



Ref No: ID/TBSG/24-25/H2FC/001

Date: 23rd Aug-2024

Bharat Heavy Electricals Limited

Invites

EXPRESSION OF INTEREST

FOR

LONG TERM STRATEGIC TIE-UPS WITH FUEL CELL OEM

FOR

Green Hydrogen Fuel Cell Locomotive(s)

Issued by:

Bharat Heavy Electricals Limited, having registered office at

BHEL House, Siri Fort New Delhi-110049 and

also office at

TBSG, Industry Sector, 7th floor, Integrated Office Complex, Lodhi Road,

NEW DELHI-110 003, INDIA

(hereinafter referred to as 'BHEL')



DISCLAIMER

All information contained in this EOI provided / clarified are in good interest and faith. The information contained in this Expression of Interest document or subsequently provided to Applicant(s), whether verbally or in documentary or any other form, by or on behalf of BHEL, is provided on the terms and conditions set out in this EOI and such other terms and conditions subject to which such information is provided.

The purpose of this EOI is to provide interested parties with information that may be useful to them in the formulation of their application for qualification and subsequent selection pursuant to this EOI. This EOI is not an offer by BHEL to the prospective Applicant(s) or any other person. This EOI is neither intended nor shall it be construed as creating or requiring any ongoing or continuing relationship or commitment with any party or person. This is not an offer or invitation to enter into an agreement of any kind with any party.

Though adequate care has been taken in the preparation of this EOI document, the interested firms shall satisfy themselves that the document is complete in all respects. The information is not intended to be exhaustive. Interested Agencies are required to make their own enquiries and assumptions wherever required. Intimation of discrepancy, if any, should be given to the specified office immediately. If no intimation is received by this office by the date mentioned in the document, it shall be deemed that the EOI document is complete in all respects and firms submitting their interest are satisfied with the EOI document in all respects.

The issue of this EOI does not imply that BHEL is bound to select and shortlist Applicant(s) for next stage or to enter into any agreement(s) with any Applicant(s). BHEL reserves all right to reject any applications submitted in response to this EOI document at any stage without assigning any reasons thereof. BHEL also reserves the right to withhold or withdraw the process at any stage. Neither BHEL nor its employees and associates will have any liability, loss, expense or damage which may arise from or be incurred or suffered in connection with anything contained in this EOI document or any matter deemed to form part of this EOI document, the information and any other information supplied by or on behalf of BHEL. BHEL accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance/use of any statements/information contained in this EOI by the Applicant. BHEL is not making any representation or warranty, express or implied, as to the accuracy or completeness of any information/statements made in this EOI.

The Applicant shall bear all its costs associated with or relating to the preparation and submission of its Application including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by BHEL or any other costs incurred in connection with or relating to its Application. All such costs and expenses will remain with the Applicant and BHEL shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by an Applicant in preparation or submission of the Application, regardless of the conduct or outcome of the EOI.



1.0 INTRODUCTION

This Expression of Interest (Eoi) seeks response from interested OEM/Supplier who are willing to work in consortium or sub-contractor form on long term basis with BHEL for green hydrogen fuel locomotive opportunity as per scope listed below:-

- i. Develop new hydrogen fuel cell locomotive
- ii. Convert existing diesel locomotive to hydrogen fuel cell locomotive

along with associated control, suitably designed Energy Management Strategy (EMS) and hydrogen storage module.

2.0 ABOUT BHEL

Bharat Heavy Electricals Limited (BHEL) is a Central Public Sector Enterprise, wherein Government of India is holding 63.17% of its equity. One of the largest engineering and manufacturing companies of its kind in India having a turnover of around USD 2.74 billion. The company is engaged in the design, engineering, manufacture, construction, testing, commissioning and servicing of a wide range of products and services for the core sectors of the economy, viz. Power, Transmission, Industry, Transportation, Renewable Energy, Oil & Gas and Defence with over 180 product offerings to meet the needs of these sectors.

Since its inception in 1964, BHEL has been the solid bedrock of evolution of India's Heavy Electrical Equipment industry. BHEL has a mammoth 20,000 MW per annum capability for manufacturing of power generation equipment. With a widespread network of 16 manufacturing facilities, 2 repair units, 4 regional offices, 8 service centres, 3 active joint ventures, 15 regional marketing centres, and current project execution at more than 150 project sites across India and abroad, BHEL manufactures a wide range of high quality & reliable products adhering to national and international standards.

