



BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Delhi – 110 049
India

BHEL seeks Expression of Interest (EoI)
for
License & Technology Transfer
of
Electrolyser System for Hydrogen Production

EoI Ref No.: AA/TL/2403

Date: March 21, 2023



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SECTION-1
DISCLAIMER

The information contained in this Expression of Interest (Eol) document provided to the Prospective Collaborator(s), by or on behalf of Bharat Heavy Electricals Limited (BHEL) or any of its employees or advisors, is provided to the Prospective Collaborator on the terms and conditions set out in this Eol document and all other terms and conditions subject to which such information is provided.

1. The purpose of this Eol document is to provide the Prospective Collaborator with information to assist the formulation of their proposal. This Eol document does not purport to contain all the information each Prospective Collaborator may require. This Eol document may not be appropriate for all persons, and it is not possible for BHEL, its employees or advisors to consider the business/investment objectives, financial situation and particular needs of each Prospective Collaborator who reads or uses this Eol document. Each Prospective Collaborator should conduct his own investigations and analysis and should check the accuracy, reliability and completeness of the information in this Eol document and where necessary obtain independent advice from appropriate sources.
2. BHEL, its employees and advisors make no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of the Eol document.
3. BHEL may, in its absolute discretion, but without being under any obligation to do so, modify, amend or supplement the information in this Eol document.
4. The issue of this Eol does not imply that BHEL is bound to select and shortlist any or all the Prospective Collaborator(s). Even after selection of suitable Prospective Collaborator BHEL is not bound to proceed ahead with the Prospective Collaborator and in no case be responsible or liable for any commercial and consequential liabilities in any manner whatsoever.
5. The Prospective Collaborator shall bear all costs associated with the preparation, technical discussion/presentation and submission of response against this Eol. BHEL shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the Eol process.
6. Canvassing in any form by the Prospective Collaborator or by any other agency on their behalf shall lead to disqualification of their Eol.
7. Notwithstanding anything contained in this Eol, BHEL reserves the right to accept or reject any application and to annul the Eol 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 Collaborator(s) to submit fresh applications.
8. BHEL reserves the right to disqualify any applicant during or after completion of Eol 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.
9. BHEL reserves the right to verify all statements, information and documents submitted by the applicant in response to the Eol. 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.



SECTION-2

SCHEDULE OF Eoi PROCESS & CONTACT DETAILS

A. SCHEDULE OF Eoi PROCESS

The schedule of activities during the Eoi Process shall be as follows -

S No.	Description	Date
1	Issue of Eoi document	21.03.2023
2	Last date of submission of Eoi	04.04.2023

B. CONTACT DETAILS:

Additional General Manager (CTM)
Corporate Technology Management,
Bharat Heavy Electricals Limited (BHEL),
BHEL House, Siri Fort, New Delhi 110049
Tel: +91-11- 6633- 7377/7323/7220
Mobile: +91 9958181792
E-Mail: techeoi@bhel.in



SECTION - 3

DETAILS OF EXPRESSION OF INTEREST (EoI)

3.1 INTRODUCTION:

BHEL seeks Expression of Interest from Original Equipment Manufacturers (OEMs) of Electrolyser System for Hydrogen Production 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, assemble, install, commission, quality control, test, supply, maintain, operate, repair, service, troubleshoot and sell Electrolyser System for Hydrogen Production.

Here, Electrolyser system means Electrolyser stack along with its necessary BOPs required for generation of fuel cell grade hydrogen from De-ionized water, such as, Stack power system, Water management system, Hydrogen processing system, Cooling system, and Control system etc.

3.2 ABOUT BHEL:

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, defence, 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 account for more than 57% (approx. 180 GW) of the total thermal generating capacity in India. BHEL is also listed in Indian stock exchanges. BHEL has 16 manufacturing units, 4 power sector regions, 8 service centres and 15 regional offices besides host of project sites spread all over India and abroad. BHEL has its footprint in all the inhabited continents with references in 88 countries including Malaysia, Oman, Iraq, Syria Sudan, Libya, Cyprus, Malta, Afghanistan, Bangladesh, Bhutan, New Zealand etc. with cumulative overseas installed capacity of BHEL manufactured power plants nearing 10,000 MW. The annual turnover of BHEL for the year 2021-22 was around US\$ 2.65 Billion. BHEL's highly skilled and committed manpower of approx. 30000; state-of-the-art manufacturing, R&D 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.

The high level of quality & reliability of BHEL products is due to adherence to international standards by acquiring and adapting some of the best technologies from leading companies in the world, together with technologies developed in its own R&D centres.

