



**BHARAT HEAVY ELECTRICALS LIMITED**  
**(A Government of India Undertaking)**

**Delhi – 110 049**

**India**

**Notice for Inviting**

**Expression of Interest (Eoi)**

**for**

**Technology tie-up for**

**Type-IV Composite Cylinders (Hydrogen & CNG)**

**Eoi Ref No.: AA/TL/1502**

**Date: 04.07.2023**

**INDEX**

<b>S No.</b>	<b>DESCRIPTION</b>
1.	SECTION - 1: DISCLAIMER
2.	SECTION – 2: SCHEDULE OF Eoi PROCESS & CONTACT DETAILS
3.	SECTION – 3: DETAILS OF Eoi
4.	ANNEXURE-1: INDICATIVE SCOPE OF TECHNOLOGY TRANSFER
5.	ANNEXURE-2: DETAILS REQUIRED FROM PROSPECTIVE COLLABORATOR
6.	ANNEXURE-3: INFORMATION ON VARIOUS PARAMETERS OF COMPOSITE CYLINDERS (HYDROGEN & CNG)



**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 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.
9. 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 affects 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 -

Sl. No.	Description	Date
1.	Issue of Eoi	04.07.2023
2.	Last date of submission of response against Eoi	25.07.2023

**B. CONTACT DETAILS:**

**Additional General Manager**

Corporate Technology Management,  
Bharat Heavy Electricals Limited (BHEL),  
BHEL House, Siri Fort, New Delhi 110049  
Tel: +91-11- 6633- 7377/7198/7323  
Mobile: +91 9958181792  
E-Mail: [techeoi@bhel.in](mailto:techeoi@bhel.in)



### **SECTION – 3**

#### **DETAILS OF EXPRESSION OF INTEREST (Eoi)**

##### **3.1 INTRODUCTION:**

BHEL seeks Expression of Interest from Prospective Collaborator(s)/ Original Equipment Manufacturers (OEMs) of Type-IV Composite Cylinders (Hydrogen & CNG), who are meeting the requirements of this Eoi and are willing to be associated with BHEL through a long term Technology Collaboration Agreement (TCA) to enable BHEL to design, engineer, manufacture, assemble, install, commission, quality control, test, supply, maintain, operate, repair, service and troubleshoot of Type-IV Composite Cylinders (Hydrogen & CNG) to meet market requirements.

##### **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 enterprise in India, catering to the core infrastructure sectors of Indian economy viz. energy, transportation, and heavy engineering industry, defence, renewable and non-conventional energy. The energy sector covers generation, transmission and distribution of equipments for thermal, gas, hydro, nuclear and solar photo voltaic power plant. BHEL has been in this business for more than 50 years and BHEL supplied equipment account for 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. The cumulative overseas installed capacity of BHEL manufactured power plants nearing 10,000 MW. The annual turnover of BHEL for the year 2022-23 was around US\$ 2.7 Billion\*. BHEL's highly skilled and committed manpower of approx. 29000; 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.

[\*Note: Currency conversion rate considered: 1 US \$=Rs. 82.18 as on 31<sup>st</sup> March 2023]



Our ongoing major technology tie-ups include agreements with Siemens Energy Global GmbH & Co. KG., Germany (for Steam Turbines, Generators and Condensers); Mitsubishi Heavy Industries Ltd., Japan (for Flue Gas Desulfurization Systems); Leonardo S.p.A, Italy (for Super Rapid Gun Mount); GE Technology 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 Ltd., 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 Sumitomo SHI FW Energia Oy., Finland (for Circulating Fluidized Bed Combustion Boilers).

**\* More details about the entire range of BHEL's products and operations can be viewed by visiting our web site [www.bhel.com](http://www.bhel.com)**

### **3.3 ABOUT FABRICATION STAMPING & INSULATOR PLANT (FSIP), JAGDISHPUR:**

BHEL FSIP, Jagdishpur is spread in about 150 Acre area, located in Amethi District of Uttar Pradesh, India, 80 Kms away from Lucknow on Lucknow-Varanasi National high-way and is well connected by railroad and air as well.

