



Expression of Interest (EoI) for Technology Tie-up for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system

Subject: Technology Tie-up for pusher type grate/stoker fired boiler system for Municipal Solid Waste (MSW) based Waste to energy plant along with downstream pollution abatement system.

1) Introduction:

This Expression of Interest (EoI) seeks response from Original Equipment Manufacturers (OEMs) for technology tie-up for pusher type grate/stoker fired boiler system for Municipal Solid Waste (MSW) based Waste to energy plant along with downstream pollution abatement system, who are meeting the requirements of this EoI and are willing to be associated with BHEL through a License & Technology Collaboration Agreement on long term basis to enable BHEL to design, engineer, manufacture, assemble, quality control, test, supply, erect, commission, repair, service and retrofit all systems and components for pusher type grate/stoker fired boiler system for Municipal Solid Waste (MSW) based waste to energy plant along with downstream pollution abatement system.

1.1 About Bharat Heavy Electricals Limited (BHEL):

BHEL is a leading state owned company, wherein Government of India is holding 63.06% of its equity. BHEL is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing organization in India, catering to the core infrastructure sectors of Indian economy viz. energy, transportation, heavy engineering industry, defense, renewable and non-conventional energy. The energy sector covers generation, transmission and distribution equipment for hydro, thermal, nuclear and solar photo voltaic. BHEL has been in this business for more than 50 years and BHEL supplied equipment account for more than 57% of the total thermal generating capacity in India. BHEL is also listed in Indian stock exchanges. The company has 17 manufacturing units, 4 power sector regions, 8 service centers, 8 overseas offices and 15 regional offices besides host of project sites spread all over India and abroad. The annual turnover of BHEL for the year 2016-17 was US\$ 4.45 Billion*. BHEL's highly skilled and committed manpower of approximately 38160 employees, the state-of-the-art manufacturing facilities and latest technologies, has helped BHEL to deliver a consistent track record of performance. To position leading state owned companies as Global Industrial giant and as a recognition for their exemplary performance, Government of India categorized BHEL as "Maharatna Company" in 2013, empowering the company with enhanced autonomy in decision making. With the current order book exceeding US\$ 16.2 Billion*, BHEL is poised for excellent future growth. Our ongoing major technology tie-ups include agreements with GE Technology GmbH, Switzerland (for Once through Boilers and Coal Pulverisers); Siemens, Germany (for Steam Turbines, Generators and Condensers); Metso Automation Inc., Finland (for Control & Instrumentation); MHI, Japan (for Pumps); MHPs, Japan (for Flue Gas Desulfurization Systems); Vogt Power International, USA (for HRSG); GENP, Italy (for Compressors); Turbo Lufttechnik, Germany (for Fans), Sheffield Forge Masters International, UK (for Forgings) and Kawasaki Heavy Industries Ltd., Japan (for Stainless Steel Metro Coaches & Bogies). More details about the entire range of BHEL's products and operations are available at www.bhel.com.

1.2 High Pressure Boiler Plant (HPBP), Tiruchirappalli:

High Pressure Boiler Plant (HPBP), established in 1965 at southern part of India at Tiruchirappalli in state of Tamil Nadu is one of the major manufacturing units of BHEL dedicated to production of various kinds of Steam Generators. HPBP has established itself as leading reliable boiler manufacturer with worldwide references in numerous overseas territories including Europe, Middle-East, CIS countries and South-East Asia. HPBP not only manufactures pulverized coal fired boilers but also manufactures CFBC boilers, HRSGs, valves, oil field equipment and many other products of strategic importance for defense sector. HPBP has strong global reference base of various kind of boilers ranging from 30 MWe to 800 MWe. Valves division of HPBP manufactures around 100,000 valves a year.

[*Note: Currency conversion rate considered: 1 US \$= Rs. 64.84 as on 31st March 2017]



Expression of Interest (Eol) for Technology Tie-up for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system

2) Scope of cooperation:

BHEL is seeking Expression of Interest (Eol) from Original Equipment Manufacturers (OEMs) for technology tie-up for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system through License and Technology Collaboration Agreement.

Prospective collaborator shall be responsible for transferring necessary know-how & know-why to BHEL for pusher type grate/stoker fired boiler system for Municipal Solid Waste (MSW) based waste to energy plant along with downstream pollution abatement system.

