	Quantity	Unit	Rate per Unit (in Rs.)	Amount (in Rs.)
1.	Design, manufacture, supply, installation, testing, commissioning and 5 yrs Comprehensive Maintenance Contract (CMC) of 10 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state.				
2.	Construction of plant housing for gasifier, engine-alternator and control equipment.				
3.	Construction of LT Mini-grid (400 volt 3 phase distribution lines as per Annexure-A, Total Cost for the project.				
4.	House wiring as per Annexure- B, Total cost for the project.				
5	Grand Total				

PRICE SCHEDULE

PRICE SCHEDULE FOR SUPPLY, INSTALLATION, TESTING, COMMISSIONING & 5 YRS COMPREHENSIVE MAINTENANCE CONTRACT (CMC) OF 20 kWe 100% PRODUCER GAS FIRED BIOMASS GASIFIER BASED POWER PLANTS INCLUDING LOCAL LT DISTRIBUTION SYSTEM IN REMOTE RURAL AREAS OF JHARKHAND STATE

Price schedule for supply, installation, testing, commissioning & 5 yrs Comprehensive Maintenance Contract (CMC) of 20 kWe 100% producer gas fired biomass gasifier based power plant including LT three phase line and LT single phase line & service connections and house wiring.

Sl. No.	Description of Items	Quantity	Unit	Rate per Unit (in Rs.)	Amount (in Rs.)
1.	Design, manufacture, supply, installation, testing, commissioning and 5 yrs Comprehensive Maintenance Contract (CMC) of 20 kWe capacity 100% producer gas mode biomass gasifier based power plants on turnkey basis in remote unelectrified villages of Jharkhand state.				
2.	Construction of plant housing for gasifier, engine-alternator and control equipment.				
3.	Construction of LT Mini-grid (400 volt 3 phase distribution lines as per Annexure-A, Total Cost for the project.				
4.	House wiring as per Annexure- B, Total cost for the project.				
5	Grand Total				

Annexure-A

ESTIMATE FOR 1 KM OF LT OVER HEAD LINE, VERTICAL CONFIGURATION ON PCC POLE

SL.No.	DESCRIPTION OF ITEMS	UNIT	RATE			AAC Gnat, 3PH 4-WIRE		AAC Gnat, 1-PH, 2-WIRE	
			SUPPLY	ERECTION	TOTAL	QUANTITY	AMOUNT	QTY.	AMOUNT
1	Supply & erection of 8 mtr. Long PCC pole in brick ballast and ramming the foundation including excavation and refilling etc. as required. (907 ERPCBB10 - CPWD Spec. 1995)	Each				24		13	
2	Supplying of angle iron 50 mm x 50 mm x 6 mm (4.5 kg/M) cross arm for 2 wire overhead line complete with clamps, bolts and nuts etc. including drilling holes for insulator pins, bolts and nuts etc. and painting with primer and finish paint as required. 2 cross arms per pole (929 MVCR4WSR50)	Set				48		32	
3	Erection of angle iron cross arm on PCC pole as required. (907 ERPCBB10)	Set				48		32	
4	Supplying & erection of galvanized 'D' iron complete with shackle insulator (75 mm x 90 mm), G.I. bolts and nuts, coach screws etc. as required.(931 DSI100X110)	Set				82		35	
5	Supplying & erection of 75 mm x 90 mm shackle insulator with G.I. bolts, nuts and straps etc. as required (935 SI100X110)	Set				112		56	
6	Supply & erection of AAC Gnat conductor, 7/2.11 mm size including binding etc. as required. 73 kg/km (941 ERCONAA3.1 + cost as per market price)	Kg				301		160	
7	Supply of 8 SWG G.I. wire (JPWD - 2006)	kg				150		100	

8	Erection of 8 SWG G.I. wire including binding etc. as required.(943 ER8GIWR & cost as per JPWD-2006)	kg				100		60	
9	Erection of cradle guard as required (946 ERCGD)	kg				20		15	
10	Supply & erection of MV horn gap lightning arrester as required.(950 HGLA)	Each				4		2	
11	Supply & erection of stay set complete with galvanized LT stay set with 1830 mm long x 16 mm dia. stay rod, LT guy insulator, anchor plate of size 450 mm x 45 mm x 7.5 mm, thimble, stay clamp, turn buckle (20 mm x 600 mm), 7/3.15 mm G.I. stay wire and strain insulator etc. in cement concrete 1:3:6 (1 cement : 3 Coarse sand : 6 graded brick chips, 40 mm nominal size) foundation including excavation & refilling etc. as required.(918 STYTB3.15)	Set				10		10	
12	Earthing with G.I. earth spike, 1830 mm x 20 mm size.(NS Item)	Each				24		24	
13	Supply & fixing of 20 mm dia. G.I. pipe for street light water tight bracket including bending to shape, 40 mm x 3 mm flat iron clamps and wiring with 1.5 sq. mm W.P/PVC wire along with water proof controlling switch and painting the flat iron with primer and fresh paint etc. as required (953 STLBR20CS)	Each				12		8	
14	Providing & fixing 50 mm dia. X3.2 metres G.I. pipe (including accessories) complete with 50 mm x 50 mm x 6 mm angle iron bracket on wall and 75 mm x 90 mm shackle insulator with straps for house service connection including painting the angle and flat iron with primer and finish paint etc. as required.	Set				25		10	

