AGENCY FOR NEW & RENEWABLE ENERGY RESEARCH AND TECHNOLOGY (ANERT)

Department of Power, Government of Kerala
Thiruvananthapuram, Kerala – 695033
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EoI Document

Expression of Interest (EOI) for selection of Consortium Partners for the submission of proposals under the Pilot Projects for the Use of Green Hydrogen in the Transport Sector in Kerala under the National Green Hydrogen Mission

Ref. No.: ANERT-RD/41/2025-T7

Date of Notification: 15 November 2025

Last Date of Submission: 22 November 2025

Contents

Disclaimer

Prospective respondents to this EoI acknowledge and agree that:

- ANERT has issued this EoI with the best intention to explore the market for eligible and interested bidders and has no compulsions to enter into definitive contractual agreements. This EoI does not guarantee the conversion of this EoI into any definitive contractual agreements.
- It is also agreed that ANERT, in its sole discretion, may reject any (all) proposals made by respondent(s), may change the conditions relating to the EoI or cancel this EoI at any time without assigning any valid reason.
- Prospective respondent(s) acknowledge and agree that response to the EoI is purely voluntary action on their part and for any expenditure incurred for the submission of proposals shall be borne by the respondent(s).
- The applicants shall bear all costs associated with the preparation and submission of the response to this EoI.

1. Introduction

The Agency for New and Renewable Energy Research and Technology (ANERT), an autonomous institution under the Department of Power, Government of Kerala, is at the forefront of promoting clean energy innovation, technology deployment, and decarbonization solutions in the state.

ANERT is the State Nodal Agency (SNA) for the Ministry of New and Renewable Energy (MNRE), Govt. of India on Renewable Energy and Green Hydrogen Technologies. ANERT is also a state agency for Renewable Purchase Obligations (RPO) and Renewable Energy Certificates (REC) for Kerala. ANERT has been nominated by Power Department as the State Nodal Agency for Green Hydrogen mission of Kerala.

ANERT now invites Expressions of Interest (EOI) for Budgetary Proposals from eligible and experienced entities for joining to participate in submission of proposal under the *Request for Proposals for the Pilot Projects for use of Green Hydrogen in the Transport Sector (Phase – II) of the Automotive Research Association of India (ARAI)*, to be implemented in the State of Kerala. This initiative forms a key component of Kerala's broader efforts to accelerate the adoption of green hydrogen technologies, strengthen the state's clean mobility ecosystem, and advance the objectives outlined under the national and state-level green hydrogen frameworks.

ANERT had already been sanctioned funding from ARAI for implementation under the Phase-I project, where it would develop 2 Nos of Hydrogen Refueling Stations at Thiruvananthapuram and Kochi and undertake pilot trial fleet of 4 hydrogen vehicles on Kochi-Thiruvananthapuram and Kochi-Edappal routes. In continuation of the Phase I, the Phase II project would aim to scale up on the routes as well as supporting hydrogen infrastructure. ANERT intends to propose the new routes of Kochi – Palakkad (140 km) and Kochi – Kozhikode (205 km) for the Phase-II as an extension of the Phase-I routes, which can be considered for interstate operations till Coimbatore and Mangalore respectively.

2. Purpose of the EoI

ANERT is floating this EoI with an intent to select prospective consortium partners for submission of proposals under the Request for Proposal for the Pilot project implementation of Green Hydrogen in the Transport sector - Phase II. Bidders are to submit technical proposal along with Budgetary estimates from interested organisations to participate in collaboration for the Design, deployment, and operation of project components in alignment with the technical and operational requirements prescribed in ARAI ***Call for Proposal, "Request for Proposal Pilot Projects for use of Green Hydrogen in the Transport Sector – Phase II" issued on 30-Sep-2025***.

This EoI calls for bidders to submit their proposal for one or more of the following project components, as per their technical competence and area of expertise. Each component is to be quoted separately:

- **Part A: Vehicles:** Applicable vehicles would be limited to gross vehicle weight greater than 3.5 tons (LDVs, MDVs & HDVs – buses, trucks, and any other vehicles) and Construction Equipment Vehicles.
- **Part B: Hydrogen Refuelling Stations:** At Palakkad and Kozhikode – Kannur border

Based on the interests received, one or more Vehicle OEM and HRS developers shall be selected by ANERT, to form a consortium for the bis submission to ARAI. ANERT will be submitting the bid as part of the consortium as the Lead Applicant / Executing Agency. ANERT is in discussions with Kerala State Road Transport Corporation (KSRTC) for their role as Vehicle operator for submitting the proposal to ARAI for the CfP.

