SET4H2

Coordination and Support Action SET4H2

Mapping of initiatives, networks and platforms to engage with on a European level

D4.1

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List of abbreviations and acronyms

List of abbreviations

Abbreviation	Long form
ACs	Associated Countries
EC	European Commission
EEA	European Economic Area
ENTSO	European Network of Transmission System Operators
ERA	European Research Area
ETIP	European Technology and Innovation Platform
EU	European Union
FCH	Fuel Cells and Hydrogen
FID	First Industrial Deployment
HEU	Horizon Europe
MI	Mission Innovation
MSs	Member States
PU	Public
RES	Renewable Energy Sources
RDI	Research, Development & Innovation
RFNBO	Renewable Fuel of Non-Biological Origin
R&I	Research and Innovation
SDG 7	Sustainable Development Goal 7
SET Plan	Strategic Energy Technology Plan
SRIA(s)	Strategic Research and Innovation Agenda(s)
TRL	Technology Readiness Level
TWG	Temporary Working Group
VET	Vocational Education and Training

Acronyms of CSA SET4H2 consortium partners

AEA: Österreichische Energieagentur - Austrian Energy Agency

BGH2A: Balgarska Asotsiatsia za Vodorod, Gorivni Kletki I Sahranenie na Energia (Bulgarian Hydrogen, Fuel Cell and Energy Storage Association)

EUREC: Association of European Renewable Energy Research Centers

DGEG: Direção-Geral de Energia e Geologia (Directorate General for Energy and Geology)

DLR: Deutsches Zentrum für Luft- und Raumfahrt e.V.

HER: Hydrogen Europe Research

MUR: Ministero dell'Università e della Ricerca

UNIBO: Alma Mater Studiorum – Università di Bologna

1 Scope and methodology

The aim of this exercise is to map the main hydrogen-related platforms and initiatives at the European Union (EU) level, providing a comprehensive overview of the key actors and programmes driving the hydrogen economy in the region. As hydrogen plays a pivotal role in achieving the EU's decarbonization goals, understanding the landscape of initiatives and platforms is crucial for identifying opportunities, gaps, and synergies.

This mapping exercise covers networks, funding instruments, industrial alliances, and institutional platforms that focus on hydrogen production, distribution, and utilization across sectors such as energy, transport, and industry, as well regulatory and policy issues. It includes EU-level initiatives and transnational efforts aimed at fostering innovation and scaling up hydrogen technologies. Due to the role of the EU as global player in the international arena, an overview of the main platforms and initiatives at the global level has been included in the report.

Data have been collected through desk research based on publicly available information published on the internet, and are organized into categories, such as platforms and networks, funding programmes, research and innovation initiatives, infrastructure projects, and regulatory bodies. The results are synthesized into a visual and analytical representation of the hydrogen ecosystem within the EU. Details of each initiative are summarised in a dedicated fiche. The overall report is conceived as a **practical handbook** and as **a catalogue** of the various initiatives, to orient in the complex hydrogen landscape and as a living document to be updated as new initiatives are set up.

2 The hydrogen ecosystem in the EU

The EU is building a dynamic and multi-faceted ecosystem of networks and initiatives centered on hydrogen, aimed at positioning this energy vector as a cornerstone of the EU's energy transition and decarbonization strategies. Initiatives are structured around key areas such as innovation, industrial deployment, policy and regulatory frameworks, international cooperation, along with funding instruments addressing different segment of the innovation chain.

This is a highly interconnected framework that involves industrial and research networks, public-private partnerships, significant funding instruments and international partners, covering the whole innovation chain and working together to accelerate the development, production, and utilization of hydrogen technologies. Networks and platforms work on policy alignment and R&I roadmaps; EU partnerships support hydrogen technology development; EU funding mechanisms like the Innovation Fund, IPCEI and the Connecting Europe Facility (CEF), combined with other, provides crucial support for hydrogen infrastructure and large-scale projects.

A brief outline of this complex landscape can be summarised as follows:

Industry and Research Networks

At the core of the EU's hydrogen ecosystem are industrial and research networks that drive innovation, commercialization, and policy alignment:

- **Hydrogen Europe** is a leading industrial association representing over 600 stakeholders across the hydrogen value chain. It advocates for the scaling up of hydrogen technologies, contributes to policy development, and fosters partnerships between the public and private sectors.
- **Hydrogen Europe Research** complements this industrial focus by representing research and academic institutions. Its aim is to bridge the gap between scientific research and commercial application, working closely with European-funded projects like those under the Clean Hydrogen Partnership.

- **European Energy Research Alliance (EERA)** Joint Program on Fuel Cells and Hydrogen is another vital research-focused entity. It brings together public research institutions from across Europe to tackle the scientific and technological challenges in hydrogen production, storage, and utilization, providing the knowledge base for long-term hydrogen strategies.
- **Hydrogen Council:** A global industry-led coalition that promotes hydrogen as a key solution for the energy transition. European companies are strongly represented, and the Council works to align industrial hydrogen roadmaps with global policies and strategies, advocating for the large-scale adoption of hydrogen technologies worldwide.

Public-Private Partnerships

Public-private partnerships play a crucial role in advancing hydrogen technologies by pooling resources, expertise, and funding from both the public and private sectors. Some key partnerships include:

- **Clean Hydrogen Partnership** (formerly the Fuel Cells and Hydrogen Joint Undertaking): This flagship initiative is one of the most significant public-private partnerships in Europe, focusing on developing a competitive and innovative hydrogen sector. It funds research, innovation, and large-scale deployment projects to accelerate hydrogen's market readiness.
- **Clean Steel Partnership, Clean Aviation Partnership, Waterborne** and **2Zero**: These sector-specific partnerships are part of Europe's broader efforts to decarbonize heavy industry and transport. They focus on using hydrogen in steel production, aviation, shipping, and road transport, advancing sector-specific applications of hydrogen technologies.

European Networks and Platforms

To ensure that hydrogen developments align with EU policies and regional needs, the European Commission has established several networks and platforms to coordinate efforts within its institutional framework. These EU networks and platforms serve various purposes, including coordinating and promoting investment in the hydrogen sector (ECHA), facilitating policy alignment between EU, national, and regional governance levels (HyENet; S3 Hydrogen Valleys), or addressing issues related to standardization and regulation (ENNOH):

- **European Clean Hydrogen Alliance (ECHA)** is the EU's main coordination platform, bringing together industry, research, policymakers, and civil society. The Alliance is tasked with scaling up hydrogen production, deployment, and infrastructure, ensuring hydrogen becomes a central part of the EU's decarbonization agenda.
- **Energy and Managing Authorities (EMA) Network** connects national and regional authorities responsible for managing EU energy-related funding programs, including those for hydrogen projects. This network ensures the alignment of funding instruments with the EU's hydrogen objectives.
- The **European Network of Network Operators for Hydrogen (ENNOH)** is an upcoming EU initiative that aims to coordinate the planning, development, and operation of hydrogen infrastructure across Europe. ENNOH is envisioned as an independent body specifically focused on hydrogen, similar to existing network organizations for electricity and gas. It is part of the EU's broader Hydrogen and Decarbonised Gas Market Package, which establishes regulations and guidelines for hydrogen and renewable gas markets under the EU Green Deal.
- **Hydrogen Energy Network (HyENet)** supports cooperation between national authorities across Europe, helping them integrate hydrogen into national energy strategies and create local hydrogen ecosystems.
- **SET Plan TWG on Hydrogen:** The Temporary Working Group (TWG) on Hydrogen within the Strategic Energy Technology (SET) Plan is an initiative set up by the European Union to support the development of hydrogen technologies as part of the EU's energy and climate goals. The SET Plan is the EU's research and innovation framework aimed at accelerating the deployment of low-carbon

technologies, and the TWG on Hydrogen specifically focuses on advancing hydrogen as a clean energy source.

- **S3 Hydrogen valleys:** This platform supports regional Smart Specialisation Strategy (S3) in the field of Hydrogen. It is a framework aimed at accelerating the development of "Hydrogen Valleys" across Europe. It encourages knowledge exchange and cooperation across regions to boost hydrogen innovation and deployment at the local level.