Interested reputed OEMs with proven pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system are invited to submit their offer in response to this Eol, as per indicative scope of technology transfer given in **Annexure-1**.

Upon receipt of responses against this Eol, BHEL will review the responses to ascertain suitability of the offer and shortlist prospective collaborator for further discussions. Detailed discussions on commercial and other terms and conditions to finalize the Technology Collaboration Agreement (TCA) shall be held with shortlisted prospective collaborator. The detailed terms and conditions for such a paid-up license agreement shall be mutually agreed upon.

Typical Indian unsegregated and untreated Municipal Solid Waste (MSW) analysis, fired in waste-to-energy boiler system is provided in **Annexure - 5** for ready reference.

3) Prequalification requirements (PQR):

The prospective collaborator shall meet all of the following qualification requirements as on the date of submission of Eol:

3.1. Prospective collaborator should have at least five (05) years of experience in designing, engineering, manufactured/ got manufactured, erected/ supervised erection, commissioned/ supervised commissioning of state-of-the-art pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system. (Prospective collaborator is required to substantiate this PQR by providing supply reference or any other relevant documentary evidence).

AND

3.2. Prospective collaborator should have designed, engineered, manufactured/got manufactured, erected/supervised erection, commissioned/supervised commissioning of at least two (02) number of Waste to Energy boiler system employing waste fired grate system having rated capacity of at least 300 Tonnes per day per line capacity each or higher in at least two (02) different project locations. Further, such waste fired grate system should be of the type specified, i.e. grate fired cooling type (air cooled or water cooled) and moving (pusher) type (reciprocating or counter reciprocating or rotary) and all two (02) reference Waste to Energy Plants should have been in successful operation for a period of not less than two (02) year prior to the submission date of Eol. Prospective collaborator shall offer only the type of grate for which it is qualified. (Prospective collaborator is required to submit documentary evidence in support of fulfilment of this PQR).

AND

3.3. Prospective collaborator should have designed, engineered, manufactured / got manufactured, erected / supervised erection, commissioned / supervised commissioning

of at least two (02) number of Waste to Energy boiler system employing waste fired flue gas treatment system (pollution abatement system) which is suitable for the grate firing system of 300 Tonnes per day per line capacity each or higher in atleast two (02) different project locations. Further, such flue gas treatment equipment system should be of the type specified, i.e. semi dry type or dry type and all two (02) reference Waste to Energy Plants should have been in successful operation for a period of not less than two (02) year prior to the submission date of Eol. Prospective collaborator shall offer only the type of flue gas treatment system for which it is qualified. (Prospective collaborator is required to submit documentary evidence in support of fulfilment of this PQR).

Definitions Used

- i. Whenever the term 'waste fired' is appearing above, "Waste" shall be deemed to include unsegregated and untreated Municipal Solid Waste.
- ii. Whenever the term boiler system employing "waste fired grate system", is appearing above, the same shall be deemed to include complete combustion system with waste feeding system, grab cranes, grate, pusher / feeder, primary/secondary air supply system, ash extractor, steam generator system including heating surface cleaning system, insulation, refractory, pressure parts including super heaters, evaporator, air heater, economiser, drum, up to the inlet of flue gas treatment system.
- iii. Whenever the term "flue gas treatment system" (pollution abatement system), is appearing above, the same shall be deemed to include complete flue gas treatment system with De-NO_x system, activated carbon injection system, fabric bag filter for particulate control, bag filter dedusting system, De-SO_x system (Flue gas desulfurization system), flue gas conditioning / quenching, chemical storage system, chemical dosing/metering system, ash storage, ash disposal system, chemical recirculation system, CEMS.
- iv. Whenever the term "successful operation" is appearing above, the criteria for successful operation shall confirm the following conditions in the plant. The reference plant should have:
 - a) Run more than 6000 operation hours in each year; and
 - b) Meets all the local environmental standards for emission, wherever the plant is located.

Prospective collaborator shall submit a certificate from the owner (end user) of the reference plant for the same.