FSIP unit is involved in manufacturing of Power Plant Structures, stamping for Traction Motors & Generators, High tension Porcelain Insulators, Ceramic lined wear resistant components and Ceramic liners.

FSIP has well-established manufacturing systems and procedures and has the requisite skilled and experienced manpower. The Unit is certified for the Quality Management System ISO-9001:2015 and Health, Safety & Environmental Management (HSE) System ISO-14001:2015 & ISO-45001:2018. The products of FSIP are tested and certified with respect to relevant National & Inter-National standards at reputed laboratories.

### **3.4 MARKET IN INDIA:**

India's type IV-cylinder market is emerging fast and is expected to surpass INR 3000 Crores (365 million US\$) by 2030. The growth in demand for lightweight cylinders with higher pressure requirements, more gas carrying capacity per cylinder and the push on Hydrogen economy with launch of National Green Hydrogen Mission are the main factors driving the type-IV cylinder market. Additionally, the market for type-IV cylinders is anticipated to grow significantly due to increased technological innovation and investments from the major players.



### 3.5 SCOPE OF COOPERATION:

BHEL is seeking Expression of Interest (Eol) from Prospective Collaborator (s)/ Original Equipment Manufacturer(s) (OEMs) for long term Technology Collaboration Agreement (TCA) for state-of-the-art & proven technology of Type-IV Composite Cylinders (Hydrogen & CNG).

The TCA shall enable BHEL to design, engineer, manufacture, assemble, install, commission, quality control, test, supply, maintain, operate, repair, service and troubleshoot of Type-IV Composite Cylinders (Hydrogen & CNG).

Prospective Collaborator(s) shall be responsible for transferring necessary know-how & know-why to BHEL for Type-IV Composite Cylinders (Hydrogen & CNG). Interested reputed OEMs/Prospective Collaborator(s) with proven Type-IV Composite Cylinders (Hydrogen & CNG) technology are invited to submit their 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(s) 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(s). The detailed terms and conditions for such a paid-up license agreement shall be mutually agreed upon. TCA may be executed with either BHEL or any of its associate/ affiliate companies as mutually agreed.

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

### 3.6 PREQUALIFICATION REQUIREMENTS (PQRs):

The Prospective Collaborator(s) shall meet the following qualification requirements as on the date of submission of Eol:

- a) The Prospective Collaborator should have at least 3 years of experience of design, engineer, manufacture/ got manufactured, assemble, testing and supply of Type-IV Composite Cylinders (Hydrogen storage) as on the closing date of this Eol. **(Prospective collaborator is required to substantiate this PQR by providing \*suitable document as evidence)**

**AND**

- b) The Prospective Collaborator should have executed at least one (1) or more order(s) for design, development and testing with type approval of Type-IV Composite Cylinders





(Hydrogen storage, Working Pressure of 350 bar or above) as per requirement of ISO 11119-3, EN 12245 or equivalent standard in last 3 years as on closing date of this EoI. **(Prospective collaborator is required to substantiate this PQR by providing design qualification test certificate with respect to ISO 11119-3, EN 12245 or equivalent standard by certified testing agency, Purchase Order (PO) and documentary evidence of PO executed by Prospective Collaborator as documentary proof)**

- \* **Note:** Suitable documents like, self-certified supply reference duly authenticated by the CEO/authorized representative of Prospective Collaborator on company letter head, design qualification test certificate with respect to ISO 11119-3, EN 12245 or equivalent standard by certified testing agency, Purchase Order (PO) and documentary evidence of PO executed by Prospective Collaborator etc.

### 3.7 INSTRUCTIONS:

- 3.7.1 The interested Prospective Collaborator shall ensure that their complete duly filled response along with following annexures are received by BHEL on or before **25<sup>th</sup> July 2023 (Tuesday)**.

Annexure 1- Indicative Scope of Technology Transfer

Annexure 2- Details required from Prospective Collaborator

Annexure 3- Information on various parameters of Type-IV Composite Cylinders (Hydrogen & CNG).