Funding Instruments

The EU has put in place various funding mechanisms to support hydrogen research, innovation, and deployment at all stages:

- **Breakthrough Energy Catalyst**: Backed by the European Commission, this initiative partners with private investors to support large-scale hydrogen projects aimed at industrial decarbonization.
- **CEF (Connecting Europe Facility):** The CEF plays a crucial role in supporting hydrogen infrastructure development in the EU. It funds cross-border energy infrastructure projects, including those related to hydrogen transport, storage, and distribution. By supporting hydrogen corridors and refueling stations, CEF enables the integration of hydrogen into the Trans-European Energy and Transport Networks, which is critical for developing an EU-wide hydrogen market.
- **Innovation Fund:** One of the largest funding programs for low-carbon technologies, the Innovation Fund supports large-scale hydrogen projects aimed at industrial decarbonization.
- **Important Projects of Common European Interest (IPCEI) on Hydrogen:** This framework enables large-scale, cross-border hydrogen projects that are of strategic importance to the EU. Under this funding framework, based on national state aid, four IPCEIs on hydrogen have been approved: HY2TECH for the development of production and storage technologies; HY2USE focusing on applications in industrial processes; HY2NFRA covering hydrogen infrastructure; HY2MOVE (in approval phase) on hydrogen mobility and transport solutions.

Project-based platforms

Under the EU funding framework, and besides the numerous projects on technology development and demonstration, there are several projects addressing cross-cutting dimensions such as skills, international cooperation or capacity building:

- **EIC Green Hydrogen Portfolio** is an initiative by the European Innovation Council (EIC) aimed at supporting innovative projects in green hydrogen technology as part of the EU's broader efforts to achieve climate goals and the transition to a low-carbon economy. This portfolio is a collection of EIC-funded projects that focus on various aspects of green hydrogen production, storage, and application.
- **European Hydrogen Academy** is a European project that intends to coordinate and support training actions on hydrogen and its technologies through the establishment of a network of over 600 European educational institutions.
- **H2Excellence** is an EU initiative focused on establishing best practices, quality standards, and benchmarks for the hydrogen sector across Europe. The project's primary goal is to support the development of a robust and reliable hydrogen economy by setting standards that promote high-quality, safe, and efficient hydrogen production, storage, distribution, and use.
- **Green Skills for Hydrogen** project is an EU initiative designed to develop and enhance the workforce capabilities necessary for the burgeoning hydrogen economy. The project focuses on creating comprehensive training programs, educational resources, and certification schemes to build the expertise required to support the hydrogen sector's growth.

The **four hydrogen IPCEIs** are "projects", but given the scale, the funding framework and the special governance that lays in the MSs, they are singled out, since they stand at the border between a funding

instrument and projects. IPCEIs are an important tool for the establishment of a European hydrogen value-chain based on cross-border cooperation and integration.

International Cooperation

Europe's hydrogen ecosystem is deeply integrated with global efforts to advance clean hydrogen technologies, recognizing that hydrogen development transcends borders. In this regard, international initiatives such as UNIDO's hydrogen programme, and collaborations under Mission Innovation, IEA and IRENA ensure that Europe's hydrogen developments are aligned with and contribute to global hydrogen efforts. The EU actively participates in various international initiatives, including:

- **Mission Innovation,** which fosters global cooperation to drive down the cost of clean hydrogen technologies.
- **IEA Hydrogen Technology Collaboration Programme (TCP)** and the **International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE)**: These platforms facilitate the sharing of best practices, research, and policy development at the international level, with EU countries playing a prominent role.
- **IRENA Collaborative Framework on Green Hydrogen**: This international platform is dedicated to scaling up the use of green hydrogen, where Europe contributes significantly in terms of technology, policy expertise, and funding.
- **UNIDO Programme on Hydrogen in Industry**: This initiative by the United Nations Industrial Development Organization (UNIDO) focuses on promoting hydrogen as a clean energy source for industrial applications, particularly in developing countries. The program helps decarbonize industries through the deployment of green hydrogen technologies, where European expertise and investment play a significant role.
- **MED-GEM**: is a project-based platform supported by the EC aimed at partnering with the Southern Mediterranean countries for the development of the hydrogen economy. It offers a platform for dialogue and cooperation as well as capacity building activities.

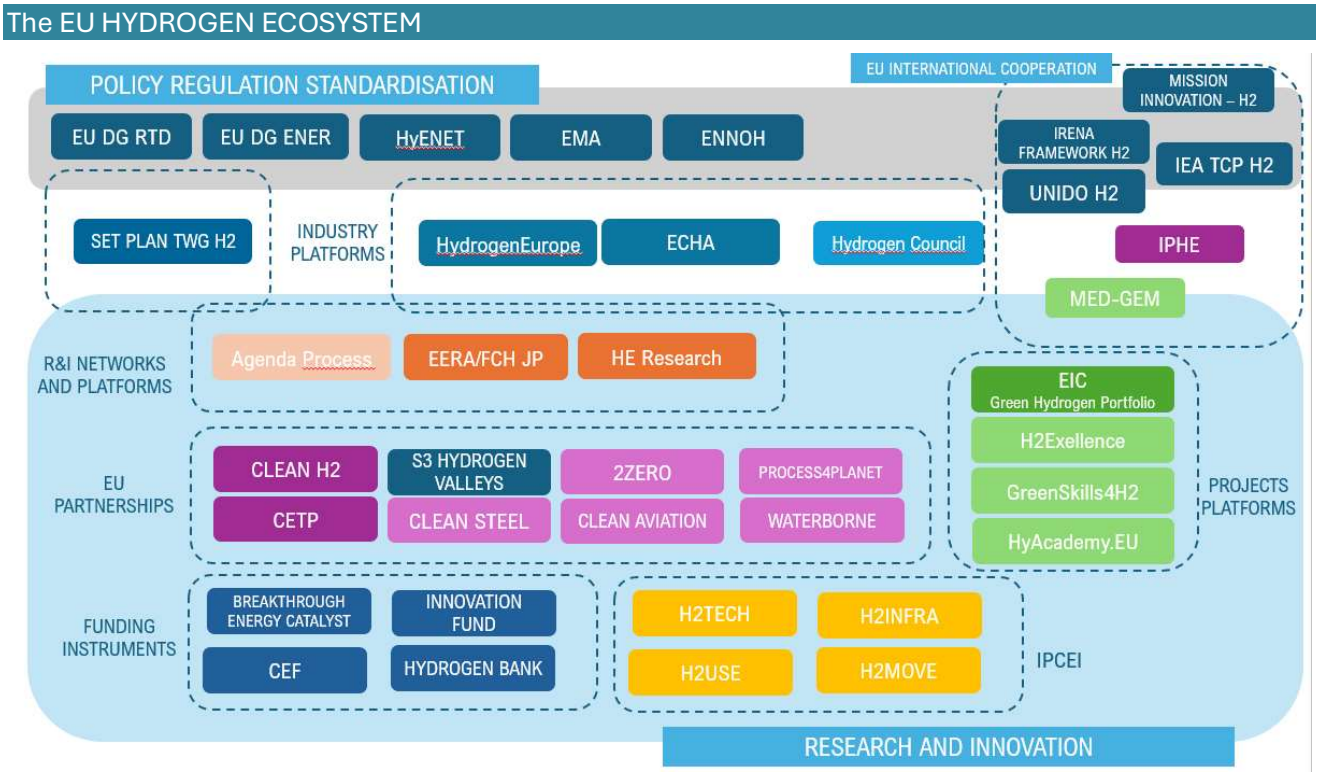

Fig. 1: The EU hydrogen Ecosystem

This comprehensive ecosystem - represented in Fig. 1 - is driving Europe's leadership in the global hydrogen economy, supporting its vision of becoming a climate-neutral continent by 2050. By fostering public-private partnerships, creating extensive networks, and investing in innovation, the EU is laying the groundwork for hydrogen to play a transformative role in the transition to a clean energy system.

To this extent, a different view of this ecosystem - which is interesting to position the various initiatives along the innovation chain - is offered in the following Fig. 2. This representation testifies to the EU strategic approach to cover all the segments to support the development and deployment of hydrogen investment according to the level of maturity, by creating enabling frameworks and instruments.

