Ref No: ID/TBSG/22-23/FC/EOI/01

Dated: 30th Mar'2023

EXPRESSION OF INTEREST

FOR

Partnering with BHEL

ON

Hydrogen Fuel cell based Trainsets

Issued by:

Bharat Heavy Electricals Limited,

having registered office at

BHEL House, Siri Fort New Delhi-110049 INDIA

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 Bidder(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 Bidder(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 itself 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 Bidder(s) for next stage or to enter into any agreement(s) with any Bidder(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 any 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 Bidder. 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 Bidder 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 Bidder and BHEL shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by an Bidder 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 Original Equipment Manufacturer (OEMs)/suppliers who have past experience in developing fuel cell/battery based hybrid power train along with associated control and suitably designed Energy Management Strategy (EMS) and storage module trainsets.

2.0 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, 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 account for more than 57% (approx. 180 GW) of the total thermal generating capacity in India. BHEL has 16 manufacturing units, 4 power sector regions, 8 service centers and 15 regional offices besides host of project sites spread all over India and abroad. 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 centers.

Our ongoing major technology tie-ups include agreements with Siemens Energy Global GmbH & Co. KG., Germany (for Steam Turbines, Generators and Condensers); MHI, Japan (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), India (for Space Grade Lithium-Ion Cells); CSIR-IIP, India (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 Sumitomo SHI FW Energia Oy, Finland (for CFBC Boiler).

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

3.0 BHEL in Transportation Business:

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. BHEL also has a Battery Packaging facility for space applications.

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.

At Jhansi plant, we manufacture complete Electric Locomotives up to 6000 HP rating for mainline application of Indian Railways, Diesel Electric Locomotives from 350 HP to 3100 HP rating. Till date, we have supplied more than 400 nos. of main line electric locomotives for Indian Railways and more than 350 nos. of diesel electric locomotives for shunting operations to different industries. We are currently executing an order for manufacture of complete Electric Locomotive of 6000 HP. Our Jhansi plant with 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 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.

At Bhopal and Bengaluru plants, among electrical propulsion equipment, we manufacture and supply traction motors, traction transformers, power converters (IGBT/GTO) & controls, auxiliary converters (IGBT/GTO) and vehicle control units for electric locomotives, diesel electric locomotives, EMUs, DEMUs & and metros trains of Indian Railways. Our manufacturing range includes conventional DC drive, IGBT based 3-phase drive equipment up to 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 centers 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.

4.0 PURPOSE

4.1 BHEL is a regular supplier of traction propulsion equipment to Indian Railways' production units.

4.2 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. Indian Railways plans to introduce hydrogen fuel cell based trainsets in its rolling stock fleet, initially to be operated in the tourism sector.

4.3 Indian Railways is expected to issue the Request for Qualification (RFQ/ Request for Proposal (RFP) (hereinafter referred as 'Tender') detailing the scope, qualification requirement, specifications and commercial conditions for the Hydrogen Fuel Cell based Trainsets (hereinafter referred as 'Hydrogen Trainset Project' in near future for participation from eligible bidders.

4.4 The intent of this Expression of Interest hereinafter referred to as the "EOI" is to invite applications from interested OEMs / companies who are willing to Partner with BHEL for submitting a joint consortium bid as per the Tender requirements and as per the following broad scope for execution of contracts.

4.5 OEMs having requisite experience in any one or/ and more areas viz. Mechanical package, Fuel cell package, on ground Hydrogen Infrastructure package, System integration may submit its response specifying name of package(s)

S.N.	Description	Scope of Partnership
1	Partner for Mechanical Package	Partner shall be responsible for design, manufacture, Installation, Commissioning, Inspection, testing/trials and third party safety audit certification of trainset in line with the requirement of Hydrogen Trainset Project. BHEL may set-up the facilities for the local manufacturing of the Trainset in India in case desired by the Mechanical Partner.
2	Partner for Fuel Cell Package	Partner shall be responsible for design, manufacture, Installation, Commissioning, Inspection, testing/trials and third party safety audit certification of On Board Fuel Cell, On Board Battery and Battery Management System & On Board Hydrogen Storage System for the Trainset in line with the requirement of Hydrogen Trainset Project.
3	Partner for On Ground Hydrogen Infrastructure Package	Partner shall be responsible for design, manufacture, installation, commissioning, inspection, testing/ trials and third party safety audit certification and operation of on ground infrastructure and supply of Hydrogen in line with the requirement of Hydrogen Trainset Project.
4	Partner for System Integration	Partner shall be responsible for system design and system integration of propulsion system of the Trainset in line with the requirement of Hydrogen Trainset Project. and Partner shall be responsible for design, manufacture, installation, commissioning, inspection, testing/trials Train Communication & Management System (TCMS) for the Trainset in line with the requirement of Hydrogen Trainset Project.

4.6 Interested OEMs / companies to submit their proposal either for Sl.no. 1 or 2 or 3 or 4 or any combination of these.

4.7 BHEL shall select suitable partner(s) who meet Pre-Qualification Criteria (PQR) of the forthcoming Indian Railways Hydrogen Based Fuel Cell Trainset tender.

4.8 The chosen partner(s) shall also be required to enter into **mutually exclusive pre-bid tie up arrangement** with BHEL to jointly bid for the Indian Railways Hydrogen Based Fuel Cell Trainset tender in consortium mode. The selected bidder cannot quote directly or enter into any kind of joint arrangement with any other party for the above mentioned tender.

5.0 INSTRUCTION TO PROPOSPECTIVE PARTNERS:

5.1 Expression of Interest to be submitted should contain:

Part-I Bid: The following documents are to be submitted as part of Part I bid.