- 3.7.2 The response shall necessarily be accompanied with following details:

1. Company Background
2. Technical features/ product catalogue
3. Details of current manufacturing facilities and relevant certificates
4. Reference list of Customers
5. Type-IV Composite Cylinders (Hydrogen & CNG) data sheet along with its design qualification test certificate with respect to ISO 11119-3, EN 12245 or equivalent by certified testing agency
6. Audited Annual Accounts along with Statutory Auditor's report for last 3 (three) years

- 3.7.3 **Language:** All correspondences and documents related to the EoI 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.

- 3.7.4 The Prospective Collaborator shall abide by the terms & conditions, as applicable, of the Eol.
- 3.7.5 All pages of the response against this Eol shall be duly signed by the authorized signatory.
- 3.7.6 Multiple proposals from the same Prospective Collaborator should not be submitted.
- 3.7.7 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.
- 3.7.8 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.

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](http://www.bhel.com)

### 3.8 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.

### 3.9 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)	Licensing & transfer of latest technology for design, engineer, manufacture, assemble, install, commission, quality control, test, supply, maintain, operate, repair, service and troubleshoot of Type-IV Composite Cylinders (Hydrogen & CNG).
b)	Transfer of applicable computer programs including logics and source code, if any.
c)	Transfer of improvements/modifications/developments/up-gradations carried out by the Prospective Collaborator over the duration of the Technology Collaboration Agreement for taking care of new market requirements and obsolescence of components used in the system.
d)	Assistance in planning & setting up of the facilities by way of expert advice in terms of identifying, sizing & selection of equipments required for manufacturing, assembly, layout and foundation etc.
e)	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.
f)	Transfer of site feedback and troubleshooting information.
g)	Training in the design, engineering, manufacturing, assembly, installation, commissioning, quality control/ quality assurance, testing, maintenance, operation, repair, service and troubleshoot.
h)	Deputation of Prospective Collaborator's experts to assist BHEL in absorbing the technology for Type-IV Composite Cylinders (Hydrogen & CNG).
i)	Support through engineering services from Prospective Collaborator's design office / manufacturing facilities for Type-IV Composite Cylinders (Hydrogen & CNG).
j)	Transfer of information to enable BHEL to source/procure those items, which the Prospective Collaborator sources from outside (as those items are not manufactured by the Prospective Collaborator) for use in the design and development of Type-IV Composite Cylinders (Hydrogen & CNG).

**Signature & Seal:**

Authorized Signatory of the Prospective Collaborator

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 Type-IV Composite Cylinders (Hydrogen & CNG)	Hydrogen: CNG:
2.	Whether the Prospective Collaborator agrees for technology transfer as per scope given in Annexure-1.	
3.	For how many years, Prospective Collaborator is in business of Type-IV Composite Cylinders (Hydrogen & CNG)	Hydrogen: CNG:
4.	Whether the prospective collaborator has capability of engineering and product development of Type-IV Composite Cylinders (Hydrogen & CNG)	Hydrogen: CNG:
5.	Whether the Company background and its product profile/catalogues along with technical details of Type-IV Composite Cylinders (Hydrogen & CNG), which is being offered to BHEL under this Eoi, enclosed.	
6.	Whether product data sheet has been enclosed	
7.	Whether Prospective Collaborator has designed, developed and supplied following Hydrogen Cylinders: a) Hydrogen Cylinder with water capacity of 450 liters and working pressure 700 bar b) Hydrogen Cylinder with water capacity of 350 liters and working pressure 350 bar	
8.	Whether Prospective Collaborator has designed, developed and supplied following CNG Cylinder: CNG cylinder with water capacity of 150 liters and working pressure 250 bar	
9.	Whether Prospective Collaborator's detailed reference list have been enclosed	



