NTPC Limited

(A Government of India Enterprise)

INVITATION FOR EXPRESSION OF INTEREST (EOI)

FOR

IDENTIFICATION OF VENDORS

FOR DESIGN, ENGINEERING, MANUFACTURING, SUPPLY, ERECTION, TESTING & COMMISSIONING

OF

250 MW SUB-CRITICAL THERMAL POWER UNITS ON EPC BASIS SUITABLE FOR FLEXIBLE OPERATION INCLUDING TWO-SHIFT OPERATION

(INVITATION FOR EXPRESSION OF INTEREST)

DETAILED NOTICE INVITING EXPRESSION OF INTEREST (EOI)

EOI No.: NTPC/EPC/EOI/SUB-CR-250/2026 **Date: 30.08.2026**

NTPC is Inviting an Expression of Interest for "Identification of Vendors for Design, Engineering, Manufacturing, Supply, Erection, Testing & Commissioning of Sub-Critical Thermal Power Units on EPC basis, suitable for Two shift operation & Technical Minimum Load (TML) as 40% with an option to optimize for 30% & 25% TML.

1.0 **Objective:**

(i) NTPC Ltd intends to set-up Sub-critical units in configuration of 1x250 MW, 2x250 MW and 3x250 MW at few NTPC stations. In this regard, NTPC invites Expression of Interest from entities in India for Design, Engineering, Manufacturing, Supply, Erection, Testing & Commissioning of coal fired (including biomass co-firing) sub-critical thermal power units on EPC basis, suitable for **two shift operation** & Technical Minimum Load (TML) as 40% with an option to optimize for 30% & 25% TML. ***This EOI is to identify such interested vendors who have adequate expertise & experience in Design, Engineering, Manufacturing, Supply, Erection, Testing & Commissioning of Sub-Critical Thermal Power Units meeting the qualifying requirements specified at*** **Annexure-B.**

(ii) Based on EOI response, NTPC will prepare a database of such capable vendors and may explore the possibility of utilizing the services for design, engineering, procurement & construction of such thermal power units through subsequent open tendering process.

(iii) Ascertaining capabilities of vendors w.r.t. their Design, Engineering, manufacturing, Supply, Erection, Testing & Commissioning towards providing such sub-critical thermal power units having **two shift operation** & TML capabilities.

(iv) As per NTPC decision & based on the EOI response, detailed discussions may be done with the applicants towards narrowing down on the 'technical and commercial' aspects.

(v) NTPC may finalise the modalities for issuance of the tender for setting up of these units based on the responses received against the EOI. However, issuance of this EOI shall not be construed as a commitment by NTPC to proceed with tendering process. NTPC reserves the sole and absolute right to decide whether or not to proceed with the tendering process, and its decision in this regard shall be final and binding on all applicants.

2.0 DOWNLOAD AND TIMELINES FOR SUBMISSION OF EOI

1. Interested APPLICANTs may download the documents of EOI free of cost from www.ntpctender.com & https://eprocurentpc.nic.in

2. Last date for EOI submission: 30.09.2026.

3.0 NTPC encourages submission of EOI in soft copy. For consideration of EOI, Applicants are required to e-mail softcopy, completed in all respect, from its official e-mail ID to below mentioned e-mail IDs. If applicants also wish to submit hard copy of the EOI, the same can be submitted either in person or by registered/ speed post till the last date of submission of EOI to the following address: -

To:

1. AGM (PE-Mechanical/TG & Sys)
   Email: pawandwivedi@ntpc.co.in
2. Deputy General Manager (PE-Mechanical/SG & Auxiliaries)
   Email: vivekbharti@ntpc.co.in

Project Engineering (Mechanical)
NTPC Limited, SRHQ, NTPC Bhavan, Kavadiguda, Secunderabad-500080

4.0 NTPC reserves the right to reject or accept any or all applications, cancel/withdraw the EOI process without assigning any reason whatsoever and in such case, applicant shall not have any claim arising out of such action. NTPC bears no responsibility or liability of any kind in reference to the EOI.

(INVITATION FOR EXPRESSION OF INTEREST)

SECTION-I

INFORMATION TO APPLICANT

1. NTPC Limited is a Govt. of India Enterprise. NTPC group produces electricity through its cluster of gas, coal, hydro and RE based power stations of more than 91 GW capacity spanning across the country.

2. **INTENT OF THE EXPRESSION OF INTEREST (EOI)**

   NTPC Ltd intends to set-up Sub-critical units of 250 MW size at few of its power stations. The indicative thermal cycle parameters at turbine inlet will be as follows.

   a. Main steam pressure (kg/cm2 abs.) – 150
   b. Main steam temperature (deg C) – 537
   c. Reheat steam temperature (deg C) - 537

   This EOI is to identify interested vendors in India, for supply & installation of sub-critical thermal power units of 250 MW size on EPC basis offering enhanced efficiency, environmentally compliant performance and suitability for **two shift operation** & Technical Minimum Load (TML) as 40% with an option to optimize for 30% & 25% TML to cater to the contemporary challenges posed by the operating regime. The applicant shall have proven experience, established technical capabilities, and sufficient organizational, financial, and execution capacities to meet the specified requirements. The brief scope of work is mentioned at **Annexure-A** and qualifying requirements for participation in the EOI are mentioned at **Annexure-B**. Further, Make in India requirements are also mentioned at **Annexure-C**.

3. **THE APPLICANTS SHOULD NOTE THAT:**

   a. Language of the responses to EOI or any query/clarifications/correspondences shall be in English only.

   b. For expression of interest, the Application Form and Annexures given in Section-II shall be duly filled out and sent to NTPC by the applicant in a soft copy.

   c. Applicants should go through Section-I thoroughly before filling and submitting the application form, annexures and schedules in Section-II.

   d. Applicants shall mention the name and contact details of two people, with their complete address, phone number and official email id.

   e. NTPC Ltd. may, at its sole discretion, ask for additional information/ documents and/ or seek clarifications from the applicant(s) after the deadline for submission of response, inter alia, for the purpose of removal of inconsistencies or infirmities in their responses.

f. Based on EOI response, NTPC will prepare a database of capable vendors for utilizing the services of design, engineering, procurement & construction of such thermal power units.

g. Applicants shall mandatorily furnish all essential information specified in the EOI, without any omission.

h. This EOI is indicative only and non-committal.

i. For the expression of interest, Applicant shall consider Coal and biomass characteristics as per the data provided in **Appendix-'Fuel Characteristics'**.

4. ENQUIRIES AND CLARIFICATIONS

Any clarifications on the EOI may be sought to the following via email:

To: AGM (PE-Mechanical/TG & Sys)
Email: pawandwivedi@ntpc.co.in

Deputy General Manager (PE-Mech/SG & Aux.)
Email: vivekbharti@ntpc.co.in

5. CORRIGENDUM

At any time before the last date of submission of EOIs, NTPC may, for any reason, whether at its own initiative or in response to a clarification requested by an applicant, modify the EOI document. The amendment will be posted on the website and will be binding on all the applicants and the applicant will give due consideration to the same, while they submit their EOIs, and would invariably enclose documents/ information, as required, on account of the amendment, as a part of the EOI. NTPC may, at its discretion, extend the deadline for the submission of EOIs.

6. SUBMISSION OF THE RESPONSE TO EOI

The responses to the EOI are to be submitted in soft copy via below e-mail & format:
To: pawandwivedi@ntpc.co.in
vivekbharti@ntpc.co.in

Ref. EOI No. NTPC/EPC/EOI/SUB-CR-250/2026 Dated: .....

Submitted to:

To: AGM (PE-Mechanical/TG & Sys)
Email: pawandwivedi@ntpc.co.in

Deputy General Manager (PE-Mechanical/SG & Auxiliaries)
Email: vivekbharti@ntpc.co.in

Project Engineering (Mechanical),
NTPC Limited, SRHQ, NTPC Bhavan, Kavadiguda, Secunderabad-500080

Submitted by:
Name, address & contact no. of the Applicant

All the pages of the response should be duly stamped and signed by the authorized signatory and the same should be reflected in the soft version also.

The responses to the EOI should be submitted within the deadline as mentioned in this document.

7. COSTS AND EXPENSES TOWARDS RESPONSE TO EOI

The applicants shall bear all the costs associated with the complete process including preparation of the response and participation in discussions and finalization & execution of the documents related with this EOI, regardless of the conduct or outcome of this process.

8. CONFIDENTIALITY

The applicants undertake to hold in confidence this EOI and any document related or pursuant to this EOI and not to disclose the terms and conditions of the transaction contemplated hereby to third parties, except:

(a) To their professional advisors.

(b) To their officers, contractors, employees, agents or representatives, financers, who need to have access to such information for the proper performance of their activities towards this EOI.

(c) Disclosures required under applicable Law, without the prior written consent of the other parties of the concerned agreements.

Provided that the applicant(s) agrees and acknowledges that NTPC may, at any time, disclose the terms and conditions of this EOI and any document related or pursuant to this EOI to any person, to the extent stipulated under the applicable Law.

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SECTION-II

APPLICATION FORM, ANNEXURES & SCHEDULES

Annexure-1

FORMAT FOR COVERING LETTER CUM UNDERTAKING

(The covering letter should be on the Letter Head of the Applicant)

Date: _____

Place: _____

To,

Pawan Krishan Dwivedi
AGM (PE-Mechanical/TG&Sys)
Project Engineering (Mechanical), 4th Floor
NTPC Limited, SRHQ, NTPC Bhavan,
Kavadiguda, Secunderabad-500080

Subject: Identification of Vendors for Design, Engineering, Manufacturing, Supply, Erection, Testing & Commissioning of Sub-Critical Thermal Power Units on EPC basis, suitable for Two Shift Operation & Technical Minimum Load (TML) as 40% with an option to optimize for 30% & 25% TML.

Ref.: EOI No. NTPC/EPC/EOI/SUB-CR-250/2026, dated.....

Dear Sir,

We, the undersigned ……. [insert name of the "Applicant"] having read, examined and understood in detail the **(INVITATION FOR EXPRESSION OF INTEREST).**

1. We give our unconditional acceptance to the EOI, issued by NTPC, as amended. In token of our acceptance to the EOI, the same have been signed & stamped by us and enclosed to the response. We hereby confirm that the provisions of the EOI shall be binding on us.

2. We have submitted our response strictly as per the provisions and formats of the EOI, without any deviations, conditions and without mentioning any assumptions or notes.

3. We hereby unconditionally and irrevocably agree and accept that the decision made by NTPC LTD. in respect of any matter regarding or arising out of the EOI shall be binding on us. We hereby expressly waive any and all claims in respect of the EOI process. We confirm that there are no litigations or disputes against us, which materially affect our ability to participate or function under the obligations with regard to the EOI.

4. Details of the contact person are furnished as below:
   Name:
   Designation:
   Address:
   Contact numbers:
   Email Id:

We are enclosing herewith the entire response containing duly signed formats in electronic format sent *via email to* pawandwivedi@ntpc.co.in *and* vivekbharti@ntpc.co.in as per the EOI for consideration.

5. It is confirmed that our response is consistent with all the requirements of submission as stated in the EOI and subsequent communications from NTPC, if any.

6. The information submitted in our response is complete, strictly as per the requirements stipulated in the EOI and is correct to the best of our knowledge and understanding. We would be solely responsible for any errors or omissions in our response.

We remain,

Yours sincerely

(Name, Designation and Signature of Authorized Person)

Annexure-A

BRIEF SCOPE OF WORK

PROJECT : Sub-Critical Unit of 250 MW Size
PACKAGE NAME : EPC PACKAGE

The scope of work for the equipment and accessories to be furnished here shall include design, manufacture, engineering, inspection and testing at Contractor's work(s), packing, forwarding to site, unloading, in plant transportation, erection, supervision, pre-commissioning, testing, commissioning and performance testing of the equipment/systems indicated hereunder. Items though not specifically mentioned here but needed to complete the equipment and systems, shall also be deemed to be included.

A. BRIEF SCOPE OF WORK

The Brief scope of work for the subject EPC Package for Sub-Critical Unit of 250 MW Size is as follows (**Applicant to consider system inside pant boundary for cost estimation purpose**):

Design, Engineering, Manufacture, Supply, Construction, Erection, Testing & Commissioning works for the EPC Package for Sub-Critical Unit of 250 MW Size, intended to be operated under cyclic operation and daily start-stop mode with Technical Minimum Load as 40% with an option to optimize 30% & 25% TML, on the basis of single point responsibility, completely covering the following activities and services in respect of Steam Generator and Auxiliaries, Electrostatic Precipitator, NOx Control Systems, Biomass co-firing capability, Steam Turbine & Auxiliaries, Generator & Auxiliaries, HP & LP Dosing Systems, Generator Bus ducts and associated equipments, ECW system for TG & SG including station auxiliaries, Condensate polishing plant (CPU), CST, CW system including equipment, Duct, IDCT & CW channel and associated civil works, Raw Water system and associated Electrical & civil works, Water treatment plant including LETP and associated civil works including Effluent quality Monitoring System(EQMS), Ash Handling & disposal System inside plant boundary, Coal and Biomass Handling Plant, Mill Reject Handling System, Fuel oil unloading system, Compressed Air System, Fire Detection & Protection System, Air Conditioning & Ventilation Systems, Power cycle & Station Piping, Power Transformers, HT Switchgears for complete plant facilities, Transformer Yard and associated controls & Instrumentation, LT indoor Transformer, MV Bus-duct, DC Batteries, Battery chargers, DG sets, LT switchgear & LT Bus Duct, Outdoor Transformers, Switchyard, HT & LT power cables, LT control cables, Lightning Protection, Lighting, Cabling, Earthing, all Control & Instrumentation(C&I) including Advanced Process Control (APC), Automatic Generation Control (AGC), complete simulator system, Fireproof cable penetration sealing system, Pipe / Cable racks, Civil, Structural & Architectural works of Main Power House, Common Control Room, Chimney with elevator, earthing mat/ grounding for the Offsite areas, Miscellaneous Buildings and other civil works including Site Levelling, Roads & Drains, Boundary wall, Watch Towers, Safety Control room, Safety Park, underground facilities like drainage, sewerage, trenches, Packaged sewerage treatment plant, Rain Water Harvesting, Recommended Mandatory Spares, etc covered under the specifications:

a. Basic Engineering of the plant.
b. Detailed design of all the equipment and equipment system(s) including civil, structure steel & Architectural works.

c. Cyclic design features validation of these units.
d. Engineering drawings, equipment sizing & performance data, instruction and O&M manuals, as built drawings and other information;
e. Compliance with statutory requirements
f. Complete manufacturing including shop testing/type testing;
g. Complete Civil, structural and architectural works.
h. Packing and transportation from the manufacturer's works to the site including logistic studies, insurance, customs clearance & port clearance, port charges, if any.
i. Receipt, storage, preservation, handling and conservation of equipment at the site;
j. Fabrication, pre-assembly, if any, erection, insurance, testing, commissioning and completion of facilities including putting into satisfactory operation all the equipment including successful completion of initial operation;
k. Performance and guarantee tests after successful completion of initial operation;
l. Supply of recommended mandatory spares on FOR site basis;
m. Reconciliation with Customs Authorities;
n. Satisfactory conclusion of the Contract;
o. Insurance and other requirements
p. The plant shall be ZLD compliant
q. Demonstration of two-shift, cyclic operation as specified for the period of 07 days during trial operation.