AND

- 3.4. The average annual turnover of the prospective collaborator, in the preceding three (03) financial years as on the date of Eol, should not be less than INR 260 Million (Indian Rupees Two hundred Sixty Million only) or in equivalent foreign currency. In case a prospective collaborator, does not satisfy the average annual turnover criteria, stipulated above on its own, its Holding Company would be required to meet the stipulated turnover requirements as above, provided that the Net Worth of such Holding Company as on the last day of the preceding financial year is at least equal to or more than the paid-up share capital of the Holding Company. In such an event, the prospective collaborator would be required to furnish, a Letter of Undertaking from the Holding Company, pledging unconditional and irrevocable financial support to the prospective collaborator.

AND

- 3.5 Net worth of the prospective collaborator should not be less than 100% (hundred percent) of its paid up share capital as on the last day of the preceding financial year on the date of EOI. In case the prospective collaborator does not meet the Net worth criteria on its own, it can meet the requirement of Net worth based on the strength of its Subsidiary(s) and/or Holding Company and/or Subsidiaries of its Holding company

wherever applicable. In such a case, however the Net worth of the Collaborator/Associate and its Subsidiary(s) and/or Holding Company and/or Subsidiary(s) of the Holding Company, in combined manner should not be less than 100% (hundred percent) of their total paid up share capital. However individually, their Net worth should not be less than 75% (seventy-five percent) of their respective paid up share capitals. For Consortiums/Joint Ventures, the Net worth of all Consortium/Joint Venture members in combined manner should not be less than 100% (hundred percent) of their paid up share capital however individually, their Net worth should not be less than 75% (seventy five percent) of their respective paid up share capitals.

Net worth in combined manner to be calculated as follows:

Net worth (combined) = $(X1+X2+X3) / (Y1+Y2+Y3) \times 100$

Where X1, X2, X3 are individual Net worth which should not be less than 75% of the respective paid up share capitals and Y1, Y2, Y3 are individual paid up share capitals

AND

3.6 In case the prospective collaborator is not able to furnish its audited financial statements on standalone entity basis, the unaudited unconsolidated financial statements of the prospective collaborator can be considered acceptable provided the prospective collaborator further furnishes the following documents for substantiation of its qualification:

- i. Copies of the unaudited unconsolidated financial statements of the prospective Collaborator along with copies of the audited consolidated financial statements of its Holding Company.
- ii. A Certificate from the CEO/CFO of the Holding Company stating that the unaudited unconsolidated financial statements form part of the consolidated financial statements of the Holding Company.

In cases where audited results for the last financial year as on the date of this EoI are not available, the financial results certified by a practicing Chartered Accountant shall be considered acceptable. In case, prospective collaborator is not able to submit the certificate from a practicing Chartered Accountant certifying its financial parameters, the audited results of three consecutive financial years preceding the last financial year shall be considered for evaluating the financial parameters. Further, a certificate would be required from the CEO/CFO stating that the financial results of the company are under audit as on the date of this EoI and the certificate from the practicing Chartered Accountant certifying the financial parameters is not available.

Notes for Clause 3.4, 3.5 & 3.6

- i. Net worth means the sum total of the paid up share capital and free reserves.
- ii. Free reserve means all reserves credited out of the profits and share premium account but does not include reserves credited out of the revaluation of the assets, write back of depreciation provision and amalgamation. Further, any debit balance of profit and loss account and miscellaneous expenses to the extent not adjusted or written off, if any, shall be reduced from reserves and surplus.
- iii. Other income shall not be considered for arriving at annual turnover.
- iv. "Holding Company" and "Subsidiary Company" shall have the meaning ascribed to them as per Companies Act of India.
- v. For annual turnover indicated in foreign currency, the exchange rate as on seven (07) days prior to the date of this EoI shall be used.