With key focus on project execution, the worldwide installed base of power generating equipment supplied by BHEL has exceeded 185 GW. BHEL's equipment that account for about 60% of the country's total generation from thermal utility sets (coal based), stand a testimony to its valuable contribution towards nation building. BHEL's global competitiveness has established its footprint in all the inhabited continents with references in 89 countries.

The high level of quality & reliability of BHEL products is a testimony to its adherence to international standards by acquiring and adapting some of the best technologies from leading companies in the world including General Electric, Siemens AG, Mitsubishi Heavy Industries Ltd. etc., together with technologies developed in its own R&D centres. BHEL invests more than 2.5% of turnover on R&D and innovation.

BHEL has been designing and manufacturing rolling stock for rail and urban transportation. BHEL has also been manufacturing Motors, Power electronics and Controllers for various transportation applications at its various factories.

In transportation sector, BHEL is into the manufacture of complete electric and diesel electric locomotives and electrical assemblies/components including traction motors, traction transformers, power & auxiliary converters and controls, gear wheels etc. We are a regular supplier of propulsion equipment of ACEMU/MEMU. India's first air-conditioned ACEMU train operational in Mumbai is equipped with BHEL's electrics and propulsion system.

At our Jhansi plant, we manufacture complete Electric Locomotives upto 6000 HP rating for mainline application of Indian Railways, Diesel Electric Locomotives from 350 HP to 1400 HP rating. Till date, we have supplied cumulatively more than 850 nos. of main line electric locomotives to Indian Railways and diesel electric locomotives for shunting operations to various industries.

Our Jhansi plant have an installed capacity of 75 nos. locomotives per year. At Jhansi, we have complete state-of-the-art facilities for manufacturing, fabrication and testing of bogies, loco shells, under frames and other mechanical components of locomotives. We have recently developed



**Expression of Interest (EoI) for Strategic tie-ups for Green hydrogen
fuel cell locomotive**
Transportation Business and Systems Group

India's first state-of-the-art WAG7 Electric Locomotive with regenerative capabilities. We have also developed India's first Traction Motor for 9000HP Electric Locomotives.

Among electrical propulsion equipment, we manufacture and supply traction motors, traction transformers, power converters(IGBT) & controls, auxiliary converters(IGBT) and vehicle control units for electric locomotives, diesel electric locomotives, EMUs, DEMUs & and metros trains of Indian Railways. Our manufacturing range includes complete solution for ACEMU/MEMU, IGBT based 3-phase drive equipment upto 6000HP rating. BHEL has also been in the forefront of providing maintenance and spares/replacement support to Indian Railways for their locomotive fleet. We have full-fledged service department located at major centres in the country.

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



3.0 PURPOSE

- 3.1 BHEL is a regular manufacturer and supplier of Electric locomotives to Indian Railways and Diesel Electric shunting locomotives to Industry such as power, steel, fertilizer, cements etc.
- 3.2 The hydrogen fuel cell based rail propulsion technologies powered by PEMFC (proton exchange membrane based Fuel Cell) along with a suitably sized battery bank are being tried out globally for powering railroad vehicles.
- 3.3 Indian Railways plans to introduce hydrogen fuel cell based trainsets in its rolling stock fleet, initially to be operated in the tourism sector.
- 3.4 NTPC Limited has also planned to introduce hydrogen fuel cell locomotive with the objective to replace its existing fleet of Diesel electric locomotives in the future. Tentatively, they have planned to replace around 245 such locomotives in a phased manner with new hydrogen fuel cell loco or conversion of diesel loco into hydrogen loco.
- 3.5 The intent of this Expression of Interest hereinafter referred to as the “EOI” is to invite applications from interested Party/Parties who are willing to work in consortium mode or as a sub-contractor with BHEL for Green hydrogen fuel cell locomotives as per the following broad scope for execution of contracts.
- 3.6 OEMs having requisite experience as mentioned in the EOI may submit its response for the below scope for partnership as under:-