B. SALIENT TECHNICAL FEATURES

(i) The plant shall be suitable for load cycling which implies that it should be designed to operate continuously under **two shift** mode (daily start stop with one shift off) and load follow mode as specified. The design would cover adequate provision for quick startup and loading of the unit(s) to full load at a fast rate. Plant shall be capable of minimum N1 number of daily load cycles (N1 shall not be less than 2), load variation from 100% to 70 % (and vice versa) of MCR with a minimum ramp rate of 3% per minute and load variation from 70% to 55% (and vice versa) of MCR with a minimum ramp rate of 2% per minute, without affecting the design life of boiler and turbine-Generator systems. In addition to this, the plant shall also be capable of minimum N2 number of daily load cycles (N2 shall not be less than 1) from 55% to 40% of MCR load (and vice versa) with a minimum ramp rate of 1% per minute. The main plant and its auxiliaries with their controls would be designed to permit operation of the units on house load without there being any necessity to shut down the unit(s) in the event of sudden loss of total load due to tripping of transmission lines or any other grid disturbances. The design of the plant equipments and control system would permit participation of the plant in automatic load frequency control. During above demonstration, parameters shall be maintained within prescribed limits.

To make unit capable of continuous **two shifting operations**, the number of hot start ups shall be increased from 4000 numbers specified elsewhere to 6700 numbers without changing cold and warm start up as well as daily N1 (minimum 13400 cycles in total design life) and N2 (minimum 6700 cycles in total design life) requirements as defined above.

(ii) Unit Load Ramp rate capability test: The contractor shall demonstrate minimum ± 3% per minute ramp rate for 70% to 100% load range, minimum ± 2% per minute ramp rate for 55% to 70% load range and minimum ± 1% per minute below 55% load to 40%

load, while maintaining the parameters within prescribed limits

(iii) Unit shall be designed for 40% Technical Minimum Load (TML) with an option to optimize 30% & 25% TML without any oil support.

1.00.00 **Steam Generator**

1.01.00 **Type**

The Steam Generator shall be once through type or natural/ forced circulation drum type, single drum (for drum type boiler), single/ double pass (tower type/ two pass type), water tube, direct pulverized coal fired, top supported, balanced draft furnace, single reheat, radiant furnace, dry bottom type and shall be suitable for outdoor installation.

1.02.00 Steam Generator & Auxiliaries and associated systems shall be designed for 40% Technical Minimum Load (TML) with an option to optimize for 30% and 25% TML.

1.03.00 **Other Features of Steam Generator Design**

- Steam Generator shall be designed for daily start-stop/ two-shift operation along with other unit requirements to give life of not less than 25 years. The steam generator and its auxiliaries shall be designed for firing Indian coal identified for the project. Steam generators shall also be capable of firing imported coal with up to 20% blending with domestic coal.
- The Steam Generators shall be designed for variable pressure operation. Thermal design of Steam Generator and the selection of materials shall be suitable for variable pressure operational modes and cyclic operation and two-shift operation as specified.
- The steam generator and its auxiliaries are envisaged to co-fire torrefied (20%)/ non-torrefied (10%) biomass pellet along with coal on weight basis.
- The Steam Generator evaporator shall be suitable for variable pressure operation and control range from 40%TMCR to 100% BMCR (the steam temperatures at SH & RH outlets shall be maintained at their rated values), with optimized pressure parts thickness, no. of headers, upgraded metallurgy, optimized fin geometry and low thermal inertia and capability to accommodate thermal expansion and differential expansion during transient and flexible operating regime.
- The Steam Generator shall be capable of stable operation at a minimum load of not more than 30% TMCR without oil support for flame stabilization.
- Steam Generator shall be provided with Low Pressure Economiser with necessary bypass provision, utilising turbine condensate with control stations to operate at both full & part load conditions.
- Upgraded Drain systems shall be suitably enhanced to support cyclic operation, higher ramp rates, and faster start-up and shutdown sequences. Also, Unit shall be envisaged with water Chemistry improvements.
- Increased number of SH/RH headers and adoption of upgraded metallurgy to enable reduced header wall thickness
- Coal pulverizers (having dynamic classifiers) with automated mill scheduler (along with mill window) for dynamic optimization of mills. Milling system equipped with variable orifice in coal flow pipes and coal pipe flow measurement.

- Improved burners suitable for low load stable operation, lower NOx and low load scanners. SG shall be fitted with Separated Overfire Air dampers.
- The SG shall be designed to have flue gas recirculation (FGR) system.
- Automated Single Stream operation of auxiliaries for low load/ near TML operation.
- Online Assessment & display of Life consumption/ Equivalent Operating Hours (EOH) of critical components due to Creep & Fatigue.
- Provision of simulation programme to assess the unit design features as envisaged and designed.

1.04.00 **Rating of Steam Generator(s)**

Steam Generator shall be designed to cater to duty requirements at Boiler Maximum Continuous Rating (BMCR) specified below:

Capacity of Steam Generator and Rated Steam parameters:	**Steam Flow (T/Hr)**	**Temp. (Deg C)**	**Pressure Kg/cm^2(a)**
i) At super-heater outlet	102% of the turbine VWO steam flow requirement.	To achieve turbine throttle main steam temperature as indicated in clause 5.02.00. The steam temperature at Superheater outlet shall be atleast 3°C higher than the rated main steam temperature at HP turbine inlet.	To achieve turbine throttle steam pressure as indicated in clause 5.02.00. The steam pressure at superheater outlet shall be atleast 9 kg/cm2 higher than the rated main steam pressure at HP turbine inlet.
ii) At re-heater outlet	-	To achieve reheat steam temperature at Turbine Inlet as indicated in clause 5.02.00 of this Sub-section. The steam temperature at reheater outlet shall be atleast 3^{o}C higher than the rated reheat steam temperature at IP turbine inlet.	To be optimized by the bidder.
iii) Feed Water Temp. at Economizer Inlet		To be optimized by the bidder but not less than 245^{o}C	

2.00.00 **Fuel data**

The primary fuel for the main steam generator shall be coal. LDO shall be used for initial start-up, coal flame stabilization and low load operation of the steam generator while firing coal. The combustion system shall also ensure efficient and stable combustion of biomass co-fired with coal, as specified.

Standard coal characteristics, LDO, and biomass characteristics are attached as Appendix –'Fuel Characteristics'.

3.00.00 Each steam generator and its auxiliaries shall necessarily include the following-

(a) Complete pressure parts, structures, platforms, stairs, piping, valves, supports etc.

(b) Soot blowing system with piping, valves, controls etc.

(c) Coal feeder and complete milling system

(d) Coal combustion system including coal / oil burners & scanners.

(e) Air and flue gas ductwork.

(f) Primary air fans.

(g) Forced draft fans.

(h) Induced draft fans.

(i) Aux PRDS and piping

(j) Startup & circulation system,

(k) Air heaters & SCAPH.

(l) Flue Gas Recirculation (FGR)

(m) Low pressure economizer (as per offered design)

(n) Elevators for Steam generators

(o) Chemical HP/LP Dozing system and Oxygenated Treatment system (as applicable)

(p) Electrostatic Precipitators (ESP).

(q) Biomass Co-firing

4.00.00 Environmental Control Equipments

4.01.00 **NOx Control Equipment**

NOx control through staged combustion and Low-NOx burners (max. 300 mg/Nm^3 at 6% O_2 on dry gas basis at Steam Generator Outlet).

4.02.00 **ESP**

Electrostatic Precipitators complete in all respects with all components and accessories.

The Electrostatic Precipitator (ESP) shall be designed to ensure that particulate matter emissions at the stack do not exceed 30 mg/Nm^3 .

5.00.00 **Steam Turbine**

5.01.00 **Type**

The steam turbine shall be tandem compound, single reheat, regenerative, condensing, multi-cylinder design with separate HP, separate IP and separate LP cylinder OR combined casing for HP-IP and separate LP cylinder directly coupled with generator suitable for indoor installation.

5.02.00 **Rating**

The steam turbine generator unit shall conform to the following design and duty conditions:

1.	Output under economic maximum continuous rating (EMCR) (guaranteed output load) at generator terminals	:	250 MW
2.	Turbine throttle steam pressure	:	**150** Kg/cm^2 (abs)
3.	Turbine throttle main steam temp.	:	**537 °C**
4.	Reheat steam temp. at turbine inlet	:	**537 °C**
5.	Condenser pressure	:	77 mm Hg (abs)
6.	Turbine speed	:	3000 rpm
7.	Frequency variation range around rated frequency of 50 Hz	:	+ 3% to - 5% (47.5 Hz to 51.5 Hz)

5.03.00 **Other Features**

Turbine shall be capable of operating continuously with valves wide open (V.W.O.) to swallow at least 105% of EMCR steam flow to the turbine at rated main steam and reheat steam parameters and also the corresponding output shall not be less than 105% of rated load with 1% make up and 77 mm Hg (abs) condenser pressure.

The steam turbine shall have minimum Six uncontrolled extractions for regenerative feed heating based on optimized cycle and shall be suitable for satisfactory operation under tropical conditions.

5.04.00 Steam Turbine Generator & Auxiliaries and associated systems shall be designed for 40% Technical Minimum Load (TML) with an option to optimize for 30% and 25% TML; for meeting this requirement and ensuring the design life of Turbine including its auxiliaries, necessary changes in design to be made. Design changes to be considered shall include but not limited to the following.

1. Changes required in LP Turbine last stage and second last stage blades (as applicable) to take care of increased flow separation at 40% TML.
2. Applicant shall consider state of art design with respect to blade metallurgy and effective moisture separation methodology to avoid blade erosion & failures at 40% load continuous operation of Turbine. Bidder shall submit thermal stress analysis report of Turbine components at 40% TML operation.
3. Increased thermal stress in Turbine stages: To enable continuous operation of turbine at 40% load, Applicant shall take care of the increased stresses (due to ventilation) in turbine

design and ensure that design life of turbine and its components is not reduced. Further, turbine and auxiliaries shall also be designed for complying the requirements related to flexibilization as mentioned in CEA (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023.

5.05.00 a) Provision for life consumption/Equivalent Operating Hours (EOH) of critical components due to Creep & Fatigue shall be made available online (display in CCR) for Operating personnel. Also program/measures shall be made available online (display in CCR) to guide the operating personnel for maintenance planning.

b) Resulting Damage Factor due to Creep-Fatigue interaction shall be made available online (display in CCR) for Operating personnel.

6.00.00 **Generator**

6.01.00 **Type**

Three phase, horizontal mounted, indoor installed, two-pole, Thermal Class 155 (F) winding insulation, Stator water/ hydrogen cooled, cylindrical hydrogen/water cooled rotor type.

6.02.00 **Rating**

Generator and its excitation system shall have a capability at least matching the declared maximum continuous rated output of the associated steam turbine (for the designed secondary cooling water temperature) at all power factors between 0.85 lagging and 0.95 leading with +3% to -5% frequency variation, terminal voltage variation of +/- 5% and combined voltage & frequency variation of 5%. It shall be ensured that when the Generator is working at this capability and design cooling water temperature, no part of the Generator shall attain a temperature in excess of the temperature limits specified for class-B insulation as per IEC-60034.

6.03.00 Also the generator and its excitation system shall be capable of continuous stable operation without any excessive temperature rise at the peak output of the associated steam turbine under VWO & HP heater out condition, etc. as available for the designed secondary cooling water temperature, at all power factors between 0.85 lagging and 0.95 leading with +3% to -5% frequency variation, terminal voltage variation of +/- 5% and combined voltage & frequency variation of 5%. Temperature of different parts may exceed those permissible for class-B insulation under such operating conditions, but shall be lower than those permissible for class-F insulation as per IEC-60034.

6.04.00 Rated Parameters

1.	Power Factor -	0.85 (lag)
2.	Terminal voltage -	In the 14 to 18kV range
3.	Frequency -	50 Hz
4.	Speed -	3000 rpm
5.	Short circuit ratio -	Not less than 0.48 (without any tolerance)

6.05.00 **Operational Flexibility**

The Generator shall be designed to support two-shift / cycling operation and frequent start-stop cycles consistent with modern grid requirements for flexible thermal units.

Design shall consider increased thermal cycling fatigue and provide adequate margins for lower Technical Minimum Load operation as required by the associated turbine and plant operating philosophy.

7.00.00 **Coal Handling & Biomass Handling Plant**

As applicable, coal requirement for new units shall be met from the existing coal handling plant through interconnection conveyors (in case the existing coal handling plant has sufficient capacity and provision for the interconnection) or a new coal handling plant shall be provided, Rated capacity of CHP shall be as specified in the technical Specification.