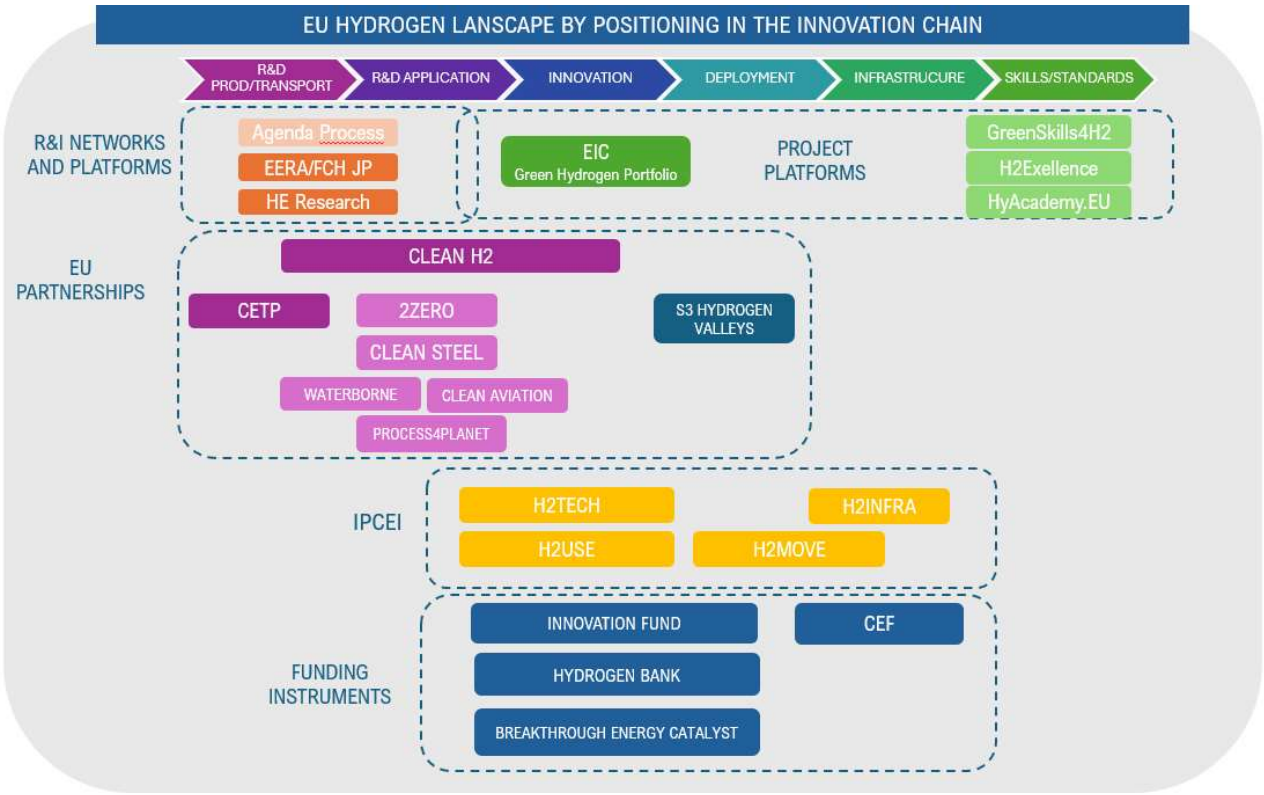

Fig. 2: The EU hydrogen ecosystem by positioning in the innovation chain

This complex hydrogen ecosystem cannot be fully understood without considering the global landscape. On one hand, the EU is a major global player, engaging with other economies and maintaining a foreign policy in which energy often plays a key role in forming cooperation agreements and international relationships. On the other hand, the EU actively participates in important international forums, collaborating with global organizations to develop policies, standards, and regulatory frameworks that support the worldwide adoption of hydrogen technologies.

A summary of key global initiatives, along with a detailed overview of the international organizations and platforms discussed here, is provided in the section on international cooperation and global programs.

The following Fig. 3 provides an overview of the major international and global programmes on hydrogen, according to their primary focus, whether support to development, standardisation and policy alignment, or R&I policies, global/regional scope. Besides the international organisations already recalled above, the **World Bank** is the main actor with several specialised programmes to support beneficiary countries to build an enabling framework for hydrogen:

- **ESMAP:** Since 1983 ESMAP collaborates with the World Bank to assist developing and emerging-market countries in addressing their energy challenges. The Programme offers: Knowledge & Expertise

on policies, regulatory frameworks; Finance Mobilization to supports the structuring of project pipelines; Analysis of energy markets, utility performance, policy and regulatory incentives, standards, operational protocols, and rules around the world, identifying effective practices to offer countries innovative solutions.

- In the field of hydrogen, ESMAP created the **Green Hydrogen Support Programme** addressing the challenges associated with the deployment of renewable hydrogen projects, such as technology risks, capacity building, regulatory requirements, and economic analyses; and the **Hydrogen for Development Partnership (H4D)**, a global platform to accelerate clean hydrogen deployment in developing countries providing advice and technical assistance.

On a regional scale, it is worth to recall the H2LAC, a collaborative platform dedicated to promoting the growth of green hydrogen and its derivatives in Latin America and the Caribbean. The implementation of the platform is supported by the Euroclima Programme, funded by the European Union and co-financed by the German Federal Government.

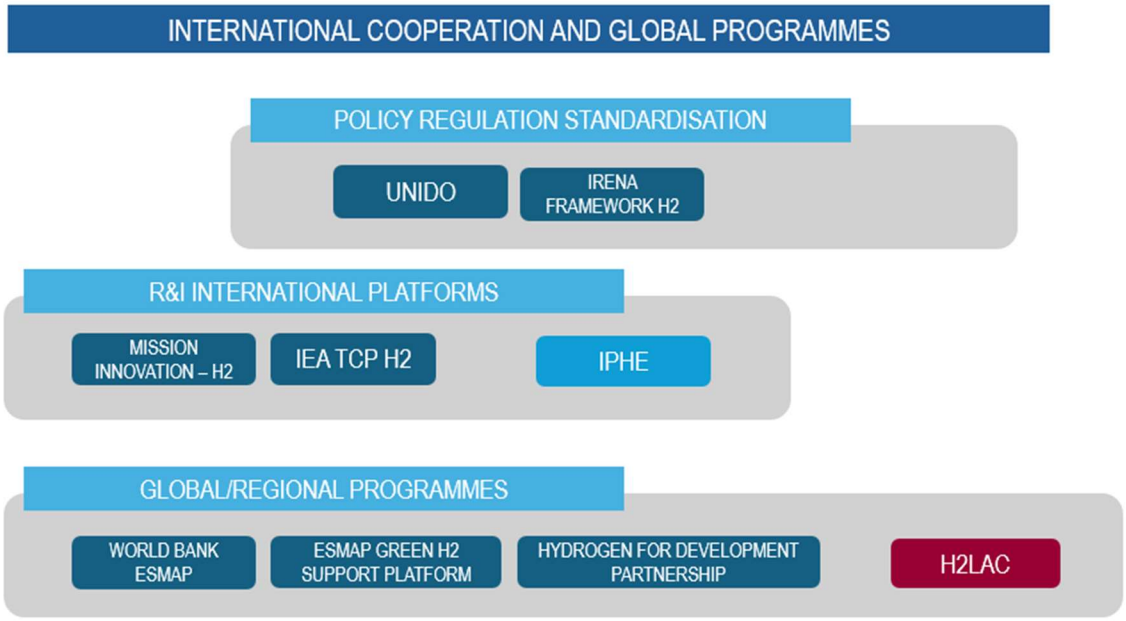

Fig. 3: International initiatives and global programmes

The following sections provide details on the mapped initiatives with the aim to offer a practical handbook to identify the type of initiative and its positioning in the hydrogen landscape.

EUROPEAN NETWORKS AND INITIATIVES ON HYDROGEN

3 European Networks and Initiatives on Hydrogen

3.1 EU Policy, Regulation and Standardisation Networks

To support a coordinated and synergic approach in the EU, the European Commission has initiated or promoted a set of platforms involving different institutional stakeholders at the national and regional level. The objective is to promote the alignment of policies and strategies across the EU MSs/ACs through an exchange of good practices and initiatives running at the national/regional level.

Together, the various networks included in this category are instrumental in building a cohesive framework for hydrogen development in the EU. They address policy alignment, funding coordination, and standardization, ensuring that regional and national hydrogen initiatives contribute effectively to the EU's overarching climate and energy goals

This cluster includes the **HyENet** and **EMA** networks, more focused on policy alignment and knowledge exchange; and the **ENNOH** network of hydrogen network operators that specifically addresses standardisation issues.

