Department of Science and Technology
Ministry of Science and Technology
Government of India

सत्यमेव जयते

MISSION INNOVATION
accelerating the clean energy revolution

Call for proposals on Hydrogen Valley Platform in India

What is Hydrogen Valley?

A Hydrogen Valley is a defined geographical area where hydrogen serves more than one end sector or application in mobility, industry and energy. This typically covers all the necessary steps in the hydrogen value chain, from production (and often even dedicated renewable electricity production) to subsequent storage and its transport & distribution to various off-takers.

Objective:

The objective of hydrogen valley is to demonstrate how the entire value chain of hydrogen (production, storage and transportation) as an energy vector fit together in an integrated system approach. Thisconcept is one of the main priorities of industry and the Department of Science and Technology for scaling-up hydrogen deployments and creating interconnected hydrogen ecosystems across India.

The specific objectives include:

1. Improve through research and innovation, including activities related to higher Technology Readiness Levels (TRL), the cost-effectiveness, efficiency, reliability, quantity and quality of clean hydrogen solutions, including production, distribution, storage and end uses;
2. Strengthen the knowledge and capacity of scientific and industrial actors along the hydrogen value chain, while supporting the uptake of industry-related skills;
3. Carry out demonstrations of clean hydrogen solutions with the view to local, regional andnation-wide deployment, aiming at assessing the resource availability, involving stakeholders andaddressing renewable production, distribution, storage, and use for transport andenergy-intensive industries as well as other applications;
4. Increase public and private awareness, acceptance, and uptake of clean hydrogensolutions.

Focus:

The main scientific priorities and challenges for the different pillars and activities are listed below:

Hydrogen Production: Further improvements are required especially in cost reduction and efficiency increase for a variety of renewable hydrogen production routes, the main workhorse being electrolysis, supported by other routes exploiting direct sunlight such as thermal dissociation of water using concentrated solar energy or through photocatalysis, biomass/biogas or other biological routes. Water electrolysis will be the main technology supported, covering both high TRL types - Alkaline Electrolysis (AEL), Proton Exchange Membrane Electrolysis (PEMEL), Solid Oxide Electrolysis (SOEL) - and less mature types - Anion Exchange Membrane Electrolysis (AEMEL) and Proton Conducting Ceramic Electrolysis (PCCEL)and other routes of renewable Hydrogen production.

Hydrogen Storage and Distribution: It is essential that hydrogen becomes an intrinsic part of an integrated energy system. For this to happen, hydrogen will have to be used for daily and/or seasonal storage providing buffering functions, thereby enhancing security of supply in the medium term. The strategy also calls for an India-wide logistical infrastructure that needs to be developed to transport hydrogen from areas with large renewable potential to demand centres across India. A pluralistic approach with respect to the technologies that will be investigated and supported is envisaged, to have a complete set of technologies that can serve as building blocks of the India-wide logistical infrastructure. The specific areas of support include Hydrogen Storage, Hydrogen in natural gas grid, Liquid hydrogen barrier, Improving existing hydrogen transport means, compression, purification and metering solutions, and Hydrogen refueling stations.

Hydrogen end uses –Transport: The technology developments so far are not sufficient to meet the ambitious emission reductions in transport. A number of technology routes still need further improvements, especially in the context of reducing costs and increasing durability, in order to make them competitive with incumbent technologies. It should be also stressed that, especially in the case of hydrogen-based transportation, the competitiveness of hydrogen technologies is dependent on research and innovation breakthroughs, on production volumes of vehicles and components and on the price and availability of hydrogen as a fuel. The areas of research include passenger vehicles, Heavy duty vehicles, waterways, Rail applications and Aeronautical applications

Hydrogen end uses - clean heat and power: Hydrogen offers a unique chance to decarbonise the power generation and heating sectors reliably and independently from weather or seasonal conditions. The overall goal of this pillar is to support Indian supply chain actors to develop a portfolio of solutions providing clean, renewable and flexible heat and power generation for all end users' needs and across all system sizes; from domestic systems all the way to large-scale power generation plants which includes Stationary fuel cells, turbines, boilers and burners.

Target:

1st phase: 2023-2027 (Activation)

Hydrogen Valleys (small-scale): Develop, deploy and demonstrate a H2 valley

- Production of ≥ 500 tonnes of renewable H2 per year
- Supply more than one end sector or application (mobility, industry energy) / >20% H2 produced for each of the 2 main applications
- Demonstrate: existing/new H2 markets, contribution to economic growth, impact and replicability and commitment of stakeholders
- Financing structure and strategy, including envisaged sources of co-funding/ co-financing needed

2nd phase: 2028-2033 (Upscaling)

Hydrogen Valleys (large-scale): Develop, deploy and demonstrate a large-scale H2 valley

- Production of ≥ 5,000 tonnes of renewable H2 per year using new hydrogen production capacity
- ≥ 2 Hydrogen and Fuel applications from ≥ 2 sectors (energy, industry, transport)
- Demonstrate: existing/new H2 markets, contribution to economic growth, impact and replicability, commitment of stakeholders
- Financing structure and strategy, including envisaged sources of co-funding/co-financing needed
- Develop, deploy and demonstrate a H2 valley

3rd phase: 2034-2050 (Market uptake)

- Low carbon hydrogen technologies reaching maturity, able to be deployed at large scale to reach all hard to decarbonise sectors.

Funding Availability:

For Phase I, the allocated budget is Rs. 90 Cr. for setting up three Hydrogen Valley Platforms. The allocated budget will be distributed among the entire hydrogen value chain (production, distribution and transportation).