The design capacity of the conveyors shall be 110% of the rated capacity.

In case the new CHP is proposed, it shall consists of the following:

(a) Conveying and Crushing streams

(b) Coal Unloading facilities like wagon tippler, apron feeder, side arm charger or paddle feeder depending upon the coal source and the type of wagons being used for coal, transportation.

(c) Stacker-cum-Reclaimer with Automatic Stockyard Management System & wind barrier in case the land is availability for additional stockyard.

(d) Upstream conveying streams up to coal bunker, including the travelling trippers

(e) Biomass handling plant (if required).

8.00.00 **Ash Handling System**

Ash handling system consists of the following sub systems:

a) Bottom Ash Handling System

i) Jet pump and Water Impounded Hopper System – An intermittent system consisting of water impounded hoppers, clinker grinders, jet pumps etc.

OR

ii) Submerged Scrapper Conveyor and dry type hopper System – A continuous system consisting of dry type Bottom Ash hoppers, submerged scrapper conveyors, clinker grinders, bottom ash slurry trench etc.

iii) Wet bottom ash handling system for economiser/eco duct hopper/APH hopper/ APH duct hopper,

b) Dry Fly Ash Conveying system

Two alternatives for pneumatic conveying system (i.e. vacuum conveying system or pressure conveying system) are specified for conveying of fly ash from ESP Hoppers to Buffer Hoppers/Intermediate cum HCSD Silo/ Main fly ash silo in dry form.

i) Vacuum Conveying System

It shall consist of liquid ring vacuum pumps, material handling valves, cast iron and MS pipes, instrument air compressors etc.

OR

ii) Pressure Conveying System

It shall consist of screw compressors, air lock/pump tanks, ash intake & discharge valves, CI & MS pipes, instrument air compressors etc.

c) Dry Fly Ash Transportation system

The dry fly ash from the buffer hoppers/ ESP hoppers/Intermediate cum storage silos shall be transported to storage silos through fly ash classification system. The user industries shall take the dry fly ash from storage silos either in rail wagons, closed tankers or in open tankers. Automatic bagging plant facility is envisaged for fly ash bagging purpose

d) Ash Disposal System

The bottom ash in slurry form shall be taken to the ash slurry sump of bottom ash slurry disposal pump house for further disposal to bottom ash dyke.

As applicable, the unutilized fly ash shall be disposed to HSCD dyke in high concentration slurry form from the mixing tank of HCSD pump house.

9.00.00 Water Systems

9.01.00 WATER TREATMENT PLANT (WTP)

Water Treatment Plant (WTP) consisting of the following sub systems shall be provided as per the scope of Technical Specification:

a) Pre-Treatment Plant
b) Chlorine Di-oxide Plant
c) Demineralizing plant
d) Liquid Effluent Treatment System & Wastewater UF-RO system
e) CSSP system
f) Drain Separation & ZLD

9.02.00 CW SYSTEM

Closed loop recirculating type CW system with CW Pumps, Induced / Natural Draft Cooling Tower & CW Chemical Treatment; Equipment cooling water system for TG, SG & Station auxiliaries etc shall be provided.

Auxiliary Water Pumps (Raw water for PT & Ash, HVAC, APH wash, Service water, potable water, DM make-up, Boiler fill, etc.) shall be provided.

10.00.00 Fire detection & protection system, Compressed air(instrument & service air) system, A/C and ventilation system, shall be provided.

11.00.00 **CONDENSATE POLISHING PLANT**

Condensate Polishing Plant (CPU) along with external regeneration facility shall be provided.

12.00.00 **Electrical Systems**

The electrical items shall cover following:

- Generator, Excitation System and its Auxiliary Systems
- Motors
- Generator Busducts, MV Busducts .
- 765 KV/400 KV/220/132 KV AIS/GIS Switchyard (As applicable)
- Power Transformers, Auxiliary Oil Filled Transformers, Indoor Transformers
- MV Switchgears, LV Switchgears and LV Busducts, Numerical Relay Networking, DC System, Battery and Battery Charger
- HT Power Cables, LT Power and Control Cables, Cabling, Earthing and Lightning Protection, Lighting, DG Sets
- Construction Power facilities
- Type Testing and Mandatory Spares.

13.00.00 **C & I Systems**

All the systems/equipment being supplied under this package shall be monitored and controlled from DDCMIS in this package. In this package fieldbus-based controls and conventional controls (hardwired 4-20mA/DI/DO) are envisaged. The control system, called Distributed Digital Control Monitoring & Information system (DDCMIS) is envisaged to be procured under this package for control and operation of -

- Integral control & protection of boiler including Burner Management System and Boiler protection system.
- The integral control & protection of Steam Turbine Generator including Electro-hydraulic control & Turbine Protection system.
- Modulating controls of the Steam Generator (SG) {Combustion Control- Fuel Flow/Air Flow; Furnace Draft Control, FW flow control etc.}.
- Modulating controls of Feedwater & Condensate Cycle {Hotwell level control, Deaerater Level control, Heater Level Control, etc.}.

- Binary control of auxiliaries of Steam Generator (SG) {Forced draft (FD) fan, Induced Draft (ID) Fan, Primary Air (PA) Fan etc.}.
- Binary control of auxiliaries of Turbine Generator (TG) {Boiler Feed Pump (BFP), Condensate Extraction Pump (CEP) etc.}.
- Electrical Breaker including synchronization circuits.
- Coal and biomass Handling Plant.
- Water System (PT Plant, DM Plant, Cooling Tower, Fire water booster pump etc.).
- CW System
- Air compressor
- Air Conditioning and Ventilation systems.
- Ash Handling Plant.
- Make-up water System.
- FOPH System
- Electric Actuators

Human Machine Interface & Plant Information System (HMIPIS) is based on Large Video Screen (LVS) displays supported by TFT monitor based Operator Work Stations (OWS). These devices through customized user-friendly displays, soft alarm facia and pop-up displays are used for giving fast pin-pointed faults/ status to the operator. Local ON/OFF operation of equipments is envisaged through Graphical Interface Unit (GIU). The total system is networked through a Station-Wide LAN for use of real time data of various plant areas by other users like maintenance, planning, efficiency enhancement groups etc.

The sequence of events recording & alarm annunciation are also implemented as a part of DDCMIS system. A GPS based master and slave clock system is to be provided for uniform and synchronized timing signals throughout the entire station.

The power supply for the control system is based on 24V DC provided through microprocessor based modular charger system and for the peripherals and other subsystem through 230V Single Phase UPS.

Main Equipment related instruments like Flame Monitoring system, Coal Bunker Level measurement system, gravimetric feeder control system, Acoustic Steam Leak detection system, Furnace and Flame viewing system, Turbine stress control / evaluation system, Turbine supervisory and diagnostic system etc are also procured through this package.

Field instruments like pressure, DP, flow & level transmitter, analyzers along with their process connection & piping as well as measurement systems like vibration monitoring system etc are also procured through this package.

A plant-wide CCTV system based on IP technology along with suitable analytics is included in this package for safety control room, storage yard monitoring, surveillance of plant equipment as an aid to the operation.

Suitable cybersecurity provisions shall be implemented for security of the complete system as well as compliance to the latest cybersecurity guidelines/ regulations.

Complete Simulator system is included in this package for training through simulation.

Apart from above, an on-line Steam & Water analysis system (SWAS), PA system, Operator control desks, panels, shielded twisted pair cables as well as optical fiber cables for system interconnection and all types of Instrumentation Cables are also included in this package.

14.00.00 Civil Works

All civil, structural, and architectural works, as well as associated underground infrastructure such as drainage systems, sewerage networks, trenches, and earthing/grounding grids for all facilities covered under the package. Civil works broadly comprise, but are not limited to, the following:

- Boiler, Mill Bunker, Mill bunker building, ESP, FD/ID/PA, Seal Air fans, mills etc.
- Coal transfer points, coal conveyor galleries and supporting trestles including staircases, gravity take up structure for conveyors of CHP and other civil works related to CHP.
- Main plant building i.e. TG building, Deaerator bay, control tower.
- TG foundation & BFP foundation
- CW System
- Civil works for ACW System.
- Civil works for Cooling Tower
- Forebay, Switchgear room, Control room and Transformer foundation.
- Raw water Pump house, Forebay, Switchgear room, Control room and Transformer foundation.
- Transformer yard i.e. Transformer foundation, rail track foundation, fire wall, central oil pit
- Works associated with rail track along A row and transformer yard.
- Foundation for DG set enclosure & stack foundation
- Service building
- Civil works for CPU in TG hall & regeneration area
- Elevator Pit & civil works for machine room for elevator.
- Chimney & chimney elevator
- ESP control room buildings.
- Mill reject silo
- Earth mat and risers for Main Plant area & other facilities included in this package
- Fuel oil pressuring pump house with switchgear room & control room.
- Ash handling system along with switch gear building & control Room and provision of Ash disposal minimum up to 10 m from plant boundary
- Civil works for switchyard.
- Sewerage works including STP of Main Plant and BOP areas
- Patrol/inspection road along with Ash slurry pipe corridor
- Compressor house
- Safety park
- Hard crusting of pre-assembly yard, boiler area, TG area, passage ways in Main Plant area
- Paving in XFMR Yard, TG, SG, ESP, ID fan, and Chimney area.
- Condensate storage tank and CST pumps foundations.
- Outdoor transformer foundations
- Site levelling of Main plant and BOP area
- Reservoir

- Plant roads & drains including approach road to ash silos
- Approach roads to various buildings
- Civil works related to Fire water booster pump house, pedestal for pipes and DV housing, concrete encasement of pylon pipes (within filled up gravel portion) used for HVW spray system for protection of transformers.
- Pipe cable supports / trestle in BTG & offsite areas for Ash handling area, Ash silo, FOPPH, Aux Steam interconnection and fire water network with existing stage and its foundations
- Civil works associated with air-conditioning and ventilation system
- Civil works associated with buried pipes
- Pedestals, thrust blocks, trenches, hume pipes & culvert, duct banks etc. at road/rail crossings for pipes & cables.
- Civil works for installation of pumps at existing MUWPH.
- Civil works associated with fire detection and protection pipes
- Civil works associated with Electrical equipment and cabling
- Civil Works for Miscellaneous switchgear room building
- CHP Office building cum Workshop

Miscellaneous Buildings

- Civil, structural, architectural, electrical and associated air-conditioning, Ventilation, and rain water harvesting for
- Fire station building
- O&M stores
- Gate Complex including CISF Complex
- Canteen
- O&M workshop building
- Watch Towers
- Dozer shed.
- Hydrogen Cylinder Storage sheds
- Administration Building,
- Occupational health center,
- Owner's construction office,
- Plant Boundary wall
- Any other miscellaneous building or facility

15.00.00 MILL REJECT SYSTEM,

Mechanical conveying system shall be employed for handling of the mill rejects. Mill reject shall be stored in Mill reject Silos through a series of Mechanical conveying equipments.

16.00.00 FUEL OIL HANDLING AND STORAGE SYSTEM

Fuel oil unloading shall be provided to handle light diesel oil (LDO) through Road Tankers.

(INVITATION FOR EXPRESSION OF INTEREST)

Annexure-B

Indicative Qualifying Requirements for EPC Package

(Note: At the stage of EOI application submission, applicant is not required to submit documentary evidence/supporting documents/credentials in support of their meeting the qualifying criteria. However, they will have to submit the essential data sought and also the route they intend to seek qualification in future in case NTPC issues any tender in this regard.)

The Applicant should meet the qualifying requirements stipulated hereunder in clauses 1.1.0 or 1.2.0 or 1.3.0 :

1.0.0 Technical Criteria:

1.1.0 Route 1: Qualified Steam Generator and/or Qualified Steam Turbine Generator Manufacturer

1.1.1 (a) The Applicant should have designed, engineered, manufactured/got manufactured, erected/ supervised erection, commissioned/ supervised commissioning of at least one (1) number of pulverized coal fired Steam Generator rated for a minimum of 150 MW size or minimum 450 T/Hr steaming capacity. Further, such Steam generator should be of the type specified, i.e. Drum type with single pass (tower type)/two pass arrangement or once through type with single pass (tower type)/two pass arrangement, both (Drum & once through type) with reheat, using either spiral wound (inclined) or vertical plain or vertical rifled type water wall tubing, and which should have been in successful operation for a period of not less than one (1) year prior to the last date of submission of EOI. In addition, the above Steam Generator should have been provided with evaporator suitable for variable pressure operation. The Applicant shall offer only the type of Steam Generator and type of water wall tubing for which it is qualified.

AND/OR

1.1.1 (b) The Applicant should have designed, engineered, manufactured/got manufactured, erected/ supervised erection, commissioned/ supervised commissioning of at least one (1) number of steam turbine of tandem compound, condensing, multi cylinder, reheat type of 150 MW or higher capacity and one (1) number of generator of two pole, Thermal class 155(F) winding insulation, hydrogen / water cooled stator and hydrogen / water cooled rotor of 150 MW or higher capacity. These steam turbine and generator should have been in successful operation for a period of not less than one (1) year prior to the last date of submission of application for EOI. The Applicant shall offer only the type of Steam Turbine generator for which it is qualified.

1.1.2 In case the Applicant meets the requirements indicated at 1.1.1 (a)/(b) for either steam generator sets or steam turbine generator sets (and not for both) then the Applicant shall associate/ collaborate for the other equipment with Qualified Steam Turbine Generator Manufacturer or Qualified Steam Generator Manufacturer, who shall in turn meet the requirements stipulated at 1.1.1 (b) in conjunction with 1.1.4 (as applicable) or 1.1.1 (a) above as the case may be for the respective equipment and shall source the equipment i.e. steam turbine generator set or steam generator set, only from such qualified associate.