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5) Brief Description of Eoi Process:

The interested prospective collaborators shall ensure that their response along with following annexures are received by BHEL on or before 15th January 2018:

- i. Annexure-1- Indicative Scope of Technology Transfer
- ii. Annexure-2- Broad technical capabilities of prospective collaborator for pusher type grate/stoker fired boiler system for unsegregated MSW based waste-to-energy (WtE) boiler system along with downstream pollution abatement system
- iii. Annexure-3- Experience in the field of MSW fired boiler
- iv. Annexure-4- Detailed and complete product reference list
- v. Annexure-5- Typical Indian unsegregated and untreated Municipal Solid Waste (MSW) analysis
- vi. Annexure-6- Sample format for end user certificate

The prospective collaborator should comply with the Solid Waste Management Rules 2016 stipulated by Ministry of Environment and Forest (MoEF); Government of India dated 08th April, 2016. Please click the link below for ready reference.

http://www.moef.nic.in/sites/default/files/SWM%202016_0.pdf

The response shall necessarily be accompanied with details on company background, product profile, MSW fired boiler proposed along with its technical details, reference list of customers, performance certificates from end user, product data sheet and annual audited financial reports for last three (03) years including auditor's report.

Prospective Collaborator should also provide list of necessary emission abatement system components required to meet all emission norms as stipulated in Indian Solid Waste Management Rules (SWM 2016).

In case any amendment/ corrigendum issued to this Eoi, it shall be notified only at www.bhel.com.

In case any further information is needed, kindly feel free to contact us.

The respondent shall submit their offer with all annexures duly signed to the following address:

General Manager (TL, JV, M&A)
Corporate Technology Management
Bharat Heavy Electricals Limited
BHEL House, Siri Fort
New Delhi - 110049, India
Phone: +91 11 66337210
Fax: +91 11 26492974
Email: techeoi@bhel.in



6) Miscellaneous:

6.1 Right to accept or reject any or all Applications:

- i. Notwithstanding anything contained in this Eoi, BHEL reserves the right to accept or reject any Application and to annul the Eoi Process and reject all Applications, at any time without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons, thereof. In the event that BHEL rejects or annuls all the Applications, it may at its discretion, invite all eligible prospective collaborators to submit fresh Applications.
- ii. BHEL reserves the right to disqualify any Applicant during or after completion of Eoi process, if it is found there was a material misrepresentation by any such Applicant or the Applicant fails to provide within the specified time, supplemental information sought by BHEL.
- iii. BHEL reserves the right to verify all statements, information and documents submitted by the Applicant in response to the Eoi. Any such verification or lack of such verification by BHEL shall not relieve the Applicant of his obligations or liabilities here under nor will it affect any rights of BHEL.

6.2 Governing Laws & Jurisdiction:

The Eoi process shall be governed by, and construed in accordance with, the laws of India and the Courts at New Delhi (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and / or in connection with the Eoi process.

Indicative Scope of Technology Transfer

1.	Transfer of state of the art technical information relating to the design, engineer, manufacture, assemble, quality control, test, supply, erect, commission, repair, service and retrofit pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system
2.	Training of BHEL engineers at collaborator's design office/manufacturing facilities to enable them design, engineer, manufacture, assemble, quality control, test, erect and commission the pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.
3.	Transfer of improvements/modifications/developments/upgradations to meet market requirements and environment norms / statutory requirements.
4.	Transfer of information to enable BHEL to source/procure those items, which the prospective collaborator sources from outside (as these are not manufactured by the prospective collaborator) for use in pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.
5.	Transfer of site feedback and troubleshooting information.
6.	Transfer of applicable proprietary computer programs including logics and source code, if any.
7.	Assist BHEL to establish manufacturing of various critical components in pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system. Prospective collaborator shall also Assist BHEL in identifying sub-vendors for all the sub-systems and bought out items.
8.	Provide technical assistance and quality surveillance /supervision during design, engineer, manufacture, assemble, quality control, test, supply, erect, commission, repair, service and retrofit pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system
9.	Provide support through engineering services from collaborator's design office / manufacturing facilities for design vetting of pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.
10.	Deputation of collaborator's experts either at BHEL's manufacturing facilities or at project sites to assist BHEL in assimilating technology for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.