EMA Network - Energy and Managing Authorities Network

Geographical scope: EU

Initiative: Energy and Managing Authorities Network

Acronym: EMA Network

Type of initiative: European Commission Initiative; Network; Informal platform

Scope: The aim is to support authorities in charge of the implementation of energy-related programmes in promoting energy efficiency, renewable energy and smart energy infrastructure, as well as energy-related research and innovation. Although it has a wider aim, it includes significant effort towards hydrogen.

Date of establishment: 2014

Status: Ongoing

Membership: Representatives of the 27 MSs national energy Authorities and Cohesion Policy Managing Authorities dealing with energy. Representatives of relevant organisations can join as observers.

Brief Description: The network acts as an informal platform for exchanging information, sharing good practices, experiences and latest developments, and joint work on specific issues through dedicated working groups.

Structure: Informal platform. The Network meets twice a year for plenary sessions.

SRIA/Roadmap:

The Network doesn't have a SRIA or Roadmap. Meeting minutes, agendas and presentations are published on:

https://circabc.europa.eu/ui/group/62397a39-ab04-4bd7-8cb3-71172b770236/library/32562dc7-8121-4978-90d0-b907f018e097?p=1&n=10&sort=modified_DESC

Website: https://energy.ec.europa.eu/yearly-energy-policy-events-and-forums/energy-and-managing-authorities-network_en

Secretariat: DG ENER and DG REGIO ensure the operation of the network.

Contact details:
Directorate-General for Energy
+32 2 299 11 11 (Commission switchboard)
European Commission
1049 Bruxelles/Brussel (Belgium)

SRIA Summary: The Network doesn't have a SRIA or Roadmap. Published documents can be found on: https://circabc.europa.eu/ui/group/62397a39-ab04-4bd7-8cb3-71172b770236/library/32562dc7-8121-4978-90d0-b907f018e097?p=1&n=10&sort=modified_DESC

Main objectives:

- Support Member States to make best use of Cohesion Policy funding for energy.
- Strengthening connections, cooperation and exchange of information, knowledge and practices.
- Promote exchange among Member States, and between the Commission and Member States.

ENNOH - European Network of Network Operators for Hydrogen

Geographical scope: EU

Initiative: European Network of Network Operators for Hydrogen

Acronym: ENNOH

Type of initiative: Network; Sectoral organisation; Organization for the cooperation of the EU Hydrogen Transmission Network Operators (HTNOs)

Scope: Promote the development and proper functioning of the internal market for hydrogen and the cross-border trade. ENNOH will bring together the unique expertise of HTNOs for the benefit of European citizens by fulfilling the mandates given to ENNOH in the EU legislation.

Date of establishment: expected in 2025

Status: Planned

Membership: Hydrogen infrastructure operators and MSs. On December 2024 ENNOH accounts for 37 entities from 26 EU Members State.

Brief Description: ENNOH works on regulatory issues related to hydrogen transport infrastructure. ENNOH's main responsibilities will include developing a Ten-Year Network Development Plan for hydrogen, promoting harmonized technical and operational standards, and coordinating with other energy sectors to ensure the efficient transport and distribution of hydrogen across the EU. This structure is expected to foster a unified approach to hydrogen infrastructure, ensuring consistency and supporting the hydrogen market's growth.

Expert tasks and deliverables will include: Developing Network Codes and technical recommendations of multiple topics for efficient and effective market and system operation; Elaborating Union-wide Ten-Year Network Development Plans (TYNDP) and all associated developments; Providing regular information, delivering common operational tools, and ensuring regional cooperation.

ENNOH will cooperate closely with the ENTSO for Electricity and the ENTSO for Gas on identifying synergies and on fostering system integration across energy carriers in order to facilitate overall energy system efficiency.

Additional resources: https://ennoh.eu/publications-events.html

Website: https://ennoh.eu/

Contact details: info@ennoh.eu

Mission statement summary: The main mission is to promote the development and proper functioning of the internal market for hydrogen and the cross-border trade and to ensure the optimal management, coordinated operation and sound technical evolution of the European hydrogen transmission network.

Main objectives:

- Developing Network Codes and technical recommendations of multiple topics for efficient and effective market and system operation.
- Elaborating Union-wide Ten-Year Network Development Plans (TYNDP) and all associated developments.
- Providing regular information, delivering common operational tools, and ensuring regional cooperation, as requested by EU H2&Gas Markets Decarbonisation Package.

HyENet - Hydrogen Energy Network

Geographical scope: EU

Initiative: Hydrogen Energy Network

Acronym: HyENet

Type of initiative: European Commission Initiative; Network; Informal platform

Scope: HyENet acts as an informal platform to share information on good practices, experience and the latest developments in hydrogen, and to work jointly on specific issues.

Date of establishment: 2019

Status: Ongoing

Membership: Representatives from the ministries in charge of energy policy in EU Member States

Brief Description: HyENet is an informal group of representatives from the energy ministries in EU countries that aims to help national energy authorities build on the opportunities offered by hydrogen as an energy carrier.

Structure: Informal group

SRIA/Roadmap: HyENet doesn't have SRIA or Roadmaps as it is an informal platform. Meetings' minutes agendas, and presentations are available on the website.

Website: https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/hydrogen-energy-network_en#previous-meetings

Secretariat: DG ENER ensures the operation of the network.

Contact details: no public contact is available. A reference person is: Tudor Constantinescu, Principal Adviser to the Director-general, DG ENER.

Main objectives:

- Help national energy authorities build on the opportunities offered by hydrogen.
- Share information on good practices, experience and the latest developments in hydrogen.
- Work jointly on specific issues.

3.2 EU Industry Platforms

This section includes two relevant industry platforms:

- the **European Clean Hydrogen Alliance**, an initiative promoted by the EC in the framework of the EU industrial policy, that brings together the main stakeholders in the hydrogen sector, particularly private companies and investors, with the objective to accelerate the development and deployment of hydrogen technologies;
- **Hydrogen Europe** which is the sectoral industry organization representing companies working in the hydrogen value chain. Hydrogen Europe works closely with EU institutions on regulatory matters, such as standardization and certification, and is a driving force in establishing a cohesive framework for hydrogen production, storage, and use across Europe. Along with the research-based sectoral network Hydrogen Europe Research, HE represents the private counterpart in the Clean Hydrogen Partnership.

Other sectoral organizations such as the Hydrogen Council are recalled under the International Cooperation section of this report, due to their global scope.

European Clean Hydrogen Alliance

Geographical scope: EU/EFTA and Neighbouring Countries

Initiative: European Clean Hydrogen Alliance

Type of initiative: EU platform; Informal Group

Scope: To accelerate clean hydrogen development and deployment across all parts of the value chain. The Alliance provides a forum that coordinates and maximises the impact of joint actions and projects by engaging all stakeholders in the hydrogen value chain, including industrial actors, Member States and regions, trade unions, civil society, innovators, research and technology organisations, investors and NGOs. The key aim is to identify and build up a pipeline of viable investment projects along the hydrogen value chain.

Date of establishment: July 2020

Status: Ongoing

Membership: Any organisation with activities in renewable or low-carbon hydrogen. Membership is open to Stakeholders with their legal establishment in one of the following geographic areas: EU Member States; Members of the EFTA (Iceland, Liechtenstein, Norway and Switzerland); Western Balkan countries (Albania, Bosnia and Herzegovina, Montenegro, North Macedonia and Serbia); Türkiye; Eastern Neighbourhood (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine).

Brief Description: The European Clean Hydrogen Alliance was set up in July 2020 to support the large-scale deployment of clean hydrogen technologies by 2030. It brings together renewable and low-carbon hydrogen production, demand in industry, mobility and other sectors, and hydrogen transmission and distribution. Its members come from industry, public authorities, civil society, and other stakeholders.

Structure: The Alliance's work centres around roundtables, working groups, and the electrolyser partnership. The roundtables cover the entire hydrogen value chain, from production to end use and meet several times a year. The European Commission organises a Hydrogen Forum at least once per year as plenary assembly for all participants, and regular high-level progress meetings with representatives of the European Clean Hydrogen Alliance to steer the coordination between the various work streams and to ensure overall progress.