3. Outcome / Deliverables of the Project

The major deliverable of the project is the Development/ Selection/ Validation of commercially viable technologies for the utilization of hydrogen in the transport sector through:

- Use of Green Hydrogen as fuel in vehicles limited to gross vehicle weight greater than 3.5 tons (LDVs, MDVs & HDVs – buses, trucks, and any other vehicles) and Construction Equipment Vehicles.
- Supporting infrastructure like Hydrogen refueling stations.

ANERT intends to achieve these deliverables through the operation of Hydrogen-powered vehicles on the tentative routes from Kochi – Palakkad and Kochi - Kozhikode for a period of 24 months and cover a total mileage of a minimum of 60,000 Km (for vehicles other than construction equipment) or 6,000 hrs (for construction equipment).

4. Technical / Regulatory Requirements from Partners under the Project

4.1. Part A: Vehicles: Only Hydrogen based vehicle OEMs will be eligible for submission under this category.

Sl. No.	Details
4.1.1.	The bidder shall submit bids for Hydrogen Fuel Cell / H2-Internal Combustion Engine vehicle(s) of all categories of vehicles as defined in CMVR, 1989:
4.1.2.	The onboard storage system to be used in the vehicles shall be PESO approved Type 3 / Type 4 cylinders with a minimum of 350 bar of storage pressure.
4.1.3.	The bidder shall provide the technical specifications of Hydrogen Fuel Cell Vehicles (FCV) and Hydrogen Internal Combustion Engine Vehicles (H2-ICE) as specified in AIS 157/157A and AIS 195/195A, respectively.
4.1.4.	The bidder shall carry out the component level certification of the Hydrogen Fuel Cell Vehicle (FCV) and the Hydrogen Internal Combustion Engine Vehicle (H2-ICE) as specified in 157/157A and AIS 195/195A, respectively, before the commencement of the trials.
4.1.5.	The vehicle(s) under trial shall be fitted with a Vehicle Location Tracking System. Telematics shall be provided for remote data acquisition. The pilot vehicles shall be loaded with dummy loads for all field trials.

4.2. Part B: Hydrogen Refueling Stations – Only PSUs / Oil Marketing Companies (OMCs) are eligible for submission under this category.

Sl. No.	Details
4.2.1.	Hydrogen Refuelling stations of minimum 260 kg/day of capacity is to be deployed. The bidder should identify the source of green/grey hydrogen for the refuelling station.
4.2.2.	The HRS operating on minimum 350 bar, approved by PESO will only be eligible. Bids with plans to upgrade for any operating pressure greater than 350 bar approved by PESO will be preferred.
4.2.3.	The bidder may select any of the locations of Palakkad or Kozhikode for the HRS or both as deemed necessary. Preference will be given to bidders, who have identified land for the development.

5. Roles and Responsibilities of Consortium Partners

The following matrix provides a brief overview and outlines the responsibilities of the consortium partners:

Organisation → **Responsibility Areas**	**ANERT (Executing Agency)**	**Vehicle OEM**	**KSRTC (Vehicle Operator)**	**HRS Developer**
Project Planning & Development				
Production & Supply of Green Hydrogen				
Hydrogen Refuelling Station: Supply, Delivery, Develop, Operation and Maintenance				
Vehicle Supply, Delivery & Warranty				
Vehicle Maintenance, Knowledge Transfer, Training & Technical Support				
Vehicle Operations, Manpower for operations, Provision of space in Depots for maintenance activities				
Safety and Certification, Approvals				
Data Collection & Reporting				
Analysis & Recommendations				

6. Submission Requirements

6.1. Proposal Components

Interested applicants must submit a comprehensive proposal package that demonstrates the technical merit, financial feasibility, and strategic alignment for any on the project component as per Clause 2. All documents must be submitted in PDF format, via email, by the stipulated deadline.