(SIGNATURE)

Broad technical capabilities of prospective collaborator for pusher type grate/stoker fired boiler system for unsegregated MSW based waste-to-energy (WtE) boiler system along with downstream pollution abatement system

Sl. No.	Description	Prospective Collaborator response
1.	<p>Indicate whether prospective collaborator has the capability to perform the design calculation, prepare schemes, Process & Instrumentation Diagram (P&IDs), engineering drawing, erection drawing, technical specification for various equipment's/components to be procured, estimable bill of material with specification on his own to address requirements as indicated below:</p> <p>a) Capability in preparation of complete arrangement of pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system including layout of all equipment starting from fuel handling to gas out of chimney.</p> <p>b) P&ID of all systems including fuel handling systems, fuel processing/treatment, feeding systems, unsegregated MSW combustion system, start-up and supplementary fuel system, heat recovery system, air and flue gas system, activated carbon system, lime reaction tower, flue gas purification systems, bag filter, waste water (leachate) treatment systems and fly ash, residual ash handling system, odor control system, slag removal system, residue from reaction tower and bag filter handling system.</p> <p>c) Design calculation for design and selection of various components like odor control system, unsegregated MSW handling system (Grab crane, etc.), feeding hopper, hydraulic ram for pushing MSW, firing system (grate fired - cooling type (air cooled or water cooled) and moving type (reciprocating or counter reciprocating or rotary), refractory, heat recovery system (pressure parts), flue gas purification system (bag/fabric filter/house, De-NOx system, De-SOx system, flue gas scrubber, activated carbon/charcoal unit), draft system (Fans), emission control equipment, slag/residual and fly ash handling, leachate treatment system.</p> <p>d) Stress analysis and design of the various components and supports for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system and also provide basic design and detailed engineering for all components planned to be manufactured by BHEL in-house even if same is outsourced by prospective collaborator</p>	

	<p>e) Design basis and selection of various components of the pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system along with valves, piping & instrumentation and their location and quantum, safety system in all applicable areas, Soot blowers, etc., waste handling/management system along with sump to waste treatment system and fly ash removal system at the appropriate places in the flue gas ducting system.</p>	
	<p>f) Capability in preparing specification for various bought out items in each of the system listed in (c) above, and all other items which are required for completeness of the pusher type grate/stoker fired boiler system for MSW based waste to energy plant with downstream pollution abatement system.</p>	
	<p>g) Design of emission abatement system like in-furnace control of toxins, additives if any, waste water treatment system, leachate treatment system, solid waste treatment system, ash/slag management system, flue gas treatment systems to meet statutory norms when firing in pusher type grate/stoker fired boiler system for MSW based waste to energy plant with downstream pollution abatement system.</p>	
	<p>h) Selection of analysers, electrical equipment, control & instrumentation system (architecture and control logics) for complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.</p>	
	<p>i) Capability in preparation of design basis for complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.</p>	
	<p>j) Capability in preparation of Hazard and Operability (HAZOP) study for complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.</p>	
	<p>k) Manufacturing drawings for the complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.</p>	
	<p>l) Erection drawings and procedure for complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.</p>	
	<p>m) Erection /Erection supervision for complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.</p>	
	<p>n) Commissioning or commissioning supervision for complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.</p>	



Expression of Interest (Eoi) for Technology Tie-up for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system

	o) Complete list of lifting, handling, installation, maintenance and unloading equipments required for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.	
	p) Capability in preparation of complete bill of materials for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system with spares and special tools and tackles.	
	q) Development of operational management and replacements system for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.	
	r) Capability to offer generic equipment design so that any make of equipments (either manufactured by BHEL in house or bought out from market) can be integrated with pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.	
	s) Operation and maintenance of pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.	
	t) Performance guarantee test procedure for complete pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.	

(SIGNATURE)

Prospective collaborator experience in the field of
Municipal Solid Waste (MSW) fired Waste to Energy (WtE) boiler system along with
downstream pollution abatement system

Sl. No.	Requirement	Prospective collaborator response (YES/NO) and remarks if any.
1	Whether prospective collaborator is an OEM for pusher type grate/stoker, fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.	
2	What is the minimum calorific value (in HHV) of MSW (without any support fuel) fired in MSW based waste to Energy boiler system, designed by the prospective collaborator? Provide details of two plants firing minimum calorific value of MSW with detailed fuel (proximate and ultimate) analysis.	
3	Whether prospective collaborator has experience in design and engineering of MSW boilers using any other technology other than grate/stoker fired.	
4	Whether prospective collaborator meets below mentioned PQR and submitted requisite supply reference or any other relevant documentary evidence to substantiate: a) Prospective collaborator should have at least five (05) years of experience in designing, engineering, manufactured/ got manufactured, erected/ supervised erection, commissioned/ supervised commissioning of state-of-the-art pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system.	
	b) Prospective collaborator should have designed, engineered, manufactured/got manufactured, erected/supervised erection, commissioned/supervised commissioning of at least two (02) number of Waste to Energy boiler system employing waste fired grate system having rated capacity of at least 300 Tonnes per day per line capacity each or higher in at least two (02) different project locations. Further, such waste fired grate system should be of the type specified, i.e. grate fired cooling type (air cooled or water cooled) and moving (pusher) type (reciprocating or counter reciprocating or rotary) and all two (02) reference Waste to Energy Plants should have been in successful operation for a period of not less than two (02) year prior to the submission date of Eoi. Prospective collaborator shall offer only the type of grate for which it is qualified.	