Our ongoing major technology tie-ups include agreements with Siemens Energy Global GmbH & Co. KG., Germany (for Steam Turbines, Generators and Condensers); MPL, Japan

[*Note: Currency conversion rate considered: 1 US \$=Rs. 76.20 as on 31st March 2022]



(for Flue Gas Desulfurization Systems); Leonardo S.p.A, Italy (for Super Rapid Gun Mount); GE Tech. GmbH, Switzerland (for Steam Turbine for Nuclear Power Plant); Vogt Power International, USA (for Heat Recovery Steam Generators); Indian Space Research Organization (ISRO) (for Space Grade Lithium-Ion Cells); CSIR-IIP (PVSA based Medical Oxygen Plant); NANO Company Ltd., Korea (for SCR Catalysts); HLB Power Company Ltd., Korea (for Gates and Dampers); Kawasaki Heavy Industries, Japan (for Stainless Steel Coaches for Metros); Valmet Automation Oy, Finland (for DCS System); Babcock Power Environmental Inc., USA (for Selective Catalytic Reduction Systems) and SHI FW Energia Oy., Finland (for Circulating Fluidized Bed Combustion Boiler).

*** More details about the entire range of BHEL's products and operations can be viewed by visiting our web site www.bhel.com**

3.3 SCOPE OF COOPERATION:

BHEL intends to shortlist the Original Equipment Manufacturers (OEMs) based on this EoI and to select a suitable partner for a long-term License & Technology Transfer Agreement (LTTA) for Electrolyser System for Hydrogen Production including stack and BoP as per indicative scope of technology licensing at **Annexure-1**.

BHEL shall receive applications pursuant to this EoI in accordance with the terms set forth herein, as modified, altered, amended and clarified from time to time by BHEL, and all applications shall be submitted in accordance with such terms on or before the date specified in this EoI for submission of applications.

Upon receipt of responses against this EoI, BHEL will review the responses to ascertain suitability of the offer and shortlist Prospective Collaborators for further discussions. Detailed discussions on commercial and other terms and conditions to finalize the License & Technology Transfer Agreement (LTTA) shall be held with shortlisted Prospective Collaborators. The detailed terms and conditions for such a paid-up license agreement shall be mutually agreed upon. Prospective collaborators shall be responsible for sharing necessary know-how & know-why to BHEL for Electrolyser System.

Business sharing option, during the initial period of technology assimilation by BHEL may also be considered.

3.4 PREQUALIFICATION REQUIREMENTS (PQRs):

- a) The Prospective Collaborator should have at least 3 years of experience of designing, engineering, manufacturing, assembling, testing, supply, installation and commissioning of Electrolyser System including stack of 200 Nm³/hr (Alkaline/ PEM), as on the closing date of this EoI. ***(Suitable documentary evidence to substantiate the fulfilment of this PQR is to be submitted along with EoI).***

AND

- b) The Prospective Collaborator should have received a commercial order of at least one (1) Electrolyser System of capacity 400 Nm³/hr Hydrogen or more in last 5 years as on the closing date of this EoI. ***(Suitable documentary evidence to substantiate the fulfilment of this PQR is to be submitted along with EoI).***



AND

- c) The Prospective Collaborator should have done system integration & supplied at least one (1) Electrolyser System of capacity 30 Nm³/hr Hydrogen or more in last 5 years and the system should have been in successful operation for at least 1000 hours in any one year as on the closing date of this Eol. ***(Suitable documentary evidence to substantiate the fulfilment of this PQR is to be submitted along with Eol).***

3.5 INSTRUCTIONS

- 3.5.1 The interested Prospective Collaborators shall ensure that their complete duly filled up response along with following annexures are received by BHEL on or before 14th April, 2023-

Annexure 1- Indicative Scope of Technology Licensing

Annexure 2- Details required from Prospective Collaborator

Annexure 3- Information on various parameters of Electrolyser System

- 3.5.2 The response to Eol shall also be accompanied with details on **company background, technical features/ product catalogue, reference list of customers, details of current manufacturing facilities and relevant certificates, annual audited financial reports for last three (3) years.**
- 3.5.3 **Language:** All correspondences and documents related to the Eol response shall be in English language, provided that any printed literature furnished by the Prospective Collaborator may be written in another language, as long as such literature is accompanied by a translation of its pertinent passages in English language in which case, for purposes of interpretation of the bid, the English translation shall govern.
- 3.5.4 The Prospective Collaborator(s) shall abide by the terms & conditions, as applicable, of the Eol.
- 3.5.5 All pages of the response against this Eol shall be duly signed by the authorised signatory.
- 3.5.6 Multiple proposals from the same Prospective Collaborator should not be submitted.
- 3.5.7 BHEL at its discretion shall inspect the Prospective Collaborator's works/office/reference site premises for the purpose of evaluation, as deemed necessary before selection of Partner. BHEL's decision in this regard shall be final.
- 3.5.8 Any Prospective Collaborator which has been debarred/blacklisted by Indian Central/State Governments or by any entity controlled by Indian Central/State Governments from participating in any of their project, as on date of submission of Eol, shall not be eligible to submit the Eol.
- 3.5.9 BHEL shall receive applications pursuant to this Eol in accordance with the terms set forth herein, as modified, altered, amended and clarified from time to time by BHEL, and all applications shall be submitted in accordance with such terms on or before the date specified in this Eol for submission of applications.

