

JOINT MISSION STATEMENT

Clean Hydrogen Mission: Building a global clean hydrogen economy

On behalf of the governments of Australia, Austria, Canada, Chile, China, the European Commission on behalf of the European Union, Germany, India, Italy, Morocco, Republic of Korea, Norway, Saudi Arabia, the United Kingdom and the United States of America (“Mission members”) on 2 June 2021

The Mission

Mission Innovation (MI) aims to accelerate the pace of clean energy innovation to achieve performance breakthroughs and cost reductions, thus providing widely affordable and reliable clean energy solutions. The Clean Hydrogen Mission (“The Mission”) is part of MI’s commitment to a **decade of clean energy innovation** to galvanise action that will enable every country to have the confidence to set ambitious clean energy and climate targets.

Almost two-thirds of current global emissions arise from hard-to-abate sectors, such as industry feedstock and transportation, some of which do not have a clear decarbonisation pathway. Clean hydrogen, which includes renewable based hydrogen and other low-carbon electricity-based hydrogen as well as fossil-based hydrogen with highly effective carbon capture and storage, provides an increasingly cost-effective solution to decarbonise these applications. Additionally, citizens need a resilient and secure energy system. Fully unlocking the potential of renewable energy requires large-scale and long-term energy storage, system integration and sector coupling, for which clean hydrogen is a promising solution. Clean hydrogen is an important building block in the clean energy transition.

The goal of the Mission is to increase the cost-competitiveness of clean hydrogen to the end user by reducing end-to-end costs to a tipping point of 2 USD/kg by 2030.

End-to-end costs of 2 USD/kg represent a tipping point in unleashing the potential for clean hydrogen to reduce global emissions, with clean hydrogen being cost competitive with other energy vectors in different industries across production, transportation, storage and end-use. Achieving this stretch goal will drive economies of scale and push down costs further, thus catalysing the development of a global clean hydrogen economy.

In addition to enhanced ambition on research, development and innovation, and working with partner initiatives and organisations, to reach **this goal the Mission will deliver at least 100 large-scale integrated clean hydrogen valleys worldwide by 2030**. Hydrogen valleys are integrated hydrogen value chains which include the production, storage, and distribution of hydrogen to end-users via various methods of transport in a defined geographic area. Hydrogen valleys usually encompass complete hydrogen value chains, can vary in scale and composition, ideally supply multiple end-use sectors, and can cross national boundaries. Established examples of these valleys feature in the Hydrogen Valley Platform.

The Mission will research, develop, and demonstrate innovative solutions and work with other international platforms to accelerate building a global clean hydrogen economy through three pillars:

1. **Promotion of research, development and innovation:** The Members of this Mission will demonstrate greater ambition on research and development, stimulating and carrying out joint research and development activities on technologies and industrial processes. This will offer step change benefits to achieve the goal, including within the areas of production, storage, networks and end-use.

2. **Demonstration through building Clean Hydrogen Valleys:** The Mission will test the delivery of different production, storage and transport methods and end use applications through cohorts of hydrogen valleys with the aim of reaching critical scale and unlocking curve effects (at a critical level of investment and experience in developing hydrogen supply chains, generating these supply chains will become cheaper and more efficient). The Mission coalition will look to achieve economies of scale through shared infrastructure and create sources of concentrated demand for clean hydrogen, working with industry to explore sector coupling and building international linkages, and linking with international initiatives to ascertain and recommend the enabling environments for hydrogen valleys.
3. **Coordination for an enabling environment:** Recognising the importance of other initiatives, and the critical role legislation, regulation and international standards play in accelerating and supporting a global clean hydrogen economy, the Mission will:
 - (a) **Identify ‘demand-pull’ efforts** needed to diffuse and deploy solutions that emerge through the Mission and partner with initiatives or actors that can deliver those activities.
 - (b) **Facilitate the creation and diffusion of non-technological and non-commercial knowledge.** This includes identifying the regulatory, standards and stakeholder education solutions necessary for deployment of technology and innovations in hydrogen valleys.
 - (c) **Generate positive engagement from local stakeholders** to facilitate the deployment and growth of hydrogen valleys, as well as the participation of local research and innovation communities.

Mission Principles

The Members of this Mission will advance their work by adhering to the following principles:

- **Coordination:** Ministers of Mission Members will be directly engaged with the Mission, stimulating greater international cooperation on clean hydrogen technology innovation, and making the Mission distinctive in the landscape of existing hydrogen initiatives.

