Subject: Expression of Interest (EoI) for Technology Tie-up for Dry Bottom Ash Handling System

1) Introduction:

This Expression of Interest (EoI) seeks response from prospective collaborators who are meeting the requirements of this EoI and are willing to be associated with BHEL through a License & Technology Collaboration Agreement (TCA) on long term basis to enable BHEL to design, engineer, manufacture, test, supply, erect, commission, retrofit, repair and service the Dry Bottom Ash Handling System as specified in this EoI.

1.1) About Bharat Heavy Electricals Limited:

BHEL is a leading state owned company, wherein Government of India is holding 63.17% 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 thermal, gas, hydro, nuclear and solar photo voltaic. BHEL has been in this business for more than 50 years and BHEL supplied equipment's account for more than 59% (approx. 190 GW) of the total thermal generating capacity in India. BHEL is also listed in both major Indian stock exchanges. BHEL has 17 manufacturing units, 4 power sector regions, 8 service centers, 3 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 2017-18 was around USD 4.1 billion. BHEL's highly skilled and committed manpower of approx. 35000; state-of-the-art manufacturing facilities and latest technologies helped BHEL to deliver a consistent track record of performance since long. 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.

Our ongoing technology tie-ups with leading technology providers are 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); OTO Melara, Italy (for SRGM); GENP, Italy (for Compressors); TLT Turbo GmbH, Germany (for Fans), Sheffield Forge Masters International, UK (for Forgings); ISRO, India (for space grade li Ion cells); BPE, USA (for SCR System), NANO, Korea (for SCR Catalyst); HLB Power Co. Ltd., Korea (for Gates and Dampers) 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) About Industrial Systems Group (ISG)

BHEL through its unit named Industrial Systems Group (ISG) based at Bangalore (State: Karnataka) has been supplying material handling systems and automation systems to thermal power plants and steel industry on EPC basis. The material handling systems include Coal handling system and Ash handling system for thermal power plants and raw material handling system for steel plants.

2) Scope of cooperation:

BHEL is seeking responses from reputed Original Equipment Manufacturer (OEM) of Dry Bottom Ash Handling System for technology transfer and collaboration on a long term basis to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Dry Bottom Ash Handling System.

BHEL intends to manufacture Dry Bottom Ash Handling System under a long term licensing & technology transfer agreement which could be operationalized with transfer of technology. Interested Parties/Prospective Collaborator meeting requirement of this EoI are invited to respond to this EoI.

Upon receipt of responses against EoI from the OEM, BHEL will review the responses to ascertain suitability of the offer made by the Prospective Collaborators and shortlist the parties for further discussions. Detailed discussions on commercial and other terms and conditions to finalise the Technology Collaboration Agreement (TCA) shall be held with shortlisted parties/Prospective Collaborators. The detailed terms and conditions for such a paid-up license agreement shall be mutually agreed upon.

Indicative scope of technology transfer for Dry Bottom Ash Handling System is given in **Annexure-1**.

3) Prequalification requirements (PQR):

The Prospective Collaborator should meet the following qualification requirements on the closing date of this EoI:

3.1 Prospective Collaborator should have designed, engineered, manufactured/got manufactured, supplied, erected/supervised erection and commissioned/ supervised commissioning of Dry Bottom Ash Handling System having mechanical conveying and crushing with minimum capacity of 20 Tones Per Hour (TPH) (dry ash basis) for Thermal power plant unit.

AND

3.2 Prospective Collaborator should have supplied at least two no's (02) Dry Bottom Ash Handling System meeting above requirement within last seven (07) years from closing date of this EoI and out of which at least one no. (01) Dry Bottom Ash Handling system should have been in successful operation for a period of not less than two (02) years as on the closing date of this EoI.

Prospective Collaborator to provide relevant certificate(s)/ document to substantiate the PQRs.

4) 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 15 May 2019:

Annexure-1- Indicative Scope of Technology Transfer

Annexure-2- Indicative technical features of Dry Bottom Ash Handling System for which the Transfer of Technology is sought

Annexure-3- Prospective Collaborator's experience in the field of Dry Bottom Ash Handling System

Annexure-4- Complete reference list of Dry Bottom Ash Handling System

The response shall necessarily be accompanied with details on:

I. Company background,
II. Technical features/product catalogue,
III. Reference list,
IV. Audited annual financial reports for last 3 (three) years including auditor's report etc.