SRIA/Roadmap: The European Clean Hydrogen Alliance does not have a SRIA. Declaration of objectives, working methods and deliverables are available on:

- https://ec.europa.eu/docsroom/documents/43526
- https://www.clean-hydrogen.europa.eu/about-us/key-documents/strategic-research-and-innovation-agenda_en

Additional resources: https://single-market-economy.ec.europa.eu/industry/industrial-alliances/european-clean-hydrogen-alliance_en#more-information

Website: https://single-market-economy.ec.europa.eu/industry/industrial-alliances/european-clean-hydrogen-alliance_en

Secretariat: the EC ensure Secretariat support

Contact: GROW-HYDROGEN-PLATFORM@ec.europa.eu

Declaration Summary: the European Clean Hydrogen Alliance aims at developing and deploying hydrogen as a viable and competitive energy carrier in Europe. The Alliance supports the implementation of the hydrogen strategy for a climate neutral Europe, by working towards developing a full and accessible EU wide hydrogen value chain. This will be achieved, among others, through an investment agenda and a pipeline of projects, as well as through mobilising resources and actors to install at least 6 GW of renewable hydrogen electrolysers in the EU by 2024 and 40 GW of renewable hydrogen electrolysers by 2030. The European Clean Hydrogen Alliance provides a forum that coordinates and maximises the impact of joint actions and projects by engaging all stakeholders in the hydrogen value chain, including

industrial actors, Member States and regions, trade unions, civil society, innovators, research and technology organisations, investors and NGOs.

Main objectives:

- Promote investments and stimulate clean hydrogen production and use.
- Provide a forum that coordinates and maximises the impact of joint actions and projects by engaging all stakeholders in the hydrogen value chain.
- Identify and build up a pipeline of viable investment projects along the hydrogen value chain.

HE - Hydrogen Europe

Geographical scope: EU

Initiative/Association: Hydrogen Europe

Acronym: HE

Type of initiative: Sectoral Association; Industry Association

Scope: Propelling global carbon neutrality by accelerating the European hydrogen industry. Hydrogen Europe is the leading European association of industrial partners and aims to make hydrogen technologies an everyday reality in Europe.

Status: Ongoing

Membership: Industry (European-based hydrogen companies and national industry associations)

Brief Description: Hydrogen Europe is the European association representing the interest of the hydrogen industry and its stakeholders and promoting hydrogen as an enabler of a zero-emission society. With more than 600+ members, including 30+ EU regions and 30+ national associations, it encompasses the entire value chain of the European hydrogen and fuel cell ecosystem.

Structure: The Association is administered by a Board of Directors composed of fifteen (15) directors supported by a Secretariat. The current CEO is Jorgo Chatzimarkakis**.**

SRIA/Roadmap: HE does not have a SRIA but contributed to the development of the SRIA of the Clean Hydrogen Partnership and to the Clean Hydrogen Partnership itself as one of its three members (together with the European Commission and Hydrogen Europe Research). Moreover, HE published a considerable amount of position papers on hydrogen related topics as well as public consultations and joint statements. They can be found here:

- Position papers: https://hydrogeneurope.eu/policy-priorities/position-papers/
- Public Consultations: https://hydrogeneurope.eu/policy-priorities/public-consultations/
- Joint Statements: https://hydrogeneurope.eu/policy-priorities/joint-statements/

Website: https://hydrogeneurope.eu/

Secretariat/Governing Board: Current Board members are listed on: https://hydrogeneurope.eu/mission-vision/board-of-directors/

Secretariat can be found here: https://hydrogeneurope.eu/mission-vision/secretariat/

Contact details:

- General enquiries: secretariat@hydrogeneurope.eu
- Comms enquiries: communications@hydrogeneurope.eu
- Chief Executive Officer: ceo@hydrogeneurope.eu

Main objectives:

The main priorities of HE is developing an internal European market, setting clean hydrogen targets to boost liquidity and unlock clean hydrogen technologies and their efficiency while establishing a sound certification system for all hydrogen types to incentivise market development at European and Global level. Moreover, it aims at building an integrated infrastructure for hydrogen to decarbonise industrial, mobility and building. Objectives include:

- Enable the adoption of clean hydrogen as an abundant and affordable energy carrier for a European net-zero economy.
- Promote national, European and international policies and initiatives through promoting and coordinating research, development and innovation of reliable clean hydrogen technologies.
- Be the driving force for the future direction of the hydrogen sector, creating sustainable jobs and growth.

3.3 EU Research Networks and Platforms

This section comprises three initiatives related to the research and innovation dimension, and in particular to the definition of R&I agendas and programmes and collaboration on research priorities.

Four initiatives are accounted for:

- the **Agenda Process**, a policy action initiated in the framework of the ERA Policy Agenda 2022 - 2024 and bringing together experts from several MSs to identify R&I priorities to support the development of green hydrogen in the EU that eventually led the way to the establishment of the TWG on hydrogen;
- the **EERA JP on FCH**, a research network of researchers, laboratories and research units carrying on research programmes on hydrogen;
- **Hydrogen Europe Research** as a sectoral association of RPOs with a focus on hydrogen;
- the **SET Plan TWG on hydrogen**: although it may be positioned in different clusters, it is considered in this section as the main objective is to define a comprehensive R&I roadmap for the full development and deployment of hydrogen technologies in the EU.

Agenda Process on Green Hydrogen

Geographical scope: EU

Initiative: Agenda process on Green Hydrogen

Type of initiative: Informal subgroup of European Research Area Stakeholder Forum

Scope: The initiative is a pilot action within the New European Research Area (ERA) aiming at delivering a comprehensive R&I agenda for hydrogen along the whole value chain.

Date of establishment: 2020

Status: Closed

Membership: MSs/ACs appointed experts

Brief Description: The European Agenda Process on Green Hydrogen is a pilot initiative of the new European Research Area (ERA) which was adopted during the German Council Presidency in 2020 on the initiative of Germany, Portugal and Slovenia. The Agenda Process brings together science, industry, civil society and public administration on a voluntary basis to identify the most pressing needs for research on green hydrogen as an inter- and transdisciplinary community. The agenda process has been a nucleus of the EU Member States' wider commitment to a European Hydrogen Union – considering different starting conditions in Europe.

Structure: a group of experts nominated by 25 interested Member States and five Third Countries under the auspices of the German Federal Ministry of Education and Research (BMBF) to form a task force to jointly launch a pilot agenda process on green hydrogen, in close collaboration with the European Commission.

SRIA/Roadmap:

- https://www.bmbf.de/SharedDocs/Downloads/files/SRIA_green_hydrogen.pdf?__blob=publicationFile&v=4 (last retrieved 11/11/2024)

Additional resources:

- https://zenodo.org/records/6365765
- https://zenodo.org/records/6365999
- https://zenodo.org/records/6366108
- https://zenodo.org/records/6366032

Secretariat of the Agenda Process:

Federal Ministry of Education and Research (BMBF) c/o DLR Project Management Agency
Heinrich-Konen-Str. 1 53227 Bonn Germany
+49 228 3821 1125 | projekttraeger.dlr.de/en

SRIA Summary:

The Agenda identified a list of research priorities on different thematic areas of the hydrogen value chain: Production, Transport and Infrastructure, Market Stimulation and Cross Cutting. The following recommendations were highlighted as strategic:

- Innovating the ecosystem for green hydrogen.
- Creating a European digital platform.
- Stimulating European and international partnerships
- Promoting the involvement of member states and national authorities, providing a Parallel coordination of R&I activities and infrastructure setup.

EERA – Joint Programme Fuel Cells and Hydrogen

Geographical scope: EU

Initiative: European Energy Research Alliance – Joint Programme Fuel Cells and Hydrogen

Acronym: EERA JP FCH

Type of initiative: Research Network

Scope: Sustains research for European leadership in fuel cell, electrolyser and hydrogen technology. The JP FCH aims to improve cooperation on strategic topics, by collectively planning and implementing a joint research programme that addresses key priorities in development and innovation. The JP is open to European academic institutions and research organisations, and interacts closely with other EERA JPs, such as AMPEA on materials, Energy Storage, Bioenergy, testifying to the central role fuel cells and hydrogen can play in the energy transition.

Date of establishment: 2008

Status: Ongoing

Membership: Research Performing Organisations. The list of members can be found here: https://www.eera-fch.eu/about/members.html

Brief Description: In the Joint Programme on Fuel Cells and Hydrogen (JP FCH), organisations from different European countries collaborate to provide scientific excellence in defining the research agenda for the next phase of break-through research in the field of fuel cells, electrolysers, and hydrogen. JP FCH pursues different activities in the area of hydrogen (workshops, project, thematic reports).