1.1.3 The applicant shall be required to furnish the Deeds of Joint Undertaking (DJUs) as per the following table:

DJU	Executants	BG
For Steam Generator	The Applicant	-------
	QSGM	0.6%
For Steam Generator (In case of Indian subsidiary / JV Company of Qualified Steam Generator Manufacturer)	The Applicant	----------
	Indian Subsidiary / JV Company for Steam Generator	0.6%
For Steam turbine Generator	The Applicant	----------
	QSTGM	0.6%
For Steam turbine Generator (In case of Indian subsidiary / JV Company of Qualified Steam turbine Generator Manufacturer)	The Applicant	----------
	Indian Subsidiary / JV Company for Steam turbine Generator	0.6%
For Steam turbine Generator (If QSTGM is not meeting requirement for Generator)	The Applicant	----------
	QSTGM	0.6%
	QGM	0.1%
For Steam turbine Generator (In case of Indian subsidiary / JV Company of Qualified Steam turbine Generator Manufacturer and If QSTGM is not meeting requirement for Generator)	The Applicant	----------
	Indian Subsidiary / JV Company for Steam turbine Generator	0.6%
	QGM	0.1%

i. In the Deed of Joint Undertaking for Steam Generator and Auxiliaries, all the executants of DJU shall be jointly and severally liable to the Employer for successful performance of the contract for the scope related to steam generator and auxiliaries.

ii. In the Deed of Joint Undertaking for Steam Turbine Generator and Auxiliaries all the executants of DJU shall be jointly and severally liable to the Employer for successful performance of the contract for the scope related to Steam Turbine Generator and Auxiliaries including turbine cycle, regenerative feed heating and pumping system.

iii. Qualified Generator Manufacturer (wherever applicable) shall be liable to the Employer for successful performance of the generator and its auxiliaries.

iv. Where the Bank Guarantee (BG) amount is indicated as %, the same shall be % of the total contract price.

v. In case the Applicant gets qualified using notes and/or other clauses then the DJU and BG requirement indicated in such notes / clauses shall also apply in addition to above.

vi. Applicable BGs are in addition to the contract performance security to be furnished by the Applicant .

vii. Applicable BGs shall be furnished as per tender requirements.

1.1.4 An Applicant who meets the requirements of clause 1.1.1 (b) except for generator would also qualify provided the Applicant/its collaborator/associate for steam turbine generator collaborates/associates with a Generator Manufacturer who meets the requirements of clause 1.1.1 (b) fully in respect of generator, hereinafter referred to as Qualified Generator Manufacturer. The Qualified Generator Manufacturer shall necessarily be one of the executants of DJU being submitted by the Applicant (for steam turbine generator and auxiliaries) as per clause 1.1.3 above.

1.2.0 Route: 2

1.2.1 The Applicant should have executed on Engineering, Procurement and Construction (EPC) basis, minimum one (1) no. 150 MW or above pulverized Coal fired unit comprising of at least steam generator and steam turbine generator sets along with their associated auxiliary equipments, electrostatic precipitators/bag filters, Switchyard, Coal Handling plant, Ash handling plant, Cooling Towers, Condenser Cooling water system, including associated civil works for the above equipments and systems, which is in successful operation for a period of not less than one (1) year prior to the last date of submission of EOI.

OR

The Applicant should have executed in the last 10 years, from the last day of month previous to one in which EOI has been invited, industrial projects on EPC basis (with or without civil works) in the area of power, steel, oil & gas, petro-chemical, fertilizer, flue gas desulphurization, cement and / or any other process industry with the total value of such projects being INR 10000 million or more. At least one of such projects should have a contract value of INR 4000 million or more. These projects shall be in successful operation for a period of not less than one (1) year prior to the last date of submission of EOI.

OR

The Applicant should have designed & engineered by itself or under collaboration, manufactured/got manufactured, erected/ supervised erection, commissioned/ supervised commissioning of at least one (1) number of pulverized coal fired Steam Generator sets and/or steam turbine generator sets rated for a minimum of 80 MW and one (1) number of generator of two pole, Thermal class 155(F) winding insulation, air/hydrogen / water cooled stator and air/ hydrogen / water cooled rotor minimum of 80 MW which should have been in successful operation for a period of not less than one (1) year prior to the last date of submission of application for EOI.

1.2.2 The Applicant shall associate/ collaborate for the (i) Steam Generator and (ii) Steam Turbine Generator sets and shall source these equipments only from the Associate / Collaborator who meets the following:

(i) Qualified Steam Generator Manufacturer, who shall in turn meet the requirements stipulated at 1.1.1(a) for Steam Generator.

OR

Indian subsidiary / JV Company of Qualified Steam Generator Manufacturer as the case may be along with requirements stipulated at Note for Clause 1.1.0.

(ii) Qualified Steam Turbine Generator Manufacturer, who shall in turn meet the requirements stipulated at 1.1.1(b) in conjunction with 1.1.4 (as applicable) for the Steam Turbine Generator Sets.

OR

Indian subsidiary / JV Company of Qualified Steam Turbine Generator Manufacturer as the case may be along with requirements stipulated at Note for Clause 1.1.0.

1.2.3 The applicant shall be required to furnish the Deeds of Joint Undertaking (DJUs) as per the following table:

DJU	Executants	BG
For Steam Generator	The Applicant	----------
	QSGM	0.6%
For Steam Generator (In case of Indian subsidiary / JV Company of Qualified Steam Generator Manufacturer)	The Applicant	----------
	Indian Subsidiary / JV Company for Steam Generator	0.6%
For Steam turbine Generator	The Applicant	----------
	QSTGM	0.6%
For Steam turbine Generator (In case of Indian subsidiary / JV Company of Qualified Steam turbine Generator Manufacturer)	The Applicant	----------
	Indian Subsidiary / JV Company for Steam Turbine Generator	0.6%
For Steam turbine Generator (If QSTGM is not meeting requirement for Generator)	The Applicant	----------
	QSTGM	0.6%
	QGM	0.1%
For Steam turbine Generator (In case of Indian subsidiary / JV Company of Qualified Steam turbine Generator Manufacturer and If QSTGM is not meeting requirement for Generator)	The Applicant	----------
	Indian Subsidiary / JV Company for Steam Turbine Generator	0.6%
	QGM	0.1%

i. In the Deed of Joint Undertaking for Steam Generator and Auxiliaries, all the executants of DJU shall be jointly and severally liable to the Employer for successful performance of the contract for the scope related to steam generator and auxiliaries.

ii. In the Deed of Joint Undertaking for Steam Turbine Generator and Auxiliaries all the executants of DJU shall be jointly and severally liable to the Employer for successful performance of the contract for the scope related to Steam Turbine Generator and Auxiliaries including turbine cycle, regenerative feed heating and pumping system.

iii. Qualified Generator Manufacturer (wherever applicable) shall be liable to the Employer for successful performance of the generator and its auxiliaries.

iv. Where the Bank Guarantee (BG) amount is indicated as %, the same shall be % of the total contract price.

v. In case the Applicant gets qualified using notes and/or other clauses then the DJU and BG requirement indicated in such notes / clauses shall also apply in addition to above.

vi. Applicable BGs are in addition to the contract performance security to be furnished by the Applicant.

vii. Applicable BGs shall be furnished as per tender requirements.

1.2.4 In case the Applicant's associate is steam turbine manufacturer meeting the requirements of clause 1.1.1 (b) except for generator would also qualify provided the Applicant/its collaborator/associate for steam turbine generator collaborates/associates with a Generator Manufacturer who meets the requirements of clause 1.1.1 (b) fully in respect of generator, hereinafter referred to as Qualified Generator Manufacturer. The Qualified Generator Manufacturer shall necessarily be one

of the executants of DJU being submitted by the Applicant (for steam turbine generator and auxiliaries) as per clause 1.2.3 above.

1.2.5 The Applicant shall offer only the type of steam generator and type of water wall tubing, and the steam turbine generator for which its collaborator / associate is qualified.

1.3.0 **Route 3: Consortium (unincorporated grouping) Route**

Applicant shall be a Consortium (unincorporated grouping) of minimum two (2) and maximum up to three (3) entities and shall collectively meet the following qualification requirement. However, each consortium partner shall necessarily be required to meet any one of the following requirements specified at clauses 1.3.1, 1.3.2 and 1.3.3.

1.3.1 One of the Consortium partners should meet the requirements as indicated at clause 1.1.1(a).

OR

Indian subsidiary / JV Company of Qualified Steam Generator Manufacturer as the case may be along with requirements stipulated at Note for Clause 1.1.0.

1.3.2 One of the Consortium partners should meet the requirements as indicated at clause 1.1.1(b).

OR

Indian subsidiary / JV Company of Qualified Steam Turbine Generator Manufacturer as the case may be along with requirements stipulated at Note for Clause 1.1.0.

1.3.3 One of the Consortium partners should meet the requirements as indicated at clause 1.2.1.

1.3.4 Each of the Consortium partners will be required to furnish a legally enforceable Consortium Agreement holding themselves jointly and severally responsible and liable to the employer to perform all works. The number of executants of the Consortium Agreement should not exceed three (3).

Notes for clause 1.0.0

(1) Definitions

(i) “Qualified Steam Generator Manufacturer” (QSGM) means a manufacturer meeting requirement stipulated at 1.1.1(a).

(ii) “Qualified Steam Turbine Generator Manufacturer” (QSTGM) means a manufacturer meeting requirement stipulated at 1.1.1(b).

(iii) Wherever the term 'coal fired' is appearing above, "coal" shall be deemed to also include bituminous coal/subbituminous coal/brown coal/lignite.

(2) Erection/Commissioning

Where erection / supervision of erection and commissioning / supervision of commissioning has not been in the scope of the Applicant as mentioned in clause 1.1.0, it should have acted as an advisor for erection and commissioning of the Steam Generator & auxiliaries/ Steam Turbine & Generator, as the case may be. Necessary documents / certificates from the client, in support of above shall be furnished along with submission of EOI.

(3) Direct / Indirect order

i) The Applicant / Qualified Steam Generator Manufacturer / Qualified Steam Turbine Generator Manufacturer / Qualified Generator Manufacturer/Consortium partner (s) shall also be considered qualified, in case the award for the reference works (steam generator / Turbine and generator) has been received by the Applicant / Qualified Steam Generator Manufacturer / Qualified Steam Turbine Generator Manufacturer / Qualified Generator Manufacturer/Consortium partner (s) either directly from owner of plant or any other intermediary organization. A certificate from such owner of plant or the intermediary organization shall be required to be furnished by the Applicant / Qualified Steam Generator Manufacturer / Qualified Steam Turbine Generator Manufacturer / Qualified Generator Manufacturer/ Consortium along with submission of EOI in support of its claim of meeting requirement stipulated at 1.1.1(a), 1.1.1(b) and 1.1.4 above as the case may be.

ii) Certificate from owner of the plant shall also be furnished by the Applicant / Qualified Steam Generator Manufacturer / Qualified Steam Turbine Generator Manufacturer / Consortium partner(s) for the successful operation of the steam generator / steam turbine generator set as specified at 1.1.1(a), 1.1.1(b) and 1.1.4 above as the case may be along with the submission of EOI.

(4). (i) "for the scope related to Steam Turbine Generator and Auxiliaries including turbine cycle, regenerative feed heating and pumping system" indicated at clauses 1.1.3 and 1.2.3 shall mean Steam Turbine Generator and their Auxiliaries including turbine cycle, regenerative feed heating and pumping system.

(ii) "for the scope related to Steam Generator and Auxiliaries" indicated at clauses 1.1.3 and 1.2.3 shall mean Steam Generator and Auxiliaries.

(5). The value of executed works shall be given a simple weightage to bring them at current price level by adding 5% for each year on prorata basis after the end date of completion/execution of the reference work, till the last day of month previous to one in which EOI has been invited.

The specified value of executed works (i.e. INR 10000 million or more and INR 4000 million or more) is excluding any taxes and duties.

(6) **The word "executed" means**:

a) In case of Project(s), the project(s) should have been commissioned, even if the contract has been started earlier and / or is not completed / closed.

b) In case of Contract(s), the scope of work under the contract(s) should have been completed, even if the contract has been started earlier and / or is not closed.

(7) For the purposes of this EOI, any reference to the last date notified for receipt of application mentioned in the Qualifying Requirements shall be deemed to refer to the last date for receipt of applications as specified in the initially published Notification.

(8) In case Steam Generator manufacturer meets all the requirements as specified in clause no. 1.1.1**(**a**)** above except that the evaporator in the reference steam generator is not designed for variable pressure operation and is designed for constant pressure (Universal Pressure) operation only, in such case, the Steam Generator manufacturer shall be considered to be qualified, provided that, such Steam Generator manufacturer has an ongoing license agreement (which covers technology transfer), with the original Technology Owner (Licensor) for design, manufacture, sell, use, service

of once through variable pressure steam generator technology (with evaporator suitable for variable pressure operation).

i. The licensor should have experience of providing such variable pressure design steam generator technology for at least one (1) no. of pulverized coal fired steam generator for a 450 T/hr or higher capacity using either spiral wound (inclined) or vertical plain or vertical rifled type water wall tubing with the evaporator suitable for variable pressure operation and which should be in successful operation for a period of not less than one (1) year prior to the last date of submission of application for EOI.

ii. The Applicant shall offer only the type of steam generator i.e. single pass (tower type) or two pass type for which the Bidder is qualified and shall offer only the type of water wall tubing (either spiral wound (inclined) or vertical plain or vertical rifled type) for which his licensor is qualified.

iii. In such an event, the Applicant shall furnish an undertaking executed between the Bidder and the steam generator manufacturer (as the case may be) and its Technology Owner (Licensor), for successful performance of the Steam Generator.

Note for Clause 1.1.0

In case the Applicant is registered in India under the Companies Act 2013 (as amended from time to time), either as a Subsidiary Company or a Joint Venture (JV) Company of QSGM/QSTGM for steam generator sets and/or steam turbine generator sets, then the Applicant can also participate under Route 1.1.0 provided it has collaboration or licensing agreement or Letter of technical support for steam generator sets and/or steam turbine generator sets with its QSGM/QSTGM.