<table>
<tr><th>Section</th><th>Content Description</th><th>Page Limit / Notes</th></tr>
<tr><td>Technical documents</td><td>1. Copy of Incorporation Certificate
2. Audited financial statements for the last 3 FYs (2022-23, 2023-24, 2024-25)
3. Filled in documents as per annexure</td><td>As applicable</td></tr>
<tr><td>Budgetary Submission</td><td>
<table>
<tr><th>Item Description #</th><th colspan="2">Cost in INR</th></tr>
<tr><td>Vehicle Cost *</td><td>(Hydrogen Vehicle Cost)</td><td>(Diesel / Conventional Vehicle of Similar Capacity)</td></tr>
<tr><td>Hydrogen Station Cost #</td><td>(Hydrogen Refueling Station Cost)</td><td>(Conventional Refueling Station Cost of Similar Capacity)</td></tr>
</table>
</td><td>1 page max</td></tr>
</table>

	* The vehicles being supplied must have a warranty of 2 years / 60,000 KM, whichever is later, and the additional O&M cost for another 3 years must be provided. Separate line entry to be added for each vehicle category and technology. The cost shall separately show the ex-showroom cost, GST, Registration charges, O&M charges etc. # The expenses on account of hydrogen production, land, operational and maintenance expenses, etc., will not be funded under this scheme. The bidder must quote the capital expenditure for setting up/transport of GH2 to the refueling stations is to be quoted. The rates being collected are indicative budgetary estimates only. Please note that the following should be indicated in the proposal: - Number of Projects executed by the company in Hydrogen domain and proof - Contribution by the bidder in financial terms/in kind - GST applicable. - The prices should be on CIF Site basis - The delivery lead times with simple PERT chart - The tentative levelized cost of hydrogen from the HRS, if no support in terms of utilities like water & electricity are provided by ANERT or GoK.	
Annexures (as applicable)	Relevant annexures may include: – Filled in Technical Specification as per applicable portion of Annexure-A – Filled in Evaluation criteria parameter as per Annexure-D – Filled in Financial quote as per Annexure-F	As applicable

6.2. Submission Format and Document Packaging

Applicants must compile their proposal into a single PDF document, following the structure, content, and page limits specified in Section 6.1. The final document should be well-organized and clearly labelled.

To avoid email size restrictions, the compiled PDF must be uploaded to a Drive folder with download permissions enabled.

Document Preparation Instructions:

- Format: PDF only
- File name: <Organization Name>_EOI_2_ANERT2025.pdf
- Upload the file to Drive
- Set access to: “Anyone with the link can download” OR shared directly with GH2CELL@ANERT.IN (with download access)

Once the document is ready and uploaded, the downloadable Drive link must be shared with ANERT via email as detailed in Section 6.2.

7. Evaluation Methodology

All eligible proposals received under this EOI will be evaluated by ANERT based on a structured and transparent assessment framework considering the technical expertise of the bidder and the budgetary estimates submitted.

Evaluation Stages

The evaluation will consist of the following stages:

a. Preliminary Screening and Scoring: Verification of completeness and eligibility. Each proposal will be scored on a scale of 1 to 10 for the following evaluation parameters:

For Part A: Vehicles

Parameter	Scoring
Minimum Annual Average Turnover (MAAT) of the bidder in Cr for the last 3 Financial Year ending 2024-25	Bidders with MAAT above ₹ 10,000 cr. will receive a full score of 10. Bidders with MAAT above ₹ 7,000 cr and less than ₹ 10,000 cr. - Will receive a score of 8. Bidders with MAAT above ₹ 5,000 cr and less than ₹ 7,000 cr. - Will receive a score of 5. Companies with turnover of less than ₹ 5,000 cr. are not eligible.
Experience with Hydrogen Project	Scoring would be based on the number of hydrogen vehicles currently operational: Bidders with 10 or more vehicles will have a score of 10. Bidders with 9 vehicles will have a score of 9…so on and so forth.
Financial Component	Bidders with the lowest cost difference between Hydrogen Component and Conventional vehicles shall be awarded higher scores according to the following: - 10 for L1 on cost difference - L2 and above on cost difference will be normalized to the L1 bid and scores be assigned

For Part B: Hydrogen Refueling Station

Parameter	Scoring
Minimum Annual Average Turnover (MAAT) of the bidder in Cr for the last 3 Financial Year ending 2024-25	Bidders with annual turnover above ₹ 4.0 lac. cr. will receive a full score of 10. Bidders with annual turnover above ₹ 3.5 lac. cr. will receive a score of 9. Bidders with annual turnover above ₹ 3.0 lac. cr. will receive a score of 8. Bidders with annual turnover above ₹ 2.5 lac. cr. will receive a score of 7. Bidders with annual turnover above ₹ 2.0 lac. cr. will receive a score of 6. Bidders with annual turnover above ₹ 1.0 lac. cr. will receive a score of 5. Bidders with annual turnover less than ₹ 1.0 lac. Cr. are not eligible.
Experience with Hydrogen Project	Scoring would be based on the number of hydrogen refueling stations implemented: Bidders with 2 or more operating HRS will have a score of 10. Bidders with at least 1 operating HRS will have a score of 9. Bidders with HRS projects under development will be scored subjectively based on the stage of the project (Awarded – 5 marks, Under Construction – 7 marks, Works completed, awaiting PESO approval post document submission – 8 marks)
Financial Component	Bidders with the lowest cost difference between Hydrogen Component and Conventional infrastructure shall be awarded higher scores according to the following: - 10 for L1 on cost difference - L2 and above on cost difference will be normalized to the L1 bid and scores be assigned.

b. Final Selection: Based on the above scoring, the final weighted score will arrive based on the weightages as below. The selection will be done out of a total score of 10 based on the weighted calculation mentioned below.