Structure: The JP FCH is organised in seven sub-programmes with specific research objectives: Electrolytes; Catalysts & Electrodes; Stack Materials and Design; Systems; Modelling, Validation and Diagnosis; Non-electrolytic Hydrogen Production; Hydrogen Handling and Storage.

SRIA/Roadmap:

- Implementation Plan: https://www.eera-fch.eu/news-and-resources/2087-the-jp-fch-implementation-plan.html
- KPIs : https://www.eera-fch.eu/news-and-resources/2121-the-jp-fch-kpis.html . The KPIs Position paper was realised in collaboration with Hydrogen Europe Research.

Website: https://www.eera-fch.eu/

Secretariat/Governing Board: The Coordinator of EERA JP FCH is Jari Kiviaho, from VTT Technical Research Centre of Finland Ltd

Contact details: Jari Kiviaho JP FCH Coordinator; email: jari.kiviaho@vtt.fi ; telephone: +358505116778

Implementation Plan Summary: The overall objective of the JP FCH is to align medium to long term precompetitive research activities to create a technical-scientific basis for further improvement of FCH technologies and to guarantee enduring cutting-edge competence in Europe in the mid-long term. The document is intended as a basis for the discussion of a structural framework for integrated programmes on long-term research, in alignment with industrial requirements, for enduring commercialization of FCH technologies.

Main objectives:

- Highlight the main areas where long-term research activities will help technological breakthroughs toward larger markets.
- Explore the possibilities for joint European technology development.
- Identify and exploit the potential synergies to enhance the deployment and commercialization of FCH technologies.
- Establish key performance indicators (KPIs) that mark the progress of FCH technologies along the technology and market readiness scales.

Fig. 4: Geographical distribution of JP FCH membership

Hydrogen Europe Research

Geographical scope: EU

Initiative: Hydrogen Europe Research

Acronym: HER

Type of initiative: Sectoral Association; Research Institutes Association

Scope: HER is a European association of research performing organizations. It brings together leading universities and research organisations to shape a sustainable future fuelled by hydrogen.

Status: Ongoing

Membership: Research Performing Organisations

Brief description: Hydrogen Europe Research is the European association representing Research Performing Organization working on hydrogen. Hydrogen Europe Research actively promotes scientific excellence, intellectual property development, and technology transfer in Europe and is also the scientific partner in the Clean Hydrogen Partnership. It is composed by 150+ members.

Structure: Hydrogen Europe Research is led by an Executive Board that manages the business of the association assisted by a Secretariat. There are 10 elected Board members: the President, the Vice-President and Treasurer, the Chair for External Affairs and 7 Technical Committee (TC) leaders following the activities of each TCs in the Clean Hydrogen Partnership. They are elected for a two-year mandate.

SRIA/Roadmap: HER does not have a SRIA but contributed to the development of the Clean Hydrogen Partnership' SRIA and to the Clean Hydrogen Partnership itself as one of its three founding members (together with the European Commission and Hydrogen Europe). It publishes research feedback on hydrogen related themes: https://hydrogeneuroperesearch.eu/resources/ .

Additional resources:

- https://hydrogeneuroperesearch.eu/our-activities/
- https://hydrogeneuroperesearch.eu/projects/

Website: https://hydrogeneuroperesearch.eu/

Secretariat/Governing Board: The current President is Luigi Crema (Fondazione Bruno Kessler, Italy). The members of the board are reported here: https://hydrogeneuroperesearch.eu/about-us/executive-board/

Contact details: secretariat@hydrogeneuroperesearch.eu

Main objectives:

- Enabling the development of mature hydrogen technologies in order to achieve a sustainable and decarbonised fully-integrated energy system.
- Supporting the excellence of European research on hydrogen and fuel cells.
- Promoting the development of research & technology infrastructures to scale up and speed up innovation.
- Ensuring sustainable development standards for a clean hydrogen ecosystem.
- Fostering education and trainings to provide the European hydrogen economy with a skilled workforce.

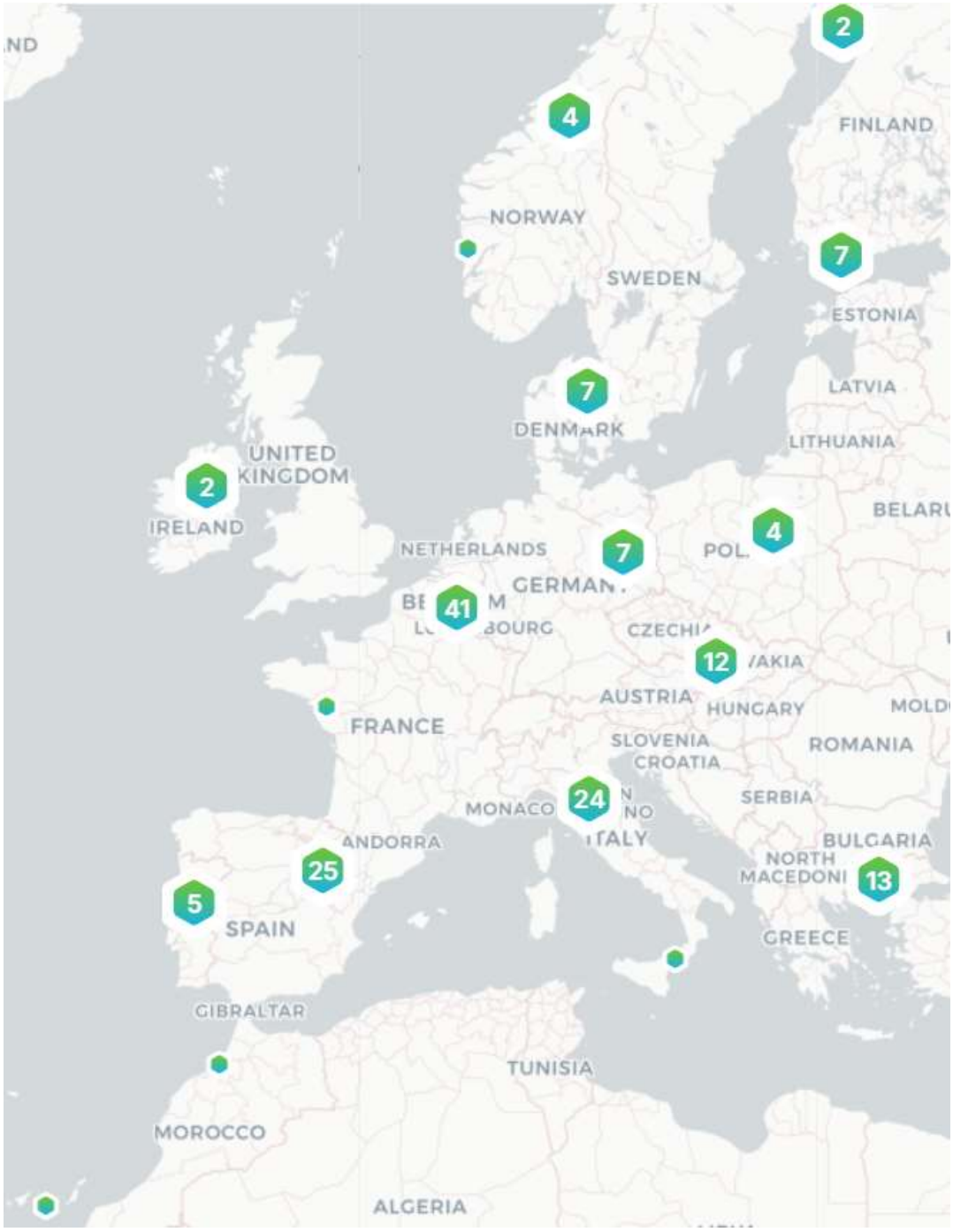

Fig. 5: Geographical distribution of Hydrogen Europe Research Membership

SET Plan TWG on Hydrogen

Geographical scope: EU

Initiative: SET Plan Temporary Working Group on Hydrogen

Acronym: Hydrogen TWG

Type of initiative: Sectoral platform on hydrogen under the SET Plam

Scope: The Hydrogen TWG works with stakeholders across the various sectors - public authorities, industry, research organizations, and other relevant bodies- to coordinate and align hydrogen-related R&D and innovation agendas.

Date of establishment: 2023

Status: ongoing

Membership: MSs/ACs appointed experts/representatives from participating MSs.