S.N.	Description	Scope of Partnership
01	Fuel Cell and associated equipment's/system Package	<p>Partner shall be responsible for design, manufacture, System Integration, Installation, Commissioning, and Inspection, testing /trials and third party safety audit certification of equipment scope comprises the following systems :</p> <ul style="list-style-type: none"> i. Proton exchange membrane (PEM) based Fuel Cell system, ii. Battery Energy Storage System (BESS) system, iii. Energy Management System/Strategy (EMS). iv. Hydrogen storage system (Type-III/IV) from PESO approved source. v. Vehicle propulsion System (Vehicle Control Unit Train control & monitoring system and Traction Converter. Different loco parameters (notch position, ground fault, wheels slip, TM temperature, air pressure etc) to be integrated with vehicle control unit for safe operation of locomotive. <p>for the Rolling Stock(Locos/Trains/EMU etc.)</p>
02	Training & Maintenance	<p>The training to BHEL's personnel and training for the site in-charge engineers along with the maintenance of 20 years for all systems mentioned above at sr no.1 of EOI.</p> <p>The maintenance activities involves overhauling, preventive and breakdown maintenance along with supply and replacement of spares, consumables, fulfilling statutory requirements etc. as per the scope mentioned at Sr. No.1 or any scope which may be deemed necessary to fulfill the requirement of the tender which is close to the hydrogen fuel cell partner's scope.</p>



- 3.7 BHEL can enter into Strategic tie-up and finalize partnership depending upon the nature of response received.
- 3.8 In the next stage, BHEL shall enter into exclusive MoU with the finalized partner(s). Subsequently, BHEL would sign the Business Sharing Agreement in line with upcoming tender(s) or on project-to-project basis, depending upon mutually agreed terms and conditions. In addition, the selected party, after entering into a mutually exclusive agreement with BHEL, cannot quote directly or enter into any kind of joint arrangement or agreement with any other party for any future requirement related to green hydrogen fuel cell locomotive/Rolling stock.
- 3.9 It is envisaged that BHEL along with the selected party shall jointly work towards preparation and submission of bid against upcoming tender(s) and shall jointly execute the works after award of contract. Any opportunity of similar nature or works would be done jointly with selected party to address green hydrogen fuel cell locomotive requirement.



4.0 INSTRUCTION TO RESPONDENTS/APPLICANTS:

- 4.1 Interested party may respond this EOI as per Annexure -1 (along with supporting documents for criteria as applicable) by Post / e-mail so as to reach us on or before 07th September 2024 at the following address:

Addl. General Manager, TBSG,
Bharat Heavy Electricals Limited
Industry sector
Integrated Office Complex,
Lodhi Road-New Delhi -110003,
India.

Email: sushilkr@bhel.in; ani@bhel.in; praveenbeck@bhel.in,
Phone: +91 11 41793488/433/ 195;
Mobile: +91-9971269977 / +91-9810911884/ +91-8800690810

- 4.2 The details submitted by the respondent(s) shall be complete in all respects and BHEL may seek clarifications/additional information as considered necessary. Such clarifications/additional information must be provided within 2 days of BHEL request.
- 4.3 The EOI process involves seeking willingness of interested party/parties and selecting party/parties amongst all who make an application in response to this EOI.
- 4.4 Selection of party for Green Hydrogen fuel cell locomotive would be done as per Broad Scope mentioned at clause no.3.7 of EOI and based on evaluation of the technical criteria as per Annexure-2 and information provided at Table-2. Preference shall be given to the fuel cell OEM or manufacturer with the maximum single stack capacity. The single stack capacity is that can produced maximum power from single cell stack by the manufacturer or OEM.
- 4.5 Any applicant from a country which shares a land border with India will be eligible to participate in this EOI only if the applicant is registered with the Competent Authority as mentioned in the Office Memorandum of Ministry of Finance(GoI), DoE F No.6/18/2019-PPD dtd 23.07.2020 the extant Government rules and orders or its amendments, if any.
- 4.6 Any applicant barred by the Central/ State Government, or any entity controlled by it, from participating in any project, will not be eligible to participate in this EOI.
- 4.7 Any request for further information or clarification on the EOI document may be submitted to above address within 07 days from date of issue of EOI.
- 4.8 Response to EOI is to be submitted in English only. Supporting documents, as required, should also be in English language. In case, documents are available in languages other than English, the Applicant shall necessarily provide duly authenticated translated version of the same in English.
- 4.9 Duly authorized representative of the respondent(s) shall sign on each page of the document. Response to EOI should be prepared in such a way so as to provide a straight forward, concise description of respondent's capabilities.
- 4.10 Notwithstanding anything contained in this EOI, BHEL reserves the right to accept or reject any response and to annul the EOI Process in whole or part, at any time without any liability



or any obligation for such acceptance, rejection or annulment, and without assigning any reasons thereof.