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



3.6 CONFIDENTIALITY:

Information relating to the examination, clarification, evaluation and comparison of Eol and recommendations shall not be disclosed to Prospective Collaborator. Any effort by Prospective Collaborator to influence BHEL in processing of Eol or selection decisions may result in the rejection of the response against Eol.

3.7 GOVERNING LAWS & JURISDICTION:

The Eol 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 Eol process.

Annexure-1

Indicative Scope of Technology Licensing

a)	<p>Licensing & sharing of the state-of-art technology for design, engineer, manufacture, assemble, install, commission, quality control, test, supply, maintain, operate, repair, service, troubleshoot and selling of the Electrolyser System for Hydrogen Production.</p> <p>Here, Electrolyser system means Electrolyser stack along with its necessary BOPs required for generation of fuel cell grade hydrogen from De-ionized water, such as, Stack power system, Water management system, Hydrogen processing system, Cooling system, and Control system etc.</p>
b)	<p>Sharing of applicable computer programs including logics and source code, if any</p>
c)	<p>Sharing of improvements/modifications/developments/up-gradations carried out by the prospective collaborator over the duration of the technology licensing agreement for taking care of new market requirements and obsolescence of components used in the system</p>
d)	<p>Assistance in planning & setting up of the facilities by way of expert advice in terms of identifying, sizing & selection of equipment required for manufacturing and assembly, their layout and foundation etc.</p>
e)	<p>Assistance for establishing manufacturing processes, commissioning of the manufacturing facilities, design of special tools and dies, jigs & fixtures etc. by way of deputation of experts for mutually agreed number of man days as and when required by BHEL.</p>
f)	<p>Sharing of Site feedback and troubleshooting information</p>
g)	<p>Training in the design, engineering, manufacturing, assembly, installation, commissioning, integration, quality control/ quality assurance, testing, supply, maintenance, operation, repair, service and troubleshoot.</p>
h)	<p>Deputation of prospective collaborator's experts to assist BHEL in absorbing the technology for licensed products.</p>
i)	<p>Support through engineering services from prospective collaborator's design office / manufacturing facilities for licensed products.</p>
j)	<p>Sharing of information to enable BHEL to source/procure those items, which the prospective collaborator sources from outside (as they are not manufactured by the prospective collaborator) for use in the Electrolyser System.</p>

(SIGNATURE)



Annexure-2

Details sought from Prospective Collaborator

S. No.	Requirement	Prospective Collaborator's response (YES/NO) and remarks if any
1.	Whether the Prospective Collaborator is an Original Equipment Manufacturer (OEM) of Electrolyser System (Stack and BoP)	
2.	For how many years, Prospective Collaborator is in business of Electrolyser System	
3.	Whether the prospective collaborator has capability of engineering and product development of Electrolyser System	
4.	Whether the Company background and its product profile/catalogues along with technical details of Electrolyser System, which is being offered to BHEL under this EoI, enclosed	
5.	Whether product data sheet has been enclosed	
6.	Whether information on competitors/market share has been enclosed	
7.	Whether Prospective Collaborator's detailed reference list (including performance certificates, satisfactory operation certificates etc.) have been enclosed	
8.	Whether Prospective Collaborator's annual audited financial reports including auditor's report for last 3 years have been enclosed	
9.	Whether the Prospective Collaborator owns the Intellectual Property Rights for the technology being proposed for licensing under the License and Technology Transfer Agreement (LTTA) or has 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.	
10.	Whether the Prospective Collaborator has any experience in establishing new manufacturing, testing and assembly facilities, if so please specify.	
11.	Whether Prospective Collaborator has offered technology license to any other entity in the world for Electrolyser System. If so, please specify.	