Brief Description The Temporary Working Group on Hydrogen within the Strategic Energy Technology (SET) Plan is an initiative set up by the European Union to support the development of hydrogen technologies as part of the EU's energy and climate goals. The SET Plan is the EU's research and innovation framework aimed at accelerating the deployment of low-carbon technologies, and the TWG on Hydrogen specifically focuses on advancing hydrogen as a clean energy source.

Secretariat: the Secretariat is supported by the current SET4H2 CSA

Main objectives:

- **Coordinate and align hydrogen-related R&D and innovation** efforts across EU member states and associated regions to avoid duplication and ensure efficient use of resources.
- **Define priorities** for hydrogen development, supporting projects that advance hydrogen production, storage, and utilization, including innovations in electrolysers and fuel cell technology.
- **Develop a unified European approach** to hydrogen infrastructure, regulatory frameworks, and market creation to ensure that hydrogen can effectively contribute to decarbonizing the EU’s energy and industrial sectors.
- **Support cross-border and regional collaboration,** enabling shared infrastructure, standards, and strategies to facilitate a robust hydrogen economy across Europe.
- **Advise on funding mechanisms** and recommend pathways for mobilizing both public and private investment in hydrogen technology and infrastructure projects.

3.4 EU Partnerships

This section includes a set of EU partnerships, established in the framework of the EC policy on R&I, either under the Framework Programme Horizon Europe or the Cohesion Policy. They belong to different types of EU partnerships, and according to their status they may support directly the funding of collaborative research projects or indirectly by feeding in the EC programmes. Although their scope is, in many cases, wider than hydrogen technologies, hydrogen is addressed as well as a relevant part of the respective SRIA.

Institutionalized EU Partnerships under Horizon Europe, such as the Clean Hydrogen Partnership and the Clean Aviation Partnership, along with Co-funded partnerships like the Clean Energy Transition Partnership, manage their own budget for cascade funding (funding to third parties R&I projects) through competitive calls for proposals.

Co-programmed EU Partnership such as 2Zero, Clean Steel, Processes4 Planet and Zero Emission Waterborne Transport, contribute to the definition of the Horizon Europe Work Programmes by feeding in specific call topics, according to the specific SRIAs.

The **S3 Hydrogen Valleys Partnership** stems from the Cohesion Policy and is a partnership of regional authorities supporting the development of hydrogen valleys. It is included in this section since it is a public-to-public cooperation platform that facilitates matchmaking and project set-up between European regions and their stakeholders. It aims to support regions in developing localized hydrogen ecosystems to accelerate hydrogen adoption, stimulate local economies, and contribute to the EU's climate and energy objectives.

2Zero - Towards zero emission road transport

Geographical scope: EU

Initiative: Towards zero emission road transport

Acronym: 2Zero

Type of initiative: Institutional partnership; EU partnership in HEU; Co-programmed Partnership

Scope: Implement an integrated system approach covering Battery Electric Vehicles (BEV) and Fuel Cell Electric Vehicles (FCEV). It includes significant effort towards hydrogen.

Date of establishment: 2021 (follows the European Green Cars Initiative (EGCI: 2009-2013) and the European Green Vehicles Initiative (EGVI: 2014-2020).

Status: Ongoing

Membership: Companies and research performing organisations based in EU MSs and ACs to Horizon Europe.

Brief Description: **2Zero** is a **co-programmed** in HEU aiming at accelerating the transition towards zero tailpipe emission road mobility across Europe. The Partnership covers all types of vehicles, from passenger cars, trucks and buses to two-wheelers and new vehicles concepts. Its main contribution to the hydrogen value chain relies on Fuel Cells Electric Vehicles. The Partnership is expected to lever 1.23 billion € with a contribution from the EU of 615 million € and up to 900 million € from partners.

Structure: 2Zero is supported by five Technology Platforms (ERTRAC, EPoSS, ETIP-SNET, ALICE and Batteries Europe). Its activities are organised around four interconnected pillars:

- Vehicle technologies and vehicle propulsion solutions for BEV and FCEV
- The integration of BEV into the energy system and related charging infrastructure
- Innovative concepts, solutions and services for the zero-tailpipe emission mobility
- LCA and circular economy approaches for sustainable and innovative road mobility solutions

SRIA/Roadmap: 2Zero SRIA is available on: https://www.2zeroemission.eu/what-we-do/strategic-research-and-innovation-agenda-sria/ . It also considers the **roadmaps** and Strategic Research Agendas of the five European Technology Platforms supporting the Partnership activities.

Additional resources: https://www.2zeroemission.eu/documents/

Website: https://www.2zeroemission.eu/

Secretariat/Governing Board: governing bodies are the General Assembly and the Executive Board. Details can be found on: https://www.2zeroemission.eu/who-we-are/governing-bodies/

Contact details:
Avenue de Cortenbergh 66, 1000 Brussels (Belgium)
Email: info@2zeroemission.eu
Telephone: +32 (0) 2 736 12 65

SRIA Summary: The overall vision of 2Zero is a climate-neutral and clean road transport system based on Battery Electric Vehicles (BEV) and Fuel Cells Electric Vehicles (FCEV) fully integrated in the energy system.

Main objectives:

- Develop solutions (technologies and services) for renewable road-based mobility across Europe.
- Develop affordable, user-friendly charging infrastructure concepts and technologies.
- Demonstrate innovative use-cases for the integration of zero tailpipe emission vehicles and infrastructure concepts for road mobility.
- Support the development of life-cycle analysis tools and skills.

Clean Aviation Partnership

Geographical scope: EU

Initiative: Clean Aviation Partnership

Type of initiative: Institutional partnership; EU Partnership; in HEU; Joint Undertaking

Scope: Develop disruptive new aircraft technologies that will reduce net greenhouse gas (GHG) of no less than 30% compared to 2020 state-of-the-art, to support the European Green Deal and climate neutrality by 2050. It delivers open competitive calls for financing these objectives (Clean Aviation Work Programme). The work programme includes significant effort towards hydrogen.

Date of establishment: 2021 (it follows Clean Sky 1 and 2).

Status: Ongoing

Membership: European Commission and Private Members.

Brief Description: As a European public-private partnership, Clean Aviation pushes aeronautical science by creating new technologies that will significantly reduce aviation's impact on the planet, enabling future generations to enjoy the social and economic benefits of air travel far into the future. The Partnership has a budget of 4.1 billion € divided into 1.7 billion € in EU funding and around 2.4 billion € in private funding.

Structure: The Clean Aviation programme is built on three key *thrusts*, each with targeted R&I and demonstration efforts driving the energy efficiency and the emissions reduction of future aircraft: Hybrid electric regional aircraft; Ultra-efficient short and short-medium range aircraft; Disruptive technologies to enable hydrogen-powered aircraft.

SRIA/Roadmap: The Partnership published a SRIA that can be found here: https://clean-aviation.eu/sites/default/files/2022-01/CAJU-GB-2021-12-16-SRIA_en.pdf

Website: https://clean-aviation.eu/

Secretariat/Governing Board: Clean Aviation Governing Board composed by two representatives of the Commission and fifteen representatives of the private members.

Contact details:
Avenue de la Toison d'Or 56-60, B-1060 Brussels
Telephone: +32-2-221 81 52
Email: info@clean-aviation.eu

SRIA Summary:

Clean Aviation supports aeronautics-related research and innovation activities, focusing on breakthrough technology initiatives and will ensure that aviation remains a safe and secure, reliable, cost-effective and efficient means of passenger and freight transportation while successfully transitioning to climate neutrality. Through this Partnership, European aviation research and innovation capacity will be strengthened, enabling new and ambitious global standards to be set

Main objectives:

- Develop disruptive new aircraft technologies to support the European Green Deal.
- Deliver net greenhouse gas (GHG) reductions of no less than 30%, compared to 2020 state-of-the-art.
- Enable net CO2 reductions of up to 90% when combined with the effect of sustainable 'drop-in' fuels, or zero CO2 emissions in flight when using hydrogen as energy source.

Clean Energy Transition Partnership

Geographical scope: EU

Initiative: Clean Energy Transition Partnership

Acronym: CETP or CETPartnership

Type of initiative: Institutional partnership; EU partnership in HEU; CoFunded Partnership

Scope: The CETPartnership aims to empower the clean energy transition and contribute to the EU's goal of becoming the first climate-neutral continent by 2050, by pooling national and regional RDTI funding for a broad variety of technologies and system solutions required to make the transition. The CETP will enable Member States and Associated Countries and the EU to align their RDI programmes to accelerate the uptake of cost-effective clean energy technologies. It includes significant effort on hydrogen.