Parameter	Weights (%)
Company MAAT in Crores	40
Experience with Hydrogen Projects	40
Financial Component	20

For eg: if a bidder gets a score of 10, 8 and 8, the final weighted score will be (40% of 10) + (40% of 8) + (20% of 8) = 4 + 3.2 + 1.6 = 8.8

Based on the final weighted scores, ANERT will select at least one (1) Vehicle OEM and two (2) HRS developers to proceed with formation of consortium partner for the preparation of final proposal for ARAI. The execution of MoU and any other process will be subject to approval of the proposal by ARAI.

8. Submission Timeline and Process

Applicants are advised to carefully note the key dates and submission process outlined below. Late or incomplete submissions may not be considered for evaluation.

8.1. Key Dates

Milestone	Date
Release of EOI	15-Nov-25 on ANERT Website
Last date for EOI proposal submission	22-Nov-2025 (by 17:00 PM IST)
Shortlisting and communication to applicants	On or before 25-Nov-2025

8.2. Final Delivery Instructions

All applicants must prepare their proposal according to the structure, content requirements, and page limits detailed in Section 6.

All proposals must be submitted by email with the required Drive link to: gh2cell@anert.in

Email Submission Details:

- Subject Line: “<Name of bidder> – ARAI PHASE 2 – 2025 – EOI Submission”
- Include in Email Body:
- – Name of applicant organization
- – Project Component quoted for
- – Link to Drive (ensure direct download access)

Important Notes:

- Ensure the Google Drive link is active and accessible until at least 31-Dec-2025
- Proposals must be submitted by 17:00 PM IST of 22-Nov-2025
- For any clarifications, please contact Mr. Praveen – 7060628900 – PMU, ANERT.

Late or inaccessible submissions may be disqualified from consideration.

9. General Terms

i. This is an EOI only, not a Tender: This document is an invitation for Expressions of Interest only. It does not constitute a commitment to award of any contract, funding, or partnership.
ii. All requirements (technical, operational, procedural) mentioned in the ARAI ***Call for Proposal, "Request for Proposal Pilot Projects for use of Green Hydrogen in the Transport Sector – Phase II" issued on 30-Sep-2025*** must be followed or taken into account while responding to this EOI.
iii. No Obligation to Select or Fund: ANERT reserves the right to accept or reject any or all proposals received without assigning any reason. Submission of a proposal does not guarantee selection, nomination, or funding under any scheme.
iv. Use of Submitted Information: Information submitted through this EOI may be used by ANERT for further discussions, stakeholder consultations, and alignment with ongoing and upcoming initiatives, including but not limited to the MNRE-supported pilot projects, Kerala HVIC and other Central Financial Assistance schemes.
v. Right to Modify or Cancel: ANERT may modify, postpone, or cancel this EOI at any stage, without incurring any liability. Any updates or clarifications will be communicated through the official ANERT website or via email.
vi. Confidentiality and IP: Proprietary information explicitly marked as confidential will be treated with due care and used only for evaluation and project planning purposes. However, ANERT does not guarantee confidentiality of submitted materials unless covered by a separate NDA.
vii. No Costs Reimbursed: ANERT will not be responsible for any costs incurred by applicants in preparing or submitting responses to this EOI.
viii. Jurisdiction: All matters arising under this EOI shall be governed by the laws of India, and subject to the jurisdiction of courts in Thiruvananthapuram, Kerala.