The Mission will endeavour to address innovation gaps in the hydrogen landscape, including the need for research and innovation across the hydrogen value chain, and to bring together public and private stakeholders committed to driving down the cost of clean hydrogen through science and technology. Members will develop and publish by COP26 a joint action plan that defines the national and international effort required to achieve the Mission’s overarching goal, with a focus on addressing the key barriers and challenges to accelerating necessary innovation and stimulating more action either individually or collaboratively. Ministers of Mission members will meet on an annual basis to discuss and review progress of the Mission and identify future areas of focus.

- **Collaboration:** Members will actively collaborate through formal and informal channels, connect and facilitate researchers and innovators across borders, and include the public and private sector and technology innovators in research planning and discussions. Members will support the Vision for Mission Innovation 2.0, engaging with the Mission Innovation Platform and MI 2.0 Missions. Recognising that no country will be able to create an efficient hydrogen economy alone, the Mission will facilitate global collaboration in this area and accelerate the development of a comprehensive, international clean hydrogen value chain. The Mission will also engage with other platforms and initiatives to maximise additionality, avoid duplication and share technological breakthroughs and demonstrations with a broader community.
- **Open and inclusive participation:** Members will actively participate in the Mission and share their resources. They will invite all stakeholders, including companies, governments, intergovernmental organisations, research institutions, investors, and NGOs, that share our ambition, to become involved in the work of the Mission.
- **Transparency:** Working with existing international institutions, members will cooperate and collaborate to help governments, private investors, and technology innovators to make available data, technology expertise, and analysis to promote commercialisation and dissemination of clean energy technologies so that they reach global market penetration. Members will develop and maintain online information sources on hydrogen research and development, including through the Mission Innovation Hydrogen Valley platform and domestic websites.
- **Adaptability:** Members will remain agile, monitor progress, and modify actions to remain at the forefront of innovation and ambition, while maintaining effective delivery.

This joint statement builds on the Mission Innovation 2.0 Launch Statement and does not constitute a legally binding commitment. This Joint Mission Statement will commence on 2 June 2021 and will continue in effect for 5 years, with the option to be amended by Mission members. The Mission will report annually to the Mission Innovation community on progress towards its goal and targets. Following this period, the Mission may be extended for a further five years to support delivery of the Mission goal by 2030, subject to review.

MI Members

The Mission will build a dynamic, ambitious, and delivery-focused alliance between countries, corporations, investors and research institutes to **accelerate innovation on clean hydrogen**.

To support the Mission's goal, MI members commit to:

- National governments participating in the Mission **developing and implementing a national hydrogen strategy** for their countries, aligning with the Mission's focus to build a global clean hydrogen economy as a building block of the overarching national clean energy transitions.
- **An enhanced level of ambition to support and carry out pioneering research, development and demonstration** into more competitive end-to-end clean hydrogen value chains and

infrastructure. Mission members will make individual commitments to fund and deliver innovation, research and development into future sustainable, cheaper hydrogen production and infrastructure that are aligned with the Mission's action plan. These commitments will also entail facilitating connections between public authorities, researchers, end-users, and regulators; identifying common, pre-commercial challenges; developing a skilled workforce; supporting market creation and stimulating international cooperation. Research and development projects will be designed and managed to attract private investors willing to advance commercialisation.

- **Facilitating the building of at least three hydrogen valleys each**, and the development of innovative new technologies, through providing sufficient investment and or support. National governments will focus new investments on innovations that can be scalable to varying economic and energy market conditions, working alongside private and public sector stakeholders, and advising each other on technical issues.
- Supporting technology demonstration projects across the clean hydrogen value chain, through securing partnerships, funding, and developing best practice.
- Accelerating and supporting market creation by actively reviewing outcomes of Mission activities and exploring appropriate subsequent actions in individual policies and hydrogen-focused international fora, including this Mission.
- Creating environments for networking at national and international levels to facilitate knowledge exchanges, learning, and best practice sharing. This includes setting up networks and workshops and providing support for regulatory authorities.
- Enabling the private sector to identify collaborative opportunities and access more actionable information, to improve its ability to make investment decisions. As part of this, MI members will provide, on an annual basis, easily accessible information on their respective clean hydrogen research and development efforts to promote transparency, broadly engage stakeholders and promote this Mission.
- Providing, as a co-lead MI member, a personnel commitment of at least 1.0 FTE or funding equivalent for the implementation of the Mission activities.
- Providing, as a core coalition MI member, a personnel commitment of at least 0.5 FTE or funding equivalent for the implementation of the Mission activities.
- Supporting corporate Mission activities by:
 - Making a financial contribution towards essential administrative functions of the Mission, such as communications. These sums will be agreed by Mission participants as part of the Mission's joint action plan.
 - Organising Mission workshops or conferences alongside MI events.