1. General Information **(As per Annexure-1)**
2. Pre-Qualification Requirements **(As per Annexure-2)**
3. **Prospective Partner to indicate if** it is willing for joint consortium bidding as per the tender requirements, declaration to be provided on the company letterhead by authorised signatory.
   Technical Proposal for the proposed scope along with proposal for transfer of manufacturing information to BHEL in case manufacturing at BHEL works is envisaged by the partner.

BHEL may verify & evaluate General information, Pre-qualification requirements and the technical proposal submitted by all interested Bidders and shortlist the parties for further processing to finalise the partner/s for consortium bidding against the tender. In this regard, decision taken by BHEL shall be binding.

5.2 Interested entities may submit their expression of interest offer by Post / e-mail so as to reach us on or before 21st April 2023 at the following address:

Mr. Pramod Khanduri, Additional General Manager/
Dr. Aniruddha, Deputy General Manager
Bharat Heavy Electricals Limited, Industry Sector,
Integrated office complex, Lodhi road, New Delhi -110003, India.
Email: pramodk@bhel.in; Phone: +91 9871800410
ani@bhel.in; Phone: +91 9810911884

5.3 The details submitted by the Bidder(s) shall be complete in all respects. However, BHEL may seek clarifications / additional information as deemed necessary. Such clarifications/additional information must be provided within 5 days of BHEL request.

5.4 The EOI process involves seeking willingness of interested parties and selecting one or more party (ies) amongst all who respond against this EOI.

5.5 Any request for further information or clarification on the EOI document may be submitted to the above mentioned official within 07 days from date of issue of EOI.

5.6 Responses to EOI are to be submitted in English only. Supporting documents, as required, should also be in English language. In case of some documents being available in

languages other than English, the Bidder shall necessarily provide duly authenticated translated version of the same in English.

5.7 Duly authorized representative of the Bidder(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 Bidder's capabilities.

5.8 Notwithstanding anything contained in this EOI, BHEL reserves the right to accept or reject any Application 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.

5.9 BHEL reserves the right to verify all statements, information and documents submitted by the Bidder in response to the EOI. Any such verification or lack of such verification by BHEL shall not relieve the Bidder of his obligations or liabilities here under nor will it affect any rights of BHEL.

5.10 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.

5.11 All costs incurred for participation in the EOI shall be borne by the Bidder(s).

Annexure-1

General Information to be submitted by Bidders

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. Date of Commencement of Business:
6. Full address including Telephone nos. / Fax nos.:

   Registered Office:

   Head Office:

   Address for communication:

   Contact Details:

   Office Address in India, if any:

   Place of address where local content is added:
7. Documents to be enclosed:
   a) Technical Credentials – Relevant Product/System catalogues, Experience /Reference List, Copies of Customer Certificates, Engineering strengths, quality accreditations, etc.
   b) Financial Credentials – Copies of Audited Financial statements (Annual Reports) for last 3 years, Credit Rating, Market share Segmental (Domestic/International) Revenue in the applied category(ies).

(Sign & Company Seal)

Authorized signatory

Annexure-2

Pre-Qualification Requirements

S. No.	Requirement	Bidder's Response	Supporting document
1	**A) Partner for Mechanical Package** Must have experience of carrying out Vehicle Design, manufacture, supply, testing and commissioning of minimum of total of 100 Cars with Aluminium and/or stainless steel car body in EMU based trainsets during last 10 years ending on 31st March'2023. & Provided that minimum of 25% of the above specified quantity of cars must have completed satisfactory revenue operation of three years or more as on 31st March'2023.		Copies of Purchase order & completion certificate for orders executed by bidder shall be provided. Further performance certificate for satisfactory operation for at least 2000 hours in a year shall be provided by bidder.
2	**B) Partner for Fuel Cell Package** Must have supplied at least ONE (01) no. fuel cell system in last 3 years for use in either traction or road transportation or stationary application with single stack capacity of 50 kW or more and the system should have been in successful operation for at least 2000 hours in a year as on 31st March 2023. In case of more than ONE no. fuel cell system cumulative hours can be considered for meeting qualification criteria upto a maximum of FIVE (05) no. fuel cell system.		Copies of Purchase order & completion certificate for orders executed by bidder shall be provided. Further performance certificate for at least 6 months satisfactory operation shall be provided by bidder.
3	**C) Partner for On Ground Hydrogen Storage System** Must have executed at least ONE (01) project for supply, installation and commissioning of on ground hydrogen storage system (including all safety systems) to store minimum 500 kg hydrogen either in single tank or in multiple tanks at minimum 150 bars in last 3 years as on 31st March 2023.		Copies of Purchase order & completion certificate for orders executed by bidder shall be provided.
4	**D) Partner for System Integration** The bidder must have experience of design, manufacture, supply, testing and commissioning of minimum 50 sets of Microprocessor based Train Control & Management System (TCMS) based on IEC 61375 (where TCMS for locomotive shall be counted as one unit sets for each locomotive and TCMS for EMU based Train-set shall be counted as one Unit for each motor car (one motor car equivalent to 4 powered axles) forming part of such trainset) during the last 10 years ending on 31st March'2023.		Copies of Purchase order & completion certificate for orders executed by bidder shall be provided. Bidder must also provide Certified copies of test reports from a reputed testing agency.

S. No.	Requirement	Bidder's Response	Supporting document
	Provided that 25% of the quantity specified above must have completed satisfactory revenue operation of three years or more as on 31st March'2023		

Any other documents considered relevant to meet PQR and to support evaluation criteria are to be submitted.

NOTE :

1. Bidders with deviations to the above mentioned PQR are also encouraged to submit their proposal. However, acceptance/suitability of such responses shall rest with BHEL and same decision shall be final and binding.

(Sign & Company Seal)

Authorized signatory