S. No.	Requirement	Prospective Collaborator's response (YES/NO) and remarks if any
12.	<p>The Prospective Collaborator should have at least 3 years of experience of designing, engineering, manufacturing, assembling, testing, supply, installation and commissioning of Electrolyser System including stack of 200 Nm³/hr (Alkaline/ PEM), as on the closing date of this EoI. (Suitable documentary evidence to substantiate the fulfilment of this PQR is to be submitted along with EoI).</p> <p><i>Whether Prospective Collaborator meets above PQR and Suitable documentary evidence to substantiate the fulfilment of this PQR has been submitted.</i></p>	
13.	<p>The Prospective Collaborator should have received a commercial order of at least one (1) Electrolyser System of capacity 400 Nm³/hr Hydrogen or more in last 5 years as on the closing date of this EoI. (Suitable documentary evidence to substantiate the fulfilment of this PQR is to be submitted along with EoI).</p> <p><i>Whether Prospective Collaborator meets above PQR and Suitable documentary evidence to substantiate the fulfilment of this PQR has been submitted.</i></p>	
14.	<p>The Prospective Collaborator should have done system integration & supplied at least one (1) Electrolyser System of capacity 30 Nm³/hr Hydrogen or more in last 5 years and the system should have been in successful operation for at least 1000 hours in any one year as on the closing date of this EoI.</p> <p><i>Whether Prospective Collaborator meets above PQR and Suitable documentary evidence to substantiate the fulfilment of this PQR has been submitted.</i></p>	
15.	<p>Whether the Electrolyser System being proposed for technology licensing to BHEL is approved for all necessary certifications (to be substantiated with necessary certificates)</p>	
16.	<p>Details about the total Strength of Engineering/ Technical/ R&D Personnel</p>	
17.	<p>Whether the Prospective Collaborator has any presence in India. If so, please specify.</p>	

(SIGNATURE)

Annexure -3

Information on Various Parameters of Electrolyser System

S. No.	Specifications / Parameters	Prospective Collaborator's response (YES/NO) and remarks if any
1.	Type of Electrolyser Technology (Alkaline/PEM) possessed by the Prospective Collaborator	
2.	Annual Manufacturing capacity of MEAs/Stack/System	
3.	Whether the Membrane Electrode Assemblies (MEAs) / Core Cells (consists of electrodes and ionic conductive separator) are manufactured in-house or bought out	
4.	If MEAs/ Core Cells are manufactured in-house, then specify details about procurement of raw materials like catalyst, electrolyte membrane etc.	
5.	If MEAs / Core Cells are bought out, then details about the process for procurement of the raw materials by BHEL	
6.	Whether the Bipolar plates are manufactured in-house or bought-out	
7.	If plates are manufactured in-house, then details about procurement of raw materials	
8.	If plates are bought out, then details about the process for procurement of raw materials by BHEL	
9.	Whether the Prospective Collaborator has in-house capability for all sub-components (Porous transport layers, end plates, sealings etc.) of stack	
10.	Whether the Prospective Collaborator has in-house capability for all other sub-systems (Power supply system, Water management system, Hydrogen processing system, Cooling system, and Control system etc.)	
11.	Whether any agreement / technology tie-up with a third party is required for any item/material used in manufacturing of electrolyser system. If yes, please specify.	
12.	Minimum and maximum capacity of Electrolyser system (range in Nm ³ /hr)	
13.	Operating temperature range (°C)	



S. No.	Specifications / Parameters	Prospective Collaborator's response (YES/NO) and remarks if any
14.	Outlet pressure of H ₂ (in Bar)	
15.	Hydrogen purity in %	
16.	Specific energy consumption incl. auxiliary units (BOL and EOL in kWh/Nm ³ H ₂)	
17.	Certification and compliances of Electrolyser plant	
18.	Water required per kg of H ₂ generated	
19.	Control range (% of nominal power)	
20.	Time taken for Cold start to nominal power in minutes	
21.	Time taken for Standby start to nominal power in sec.	
22.	Designed life of Stack in hours	
23.	Designed life of Electrolyser System in years	
24.	Whether the Control system panels and software are self-developed	
25.	Whether the Prospective Collaborator has the capability of making Electrolyser stack and system of 200 Nm ³ /hr or more	
26.	Whether the Prospective Collaborator has supplied Electrolyser systems of at least 30 Nm ³ /hr or more	
27.	Number of Electrolyser stack and system supplied (numbers with capacity) in last three years	
28.	Cumulative Operational hours of Stack and Electrolyser systems supplied by the Prospective Collaborator in last three years	
29.	Minimum operational durability of Electrolyser stacks and systems with degradation rate	
30.	Nominal current density (A/cm ²)	
31.	Voltage range (Volts)	
32.	Voltage efficiency (LHV in %)	

(SIGNATURE)