- 4.11 BHEL reserves the right to verify all statements, information and documents submitted by the respondent(s) in response to the EOI. Any such verification or lack of such verification by BHEL shall not relieve the respondent of his obligations or liabilities hereunder nor will it affect any rights of BHEL.
- 4.12 The EOI process shall be governed by, and construed in accordance with, the laws of India and the Courts at New Delhi shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the EOI process.
- 4.13 All costs incurred for participation in the EOI shall be borne by the respondent(s).
- 4.14 Applicant may be a natural person, private entity, government-owned entity with a formal intent to enter into an agreement to form a Consortium.



Annexure-1

Information to be submitted by Applicant

1. Name of the Company:
2. Legal status of the Company:
3. Brief description of the Company including details of its business groups/subsidiaries/affiliates:
4. Date of Incorporation:
5. Full address including Telephone / Mobile nos. / Fax nos./Email ID:
 - Registered Office:
 - Head Office:
 - Address for communication:
 - Contact Details:
 - Office Address in India, if any:
 - Place of address where local content is added:
6. PAN & GST No.:
7. Documents to be enclosed:
 - i. Technical Credentials - Filled up Annexure -2 along with all applicable documents considered relevant to meet and support evaluation criteria indicated in Applicant's Response Column of Annexure 2. Relevant Product/System catalogues, Experience /Reference List, Engineering strengths, quality accreditations, etc.
 - ii. Financial Credentials - Copies of Audited profit and loss account and balance sheet for last 3 years.

(Sign & Company Seal)
Authorized signatory



Annexure-2

Table-1

Criteria		Applicant's Response	
Technical & Financial Criteria		Meeting the criteria Yes / No*	Documentary evidence: Enclosed
1	<p>The party/respondent should have manufactured or got manufactured fuel cells system of cumulative 100 kW or above rating in one single application with single stack capacity of minimum 25 kW in the last three (3) years.</p> <p>The above fuel cells system should have been either successfully commissioned or operating successfully for at least six month from the date of submission of this EOI at customer's premises or tested for performance at OEM's works.</p>	Yes <input type="checkbox"/> No <input type="checkbox"/>	
2	<p>The applicant should have an average annual turnover of more than Rs.100 crore in the preceding 3 financial years till last date of EOI.</p>	Yes <input type="checkbox"/> No <input type="checkbox"/>	

Note: Any Indian company or subsidiary, affiliates or associates can submit the technical as well as financial credentials of its parent company for evaluation of the party/respondent. A declaration from the parent company is required for authentication to its Indian subsidiary/affiliates/associates for submission of response.



Table-2

		Applicant's Response	
Other Criteria for Partnership		Response	Remarks if any/ Documentary evidence: Enclosed
1	<p>Whether applicant ready to associate with BHEL in the consortium or sub-contractor</p> <p><i>In case, for both options, please select (yes) in the response.</i></p> <p><i>For any single mode of association, please mention in the remarks column.</i></p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>	
3	<p>Experience of carrying out Design, Manufacture, Supply, Testing and Commissioning of green hydrogen fuel cell, Battery Energy Storage System (BESS) system, Hydrogen storage system for any rolling stocks, vehicle, mobility or any project of similar nature during the last Ten years till last date of EOI.</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>	
4	<p>Whether applicant has manufacturing facility in India</p> <p>Or</p> <p>Has plan to establish manufacturing set up in India. (Please indicate the tentative location and timeline to setup facility)</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>	
5	<p>Applicant may submit details of the maximum capacity of single stack fuel cell manufactured by them</p>		
6	<p>The Net Worth of the applicant should not be less than 100% of the applicant's paid up share capital as on the last day of the preceding financial year</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>	