Annexure-A

Technical Specificatio ı of Vehicle		
Sr. No.	Item	Input
1.	General Description of the vehicle	
i.	Name of the Manufacturer	
ii.	Vehicle Model Name	
iii.	Vehicle Type and Category	
iv.	Serial Number	
v.	Date of manufacture	
vi.	Hydrogen System Type (H2-ICE/ FCV)	
2.	Hydrogen Cylinder/tank detail (PESO approved)	
i.	Make	
ii.	dentification No.	
iii.	Working pressure (kg/cm2)	
iv.	Max. test pressure (kg/cm2)	
v.	Tank Type (Type III/IV)	
vi.	Tank Capacity (water equivalent)	
vii.	Tank Dimensions	
viii.	Approval No.	
3.	Cylinder Valves	
i.	Make	
ii.	Identification No.	
iii.	Type	
iv.	Working pressure (kg/cm2)	
v.	Approval No.	
4.	Fuel Cell Details (For FCV only)	
i.	Make, Trade name and mark of the fuel cell	
ii.	Types of fuel cell	
iii.	Nominal voltage (V)	
iv.	Number of cells	
v.	Type of cooling system (if any)	
vi.	Max Power (kW)	
5.	Battery Pack Details (if applicable)	
i.	Make and Trade name (If any)	
ii.	Battery Type	
iii.	Number of Cells/Modules and its Configuration	
iv.	Battery Energy (kWh)	
v.	Battery Capacity (C5)	

Annexure-B : Performance and Safety Monitoring Parameters

Table B1: H2ICE Engine data

1	Engine full and part load performance	
1.1	In-cylinder pressure	
1.2	H2 line pressure	
1.3	H2 injection pulse width	
1.4	Hydrogen flow rate	
1.5	Air flow rate	
1.6	Engine Oil Pressure & Temperature	
1.7	Engine oil consumption	
1.8	Engine blow-by	
1.9	EGR flow rate and temperatures, if used	
1.10	Exhaust lambda (H2 in exhaust system)	
1.11	Water-in temp.	
1.12	Water-out temp.	
1.13	Boost pressure	
1.14	Engine knock Sensor data	
1.15	Backfire detection sensor data	
1.16	Aftertreatment details & measurements (Temperature & Pressures)	
1.17	Exhaust gas temperature before turbocharger	
1.18	Manifold temperature	
2	WHSC emissions report	
3	WHTC emissions report	

Note: Engine specific performance and safety parameters mentioned in Table B1 are for ready reference. Based on feasibility, addition or deletion of parameters SIA will take decisions accordingly.

Table B2: H2ICE Vehicle Level monitoring Parameters

Daily Check		
	General Information	
	Date of Trial	
	Driver Name	
	At Start of trial	
	Time	
	Odometer Reading	
	Hydrogen Tank Reading	
	At End of trial	
	Time	
	Odometer Reading	
	Hydrogen Tank Reading	
1	Vehicle Performance	
1.1	Vehicle Range (Km)	
1.2	Hydrogen Fuel Consumption	
1.3	Indication of Reduced Power	
1.4	Driving Backward	
1.5	Unintentional Driver behavior	
1.6	Overall Drivability feedback	
1.7	Any other specific observation during the overload	
1.8	Vehicle Speed	
1.9	GPS coordinates - Longitude, latitude and altitude	
1.10	A/B/C pedal position	
1.11	H2 leak in cabin	
1.12	H2 leak in passenger compartment	
2	Fuel tank /Fuel Lines	
2.1	Any leak in fuel line (leak check with leak detector)	
2.2	Integrity of fuel circuit- Check any damages /kinks / bulge in flexible fuel lines	
2.3	Details of Safety devices used in vehicle (attach separate sheet)	
2.4	Details Hydrogen Kit (attach separate sheet)	
2.5	Tank working Pressure (nominal) profile	
2.6	Temperature sensors - Tank, H2gas, nozzle, pump, etc. (depending on technology)	
2.7	Flame detector sensors data	

2.8	Boil-off management system (BMS) data (standstill condition)	
2.9	Hydrogen fill level monitoring	
2.10	ESD - Electrostatic Discharge Prevention	
3	During H2 Fuel tank filling	
3.1	H2 filling monitoring	
3.2	Ambient Temperature at the time of filling	
3.3	Nominal Working pressure of H2 cylinder (NWP)	
3.4	H2 inlet temperature i.e., at the outlet of fuel station hose pipe or density	
3.5	Vehicle H2 cylinder initial Pressure i.e., at start of filling	
3.6	H2 Filling flow rate or Average Pressure Rise Rate	
3.7	Cyl.Temperature of the H2 cylinder during filling w.r.t time	
3.8	Cyl. Pressure of the H2 cylinder during filling w.r.t time	
3.9	Total Filling time	
3.10	SOC (State of Charge) w.r.t volume of cylinder	
3.11	Time taken to get stabilization of cylinder pressure after H2 filling	
3.12	H2 Filling Date & Time	
3.13	H2 Filling Location (GPS coordinates - Longitude, latitude and altitude)	
3.14	Odometer Reading at that time of filling	
3.15	Total mass of H2 filled	
4	Engine Oil	
4.1	Oil pressure - any change?	
4.2	Oil level in Dipstick - Increase / Decrease?	
4.3	Condition of oil - any water traces, emulsion?	
5	Powertrain components	
5.1	Any abnormal noise from the engine	
5.2	External periodic check	
5.3	Daily Cold and hot Startability on test vehicles	
Fortnightly Check		
1	Leak check of the Hydrogen tank, HP Line to regulator (with leak detector)	
2	Any issues in fuel system, leak etc...	
3	Safety sensors alarm if any	
4	OBD /MIL condition	
Monthly Check		
1	Safety issues	
2	Durability	