	<p>c) Prospective collaborator should have designed, engineered, manufactured / got manufactured, erected / supervised erection, commissioned / supervised commissioning of at least two (02) number of WtE boiler system employing waste fired flue gas treatment system (pollution abatement system) which is suitable for the grate firing system of 300 tonnes per day per line capacity each or higher in atleast two (02) different project locations. Further, such flue gas treatment equipment system should be of the type specified, i.e. semi dry type or dry type and all two (02) reference Waste to Energy Plants should have been in successful operation for a period of not less than two (02) year prior to the submission date of EOI. Prospective collaborator shall offer only the type of flue gas treatment system for which it is qualified.</p>	
<p>5</p>	<p>Whether prospective collaborator meets the below mentioned PQR and submitted documentary evidence to substantiate:</p> <p>a) The average annual turnover of the prospective collaborator, in the preceding three (03) financial years as on the date of Eol, should not be less than INR 260 Million (Indian Rupees Two hundred Sixty Million only) or in equivalent foreign currency. In case a prospective collaborator does not satisfy the average annual turnover criteria, stipulated above on its own, its Holding Company would be required to meet the stipulated turnover requirements as above, provided that the Net Worth of such Holding Company as on the last day of the preceding financial year is at least equal to or more than the paid-up share capital of the Holding Company. In such an event, the prospective collaborator would be required to furnish, a Letter of Undertaking from the Holding Company, pledging unconditional and irrevocable financial support to the prospective collaborator.</p>	
	<p>b) Net Worth of the prospective collaborator should not be less than 100% (hundred percent) of its paid up share capital as on the last day of the preceding financial year on the date of Eol. In case, the prospective collaborator does not meet the Net worth criteria on its own, it can meet the requirement of Net worth based on the strength of its Subsidiary(s) and/or Holding Company and/or Subsidiaries of its Holding company wherever applicable. In such a case, however the Net worth of the Collaborator/Associate and its Subsidiary(s) and/or Holding Company and/or Subsidiary(s) of the Holding Company, in combined manner should not be less than 100% (hundred percent) of their total paid up share capital. However individually, their Net worth should not be less than 75% (seventy-five percent) of their respective paid up share capitals. For Consortiums/Joint Ventures, the Net worth of all Consortium/Joint Venture members in combined manner should not be less than 100% (hundred percent) of their paid up share capital however individually, their Net worth should not be less than 75% (seventy five percent) of their respective paid up share capitals.</p>	