S. No.	Requirement	Prospective Collaborator's response (YES/NO) and remarks if any
10.	Whether Prospective Collaborator's Audited Annual Accounts along with Statutory Auditor's report for last 3 years have been enclosed	
11.	Whether the Prospective Collaborator owns the Intellectual Property Rights for the technology being proposed for licensing under Technology Collaboration Agreement (TCA) 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 to be enclosed.	
12.	Whether the Prospective Collaborator has any experience in establishing new manufacturing, testing and assembly facilities, if so please specify.	
13.	Whether Prospective Collaborator has offered technology license to any other entity in the world for Type-IV Composite Cylinders (Hydrogen & CNG). If so, please specify.	
14.	The Prospective Collaborator should have at least 3 years of experience of design engineer, manufacture/ got manufactured, assemble, testing and supply of Type-IV Composite Cylinders (Hydrogen storage) as on the closing date of this EoI.  <b><i>Whether Prospective Collaborator meets above PQR and Suitable documentary evidence to substantiate the fulfilment of this PQR has been submitted.</i></b>	
15.	The Prospective Collaborator should have executed at least one (1) or more order(s) for design, development and testing with type approval of Type-IV Composite Cylinders (Hydrogen storage, Working Pressure of 350 bar or above) as per	



S. No.	Requirement	Prospective Collaborator's response (YES/NO) and remarks if any
	requirement of ISO 11119-3, EN 12245 or equivalent standard in last 3 years as on closing date of this Eol.  <b><i>Whether Prospective Collaborator meets above PQR and design qualification test certificate with respect to ISO 11119-3, EN 12245 or equivalent standard by certified testing agency, Purchase Order (PO) and documentary evidence of PO executed by Prospective Collaborator as documentary evidence to substantiate the fulfilment of this PQR has been submitted.</i></b>	
16.	Whether the Type-IV Composite Cylinders (Hydrogen & CNG) being proposed for technology transfer to BHEL is approved for all necessary certifications (To be substantiated with necessary certificates)	
17.	Details about the total strength of Engineering/ Technical/ R&D Personnel.	
18.	Whether prospective collaborator is having positive net worth, as per the latest audited annual account.	
19.	Whether the Type-IV Composite Cylinders (Hydrogen & CNG) offered for technology transfer is the latest being marketed by the Prospective Collaborator.	
20.	Whether the Prospective Collaborator has any presence in India. If so, please specify.	

Signature & Seal:

Authorized Signatory of the Prospective Collaborator

**INFORMATION ON VARIOUS PARAMETERS OF TYPE-IV COMPOSITE CYLINDERS (HYDROGEN & CNG)**

S. No.	Specifications / Parameters	Prospective Collaborator's response
1.	Specifications of all available models of Type-IV Composite Cylinders (Hydrogen & CNG) possessed by the Prospective Collaborator	Hydrogen: CNG:
2.	Annual Manufacturing capacity of Type-IV Composite Cylinders (Hydrogen & CNG)	Hydrogen: CNG:
3.	Whether the polymer liner of the cylinders are manufactured in-house or bought out	
4.	Whether the cylinder boss is manufactured in-house or bought out	
5.	Pressure levels achieved	
6.	Max. volume of the cylinders designed	
7.	Carbon fiber-Composite strength (Tensile and Modulus) achieved	
8.	Whether the Prospective Collaborator has in-house capability for all sub-components.	
9.	Whether any agreement / technology tie-up with a third party is required for any item/material used in manufacturing of Type-IV Composite Cylinders (Hydrogen & CNG). If yes, please specify.	
10.	Minimum and maximum capacity of Type-IV Composite Cylinders (Hydrogen & CNG)	Hydrogen: CNG:
11.	Operating temperature range (oC) of prototyped/manufactured Type-IV Composite Cylinders (Hydrogen & CNG)	



Expression of Interest (Eoi) for technology tie-up  
for Type-IV Composite Cylinders (Hydrogen & CNG)

S. No.	Specifications / Parameters	Prospective Collaborator's response
12.	The kind of technology being used in liner production (Roto, blow or any other etc)	
13.	Certification and compliances of Type-IV Composite Cylinders (Hydrogen & CNG)	
14.	Designed life of the Type-IV Composite Cylinders (Hydrogen & CNG)	Hydrogen: CNG:

**Signature & Seal:**  
**Authorized Signatory of the Prospective Collaborator)**