3	Engine Oil Consumption and analysis	
Six Monthly Check		
1	Hydrogen Fueling Equipment	
2	Degradation of Engine Components	
Other Information		
1	Any Engine components issue reported	
2	Frequency of water draining in oil - Last attention date/ Km	
3	Oil Grade /specification / make used	
4	water dilution in oil	
5	Oil last change kms (Servicing Details)	
6	Oil sampling after a cumulative run of 1000kms/2000kms (kms to be decided regulatory authority)	
7	Critical components calibration report	
8	Scheduled calibration report on leak and flame detectors	
Checked by		Reviewed by

Table B3:H2 fuel Cell Performance Report

S. No:	Base Fuel Cell Stack Test Data Before Start of Trials	
1	Electrical measurements:	
1.1	Fuel Cell Stack Voltage output	
1.2	Fuel Cell Stack Current out	
2	Hydrogen flow rate	
3	Air flow measurements	
4	Fuel Cell stack temperature	
5	Hydrogen injection pressure in FC	
6	Humidity	
7	FC Load Curve	
8	Fuel Cell stack coolant-in temp.	
9	Fuel Cell stack coolant-out temp.	

Table B4:H2 fuel Cell Vehicle Safety and Performance Monitoring Parameters

Daily Check		
	General Information	
	Date of Trial	
	Driver Name	
	At Start of trial	
	Time	
	Odometer Reading	
	Hydrogen Tank Reading	
	Battery SOC (if applicable)	
	At End of trial	
	Time	
	Odometer Reading	
	Hydrogen Tank Reading	
	Battery SOC (if applicable)	
1	Vehicle Performance	
1.1	Vehicle Range (Km)	
1.2	Hydrogen Fuel Consumption	
1.3	Indication of Reduced Power	
1.4	Driving Backward	
1.5	Unintentional Driver behavior	
1.6	Overall Drivability feedback	
1.7	Any other specific observation during the overload	
1.8	Fuel Cell Stack Voltage output	
1.9	Fuel Cell Stack Current out	
1.10	Hydrogen flow rate	
1.11	Air flow measurements	
1.12	Fuel Cell stack temperature	
1.13	Hydrogen injection pressure in FC	
1.14	Humidity	
1.15	FC Load Curve	

1.16	Fuel Cell stack coolant-in temp.	
1.17	Fuel Cell stack coolant-out temp.	
1.18	Power steering - duty cycle	
1.19	Vehicle Speed	
1.20	Propeller rpm	
1.21	GPS coordinates - Longitude, latitude and altitude	
1.22	A/B/C pedal position	
1.23	H2 leak in cabin	
1.24	H2 leak in passenger compartment	
2	Fuel tank /Fuel Lines	
2.1	Any leak in fuel line (leak check with leak detector)	
2.2	Integrity of fuel circuit- Check any damages /kinks / bulge in flexible fuel lines	
2.3	Details of Safety devices used in vehicle (attach separate sheet)	
2.4	Details Hydrogen Kit (attach separate sheet)	
2.5	Tank working Pressure (nominal) profile	
2.6	Temperature sensors - Tank, H2gas, nozzle, pump, etc. (depending on technology)	
2.7	Flame detector sensors data	
2.8	Boil-off management system (BMS) data (standstill condition)	
2.9	Hydrogen fill level monitoring	
2.10	ESD - Electrostatic Discharge Prevention	
3	During H2 Fuel tank filling	
3.1	H2 filling tank number	
3.2	Ambient Temperature at the time of filling	
3.3	Nominal Working pressure of H2 cylinder (NWP)	
3.4	H2 inlet temperature i.e., at the outlet of fuel station hose pipe or density	
3.5	Vehicle H2 cylinder initial Pressure i.e., at start of filling	
3.6	H2 Filling flow rate or Average Pressure Rise Rate	
3.7	Cyl.Temperature of the H2 cylinder during filling w.r.t time	
3.8	Cyl. Pressure of the H2 cylinder during filling w.r.t time	
3.9	Total Filling time	
3.10	SOC (State of Charge) w.r.t volume of cylinder	
3.11	Time taken to get stabilization of cylinder pressure after H2 filling	
3.12	H2 Filling Date & Time	
3.13	H2 Filling Location (GPS coordinates - Longitude, latitude and altitude)	
3.14	Odometer Reading at that time of filling	
3.15	Total mass of H2 filled	
4	Motor and Battery parameters	
4.1	Battery charging	
4.2	Battery Discharging	
4.3	Battery Temperature	
4.4	Battery Coolant-in temp	
4.5	Battery Coolant-out temp	
4.6	Motor torque mapping	
4.7	Motor Coolant-in temp	