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

5) Schedule of EoI & contact details:

5.1 Schedule of EoI:

The schedule of EoI shall be as follows -

Sl. No.	Description	Date
1.	Issue of EoI document	17.04.2019
2.	Last date for submission of EoI response	15.05.2019

5.2 Contact Details:

The respondent shall submit their response with all annexures duly signed to the following official:

Deputy General Manager (Technology Licensing)
Corporate Technology Management
Bharat Heavy Electricals Limited
BHEL House, Siri Fort
New Delhi - 110049, India
Phone: +91 11 66337213 / 7339
Fax: +91 11 26492974
Email: techeoi@bhel.in

6) Miscellaneous:

6.1 Right to accept or reject any or all Applications:

a) 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.

b) 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.

c) 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 hereunder 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.

Annexure-1

Indicative Scope of Technology Transfer

a)	License & transfer of technology relating to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the complete Dry Bottom Ash handling System as specified in this EoI.
b)	Transfer of applicable and relevant knowledge and information/ Know-how and Know-why pertaining to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Dry Bottom Ash handling System as specified in this EoI.
c)	Preparation of Purchase Specification and Quality Plan for all applicable bought out items for which manufacturing drawings are not prepared by Proposed Collaborator.
d)	Transfer of applicable computer programs and design calculations.
e)	Assistance during procurement of any new machines, special tools, Jigs & Fixtures, setup of test facility etc. required for manufacturing and testing of Dry Bottom Ash Handling System's equipment/components at BHEL works.
f)	Preparation of manufacturing drawings for all components, sub-assemblies and transfer of the same to enable BHEL to manufacture them at its works.
g)	Technical and quality surveillance assistance and supervision during design, engineer, manufacture, assembly, test, supply, erect, commission, performance test at site, repair, service and retrofit the Dry Bottom Ash Handling System as specified in this EoI.
h)	Transfer of improvements/modifications/developments/up gradations to be carried out by the Prospective Collaborator during the period of Technology Collaboration Agreement for taking care of new market requirements and obsolescence in the Dry Bottom Ash Handling System. Subsequent updates required due to component obsolescence or updates implemented by Prospective Collaborator due to safety consideration should also be provided.
i)	Assistance during selection and procurement of accessories required for the Dry Bottom Ash Handling System. Transfer of information regarding sub-vendors to enable BHEL to procure items for the Dry Bottom Ash Handling System.
j)	Training of BHEL engineers to enable them to design, engineer, manufacture, assembly, test, supply, erect, commission, repair, service and retrofit the Dry Bottom Ash Handling System.
k)	Deputation of Prospective Collaborator's experts to assist BHEL in absorbing the technology for Dry Bottom Ash Handling System.

(SIGNATURE)

Annexure-2

Indicative technical features of Dry Bottom Ash Handling System for which the Transfer of Technology is sought

A) Dry Bottom Ash Handling System parameters:

1)	Application	= Dry Bottom Ash of thermal power plant
2)	Conveyor Capacity	= 20 TPH (min.)
3)	Design capability	= 60 TPH and/or above
4)	Temperature of Bottom ash to be handled	= 1000-1100 Deg C

B) Dry Bottom Ash handling equipment:

B.1) Bottom Ash Hopper:

1)	Function	=	To store Bottom Ash during on load maintenance of conveyor and also act as a transition chute for falling bottom ash during normal working
2)	No. of hopper cum-transition chute segments	=	As per manufacturer's standard
3)	No. and type of isolation gates	=	Hydraulically operated Sliding type multiple gates with provision for manual operation. Optionally, apart from isolation, crushing arrangement can also be provided.
4)	Sealing between furnace bottom header and bottom ash hopper	=	Heat resistant mechanical seal (multi-layered fabric and metallic layer from inside). It shall be installed all around the top of Bottom ash hopper to provide a seal for boiler furnace section.

B.2) Metallic Conveyors:

1)	Function:	=	To convey Bottom ash from Bottom ash hopper to crusher and from crusher discharge to Buffer hopper/Silo
2)	Design Capacity	=	60 TPH and above
3)	Speed of conveyor	=	Variable
4)	Drive of each conveyor	=	VVVF drive-electric motor with gearbox
5)	Material of construction of conveyor components	=	1) Dry Bottom Ash conveyor - Heat resistant stainless steel 2) Casing - Carbon Steel
6)	Tensioning arrangement	=	Hydraulic/pneumatic
7)	Additional Features:	=	1) Metallic conveyor will be required to handle a very high quantity of highly abrasive ash continuously. So all components shall be of proven design having a track record of trouble free-operation in order to avoid problems of frequent stoppages. The

conveyor shall be sized for start-up with load.