The following governments, international initiatives and organisations commit to demonstrate global leadership through active participation and cooperation towards the **building of a global clean hydrogen economy**:

Co-leads

- *Australia, Department of Industry, Science, Energy and Resources*
- *Chile, Ministry of Energy*
- *European Commission, DG Research and Innovation*
- *United Kingdom, Department for Business, Energy and Industrial Strategy*
- *United States of America, Department of Energy*

Core coalition MI members

- *Austria, Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology*
- *Canada, Natural Resources Canada*
- *China, Ministry of Science and Technology*
- *Germany, Federal Ministry for Economic Affairs and Energy*
- *India, Department of Science and Technology*
- *Italy, Ministry of Ecological Transition*
- *Republic of Korea, Ministry of Trade, Industry and Energy*
- *Morocco, Ministry of Energy, Mines and Environment*
- *Norway, Ministry of Petroleum and Energy*
- *Saudi Arabia, Ministry of Energy*

International initiatives and partner organisations

- *Clean Energy Ministerial, Hydrogen Initiative*
- *IPHE Secretariat, International Partnership for Hydrogen and Fuel Cells in the Economy*
- *UNFCCC, Green Hydrogen Catapult*
- *World Bank Group, Energy Sector Management Assistance Program*
- *World Economic Forum, Accelerating Clean Hydrogen Initiative*

Other countries, international initiatives, investors, organisations from research and industry will be encouraged to join in the future.

MI member Ministers quotes

“Australia is pleased to announce that we have committed more than \$850 million to build an Australian hydrogen industry, including identifying locations for five hydrogen export hubs. This is our first step in achieving the mission goals by 2030.”

Minister Angus Taylor, Minister for Energy and Emissions Reduction, Australia

“The world needs to get to net-zero. There’s no other option. Hydrogen will get us there. Mission Innovation’s new Clean Hydrogen Mission accelerates a global clean hydrogen economy and pushes us

faster towards the clean energy future we need. Canada is a proud founding member of Mission Innovation, and through it we will lower emissions, have prosperous economies that create jobs and leave no energy worker behind.”

Minister Seamus O’Regan Jr., Minister of Natural Resources, Canada

“Chile is proud to reaffirm its commitment to deploying large-scale green hydrogen valleys in the Antofagasta and Magallanes regions through policy support and public-private collaboration, which will leverage both domestic and international demand, as well as our abundant renewable resources, to deliver competitive clean fuels to the end-user by 2030.”

Minister Juan Carlos Jobet, Minister of Energy, Chile

“The European Commission will, together with the Hydrogen and Fuel Cells joint undertaking and the EU Member States, develop further the hydrogen valleys in Europe and abroad. This will create a strong network which will benefit from the foreseen extension of the hydrogen valleys platform as a significant step in helping to achieve our ambitious EU climate goals by 2030.”

Mariya Gabriel, Commissioner for Innovation, Research, Culture, Education and Youth, European Commission

“In establishing our National Hydrogen Strategy, we have committed to strengthening international cooperation on hydrogen technologies. Hydrogen will be instrumental in reaching Germany’s ambitious goal of becoming climate neutral by 2045. In order to satisfy our projected hydrogen demand, we will in the future need to import green and sustainable hydrogen. It is therefore an important goal to establish a global hydrogen market as swiftly as possible. Since increased cooperation on innovation can contribute towards achieving this goal, we are excited to join the new Mission Hydrogen.”

Minister Peter Altmaier, Minister of Economic Affairs and Energy, Germany

“I am delighted to celebrate the launch of Mission Innovation’s Hydrogen Mission and, as a Mission co-lead, to reaffirm the UK’s support for the Mission’s ambitious – and achievable – goal.

“Low carbon hydrogen is the energy carrier of tomorrow: innovation and deployment of hydrogen technologies will enable the decarbonisation of hard-to-abate sectors, boost the flexibility and resilience of low carbon energy systems and thus make a key contribution to global net zero. The new phase of international collaboration unleashed by the Hydrogen Mission places us in prime position to unlock this potential more swiftly and share its benefits most widely. We look forward to leading from the front.”

Minister Anne-Marie Trevelyan, Minister of State for Business, Energy and Clean Growth, United Kingdom

Annex 1 – Partner Organisations and Initiatives Commitments

Clean Energy Ministerial (CEM), Hydrogen Initiative

Promotion of research, development and innovation

- Sharing prioritised challenges in key segments of the value chain and applications for a more focused definition of research, development and innovation (R&D&I) needs and programs.
- Creating a robust network of innovators and researchers, deeply rooted in industry.