In case of JV Company - In such a case, such QSGM and/or QSTGM shall maintain a minimum 26% equity participation in its JV Company for a lock-in period of seven (7) years from the date of incorporation of such Joint Venture or up to the end of defect liability period of the contract, whichever is later.

In case of Subsidiary Company - The Subsidiary Company shall remain a subsidiary Company of the QSGM and/or QSTGM for a minimum period of 7 years from the date of incorporation of such Subsidiary Company or up to the end of the defect liability period of the contract whichever is later.

In case applicant is not having collaboration or licensing agreement and seeking qualification through Letter of technical support from QSGM and/or QSTGM then such Letter of technical support shall be valid minimum up to the end of defect liability period of the contract.

Further, Subsidiary Company or a Joint Venture (JV) Company of QSGM/QSTGM shall be required to meet other applicable requirements of respective Routes as the case may be.

Note for clause 1.3.0:

(i) All the Consortium partners shall identify one of the partners as the “lead partner”. In case any consortium partner is meeting more than one qualifying requirement (as specified in clause 1.3.1, 1.3.2 & 1.3.3) then the consortium may not tie-up with any other entity for such qualifying requirements. In such a case, number of consortium partners may get reduced but not less than two.

(ii) In case one of the Consortium partners who meets the requirements of clause 1.3.2 except for generator would also be considered provided it associates with a Qualified Generator Manufacturer who meets the requirements of clause 1.1.1(b) fully in respect of generator. In Such a case Qualified Generator Manufacturer shall also be the executant of the Consortium Agreement. In such a case the number of executants of the Consortium Agreement should not exceed four (4).

(iii) Consortium partners shall collectively be required to furnish "Contract Performance Security" regardless of their share and role in the Consortium. However, each Consortium partner shall necessarily furnish at least 10% of the "Contract Performance Security".

(iv) The Consortium shall offer only the type of steam generator and type of water wall tubing, and the steam turbine generator for which it or its Consortium partner(s) is qualified.

(v) The work executed by the Consortium will be considered for the purpose of the qualification specified at 1.3.1, 1.3.2 & 1.3.3 provided the same Consortium partner who has executed the qualifying works is getting associated in the Consortium of this EOI.

(vi) Consortium partners (including the lead partner) shall be required to submit additional Bank Guarantees (BGs) for a total amount of 2% of total contract price for successful integration/interfacing of SG, TG and BOP systems. However, each Consortium partner shall necessarily furnish Bank Guarantees (BGs) for at least 0.5% of the total contract price for successful integration/interfacing of SG, TG and BOP systems. In case qualified generator manufacturer is an additional consortium partner, then qualified generator manufacturer shall necessarily furnish bank guarantee (BG) for at least 0.1% of total contract price. However, the aggregate value of all such BGs furnished by the Consortium Partners, including the Qualified Generator Manufacturer, shall remain limited to 2% of the Total Contract Price.

(vii) The Lead Partner shall be authorised by the Consortium Partners to incur liabilities and receive instructions for and on behalf of any and all Consortium Partners in connection with the Consortium.

2.0.0 Additional Requirements:

2.1.0 For Steam Generator of 250MW Unit:

The following unit features aimed at enhancing the flexibility, efficiency, and environmental performance of the Steam Generator are sought. The applicants/QSGM shall furnish details of their capabilities, relevant experience, and project references demonstrating their experience in implementing such features, as per the information sought in the Annexures or submission through attachments.

(a) Steam Generator shall be designed for daily start-stop/ two-shift operation, load follow mode as specified and Technical minimum Load (TML) as 40%, including other plant requirements to give life of not less than 25 years.
(b) *Applicants are also required to indicate their capability and willingness to design units with Technical minimum Load (TML) as 30% and 25%. Minimum TML for tendering shall be decided based on EOI response.*
(c) *Control Range of operation: 40%TMCR to 100% BMCR*
(d) Steam Generator (SG) pressure parts and other thick components shall be designed for creep, fatigue & creep-fatigue loading criteria as also per EN-12952-3. The SG and its pressure parts shall be capable to withstand increased thermal stresses, differential expansion and cyclic loading.

(e) The SH/RH outlet headers and other thicker components shall be suitably designed with higher number of headers, superior metallurgy, lower thicknesses than conventional sub-critical units.
(f) Automatic Mill scheduler along with 'Mill Performance Window; to monitor & control the related parameters.
(g) Online Coal Flow Measurement System along with online adjustable coal pipe orifice for dynamic optimisation as per industry standard requirements.
(h) Advance Combustion System (Mills with dynamic classifer, low NOx burners, flame monitoring) with wide range of turn down ratio, capable of operating in specified range of operation (i.e. TML to 100% BMCR) without any oil support.
(i) Steam Generator capability of operating on single stream operation of auxiliaries such as PA/FD/ID fans, APH etc, at part load conditions based on operating conditions.
(j) Design of Flue gas re-circulation system.
(k) Low Pressure Economiser with auto operation/ control at full & part loads.
(l) Modified Start-up & drain circulation system capable of faster light ups and cyclic operations.
(m) Plant shall be designed with Condensate Polishing Unit (CPU).
(n) Steam Generator design shall also be efficient at part loads and shall meet the minimum boiler efficiency requirements as specified by CERC.
(o) Any other feature supporting the flexible, efficient and environmentally compliant unit.
(p) Steam Generator shall be designed as per the applicable codes and flexible features shall be demonstrated using simulation of the proposed steam generator meeting the specified requirements at detailed Engg stage.

Note-1: Any information not furnished against the above requirements or as specifically sought in the related annexures shall be construed as non-availability of the requisite capability/ experience for the corresponding requirement for additional requirements specified above.
Note-2: Justification for type of Steam Generator offered: The applicant/ QSGM of the EOI shall necessarily submit the detailed basis of selection (in write-up form) of proposed Steam Generator and Waterwall arrangement over other available alternatives, considering flexibilization requirements mentioned above, duly substantiated with relevant technical data and operating references. (Refer Format-A also)

(INVITATION FOR EXPRESSION OF INTEREST)

Format-A: Justification for proposed Steam Generator

Justification for type of Steam Generator proposed and comparison wrt performance, reliability and flexible/ cyclic mode of operation over the other type.

Note: Below table is for reference and indicative parameters and comparison between proposed and other type of steam generator. Applicant to submit the writeup and comparative justification wrt design and other additional requirements.

Sl. No.	Flexible Unit Features	Drum Type	Once-Through Type
1)	Design Ramp Rate (%TMCR/ minute)- a) 100% BMCR to 70% TMCR b) 70% TMCR to 55% TMCR c) 55% TMCR to 40% TMCR d) 40% TMCR to 30% TMCR e) 30% TMCR to 25% TMCR		
2)	Metal Temperature excursion probability during- i) Ramp-up (TML to 100% TMCR) ii) Ramp-down (100%TMCR to TML) iii) During light-up (faster than conventional unit)		
3)	Design Control Range (i.e. rated steam parameters are maintained)	%.....TMCR to 100%BMCR	%.....TMCR to 100%BMCR
4)	Suitable for Daily Start-Stop		
(a)	Stress Comparison/ Consumption of component life i) Drum/ Separator ii) SH/ RH Header iii) BRP/ BCW Pump Casing etc. iv) Daily N1 ramping v) Daily N2 ramping		
(b)	Consumption of Unit/ Thick Component during- i) Cold Start-up ii) Warm Start-up iii) Hot Start-ups		
(c)	Start-up Time for all cases of 3(b) above i) Cold Start-up ii) Warm Start-up iii) Hot Start-ups		
5)	Type of waterwall type & comparative benefit		
6)	NOx emission control		
7)	Boiler Efficiency (%) i) at Full load (generally 80% to 100% TMCR) ii) at Part load (generally TML to 60%TMCR)		
8)	Overall Better suited to Flexible/ Cyclic Operation. Specify reason for choosing the Steam Generator type over the other type.		

2.2.0 For Steam Turbine Generator of 250 MW Unit:

The following capabilities towards designing the steam turbine Generator for load flexibilization are additional for such smaller units –

1. **Two shift operation**, Cyclic loading, ramping requirement & Technical Minimum Load (TML) as 40%. *Applicants are also required to mention their capability and willingness to design units with Technical Minimum Load (TML) as 30% and 25%. Minimum TML shall be decided based on EOI response.*
2. Capabilities to design LP Turbine last & second last stage blading to handle moisture and flow separation.
3. Capabilities to design Steam turbine Generator & its parts for creep, fatigue & creep-fatigue loading criteria. The combined creep fatigue damage shall lie within acceptable limits.
4. Catering to CEA's flexibilization requirements for load ramping & Technical Minimum Load criteria.
5. Max Turbine Cycle Heat rate: As per CERC requirements for such unit sizes.

Note-1: Any information not furnished against the above requirements or as specifically sought in the related annexures shall be construed as non-availability of the requisite capability/ experience for the corresponding requirement for additional requirements specified above.

Note-2: Justification for type of Steam Turbine Generator offered: The applicant/ QSTGM of the EOI shall necessarily submit the detailed basis of selection (in write-up form) of proposed Steam Turbine Generator, considering flexibilization requirements mentioned above, duly substantiated with relevant technical data and operating references.

Annexure-C

Make In India Requirements

1. The applicant shall take note of the following as per Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry, Government of India, Public Procurement (Preference to Make in India) Order 2017–Revision; Dt.16.09.2020 and 19.07.2024 further revisions/ amendments if any and confirm compliance.
2. All equipment/materials/parts/items covered under the scope of supply and services in this EOI which are domestically manufactured with sufficient domestic capacity as identified in Annexure-I of MOP order dated 16/11/2021 including its subsequent revisions shall necessarily be sourced from the class-I local suppliers only as per the extant provisions of the Public Procurement (Preference to Make in India) Orders issued by DPIIT and MoP.
   Any violation w.r.t Make in India and minimum local content (MLC) requirements as specified shall be sole responsibility of the applicant.

3. Any Applicant (including its Collaborator/Associate/DJU Partner/JV partner/Consortium Member/Assignee, wherever applicable) from a country which shares a land border with India will be eligible to bid in this EOI only if Applicant is registered with the Competent Authority. Further, any Applicant having specified Transfer of Technology (ToT) arrangement with an entity from a country which shares a land border with India, will be eligible to bid only if the Applicant is registered with the competent authority. (Definition/Requirement of ToT shall be as specified in DOE OM Ref. No. F.7/10/2021- PPD(1) dated 23.02.2023). However, the said requirement of registration will not apply to bidders from those countries (even if sharing a land border with India) to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects.

   Further the successful Applicant shall not be allowed to sub-contract services/works to any “Sub-contractor” from a country which shares a land border with India unless such Subcontractor is registered with the competent Authority.
   It shall be the sole responsibility of Applicant to comply with MII and Public procurement guidelines issued time to time by DPIIT/MoF/DoE/MoP including its clarifications and amendments.

(INVITATION FOR EXPRESSION OF INTEREST)

Annexure-2

GENERAL INFORMATION TO BE SUBMITTED BY APPLICANT

1. Name of Applicant Company:
2. Legal status of the Applicant Company:
3. Brief description of the Company with details of its business groups/subsidiaries/ affiliates:
4. Date of Incorporation:
5. Date of Commencement of Business:
6. Shareholding details:
7. Full address including Telephone nos. / Fax nos.:
   a. Registered Office:
   b. Head Office:
   c. Address for communication:
   d. Contact Details:
   e. Office Address in India, if any:
8. Existing Infrastructure & design facilities – locations, capacity, Complete address.
9. Information to be furnished:

   Financial Credentials for preceding four financial years as on the date of EOI submission –

   i. Average Annual Turnover for preceding four (4) financial years.
   ii. Net worth for the preceding financial year.
   iii. Paid up Share capital for the preceding financial year.

10. We confirm that we are interested in Design, Engineering, Manufacturing, Supply, Erection, Testing & Commissioning of efficient Sub-Critical Thermal Power Units **of 250 MW size** on EPC basis suitable for **two shift operation** & Technical Minimum Load (TML) as -
    a. 40% TML – Yes / No
    b. 30% TML – Yes / No
    c. 25% TML – Yes / No
11. We agree that the reference units shall be considered successful based on minimum one-year completion criteria. We also agree that the successful completion of the project to establish performance shall be as stipulated by NTPC for respective system (s) / equipment(s).
12. We confirm that the Steam Generator, Steam turbine & Generator and BOP design & further activities will follow specification requirements as well as Codes and Standard as applicable & specified.