15	Providing & fixing 50 mm dia. X 5.6 metres G.I. pipe (including accessories) complete with 50 mm x 50 mm x 6 mm angle iron cross arm and 40 mm x 3 mm MS flat iron clamps, bends for guard wire, 75 mm x 90 mm shackle insulator with straps, 7/3.15 mm G.I. wire stay set for house service connection including painting the angle and flat iron with primer and finish paint etc. as required.	Set					3		1	
16	Earthing with G.I. earth Spike, 1830 mm x 20 mm	Each					4		8	
17	Total									
18	Sundries @5%									
19	Grand Total									
<p>NOTE: This estimate is based on CPWD Schedule, 1995 with 50% price escalation except Item No. 8 (as Per JPWD 2006) and Item No. 16 (market price)</p>										

Annexure-B

**STANDARD ESTIMATE FOR HOUSE SERVICE CONNECTION INCLUDING HOUSE WIRING
For 50 Nos. of Families with 2 (two) light points for each house fitted with 11 watt CFL lamps.**

The estimate for wiring of one house for a family is shown below.

Sl. No	Description of Items	Unit	Quantity	Rate	Amount	CPWD Specification Part - II, External-1995
1	Providing & fixing House Service Connection Providing & fixing 50 mm dia. x 3.2 metre G.I. pipe (including accessories) complete with 50 mm x 50 mm x 6 mm angle iron bracket on wall and 75 mm x 90 mm shackle insulator with straps for house service connection including painting the angle and flat iron with primer and finish paint etc. as required.	Set				955 HSC 1995 Specification considered is 50% above Schedule Rate of 1995
	HOUSE WIRING (As per CPWD Electrical (internal) Schedule of Rates 2007)					
3.1	Point wiring in PVC conduit, with piano type switch: Wiring for light point/fan point with 1.5 sq. mm FR PVC insulated copper conductor, single core cable in surface PVC conduit, with piano type switch, phenolic laminated sheet, suitable size M.S. box and earthing the point with 1.5 sq.mm FR PVC insulated copper conductor single core cable etc. as required. Group - A	Point	2			WGPVCPT - 2007 As per CPWD Specification Part -1, Internal - 2007 (at par)
3.2	S/F Piano type switch/socket: Supplying & fixing following type switch/socket on the existing switch box/ cover including connection etc. as required. 1.23.1 5/6 amps switch 1.23.4 3 Pin 5/6 amp socket outlet	Each Each	2 1			PTSWEB - 2007 Same as 3.1 above
3.4	Supplying & fixing of 11 watt CFL lamps with fittings	Set	2			Non-schedule Item
4	S/F SP MCB DB: Supplying & fixing 4 way, single door, single pole and neutral, sheet steel, MCB distribution board, 240 volts, on surface, complete with tinned copper busbar, neutral busbar, earth bar, din bar, detachable gland plate, interconnections, phosphated and powder painted including earthing etc. as required but without MCB. 2.31.1	Each	1			SPMCBDB - 2007

5	SP MCB Supplying & fixing 5 amp to 32 amp rating 240 volts 'B' series, miniature circuit breaker suitable for lighting and other loads of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required. 2.51.2 Single pole and neutral	Each Each	2 1			MCBB - 2007
6	S/F DP MCB Isolator Supplying & fixing following rating, double pole, 240 volts, isolator in the existing MCB DB complete with connections, testing and commissioning etc. as required. 2.54.2 40 amps	Each	1			MCBDPIS - 2007
7	EARTHING					
7.1	G.I.earth pipe electrode earthing with G.I. pipe 4.5 meter long 40 mm dia. Including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. (but without charcoal or coke and salt) as required	Set	1			EARGIPI - 2007
7.2	Salt & charcoal G.I. pipe electrode	Set	1			EARCHARPL - 2007
7.3	S/L 6 SWG GI wire in ground Supplying & laying 6 SWG G.I. wire at 0.5 metre below ground level for conductor earth electrode, including soldering etc. as required.	metre	10			EAR6GGIWR - 2007
	<u>TOTAL for house wiring</u>					
	<u>Grand total for service connections</u>					

Note: JREDA will allow payment only for two light points with 11 volt CFL lamps along with necessary switches, earthing and cabling etc. as required for complete wiring per family. Any extra work, if carried out as per request of house owner will to his account and JREDA will not entertain any claim against such works.