	<p>c) In case the prospective collaborator is not able to furnish its audited financial statements on standalone entity basis, the unaudited unconsolidated financial statements of the prospective collaborator can be considered acceptable provided the prospective collaborator further furnishes the following documents for substantiation of its qualification:</p> <p>i. Copies of the unaudited unconsolidated financial statements of the prospective collaborator along with copies of the audited consolidated financial statements of its Holding Company.</p> <p>ii. A certificate from the CEO/CFO of the Holding Company stating that the unaudited unconsolidated financial statements form part of the consolidated financial statements of the Holding Company.</p> <p>In cases where audited results for the last financial year as on the date of this Eol are not available, the financial results certified by a practicing Chartered Accountant shall be considered acceptable. In case, prospective collaborator is not able to submit the certificate from a practicing Chartered Accountant certifying its financial parameters, the audited results of three (03) consecutive financial years preceding the last financial year shall be considered for evaluating the financial parameters. Further, a certificate would be required from the CEO/CFO stating that the financial results of the company are under audit as on the date of this Eol and the certificate from the practicing Chartered Accountant certifying the financial parameters is not available.</p>	
6	Whether prospective collaborator has listed all reference plants, which meets all the local environmental standards for emission, wherever the plant is located as mentioned in Annexure 4 B.	
7	<p>Whether the prospective collaborator owns the Intellectual Property Rights (IPR) for the technology being proposed for transfer under the Technology Collaboration Agreement (TCA) or have an unencumbered right from the owner of the Intellectual Property Rights to sub-license the technology, if applicable.</p> <p>If yes, whether list of such Intellectual Property Rights enclosed.</p>	
8	Whether company background and its product profile along with technical details of pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system, which is being offered for technology tie-up to BHEL under this Eol enclosed.	
9	Whether product data sheet enclosed.	
10	Whether prospective collaborator detailed reference list enclosed as per Annexure 4 A.	
11	Whether prospective collaborator annual audited financial reports including auditor's report for last three (03) years enclosed.	

12	Whether the pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system offered for technology transfer is the latest being marketed by the prospective collaborator.	
13	Whether prospective collaborator has designed, engineered waste-to-energy boiler system along with downstream pollution abatement system, for unsegregated and untreated municipal solid waste nearer or equivalent to the MSW analysis indicated in Annexure-5.	
14	<p>Whether the prospective collaborator is meeting the following requirements for a 300 TPD or higher pusher type grate/ stoker fired boiler system for MSW based waste to energy boiler system along with downstream pollution abatement system:</p> <p>a) Designed and engineered or procured MSW fuel handling system.</p> <p>b) Designed and engineered or procured MSW fuel firing system including stoker (grate fired - cooling type (air-cooled or water-cooled) and moving type (reciprocating or counter reciprocating or rotary) and feeder hydraulics.</p> <p>c) Designed and engineered or procured wastewater and leachate treatment system.</p> <p>d) Designed and engineered or procured complete refractory or without refractory.</p> <p>e) Design and engineered complete system, without refractory.</p> <p>f) Designed and engineered or procured complete pressure parts including super heaters, evaporator, economiser, drum and air heater up to the inlet of flue gas treatment system.</p> <p>g) Designed and engineered or procured complete De-SO_x system (semi dry type FGD or dry type FGD) with lime reaction tower system.</p> <p>h) Designed and engineered or procured complete activated carbon system.</p> <p>i) Designed and engineered or procured complete particulate control system (bag filter).</p> <p>j) Designed and engineered or procured complete solids waste handling and management system (ash, sludge, slag, sewage, etc.).</p> <p>k) Designed and engineered or procured complete De-NO_x system (SCR/SNCR/hybrid).</p> <p>l) Designed and engineered or procured complete draft system (primary air fan, secondary air fan, seal air fan, gas recirculation fan (if applicable), hot air fan, induced draft fan, etc.).</p>	



Expression of Interest (Eoi) for Technology Tie-up for pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system

	m) Designed and engineered or procured complete supporting structure.	
15	Whether performance certificates from end customer enclosed.	
16	Whether the prospective collaborator has any experience in establishing a new manufacturing testing and assembly facilities, if so please specify.	
17	Whether prospective collaborator has offered technology license to any other company in the world for supply of pusher type grate/stoker fired boiler system for MSW based Waste to energy plant along with downstream pollution abatement system.	
18	Please indicate number of 500 TPD and above capacity, pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system, designed and engineered by prospective collaborator. Whether details of the reference plants furnished.	
19	What is the largest capacity in single line pusher type grate/stoker fired boiler system for MSW based waste to energy plant along with downstream pollution abatement system designed and engineered by the prospective collaborator. Whether end user certificate or reference document furnished.	
20	Whether the prospective collaborator has offered any other technology, other than dry/semi-dry type flue gas treatment system (SOx, NOx and for particulate matter etc.). Whether details of the reference plants furnished.)	