4.8	Motor Coolant-out temp	
4.9	Motor Temperature	
5	Other OBD checks	
5.1	Safety sensors alarm if any	
5.2	OBD /MIL Data Monitoring	
5.3	Hydrogen Fueling Equipment periodic checks	
5.4	FC stacks failure report	
5.5	Oil last change kms (Servicing Details)	
5.6	Emergency shut-off mechanisms	
5.7	Ventilation systems	
5.8	Wiring harness checks	
Fortnightly Check		
1	Leak check of the Hydrogen tank, HP Line to regulator (with leak detector)	
2	Any issues in fuel system, leak etc...	
3	Safety sensors alarm if any	
4	OBD /MIL condition	
Monthly Check		
1	Safety issues	
2	Durability	
3	Fuel Cell Stack Inspection	
Six Monthly Check		
1	Hydrogen Fueling Equipment	
2	Fuel Cell Cooling System	
Other Information		
1	H2 kit Component testing as per Annex II of AIS 157/AIS 195	
Checked by		Reviewed by

Table B5: HRS Safety and Performance Monitoring Parameters

HRS Safety and Performance Monitoring Parameters		
S.No	Parameter	units
1	Ambient Temperature sensor monitoring while filling	K
2	Dispenser pressure and temperature sensor monitoring while filling	bar and K
3	Gas management panels maintenance report	
4	Selection of H2 compatible materials	
5	Pressure Measurements of HRS storage system	bar
6	Monitoring of flowrate of dispenser	
7	Breakaway and automatic shut off valves calibration	
8	Grounding and ESD protection	
9	Explosion proof (insulated) of electrical components	
10	Regular inspection for H2 leak sensor sensibility	
11	Dispenser periodic calibration for its operating pressures	
12	Periodic calibration of all sensors and instruments	
13	Regular cleaning or replacement of H2 filters	
14	Inspection of grounding and electrical components	
15	Periodic software updates for dispenser funcionality and safety	
16	Employee trainings report on up to date safety knowledge	
17	Emergency shutdown systems periodic checks	
18	FIRE suppression systems periodic checks	
19	Periodic H2 cooling system maintenance report	
20	High pressure Compressor calibration	

Annexure - D

Hydrogen ICE vehicles limited to gross vehicle weight greater than 3.5 tons (LDVs, MDVs & HDVs - buses, trucks and any other vehicles) and Construction Equipment Vehicles: Details Required for Evaluation

Sr. No.	Vehicle Parameters	Description	Bidder Response
1	Company Turnover	Turnover in Cr for financial Year 2022-23, 2023-24 & 2024-25	
2	Experience with Hydrogen Project	Number of Projects and proof	
3	Service centres along the project route	Number of service centres on project routes	
4	Performance (Power)	Specific power in kW/ltr	
5	Refuelling time	Refuelling time in minutes	
6	Fuel Storage and Vehicle Range	Vehicle Range in Kms./ Fuel Efficiency	
7	Emissions	Emission compliance to BSVI / Bharat Stage IV/V	
8	Vehicle payload	Vehicle payload in Tons / Tonnage handling capacity	
9	Fire Fighting Measures	FDSS / Fire Extinguishers	
10	Onboard Data Generation (Real time)	Onboard Data Generation (Real time) - Automated / Manual	

Note: Bidder may provide additional information if any related to experience on Hydrogen Fuel, H2ICE vehicle and operation.