Demonstration through building Clean Hydrogen Valleys

- Stimulating public-private and private-private partnerships to catalyse the deployment of hydrogen valleys around large-scale clean hydrogen projects, particularly those centered around the industrial, energy supply and transport sectors.
- Information exchanges and networking with hydrogen valley champions regarding roadmaps to cost parity of clean hydrogen through policy instruments.

Coordination for an enabling environment

- Sharing research and development (R&D) activities' and demonstration projects' results to the CEM community to inform the development of supporting policy.
- Sharing tools and resources produced by CEM with the hydrogen valleys and policy makers to inform the development of supporting policy and demonstration projects.

Secretariat for the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE)

Promotion of research, development and innovation

- Identify key barriers and challenges where directed R&D&I might achieve improvements and breakthroughs to bring down the cost of clean hydrogen across the value chain.
- Monitor the progress in delivering country-level R&D&I commitments, working to increase transparency in reporting program results.

Demonstration through building Clean Hydrogen Valleys

- Collaborate to help establish the concept of hydrogen valleys in country- and region-level policy making, as well as an attractive approach for private business and investment models.
- Share information on hydrogen valley deployments, such as technologies, experiences, and roles of all stakeholders, for dissemination through the IPHE network.

Coordination for an enabling environment

- Leverage the experience of IPHE in hydrogen education and outreach initiatives, and, codes, standards, and safety, sharing learnings with hydrogen valley private and public stakeholders.
- Communicate findings and learnings developed by IPHE to the Mission member countries.

UNFCCC, Green Hydrogen Catapult

Promotion of research, development and innovation

- Sharing prioritised challenges in key segments of the value chain and applications for a more focused definition of R&D&I needs and programs.
- Co-developing a cost reduction roadmap to most cost-effectively scale green hydrogen production through innovation in several regions before 2026.
- Creating a robust network of innovators and researchers, deeply rooted in industry.

Demonstration through building Clean Hydrogen Valleys

- Stimulating public-private and private-private partnerships to catalyse the deployment of hydrogen valleys around large-scale green hydrogen projects, particularly integrating shipping, fertilizer, and steel production sectors.
- Specifying and aligning on public and private actions required to accelerate technology deployment and market development on 2026 and 2030 timeframes.
- Information exchanges and networking with hydrogen valley champions regarding roadmaps to large-scale deployment of innovative technologies.

Coordination for an enabling environment

- Sharing R&D activities' and demonstration project's results to the Hydrogen Catapult community.
- Sharing tools and resources produced by the Hydrogen Catapult with the hydrogen valleys and policy makers.

World Bank Group, Energy Sector Management Assistance Program (ESMAP)

Promotion of research, development and innovation

- Share experiences and best practices from developing countries regarding clean energy R&D funding programs and initiatives, including clean hydrogen technologies and systems, highlighting opportunities and challenges with the objective of developing adequate public policies adapted to the specific needs and conditions in these countries.
- Channelling potentially available resources towards R&D programs and initiatives in developing countries.
- Connect green hydrogen technologies with energy storage testbeds under the World Bank's Global Network of Energy Storage Testbeds to facilitate testing under conditions found in developing countries, conditional to the interest of testbed host country.

Demonstration through building Clean Hydrogen Valleys

- Include the concept of hydrogen valleys in the development of ESMAP/World Bank-supported strategies, to increase the number of developing countries hosting hydrogen valleys.
- Provide financial support through World Bank financial instruments and technical assistance, for the identification and development of demonstration projects and the implementation of hydrogen valleys.

Coordination for an enabling environment

- Share experiences from developing countries pursuing green hydrogen projects, highlighting opportunities and challenges, with the objective of developing innovative solutions adapted to the specific needs and conditions in developing countries.
- Contribute to fostering interaction between public and private stakeholders.

World Economic Forum (WEF), Accelerating Clean Hydrogen Initiative

Promotion of research, development and innovation

- Sharing prioritised challenges in key segments of the value chain and applications for a more focused definition of R&D&I needs and programs.
- Creating a robust network of innovators and researchers, deeply rooted in industry and connected to the investment community.

Demonstration through building Clean Hydrogen Valleys

- Stimulating public-private and private-private partnerships to catalyse the deployment of hydrogen valleys around relevant clean hydrogen investments and projects, as well as integrating new technologies into existing valleys.
- Exploiting synergies between industrial clusters looking for decarbonization solutions and hydrogen valleys, linking the Mission with the Accelerating Clean Hydrogen Initiative.
- Information exchanges and networking between hydrogen valley stakeholders and the Forum's network, particularly its finance community.

Coordination for an enabling environment

- Sharing R&D activities' and demonstration projects' results with the WEF network.
- Sharing policy and finance insights and recommendations generated by the WEF platform with hydrogen valley stakeholders to facilitate further project development and scale-up.