(SIGNATURE)



Expression of Interest (EoI) for Technology Tie-up for pusher type grate/stoker fired boiler system for MSW based Waste to energy plant along with downstream pollution abatement system

Annexure -4B

Complete Reference List: The prospective collaborator shall furnish details of plants meeting all the local environmental standards for emission as per table below:

Sl No	Owner / Customer	Plant Location	Date of Commissioning	Unit Rating, MWe	Unit Steaming capacity, Tons per hour (T/h)	Unit MSW firing Capacity, Tons per day (TPD)	Name of local environmental standards*	Emission Standard vis-a vis achieved values

(SIGNATURE)

*- Eg: Indian solid waste management rules (SWM 2016) / European emission norms for MSW fired boiler EU directive 2000/76/EC / American emission norms for MSW fired boiler USEPA.../any other emission standards



Expression of Interest (EoI) for Technology Tie-up for pusher type grate/stoker fired boiler system for MSW based Waste to energy plant along with downstream pollution abatement system

Annexure -4C

Complete Reference List: The prospective collaborator shall furnish details as per table below

Description	Design (Yes / No)	Engineering (Yes/No)	Manufactures/Got Manufactured /Supply	Erection / Supervised Erection	Commissioning / Supervised Commissioning
Refuse pond, sewage from garbage extraction system					
Fuel Feeding system: (grab crane, bunker, pusher/feeder)					
Fuel Firing system : Grate/ stoker					
Heat recovery system (Pressure part) Draft system (Fans, etc.,)					
Gas purification system (De-NOx (SCR/SNCR), Bag filter, De-SOx (FGD), Scrubber, Activated carbon unit, etc.,)					
Furnace residue from grate (stoker) conveying and handling system					
Ash from bag filter and AH hoppers conveying and handling system					
Leachate treatment system					
odor control system					

(SIGNATURE)

Typical Indian unsegregated and untreated Municipal Solid Waste (MSW) analysis

Description	Minimum Calorific value	Average Calorific value	Maximum Calorific value
Carbon	7.10	10.35	14.92
Hydrogen	2.10	2.19	2.09
Oxygen	6.84	6.84	9.53
Moisture	50.00	50.00	43.00
Sulfur	0.12	0.12	0.12
Ash	33.60	30.30	30.00
Nitrogen	0.24	0.20	0.34
Gross/ Higher calorific value (kcal/kg)	1003	1296	1514
Net /Lower calorific value (kcal/kg)	604	892	1156

Typical Indian unsegregated and untreated Municipal Solid Waste (MSW) composition

Sl.No.	Component	Minimum Calorific value	Average Calorific value	Maximum Calorific value
1	Organic/ Food / Kitchen Waste	10	30.7	31.92
2	Garden Waste	4	5.5	6.68
3	Paper	4	2.2	6.35
4	Plastic	10	13.5	14.83
5	Wood	1	0.8	2.06
6	Card Board	2	2	3.22
7	Tyres	1	0.2	1.34
8	Leather	0.7	0.5	0.7
9	Coconut shell	2.1	3.9	5.09
10	Thermocoal	0.2	0.7	0.62
11	Cloth / Rag	9	9.8	11.07
12	Jute	0.2	1	1.16
13	Stone	8.1	6	1.96
14	Silt and inert	13.5	10	6.65
15	Ceramic	7.5	5	0.77
16	Debris	9.3	4.4	3.05
17	Metal	7	1	0.53
18	Glass	7	0.8	0.66
19	Others	3.4	2	1.29
20	Total HHV(kcal/kg)	1003	1296	1514

(SIGNATURE)



Sample format for End User Certificate

Owner / Customer Letter Head with address

Date:

M/s ABC (PROSPECTIVE COLLABORATOR)
ADDRESS

Subject : PROJECT/PLANT NAME

Name of the project :
Location :
Name of supplier :
Date of order :
Date of commissioning :
Unit rating, MWe :
Unit MSW firing capacity, TPD :
Higher heating value (HHV) /
Gross calorific value (GCV) of MSW, kcal/kg:

Grate/stoker type : Air-cooled or Water-cooled
Reciprocating or Counter reciprocating or Rotary

Emission norms prevailing in project location :

“ M/s ABC” has successfully Designed, Engineered, designed, engineered, manufactured / got manufactured, erected / supervised erection, commissioned / supervised commissioning the above Project/Plant (boiler system along with pollution abatement system) and it is in operation for not less than 2 years and running more than 6000 operation-hours in each year”

Sign with seal and address with contact details.