Hydrogen Fuel Cell vehicles limited to gross vehicle weight greater than 3.5 tons (LDVs, MDVs & HDVs – buses, trucks and any other vehicles) and Construction Equipment Vehicles: Details Required for Evaluation

Sr. No.	Vehicle Parameters	Description	Bidder Response
1	Company Turnover	Turnover in Cr for financial Years 2022-23, 2023-24 & 2024-25	
2	Experience with Hydrogen Project	Number of Projects and proof	
3	Service centres along the project route	Number of service centres on project routes	
4	Performance (Power)	Power in kW	
5	Refuelling time	Refuelling time in minutes	
6	Fuel Storage and Vehicle Range	Vehicle Range in Kms./ Vehicle operation time	
7	Fuel cell vehicle service life	Total Kms	
8	Vehicle payload	Vehicle payload in Tons / Load carrying capacity in Tons	
9	Fire Fighting Measures	FDSS / Fire Extinguishers	
10	Onboard Data Generation (Real time)	Onboard Data Generation (Real time) - Automated / Manual	

Note: Bidder may provide additional information if any related to the experience on Hydrogen Fuel, H2ICE vehicle and operation.

Details Required for HRS Setup

Sr. No.	Vehicle Parameters	Description	Bidder Response
1	Company Turnover	Turnover in Cr for Financial Years 2022-23, 2023-24 & 2024-25	
2	Number of hydrogen demo station /installation in India	Provide Details	
3	Number of filling centre on the project route	Mention numbers of filling stations proposed, Provide Details of the facility	
4	Hydrogen vehicle filling experience	Mention from below options for hydrogen experience: A. More than 2 years B. Between 1 Year to 2 Years; C. Between 6 months to 1 Year; D. Less Than 6 Months.	
5	Trained manpower availability	Hydrogen Fuel Station Trained Manpower Mention from below options: A. More than 10 Employees; B. Between 5 to 10 employees; C. Less Than 5 employees;	
6	Owned / Leased land (minimum 5 years tenure)	Mention from below options: A. Minimum 5 years tenure; B. Less than 5 Years tenure. (Provide details on Lease/Rented)	
7	Frontage	Mention from below options: A. More than 1000 sq. M; B. Between 700 - 1000 sq. M; C. Less than 700 sq. M.	
8	Earth moving required	Mention from below options: Ease of vehicle entrance and all safety distances achieved A. As per PESO guidelines; B. Non-PESO Approved;	
9	Availability of power	Mention from below options: A. Uninterrupted power supply with Power backup; B. Uninterrupted power supply without Power backup;	
10	Availability of water	Mention the water availability	

Note: Bidder may provide additional information if any related to experience on HRS, Hydrogen Fuel, H2ICE vehicle and operation.

Annexure - F

Budgetary Estimate for Vehicle OEMs

Type of Vehicle	HICE Bus / HICE Truck FCEV Bus / FCEV Truck
Base Cost of the Vehicle considering warranty for 2 years / 60,000 KMs	
GST	
Sub Total (A)	
Road Tax (Kerala regn)	
Insurance for 5 years incl GST, if any	
Any other cess	
Sub Total (B)	
Cost on Road (A+B)	
O&M Charges for Year 3 (1st year after warranty)	
O&M Charges for Year 4 (2nd year after warranty)	
O&M Charges for Year 5 (3rd year after warranty)	

Cost Comparison with Conventional Vehicle

SN	Vehicle Type	Hydrogen Vehicle Cost	Diesel / Conventional Vehicle Cost
1	HICE Bus		
2	FCEV Bus		
3	HICE Truck		
4	FCEV Truck		
GST (%)			
Total			

Contribution from the Partner end if any

SN	Nature of Contribution	Equivalent Amount in Crores
1		

Budgetary estimates for HRS

SN	Vehicle Type	Hydrogen Refueling Station Cost	Conventional Fueling Station Cost
1	HRS Cost for 260kg/day @ Min 350 bar pressure		
	GST (%)		
	Total		

Split up of costs for Hydrogen Refueling Station

ITEM	Amount in INR (Crores)
Base Cost of Electrolyser unit for H2 production at site	
Dispenser and other equipment costs	
Tentative Site Development and Installation cost	
All other expenses	
GST	
Total CAPEX Cost	
Operational expenses for utilities for a period of 2 years	
Other Operational expenses for 2 years	
GST	
Indicative Operational Cost	

Normalized Levelized Cost of Hydrogen that is supplied for the pilot project, in case no support on utility costs is provided from ANERT / GoK

ITEM	Amount in INR (Crores)
Levelised Cost of Hydrogen, assuming a minimum of 50 kg/day	

Contribution from the Partner end if any

SN	Nature of Contribution	Equivalent Amount in Crores
1		