Budgeted costs of the project to legal entities subject to obligatory fulfilment of eligibility criteria, DST will support:

1) Grant-in-aid: 100% of the approved budget costs to the following two categories of organizations such as Government of India supported or recognised public or private academic institutions or research organisation / labs, and urban or other local bodies. The eligible budget cost to be supported by DST includes: Capital expenditure (equipment's & fabrication costs), Manpower, Consumables, Travel (local and international travel), Testing & Standardisation Costs, Contingency, Overheads (as per DST norms), etc. excluding Civil Construction costs, Prosecution / litigation costs, Salary of investigators). The equipment cost can include partial cost of first application / demonstration, which has to be borne by respective organisation. However, testing costs as per agreed protocol of the first application / deployment are admissible under testing and standardization costs.

2. Grant-in-aid to Not-for-profit (NGOs/Trusts/ Research Foundations recognized as SIRO, Industry and Start-ups: (i) DST's support to Not-for-profit (NGOs/Trusts/ Research Foundations recognized as SIRO, Industry and start-ups shall not exceed 50% of the total sanctioned amount in specific heads as per the DST norms (No financial support for manpower and equipment will be provided to the industry. However,industry can hire the manpower through academic institution) and the remaining 50% contribution shall mandatorily come from the Non-for-profit (NGOs/Trusts/ Research Foundations recognized as SIRO, Industry and start-ups.The balance 50% is released on the successfulcompletion of the project as the reimbursement.

Eligibility:

Indian entities eligible to participate

- Central Government / State Government supported or recognized (Public or Private) academia and urban or other local bodies with Industry partners;
- National / State funded R&D Labs with Industry partners
- Government of India / State Government recognized not-for-profit (NGOs, Voluntary Organizations / Trusts/ Research Foundations), having research and innovation as one of the imperative mandates; R&D centers recognized as Scientific Industrial Research Organization (SIRO) by DSIR with Industry partners;
- Incubates / Start-ups incubated in any of the recognized Business Incubator (will be funded through the incubator);
- Indian Industry can be a partner in the consortium and are eligible for funding subject to fulfillment of DST's technical, administrative and financial norms.
- **Preference will be given to projects with Industry partners providing funds.**

Academic/Research Partners:

- Public and/or private universities and research organisations must have a well-established research support system for research. Submission of proof of establishment under Indian statue; recognition documents and registration at Government of India's Public Finance Management System (PFMS) is mandatory.

Not-for-profit Organizations (NGOs/ Societies / Trusts / Research Foundations:

- The Indian Private R&D performing institutions and Not-for-profit, NGO(s)/ VO(s)/ Trust(s)/

research foundations should have experience of at least 3 years in scientific research, teaching, skill development, training and extension activities;

- Proof of Certificate of registration under Society Registration Act; registration at 'NGO DARPAN' of NITI Aayog; R&D centre recognition as Scientific Industrial Research Organization (SIRO) by DSIR and registration at Government of India's Public Finance Management System (PFMS) shall be obligatory.

Industry partners:

- Should be an Indian Company registered under the Companies Act, wherein 51% (or more) of the ownership / shareholding /partnerships shall be held by resident Indian citizen(s);
- Start-up companies registered in India by Indian Resident having valid registration and Submission of certificate of incorporation issued under Companies Act;
- Shareholding / subscriber Particulars; Recognition certificate issued by DSIR to the in-house R&D centre of the company and registration at Government of India's Public Finance Management System (PFMS) shall be obligatory.

All applicants should abide /comply with the terms & conditions of the grant of DST.

Components of Funding:

- Additional research manpower especially hired for the project in India (existing research manpower will not be eligible for funding).
- Travel (domestic and international) for student / researcher mobility
- Dissemination activities and stakeholder workshops
- Contingent expenditure such as stationery, incidentals etc.
- Equipment, Where possible, researchers are advised to make use of existing facilities and equipment, including those hosted at Mission Innovation countries. Please click the link for more detailshttp://mission-innovation.net/missions/hydrogen/. If equipment is needed as part of the research proposal, applicants must follow DST norm for requesting equipment which will be made available only on the basis of strong dedicated requirement for the project.
- Outsourcing / Fabrication costs.
- Field/Pilot demonstration in India (up to 50 % of project cost, if proposed).

Evaluation Criteria:

Proposals are evaluated and scored against selection and award criteria - excellence, impact, and quality and efficiency of implementation. Integrated proposals which can address one or more research challenges right from R&D to development and demonstration at laboratory/ field level/ Technology bed, wherever feasible as well as standalone proposal focusing on pressing challenges/issues with clear path to bring about out affordability, robustness and accessibility are welcome. It is mandatory that the research consortium is engaged in cutting edge R&D and has proven research and technical competence to execute the project. The lead organization hosting the Hydrogen Valley Platform should have ability to connect with various stakeholders to translate the research outputs for practical applications.

Evaluation Process:

For Stage IEvaluation, the proposals will be evaluated on the criteria Excellence and Impact and within those criteria.

After the Stage I Evaluation, DST will then fix an overall threshold, to limit the proposals that will be invited to Stage II. (This overall threshold will be set at a level which ensures that the total requested budget of proposals admitted to Stage II is as close as possible to three times the available budget, and in any case, not less than 2.5 the available budget. The actual level will therefore depend on the volume of proposals received.)

The proposals will be critically evaluated by DST constituted expert committees in India during both stages of evaluation.

Timelines:

Call for proposals–03rd October 2022
Last date of submission– 31st March 2023

Submission of Project Proposals:

The Project Proposal could be submitted in the enclosed format throughONLINE MODE ONLY (www.onlinedst.gov.in). NO HARD COPY of the project proposalshould be submitted.