2) The conveyor shall be enclosed in an air tight steel casing & insulated from outside, if it is applicable

3) Separate conveyor or inbuilt-fine recirculation system in the main conveyor shall be provided to remove fine ash accumulated in the casing. The conveyor may operate continuously/intermittently.

4) The conveyor/rollers bearings shall be grease packed with facility of recharging from outside. It shall be possible to carry out maintenance/replacement of bearings from outside. The guide roller movement should be visible from outside.

5) Reliable and proven hydraulic/pneumatic auto take up arrangements, with facility of adjustment of tension. The tension assembly shall be designed to absorb any momentary shock loading.

6) Necessary air inlets for cooling air shall be provided in the conveyor casing, otherwise the entire conveyor chain path shall be totally enclosed and air tight.

B.3) Bottom Ash Crusher

1) Function = To reduce bottom ash clinkers to a suitable dimensions for handling by conveyors.

2) Pre-Crusher =
1) Type: Jaw Type
2) Location:
Option 1 Along with Hydraulic Operated Sliding type isolation gate with crushing arrangement below bottom ash hopper.
Option 2 At the discharge of Dry Bottom Ash Conveyors.
3) Drive arrangement: Hydraulic operated

3) Primary Crusher =
1) Type: Single / Double roll
2) Location : At the discharge of each Dry Bottom Ash Conveyors
3) Drive arrangement : Electric reversible drive motor, fluid coupling and gear box.

(SIGNATURE)

Annexure -3

Prospective Collaborator's experience in the field of Dry Bottom Ash Handling System

Sl. No.	Requirement	Prospective Collaborator's response YES/NO and remarks if any
a)	Whether the Prospective Collaborator is an OEM of Dry Bottom Ash Handling System.	
b)	Whether Prospective Collaborator has its own manufacturing facility for Dry Bottom Ash Handling System. If not, furnish details of where these are being manufactured.	
c)	Whether Prospective Collaborator has designed, engineered, manufactured, supplied, erected/supervised erection and commissioned/supervised commissioning of Dry Bottom Ash Handling System of min. 20 TPH capacity for Thermal power plant unit.	
d)	Whether Prospective Collaborator has supplied at least two no's (02) Dry Bottom Ash Handling System meeting above requirement within last 7 years from closing date of EoI and whether out of these two no's (02) at least one no. (01) Dry Bottom Ash Handling System is in successful operation for a period not less than one (1) year as on the date of closing of EoI.	
e)	Whether Prospective Collaborator has design capability to design Dry Bottom Ash Handling System of 60 TPH or more. If yes, whether list of systems enclosed.	
g)	Whether company background and its product profile along with technical details for Dry Bottom Ash Handling System in thermal power plants being offered to BHEL under this EoI enclosed.	
h)	Whether product data sheet and General Arrangement (G.A) drawings enclosed as per above PQR.	
i)	Whether Prospective Collaborator's detailed reference list as per Annexure-4 enclosed.	
j)	Whether Prospective Collaborator's audited annual financial reports including auditor's report for last 3 years enclosed.	
k)	Whether the Dry Bottom Ash Handling System design offered for technology transfer is the latest being marketed by the Prospective Collaborator.	
l)	Whether Prospective Collaborator has provided relevant certificate/ document to substantiate the PQRs at 3.1 and 3.2.	
m)	Whether the Prospective Collaborator owns the Intellectual Property Rights 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. If yes, whether list of such Intellectual Property Rights enclosed.	
n)	Whether Prospective Collaborator has any experience in establishing a new manufacturing, testing and assembly facilities, if so please specify.	
o)	Whether information on market share of Prospective Collaborator enclosed.	

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Annexure -4

Reference list of Dry Bottom Ash Handling System supplied by Prospective Collaborator

Sl. No.	Project Name / Location	Customer & End user details	Configuration of Dry Ash Conveyor system	Application (coal fired thermal / others)	Conveying capacity (TPH)	Month and year of supply	Year of commissioning

(SIGNATURE)