(Sign & Company Seal)
Authorized signatory

Annexure-3

MANDATORY ESSENTIAL INFORMATION TO BE SUBMITTED BY APPLICANT PERTAINING TO MINIMUM QUALIFYING CRITERIA AND ADDITIONAL REQUIREMENTS MENTIONED AT ANNEXURE-B

Mandatory Essential Information:

Applicant Qualifying Route (as per Annexure-B)	Mention Qualifying Route	Additional Data/ Details
Route 1.1.0		Associate/Collaborator details as applicable
Route 1.2.0		Associate/Collaborator details as applicable
Route 1.3.0		Consortium partner Details as applicable

I. For Steam Generator:

		Write Yes/No & provide details with attachments.	
S.No.	**Information/ Details Head**	**YES/ NO**	**Additional Data/ Details**
A	Details to be filled by applicant meeting the requirement as per **Route 1.1.0** as detailed below		Associate/Collaborator details as applicable
1	Name of Applicant/ Collaborator/ Associate meeting requirements of Route 1.1.0 (as the case may be)		
2	Name of JV/Subsidiary (if applicable)		Attach organization details along with QSGM Equity details as per Note for Clause 1.1.0
3	The applicant or its associate/ collaborator meeting the requirements of Route 1.1.0 has at least one no. of unit, which is-		Specify Name of Plant/ Unit meeting the qualifying criteria
(a)	Designed	Yes/ No	
(b)	Engineered	Yes/ No	
(c)	Manufactured	Yes/ No	
(d)	Got Manufactured	Yes/ No	
(e)	Erected	Yes/ No	
(f)	Supervised Erection	Yes/ No	
(g)	Commissioned	Yes/ No	
(h)	Supervised Commissioning	Yes/ No	
(i)	Pulverised Coal fired	Yes/ No	Specify coal type, Ash content, GCV Specify Type of Steam generator, if not PC fired
(j)	Type of Steam Generator		

	i. Drum Type-Single Pass (Tower type)	Yes/ No	
	ii. Drum type – two pass arrangement	Yes/ No	
	iii. Once Through – Single Pass (tower Type)	Yes/ No	
	iv. Once through – two pass arrangement	Yes/ No	
	having Reheat	Yes/ No	
(k)	Having water wall tubing type		
	i. Spiral wound (inclined)	Yes/ No	
	ii. Vertical plain	Yes/ No	
	iii. Vertical rifled type	Yes/ No	
	iv. Any other type, specify	Yes/ No	
(l)	i. of at least 150MW Capacity	Yes/ No	Specify Unit capacity in MW
	ii. of at least 450 TPH steam capacity		Specify Steaming capacity in TPH
(m)	in successful operation for period of at least one year prior to the date of EOI publication	Yes/ No	Specify Commissioning date, & successful operation years.
4	Specify range of Steam Parameters (SHO Pr/ SH Temp/ RH Temp., MS Pr/ MS Temp/ HRH Temp) for the reference unit referred at sl .no A.3 above		
5	Reference unit capability to operate with Variable pressure operation (VPO)	Yes/ No	Mention the VPO range
6	Details as per regular Indian manufacturer of coal fired steam generators		Provide Name & other details
(a)	No. of steam generators manufactured		
(b)	Type of steam generators manufactured		
(c)	Fuel Type		
(d)	Steam generators size & capacity		
(e)	Other details		
7	Design & manufacturing capabilities & infrastructure owned by the applicant		
a	Software Tools & Licenses (Name, License validity)		
b	Whether the source-codes of the necessary design tools/software's available for boiler, furnace & associated system design.		
c	Experience in Pulverized Coal fired Steam Generators i. Drum type, single pass arrangement (Tower type) sub-critical unit and its min. & max. capacity (MW) range. ii. Drum type, Two pass arrangement sub-critical unit and its min. & max. capacity (MW) range.	**YES/ NO** **YES/ NO**	Provide reference of Applicants or its Technology Provider/ QSGM, of at least one unit (Capacity>150MW) for each type declared, in India or Overseas.

	iii. Once-Through type single pass arrangement (Tower type) sub-critical unit and its min. & max. capacity(MW) range. iv. Once-Through type, Two pass arrangement sub-critical unit and its min. & max. capacity(MW) range.	**YES/ NO** **YES/ NO**	
d	Experience in Design, Engg. of Water wall tubing type for units upto 250MW size i. Vertical plain ii. Spiral wound (inclined) iii. vertical plain iv. vertical rifled	**YES/ NO** **YES/ NO** **YES/ NO** **YES/ No**	Provide reference of Applicants or its Technology Provider/ QSGM, of at least one unit (Capacity>150MW) for each type declared, in India or Overseas.
e	Experience in bio-mass co-firing with pulverised coal i. biomass co-firing up to 10%wt ii. biomass co-firing up to 20%wt iii. biomass co-firing up to 30%wt iv. biomass co-firing greater than 30%	**Yes/ No** **Yes/ No** **Yes/ No** **Yes/ No**	Add reference plant information. Specify type of biomass, max. % of cofiring by wt%
8	Location of design capabilities/software's & infrastructure facility		
9	Technical Expertise in the relevant field of qualifying criteria as per Annexure-B		
a	Experts/ Engineers (with Qualification)		
b	Experience (in years) of Engineers at A.8(a) above		
c	Mention specific features for **Two shift operation** & TML requirements.		
10	Data Security (Policy docs, compliance certificates etc)		
11	Areas/ Industrial Sectors of successfully completed projects		
11A	Successfully delivered projects in pulverized coal (PC) fired thermal power plants (>=150 MW units)	YES/ NO	
11B	Successfully delivered projects (PC fired steam generators >=450TPH capacity) other than thermal power plants.	YES/ NO	
12	Name of Steam Generator Technology collaborator/ Licensor		
13	Manufacturing Details of coal fired steam generators		
14	Scope division between the applicant and Technology collaborator.		
15	Mention design collaborator/ technology partner for load cycling (**Two shift operation** & TML) related design requirements (attach credentials of the technology company proposed with credentials)		

B	**Information related to Additional requirement (Annexure-B, cl. 2.1.0)**	**Provide Yes/No with capability details**	Refer Annexure-B ADDITIONAL REQUIREMENTS **Provide References wrt declared capability or actual achieved experience details**
1	Design of SG with Two shift/ Daily Start-stop operation capability	Yes/ No	
2	Design of SG having TML as i. 40% TMCR, ii. 30% TMCR iii. 25% TMCR	Yes/ No Yes/ No Yes/ No	
3	SG designed for max. number of start-stop cycles, considering 25 years of life w.r.t. a) Two shift/ daily start stop operations b) at least 40% TML	Yes/ No Yes/ No	
4	Mention Ramp-rates (% of TMCR per minute) for the unit		
5	Capabilities to design pressure parts for creep, fatigue & creep-fatigue loading criteria as also per EN-12952-3.	Yes/ No	
5A	In case of any other standard/code used for design of creep-fatigue loading criteria for pressure parts, Specify the relevant standard/ code.	Yes/ No	
6	Design of SG having Control Range of- a) 60%TMCR to 100% BMCR b) 50%TMCR to 100% BMCR c) 40%TMCR to 100% BMCR d) 30%TMCR to 100% BMCR Any other, specify range	**Yes/ No** **Yes/ No** **Yes/ No** **Yes/ No** **Yes/ No**	
7	Max. no. of Finish SH/ Finish RH Headers (each) designed for a 150 - 250MW unit- a) 2 b) 3 c) 4 d) If Other than above, specify details	**Yes/ No** **Yes/ No** **Yes/ No** **Yes/ No**	Also, include material of such headers and rated SH/RH steam temp.
7A	In case of unit size> 250MW unit in sl. No. B.7 above, specify details of no. of Finish SH/RH header & material along with rated temp	**Yes/ No**	
8	Burners designed/ supplied providing stable combustion (without any secondary fuel support) with unit operating at TML declared in sl. No. 2 above.	**Yes/ No**	Specify unit size and TML
8A	If No, in sl no. 8 above, provide min. load (%TMCR) upto which stable combustion persisted without any secondary fuel/ oil support.	**Yes/ No**	Specify unit size and TML
9	Whether any pc fired unit supplied with Online Coal Flow Measurement System	**Yes/ No**	Include details, along with measurement accuracy (%) of measurement of such system.
9A	Envisaged/ provided No. of Mills for 250MW / comparable flexible unit: a) 6 or higher b) 5	**Yes/ No** **Yes/ No**	

	c) 4 or lower	**Yes/ No**	
9B	No. of mills at full load corresponding to mills declared at 9A:		
9C	No of mills at TML: a) 40% b) 30% c) 25%		
9D	Envisaged firing type for 250MW / comparable flexible unit: a) Corner fired b) Twin-vortex corner fired c) front/ rear fired	**Yes/ No** **Yes/ No** **Yes/ No**	For other type, specify.
10	Whether any pc fired unit supplied/ retrofitted with Automatic Mill scheduler, Mill window etc.	**Yes/ No**	Provide details
11	Whether any pc fired sub-critical unit supplied with Flue Gas Re-circulation	**Yes/ No**	Provide details
12	Whether any pc fired sub-critical unit supplied/ retrofitted with Low Pressure Economizer	**Yes/ No**	Also include details efficiency gain, temperature drop in FG across LPE, min. LPE inlet/ exit temperatures
13	Whether any upgradation done in start-up & drain circulation system wrt conventional SG design/ supplied, in order to facilitate flexibilization	**Yes/ No**	Provide details
14	Whether any SG designed/ supplied required/ fitted with sub-critical unit supplied with Condensate Polishing Unit (CPU) – v. To meet the required water quality. vi. To facilitate faster unit start-ups.	**Yes/ No** **Yes/ No**	Provide details
15	Type of Nox control system designed for sub-critical units< 250MW a) Staged Combustion having one level SOFA b) Staged Combustion having two level SOFA c) Low Nox burner	**Yes/ No** **Yes/ No** **Yes/ No**	
16	Whether any supplied SG is designed to operate in single stream operation of auxiliaries (such as PA, FD, ID fans, APH etc.) at part load conditions.	**Yes/ No**	
17	Whether supplied any simulation programme for assessment/ upgrade of steam generator design and to assess the flexibility and other designed features, capabilities.	**Yes/ No**	If Yes, Provide details through separate attachment
18	Additional proven design features towards improving the flexibilization & heat rate of the units	**Yes/ No**	If Yes, Provide details through separate attachment
19	Details of the design features with **Two shift operation** & TML as 40%, 30% and 25%	**Yes/ No**	If Yes, Provide details through separate attachment
20	Proposed/ Existing Tie-ups with Collaborators/ Technology Partners/	**Yes/ No**	Provide Name of Proposed Collaborator and add credentials

	Reputed Expert Organizations for Consultation, Implementation, and Vetting of Flexible Unit Design and similar Additional Requirements features in a Steam Generator		of such collaborator in separate attachment.
21	Whether any design interventions by applicant (self or in technology agreement) for making the sub-critical units capable of meeting the CEA requirements of flexible units specifically the following but not limited to-		Specify details
a)	Drum Thickness		
b)	Enhancing Creep-fatigue life of components		
c)	Firing system (mills, burners etc.)		
d)	Advanced Process control		
e)	Any other interventions		
22	Performance data (100%, 60%, 55%, 40%, 30% & 25% of TMCR		
a)	Boiler efficiency		
b)	TG Cycle heat rate		
c)	Aux. Power Consumption.		
d)	Cycle efficiency %		

Note: Any information not furnished/ partial information provided against the above requirements shall be construed as non-availability of the requisite capability/ experience for the corresponding requirement.

II. For Steam Turbine Generator:

		Write Yes/No & provide details with attachments	
S.No.	**Information/ Details Head**	**Details**	**Additional Data**
A	**Information related to Qualifying Criteria**		
1	Details to be filled by applicant meeting the requirement as per **Route 1.1.0** as detailed below		Refer Annexure-B for qualifying requirements
2	Name of Applicant/ Collaborator/ Associate meeting requirements of Route 1.1.0 (as the case may be)		
2 a)	Name of JV/Subsidiary (if applicable)		Attach organization details along with QSTGM Equity details as per Note for Clause 1.1.0
3	The applicant or its associate/ collaborator meeting the requirements of Route 1.1.0 has at least one no. of unit, which is-		Specify Name of Plant/ Unit meeting the qualifying criteria
a	Designed	Yes/ No	
b	Engineered	Yes/ No	
c	Manufactured	Yes/ No	
d	Got Manufactured	Yes/ No	
e	Erected	Yes/ No	
f	Supervised Erection	Yes/ No	

g	Commissioned	Yes/ No	
h	Supervised Commissioning	Yes/ No	
4	Details for Steam Turbine Generator		
4.1	Description & Name of project for Steam turbine Generator		Specify Name of Plant/ Unit meeting the qualifying criteria
4.2	Name of Client with full address, FAX No. & Tel No.		
4.3	Purchase Order/ Contract No./ LOA No. and Date		
4.4	Name of Thermal Power Station & Location		
4.5	Whether aforesaid Thermal Power station is fossil fuel fired		
4.6	No. of unit(s) of Turbine set supplied to the station		
4.7	Make of Turbine		
4.8	Number of cylinders (HP/IP/LP)		
4.9	Module number/description (HP/IP/LP)		
4.10	Steam Parameters at turbine inlet a. Main steam pressure (kg /cm^2 (abs)) b. Main steam Temperature (° C) c. Reheat Steam Temperature (° C)		
4.11	Whether the Turbine Set a) is of Reheat type b) consists of separate HP, IP and LP cylinders c) is Tandem Compound d) directly coupled with generator	Yes/No Yes/No Yes/ No Yes/No	
4.12	Capacity in MW of each unit		
4.13	Condenser Type : a) Water Cooled b) Air Cooled c) Design vacuum		
4.14	Whether the scope of work executed for the aforesaid Steam Turbine Set included a) Design b) Engineering c) Manufacturing d) Erection e) Supervising Erection f) Commissioning g) Supervising Commissioning		
4.15	Steam Turbine Set a) Designed by b) Engineered by c) Manufacture by d) Erection by e) Supervision of Erection by f) Commissioning by g) Supervision of Commissioning by		
4.16	Actual Date of commissioning		
4.17	Date of commencement of successful operation		
4.18	Factory /Works where the Steam turbine rating equal to 150 MW or more was Manufactured, assembled & tested		

4.19	Factory/works where the offered Steam Turbine is proposed to be Manufactured, assembled and tested		
4.20	Whether work executed under technology collaboration, (yes/no) **If Yes**, a. Name of Technology collaborator b. Validity of Technology Transfer Agreement (mention Date)		
4.21	Execution Time (in months):		
4.22	Certificate from the Owner of the reference plant that the aforesaid Steam Turbine Generator Set with their Associated Auxiliaries and facilities is in successful operation for a period of not less than 1 year prior to last date of EOI submission		
B	**Information related to Additional requirement (Annexure-B, cl. 2.2.0)**	**Provide Yes/No with capability details**	Refer Annexure-B ADDITIONAL REQUIREMENTS **Provide References wrt declared capability or actual achieved experience details**
5	**Additional requirement (Annexure-B, cl. 2.2.0) w.r.t. Steam Turbine**		
5.1	Mention & attach specific design features for **Two shift operation**		
5.2	Mention max. number of start-stop cycles, considering 25 years of life wrt a) Two shift/ daily start stop operations b) at least 40% TML		
5.3	Mention Ramp-rates (% of TMCR per minute) for the unit		
5.4	Mention specific design feature steam turbine Cyclic loading, ramping requirement & Technical Minimum Load (TML) as 40%, 30% and 25%.		
5.5	Mention specific design feature of steam turbine LP Turbine last & second last stage blading to handle moisture and flow separation.		
5.6	Mention capabilities to design Steam turbine Generator & its parts for creep, fatigue & creep-fatigue loading criteria		
5.7	Details of collaborator/technology partner for **Two shift operations**, & Technical Minimum Load (TML) as 40%, 30% and 25%		
5.8	Plant details wherein the above **Two Shift operation** & TML interventions carried out		
i	No. of years in successful operation		
ii	Ramp rate designed & achieved		
iii	TML designed & achieved		
a	40%		
b	30%		

c	25%		
iv.	Specify the following details of unit mentioned at sl.no, 5.8 above		
a	Turbine inlet Pressure		
b	Main Steam Inlet Temp		
c	IPT inlet Temp (HRH Temp.)		
d	Steam turbine TG Cycle Heat Rate		
e	Design vacuum		
5.9	Additional proven design features towards improving the flexibilization & heat rate of the units		
5.10	Whether any design interventions by applicant (self or in technology agreement) for making the sub-critical units capable of meeting the CEA requirements of flexible units specifically the following but not limited to-		
a	HP, IP & LP Rotors and Casings		
b	Steam Turbine Valves		
c	Changes in Turbine Control/Governing system		
d	Exhaust hood spray		
5.11	Performance data (100%, 60%, 55%, 40%, 30% & 25% of TMCR)		
i	Boiler efficiency		
ii	TG Cycle heat rate		
iii	Aux. Power Consumption.		
iv	Cycle efficiency %		
Note: Any information not furnished/ partial information provided against the above requirements shall be construed as non-availability of the requisite capability/ experience for the corresponding requirement.			
III. Details for Generator			
1	**Details for Generator**		
1.1	Description & Name of project for Generator		Specify Name of Plant/ Unit
1.2	Name of Client with full address, FAX No. & Tel No.		
1.3	Purchase Order/ Contract No./ LOA No. and Date		
1.4	Name of Thermal Power Station & Location		
1.5	Whether aforesaid Thermal Power station is fossil fuel fired	Yes/ No	
1.6	No. of unit(s) of Generator set supplied to the station		
1.7	Make of Generator		
1.8	Model No of Generator		
1.9	MVA rating of Generator		
1.10	MW rating of Generator		
1.11	Rated Voltage of Generator		

1.12	Cooling Medium (e.g. Water, hydrogen etc) (i) Stator Core (ii) Stator Winding (iii) Rotor		
1.13	Number of shaft mounted fans		
1.14	Thermal Class of Insulation (ii) Stator (iii) Rotor		
1.15	Type of Excitation System		
1.16	Details of Core & Core support system (e.g. Spring type/ Rigid type etc.)		
1.17	No. of designed start/stops of the Generator over its entire life to meet the requirement of **two shift operation**		
1.18	Whether the scope of work executed for the aforesaid Generator Set included a) Design b) Engineering c) Manufacturing d) Testing e) Erection f) Supervising Erection g) Commissioning h) Supervising Commissioning		
1.19	Generator Set a) Designed by b) Engineered by c) Manufacture by d) Tested by e) Erection by f) Supervision of Erection by g) Commissioning by h) Supervision of Commissioning by		
1.20	Actual Date of commissioning		
1.21	Date of commencement of successful operation		
1.22	Factory /Works where the Generator rating equal to 150 MW or more was Manufactured, assembled & tested		
1.23	Factory/works where the offered Generator is proposed to be Manufactured, assembled and tested		
1.24	Whether work executed under technology collaboration, (yes/no) **If Yes**, a. Name of Technology collaborator b. Validity of Technology Transfer Agreement (mention Date) Whether Deed of Joint Undertaking (DJU) with Technology collaborator submitted (***Yes/No***)		
1.25	Execution Time (in months):		
1.26	Latest/ recent certificate from client that the generator with above technical parameters is in		

	successful operation for a period of not less than one (1) year prior to the date of publication of this EOI (actual time period to be mentioned) and caused no serious problem in past, is enclosed at Attachment....		
1.27	List of above Generators (with date of supply) already manufactured, assembled & tested in the factory/ works mentioned at S.No.(1.22) above is enclosed at Attachment....		
S.No.	**Information/ Details Head**	**Details**	**Additional Data**
IV	Details to be filled by applicant meeting the requirement as per **Route 1.2.0**		**Attach details**
IV. A	Details to be filled by applicant meeting the requirement as per **Route 1.2.0** as detailed below		
1	Experience details of Applicant meeting the requirement of Route 1.2.0, for at least one unit which is-	Name of EPC Applicant	
a	Executed on EPC basis	Yes/ No	
b	having 150MW capacity	Yes/ No	
c	pc fired unit	Yes/ No	
d	having steam generator	Yes/ No	
e	having steam turbine generator	Yes/ No	
f	along with aux. equipments	Yes/ No	
g	having ESP/ bag filters	Yes/ No	
h	having switchyard	Yes/ No	
i	having CHP	Yes/ No	
j	Having Ash Handling plant	Yes/ No	
k	Having cooling towers	Yes/ No	
l	Having condenser cooling water system	Yes/ No	
m	Type of Steam generator		
n	Type of Steam Turbine Generator		
o	Including associated civil works for the above equipment and systems	Yes/ No	
p	In successful operation for a period of not less than one (1) year prior to the last date of submission of EOI.	Yes/ No	
q	Unit Size in MW for which above work carried out		
2	Specify the following details of unit mentioned at sl.no, V.A 1 above		
a	Superheater Outlet Pressure		In ksc-g
b	SH Temp.		In deg-C
c	RH Temp.		In deg-C
d	Steam Generator Efficiency		
e	Aux. Power Cons. %		

f	Cycle efficiency %		
g	Whether unit has Condensate Polishing Unit	Yes/ No	
h	Turbine inlet Pressure		
i	Main Steam Inlet Temp		
j	IPT inlet Temp (HRH Temp.)		
k	Steam turbine TG Cycle Heat Rate		
l	Design vacuum		
m	No. of sub-cr. Units supplied		Details with MW
3	Details of Qualified Steam Generator Manufacturer meeting the requirements as indicated at clause 1.1.1(a).		
4	Details of Qualified Steam Turbine Generator Manufacturer meeting the requirements stipulated at 1.1.1(b) in conjunction with 1.1.4 (as applicable)		
5	Details of Qualified Generator Manufacturer (QGM) in case Applicant's associate is steam turbine manufacturer meeting the requirements of clause 1.1.1 (b) except for generator		
6.	Details of JV/Subsidiary of Qualified Steam Generator Manufacturer		Attach organization details along with QSGM Equity details as per Note for Clause 1.1.0
7.	Details of JV/Subsidiary of Qualified Steam Turbine Generator Manufacturer		Attach organization details along with QSTGM Equity details as per Note for Clause 1.1.0
8.	Experience details as per Sl no 3 above		**Details to be filled inline with data required as per Sl no I**
9.	Experience details as per Sl no 4 above		**Details to be filled inline with data required as per Sl no II**
10.	Experience details as per Sl no 5 above		**Details to be filled inline with data required as per Sl no III**
S.No.	**Information/ Details Head**	**Details**	**Additional Data**
	Details to be filled by applicant meeting the requirement as per **Route 1.2.0**		
IV. B	Details to be filled by applicant meeting the requirement as per **Route 1.2.0** as detailed below		
1	As per Route 1.2.0, Details of the Industrial Project carried out on EPC basis in the area- (a) Power (b) Steel (c) Oil and Gas (d) Petro Chemical (e) Fertilizer		**Attach details**

	(f) FGD (g) Cement (h) Any other process industry		
2	Unit Size in MW for which above work carried out		**Attach details**
3	Reference plant which is in successful operation for a period of not less than 1 year prior to last date of EOI submission		**Attach details**
4	Whether cumulative value of EPC orders executed is INR 10000 million or more	**Yes/No**	**Include supporting document**
5	Whether Single EPC contract executed value is INR 4000 million or more	**Yes/No**	**Include supporting document**
6	Details of Qualified Steam Generator Manufacturer meeting the requirements as indicated at clause 1.1.1(a)		
7	Details of Qualified Steam Turbine Generator Manufacturer meeting the requirements stipulated at 1.1.1(b) in conjunction with 1.1.4 (as applicable)		
8	Details of Qualified Generator Manufacturer (QGM) in case Applicant's associate is steam turbine manufacturer meeting the requirements of clause 1.1.1 (b) except for generator		
9	Details of JV/Subsidiary of Qualified Steam Generator Manufacturer		Attach organization details along with QSGM Equity details as per Note for Clause 1.1.0
10	Details of JV/Subsidiary of Qualified Steam Turbine Generator Manufacturer		Attach organization details along with QSTGM Equity details as per Note for Clause 1.1.0
11	Experience details for Sl no 6 above		**Details to be filled in line with data required as per Sl no I**
12	Experience details for Sl no 7 above		**Details to be filled in line with data required as per Sl no II**
13	Experience details for Sl no 8 above		**Details to be filled in line with data required as per Sl no III**
	Details to be filled by applicant meeting the requirement as per **Route 1.2.0**		
IV. C	**Details to be filled by applicant meeting the requirement as per Route 1.2.0 as detailed below**		
1	Name of Applicant meeting requirements of Route 1.2.0 (as the case may be)		
1.1	Mention whether scope of work executed under Clause 1.2.0 by itself or Under Collaboration (Details of Collaborator-if applicable)		Separate details for Steam generator, Steam turbine and Generator to be furnished

2	The applicant meeting the requirements of Route 1.2.0 has at least one no. of unit, which is-		Specify Name of Plant/ Unit meeting the qualifying criteria
a	Designed	Yes/ No	
b	Engineered	Yes/ No	
c	Manufactured	Yes/ No	
d	Got Manufactured	Yes/ No	
e	Erected	Yes/ No	
f	Supervised Erection	Yes/ No	
g	Commissioned	Yes/ No	
h	Supervised Commissioning	Yes/ No	
i	Whether PC fired	Yes/ No	
j	Unit Size in MW for which above work carried out		
k	In successful operation for a period of not less than one (1) year prior to the last date of submission of EOI.		
l	Type of Steam generator		
m	Type of Steam Turbine Generator		
4	Details of Qualified Steam Generator Manufacturer meeting the requirements as indicated at clause 1.1.1(a).		
5	Details of Qualified Steam Turbine Generator Manufacturer meeting the requirements stipulated at 1.1.1(b) in conjunction with 1.1.4 (as applicable)		
6	Details of Qualified Generator Manufacturer (QGM) in case Applicant's associate is steam turbine manufacturer meeting the requirements of clause 1.1.1 (b) except for generator		
7	Details of JV/Subsidiary of Qualified Steam Generator Manufacturer		Attach organization details along with QSGM Equity details as per Note for Clause 1.1.0
8	Details of JV/Subsidiary of Qualified Steam Turbine Generator Manufacturer		Attach organization details along with QSTGM Equity details as per Note for Clause 1.1.0
9	Experience details as per Sl No 4 above		**Details to be filled in line with data required as per Sl no I**
10	Experience details as per Sl No 5 above		**Details to be filled in line with data required as per Sl no II**
11	Experience details as per Sl No 6 above		**Details to be filled in line with data required as per Sl no III**

V	Details of Consortium as per Route 1.3.0		Attach details
1	Consortium partners meeting the requirements as indicated at clause 1.1.1(a) OR Indian subsidiary / JV Company of Qualified Steam Generator Manufacturer as the case may be along with requirements stipulated at Note for Clause 1.1.0.		
2	Consortium partners meeting the requirements as indicated at clause 1.1.1(b) OR Indian subsidiary / JV Company of Qualified Steam Turbine Generator Manufacturer as the case may be along with requirements stipulated at Note for Clause 1.1.0.		
3	Consortium partners meeting the requirements as indicated at clause 1.2.1		
4	Details of Qualified Generator Manufacturer (QGM) in case one of the Consortium partners who meets the requirements of clause 1.3.2 except for generator		
5	Lead Partner details		
6	Type of steam generator and the steam turbine generator offered		
7	Experience details of Consortium Partners		**Attach details**
8	Experience details of Consortium Partners mentioned at Sl no 1 above		**Details to be filled in line with data required as per Sl no I**
9	Experience details of Consortium Partners mentioned at Sl no 2 above		**Details to be filled in line with data required as per Sl no II**
10	Experience details of Consortium Partners mentioned at Sl no 3 above		**Details to be filled in line with data required as per Sl no IV A/B/C as applicable**
11	Experience details of QGM mentioned at Sl no 4 above		**Details to be filled in line with data required as per Sl no III**

Note: 1. Add additional rows for requisite information.

2. Any other data pertaining to EPC scope may also be furnished.

SCHEDULES

(SCHEDULES ARE TO BE FILLED UP AND SUBMITTED IN MS WORD FORMAT. All CREDENTIALS/SUPPORTING DOCUMENTS RELEVANT TO THE SCHEDULES ARE TO BE SUBMITTED PREFERABLY IN SINGLE PDF FILE)

(All the documents are to be submitted on Company's Letter Head)

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule – 1

(Company Profile and Organization Structure)

Name of the Company:

Registered Address:

Contact Person & Designation:

Postal address for communication:

Telephone No.:

Fax No.:

E-mail address:

Document regarding Organization Structure and Ownership to be enclosed.

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule – 2

(TURNOVER OF THE COMPANY IN THE LAST FOUR FINANCIAL YEARS AND NETWORTH OF THE COMPANY)

A) We confirm that annual turnover of M/s..... **[Applicant]** for the preceding four financial years is indicated below:-

Sl. No.	Financial Year	Turnover amount (In Million Rs.)
1.	25-26	
2.	24-25	
3.	23-24	
4.	22-23	

B) We confirm that Networth of M/s…**……[Applicant]** for the preceding four financial years is indicated below:-

Sl. No.	Financial Year	Networth (In Million Rs.)
1.	25-26	
2.	24-25	
3.	23-24	
4.	22-23	

We have enclosed Balance Sheets and Profit & Loss account duly certified by Chartered Accountant

We hereby confirm that net worth of M/s ---------- (Applicant) as on the last day of the preceding financial year on the date of publication of the EOI is given below:-

Sl. No.	Description	As on last day of the preceding financial year
1.	Paid-up Share Capital	
2.	Net worth	
3.	% age of Net worth to paid-up Share Capital	

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule - 3

1. Indicative typical layout drawing of coal fired steam generator & associated systems to be attached for reference.

2. Indicative typical layout drawing of steam turbine generator & associated systems to be attached for reference.

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule - 4

Broad time schedule for executing the 1x250 MW, 2x250 MW, 3x250 MW Sub-Critical Thermal Power Unit -

S. No.	Activities/Milestone	Period in months from date of award	
		Start	Finish
1.	Design & Engineering		
2.	Manufacturing		
3.	Transportation/Supply		
4.	Erection		
5.	Commissioning & testing		
6.	Completion of facilities		
7.	Any other activity		
8	Phase difference between Units		

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule – 5

Additional Information relevant to the work / assignment to be enclosed:

1. Scope division with details between applicant & technology collaborator.
2. Details of additional design features as per 'Additional Criteria'.
3. Suggestions for enhancing participation of technologically capable vendors.
4. Whether design simulation capabilities like FEM (finite element method analysis), CFD etc. exist with the applicants. Provide details.
5. Any other information

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule – 6

Details of indicative costing for 1x250 MW, 2x250 MW, 3x250 MW configurations and Incremental cost details for of 30% and 25% TML

Sl No	Description	BTG Cost	BOP Cost	Total Plant Cost
1	Applicant to give the indicative Cr per MW cost for specified scope of work in this EOI	INR……. Cr/MW	INR…… Cr/MW	INR …… Cr/MW
a	1x250 MW unit configuration			
b	2x250 MW Unit configuration			
c	3x250 MW unit configuration			
2	Applicant to give indicative incremental cost for specified scope of work in this EOI	INR …… Cr	INR ……Cr	INR ……Cr
a	Designing 1x250 MW unit with 30% TML			
b	Designing 2x250 MW unit with 30% TML			
c	Designing 3x250 MW unit with 30% TML			
d	Designing 1x250 MW unit with 25% TML			
e	Designing 2x250 MW unit with 25% TML			
f	Designing 3x250 MW unit with 25% TML			
3.	Number of Sub-critical units of 250 MW size Applicant can offer	----------		

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule – 7

Details of Recommended Mandatory Spares

(INVITATION FOR EXPRESSION OF INTEREST)

(To be submitted on Company's Letter Head)

Schedule – 8

We declare that we can offer _____ number of Sub-critical units of 250 MW size.

APPENDIX- FUEL CHARACTERISTICS

(Annexure-IV-2 Standard Coal Characteristics, Annexure-IV-7(A,B,C,D) Biomass Characteristics)

ANNEXURE-IV-2

STANDARD COAL CHARACTERISTICS

S.No.	Characteristics		Range of coal supplies 95%			Range of coal supplies 5%	
	(as received basis)		Column - 1	Column - 2	Column - 3	Range of Adequacy Coal	
1	PROXIMATE ANALYSIS		Design	Worst	Best	Worst	Best
1.1	Total Moisture (%)		14	15	12	16	11
1.2	Ash (%)		41	45	38	46	30
1.3	Volatile Matter (%)		21	19	24	19	26
1.4	Fixed Carbon (%)		24	21	26	19	33
1.5	Total (%)		100	100	100	100	100
2	ULTIMATE ANALYSIS						
2.1	Carbon (%)		34.75	30.5	37.84	29.23	44.7
2.2	Hydrogen (%)		2.32	2.25	2.8	2.1	2.98
2.3	Sulphur (%)		0.4	0.35	0.5	0.35	0.55
2.4	Nitrogen (%)		0.85	0.6	1.2	0.55	1.3
2.5	Oxygen (%)(By difference)		5.95	5.83	6.72	5.32	8.45
2.6	Total Moisture (%)		14	15	12	16	11
2.7	Ash (%)		41	45	38	46	30
2.8	Carbonates (%)		0.58	0.32	0.78	0.3	0.86
2.9	Phosphorus (%)		0.05	0.03	0.08	0.02	0.1
2.10	Chloride (%)		0.1	0.12	0.08	0.13	0.06
2.11	Trace Elements (ppm)						
	Arsenic	ppm	0.035	0.04	0.03	0.05	0.02
	Lead	ppm	25	30	10	35	10
	Mercury	ppm	0.06	0.1	0.02	0.15	0.01
	Selenium	ppm	0.3	0.5	0.03	0.6	0.02
	Total		100	100	100	100	100
2.12	GCV (Kcal/Kg)		3300	3000	3750	2900	4300
2.13	Hard Grove Index		55	50	60	50	70
2.14	YGP		75	80	70	85	65

3	ASH ANALYSIS						
3.1	Silica (%)		58.52	57.8	60.12	57.3	61.2
3.2	Alumina (%)		28.17	27.42	28.67	27.1	29.1
3.3	Iron Oxide (%)		7.2	7.6	6.03	8	5.5
3.4	Titania		1.68	1.78	1.56	1.86	1.32
3.5	Phosphoric Anhydride (%)		0.6	0.8	0.46	0.82	0.12
3.6	Lime (%)		1.36	1.7	1.32	1.84	1.05
3.7	Magnesia (%)		0.74	1.22	0.5	1.28	0.31
3.8	Sulphuric Anhydride (%)		0.2	0.08	0.3	0.08	0.32
3.9	Sodium Oxide (%)		0.3	0.26	0.5	0.12	0.65
3.1	Balance Alkalies (by difference)		1.23	1.34	0.54	1.6	0.43
	Total		100	100	100	100	100
4	ASH FUSION RANGE						
	REDUCING ATMOSPHERE						
4.1	Initial Deformation Temp.(°C)		1150	1100	1200	1100	1200
4.2	Hemispherical Temp. (°C)		1300	1250	1350	1250	1350
4.3	Fusion Temperature (°C)		1400	1400	1400	1400	1400

Annexure-IV-7(A)

S.N.	Technical Data	Unit	Specifications for Torrefied Pellet
1.	Base Material		**Agro residue:** Which means the leftover portion of the agriculture produce such as stubble/straw/stalk/husk of those agro residue which are surplus and not being used as animal fodder such as paddy, soya, arhar, gwar, cotton, gram, jawar, bajara, moong, mustard, seasam, til, maize, sunflower, jute, coffee etc., groundnut shell, coconut shell, castor seed shell etc., pine needle, elephant grass, sarkanda and horticulture waste such as dry leaves and trimmings generated during the maintenance and pruning of trees and plants. Wood obtained from tree cutting shall not be treated as agro residue and shall be not to be used as base material or mixing purpose whatsoever.
2.	Diameter	mm	In case of cylindrical shape: Diameter: Not more than 35 mm Length: Random For other shapes: No dimension should exceed 35 mm.
3.	Fines % (<3 mm) (ARB*)	Wt%	fines ≤ 5%
4.	Gross Calorific Value (GCVARB*)	Kcal/Kg	**Refer below**
5.	Moisture (ARB*)	Wt%	<= 15% (not more than 15%)
6.	Bulk density	Kg/m^3	600

*ARB – As Received Basis

Annexure-IV-7(B)

The sample was prepared by torrefying rice straw at 300 deg C with a holding time of one hour. Following analysis are carried out at NETRA using the powdered torrefied rice straw samples and the results of various testing for the specific sample is tabulated below:

a. Proximate Analysis (wt %, Air Dried Basis)

M	Ash	VM	FC
6.68	21.66	47.68	23.98

b. Ultimate Analysis (wt %, Air Dried Basis)

C	H	N	S	O
46.65	3.93	1.13	0.14	19.81

c. GCV : 4201 kcal/kg

d. Ash Fusion Temperature under reducing conditions: ^{0}C

IDT	ST	HT	FT
1134	1357	1374	1422

e. Ash Elemental Analysis (Elements expressed as Oxides in %w/w)

Na2O	MgO	Al2O3	SiO2	P2O5	SO3	K2O	CaO	TiO2	MnO	Fe2O3
2.423	7.783	4.623	67.48	1.9	1.9	6.15	4.21	0.39	0.03	2.83

Annexure-IV-7(C)

For the Torrefied Rice Straw Pellets (Prepared by torrefaction of rice straw at 300 deg C with holding time of 1 hr) tested at NETRA, the test results are as follows:

A. For Anion (ISO 16994:2016 E-Solid Biofuels- Determination of total content of sulphur and chlorine)-reported as wt % dry basis

a. Chlorine (Cl): 0.32%

b. Fluorine (F) : 0.09%

B. For Cation (ISO 16967:2015 E-Solid Biofuels- Determination of major elements …)- Reported as wt % dry basis

a. Sodium (Na): 0.31%

b. Potassium (K): 2.04%

Note: The above details as at Annexure-IV-7(A), IV-7(B & IV-7(C) are indicative only and shall vary based on the exact raw material and its subsequent processing.

Annexure-IV-7(D)

SPECIFICATIONS FOR NON-TORREFIED BIOMASS PELLETS

S. N.	Technical data	Unit	Specifications of Non-Torrefied Biomass pellets
1	Base Material	-	Agro residue
2	Shape and Size	mm	Cylindrical shape: Diameter: Not more than 25 mm Length: should not exceed 35 mm.
3	Fines% (length<3 mm) (ARB*)	Wt %	fines ≤ 5% [Less than 5% by weight]
4	Gross Calorific Value (GCV-ARB*)	kCal/kg	Acceptable range 2800 kCal/Kg to 4000 kCal/kg [both inclusive]
5	Moisture (ARB*)	Wt %	Not more than 14%
Raw Material for pellet Manufacturing			• Base material for pellet manufacturing shall be agro residue, which means the leftover portion of the agriculture produce, such as stubble/straw/stalk/husk of those agro residues which are surplus and not being used as animal fodder, such as paddy, soya, arhar, gwar, cotton, gram, jawar, bajara, moong, mustard, sesame, til, maize, sunflower, jute, coffee etc., groundnut shell, coconut shell, castor seed shell etc., pine needle, elephant grass, sarkanda, bamboo and its by product (e.g. Bamboo chips, Cuttings, Bamboo Dust etc.) and horticulture waste such as dry leaves and trimmings generated during the maintenance and pruning of trees and plants. • Agro residue-based biomass pellets can be manufactured by single base material or mixing multiple base materials together. • Mixing materials such as by product of woodwork factory such as wood chips, saw dust, furniture waste etc., bagasse, press mud, molasses or natural additives/binder such as lignin, starch, and animal dung may also be used with agro residue in limited proportion to enhance material properties and same shall be explicitly mentioned by supplier in consignment details.

*ARB – As Received Basis

NON-TORREFIED BIOMASS CHARACTERISTICS

(A) BIOMASS PELLET CHARACTERISTICS

S.N.	Test Parameters	Observed Results	Test Method
1	**Proximate analysis**		
	Moisture (ADB), % by mass	5.62	IS: 1350 (P-1) 1984
	Ash content, % by mass	18.90	IS: 1350 (P-1) 1984
	Volatile matter, % by mass	65.95	IS: 1350 (P-1) 1984
	Fixed Carbon, % by mass	9.53	IS: 1350 (P-1) 1984
	Gross calorific value, kcal/kg	3855	IS: 1350 (P-2) 1970
	Net calorific value, kcal/kg	3601	IS: 1350 (P-2) 1970
	Ignition temperature, ºC	240	ASTM E1491
	Chlorine, % by mass	0.61	ASTM D4208-13
2	**Ultimate analysis**		
	Carbon, %	42.08	IS: 1350 (P-4/sec 1) 1974
	Hydrogen, %	4.79	IS: 1350 (P-4/sec 1) 1974
	Nitrogen, %	0.65	IS: 1350 (P-4/sec 2) 1999
	Sulphur, %	0.02	IS: 1350 (P-3) 1969
	Ash, %	18.90	IS: 1350 (P-1) 1984
	Moisture (ADB),, %	5.62	IS: 1350 (P-1) 1984
	Oxygen, %	27.94	By difference

(B) ASH ANALYSIS

S. N.	Test Parameters	Observed Results	Test Method
1	**Chemical composition of ash**		**IS: 1355- 1984/XRF**
	Silica (as SiO_2), % by mass	56.41	
	Alumina (as Al_2O_3), % by mass	1.94	
	Iron Oxide (as Fe_2O_3), % by mass	2.05	
	Calcium Oxide (as CaO), % by mass	5.68	
	Magnesium Oxide (as MgO), % by mass	5.28	
	Sodium Oxide (as Na_2O), % by mass	0.11	
	Potassium Oxide (as K_2O), % by mass	16.58	
	Sulphate (as SO_3), by mass	2.42	
	Chloride (as Cl), % by mass	6.73	
	Zinc Oxide (as ZnO), % by mass	0.07	
	Manganese Oxide (as MnO), % by mass	0.59	
	Phosphate (as P_2O_5), % by mass	2.04	
2	**Ash fusion profile (Oxidizing medium)** Initial deformation temperature Softening temperature Hemispherical temperature Fusion temperature	 1111 1164 1184 1208	ASTM D1857-16
3	**Ash fusion profile (Reducing medium)** Initial deformation temperature Softening temperature Hemispherical temperature Fusion temperature	 1074 1022 1051 1074	ASTM D1857-16

Note: The above are typical specifications and characteristics of biomass pellet, however, same shall vary based on the exact raw material and its subsequent processing.