Date of establishment: 2022

Status: Ongoing

Membership: R&I Funding Organisations from the following EU MSs: Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Romania, Spain, Sweden; Acs: Iceland, Israel, Norway, Tunisia, Türkiye, United Kingdom; International Partners: Canada, India, South Korea, Switzerland, United States. The list of members can be found on: https://cetpartnership.eu/members

Brief Description: The CETPartnership is a strategic partnership of national and regional Funding Orgsanisatons in EU Mss and ACs, aiming to accelerate the energy transition and to support the implementation of the SET Plan. The Partnership levers an annual budget of around 100 million € to implement annual Joint Calls for R&I projects, including hydrogen related projects.

Structure: The CETPartnership is organised in thematic areas called Transition Initiatives (TRIs) that are configurations of the partnership members working on a specific challenge. There are seven TRIs: TRI 1 Integrated Net-zero-emissions Energy System; TRI 2 Enhanced Zero-emission Power Technologies; **TRI 3 Enabling Climate Neutrality with Storage Technologies, Renewable Fuels (including hydrogen) and CCU/CCS**; TRI 4 Efficient Zero-emission Heating and Cooling Solutions; TRI 5 Integrated Regional Energy Systems; TRI 6 Integrated Industrial Energy Systems; TRI 7 Integration in the Built Environment.

SRIA/Roadmap: The CETP vision is reflected in the Strategic Research and Innovation Agenda (SRIA), co-created together with the involved countries, the EU SET Plan Implementation Working Groups and ETIPs, all energy relevant ERA-Nets as well as the EERA joint programmes (over 500 editors, co-authors, commenters and discussants). The SRIA was endorsed in November 2020. It is available on: https://cetpartnership.eu/sites/default/files/documentation/cetp_sria_1.0.pdf

Website: https://cetpartnership.eu/

Contact details:

- Coordination**:** coordination@cetpartnership.eu
- Call Management: callmanagement@cetpartnership.eu
- Communication Office: CommunicationOffice@cetpartnership.eu

SRIA Summary: The SRIA follows a challenge-driven and transdisciplinary approach. It identifies CETP Challenges articulated in the seven TRIs plus several Cross Cutting Dimensions which are key to the energy transition. It encompasses: the key enabling zero emission technologies and their integration into the energy system considering relevant end-user's sectors.

Main objectives:

- Contribute to the implementation of the SET Plan and to achieve a climate-neutral society by 2050.
- Strengthen national and regional research, development and innovation policies and provide for faster market diffusion, upscaling and replication of technologies.

Clean Hydrogen Partnership

Geographical scope: EU

Initiative: Clean Hydrogen Partnership

Acronym: Clean Hydrogen JU

Type of initiative: Institutional partnership; EU Partnership in HEU; Joint Undertaking

Scope: Accelerate the development and deployment of the European value chain for safe and sustainable clean hydrogen technologies, strengthening its competitiveness and with a view to supporting notably SMEs, accelerating the market entry of innovative competitive clean solutions. The goal is to contribute to a sustainable, decarbonised and fully integrated EU energy system, and to the EU's Hydrogen Strategy.

Date of establishment: 2007 as Fuel Cell and Hydrogen JU; 2021 as Clean Hydrogen Partnership.

Status: Ongoing

Membership: European Commission, Industry (through Hydrogen Europe) and Research Institutions (through Hydrogen Europe Research).

Brief Description: The Clean Hydrogen Partnership (as per its legal name Clean Hydrogen Joint Undertaking) is a unique public private partnership supporting research and innovation (R&I) activities in hydrogen technologies in Europe.

Its aim is to strengthen and integrate EU scientific capacity, to accelerate the development and improvement of advanced clean hydrogen applications. The three members of the Joint Undertaking are the European Union, represented by the European Commission, the fuel cell and hydrogen industries represented by Hydrogen Europe and the research community represented by Hydrogen Europe Research. The Partnership budget is €1 billion euro for the period 2021-2027 coming from the European Commission, complemented by at least an equivalent amount of private investment.

Structure: The bodies of the Clean Hydrogen Joint Undertaking are:

- The Governing Board
- The Executive Director, assisted by the Programme Office
- The States Representatives Group (see Annex 2)
- The Stakeholders Group

SRIA/Roadmap: https://www.clean-hydrogen.europa.eu/about-us/key-documents/strategic-research-and-innovation-agenda_en

Website: https://www.clean-hydrogen.europa.eu/index_en

Secretariat/Governing Board:

- European Commission: Rosalinde van der Vlies, DG RTD; Tudor Constantinescu, DG ENER; Herald Ruijters, DG MOVE
- Hydrogen Europe: Gunnar Groebler, Salzgitter; Pere Margalef, Snam Spa; Melissa Verykios, Helbio; Glenn Llewellyn, Airbus;Olivier Bucheli, EFCF; Sopna Sury, RWE Generation SE
- Hydrogen Europe Research: Luigi Crema, Fondazione Bruno Kessler, Chair of Hydrogen Europe Research

Contact details:

- Secretariat info@clean-hydrogen.europa.eu
- Telephone : +32 2 221 81 48 ; +32 2 221 84 10

SRIA Summary:

The Clean Hydrogen JU supports clean hydrogen research and innovation (R&I) solutions and technologies under Horizon Europe, in synergy with other EU initiatives and programmes particularly on

renewable hydrogen production, hydrogen transport, distribution and storage, selected fuel cell end-use technologies, as well as cross-cutting aspects such as safety, circularity by design and sustainability and Hydrogen Valleys. The activities are guided by EU's Hydrogen Strategy and the policy developments in this context, contributing to its implementation and to develop the hydrogen value chain.

Main objectives:

- Contribute to a sustainable, decarbonised and fully integrated EU energy system, and to the EU's Hydrogen Strategy.
- Improve through research and innovation the cost-effectiveness, efficiency, reliability, quantity and quality of clean hydrogen solutions and value chain (production, distribution, storage and end uses) also starting from low TRL.
- Strengthen the knowledge and capacity of scientific and industrial actors along the Union's hydrogen value chain, while supporting the uptake of industry-related skills.
- Carry out demonstrations of clean hydrogen solutions with the view to local, regional and Union-wide deployment, aiming at involving stakeholders in all Member States and at increasing public and private awareness, acceptance, and uptake of clean hydrogen solutions.

Clean Steel Partnership

Geographical scope: EU

Initiative: Clean Steel Partnership

Acronym: CSP

Type of initiative: Institutional partnership; EU partnership in HEU; Co-programmed Partnership

Scope: Decarbonise the European steel sector and transform it into a vital, sustainable and circular industry. It includes significant effort towards hydrogen as a solution for decarbonizing steelmaking.

Date of establishment: 2021

Status: Ongoing

Membership: The Clean Steel Partnership is established between the European Commission and the European Steel Technology Platform (ESTEP). ESTEP and the Clean Steel Partnership are open to the entire European steel value chain community.

Brief Description: The CSP is a European co-programmed public-private Partnership established between ESTEP – as the private entity – and the European Commission in the context of Cluster 4 (Digital, Industry and Space) of the Horizon Europe funding programme and the Research Fund for Coal and Steel). The funding of the CSP is a unique setting due to synergies between two public financial pillars, the Horizon Europe (HEU) programme and the Research Fund for Coal and Steel (RFCS), and the private steel sector. The HEU and RFCS budgets together amount to 700 million € over the period 2021-2027, at least matched by the steel sector, expected EUR 1000 million €.

Structure: The Implementation Group is the general assembly of the Clean Steel Partnership. Various Task Forces are established to address all relevant technological pathways, including Carbon Direct Avoidance technologies, Smart Carbon Usage technologies in steelmaking (such as Carbon Capture and process integration), and approaches related to the circular economy.

SRIA/Roadmap: The CSP SRIA is published on:
https://www.estep.eu/assets/CSP/CSP_SRIA_Oct2021_clean.pdf

Website: https://www.estep.eu/clean-steel-partnership

Secretariat/Governing Board: ESTEP ensures secretariat support to the CSP

Contact details:
ESTEP ASBL, Av. de Cortenbergh, 172B - 1000 Brussels
Tel. +32 2 738 79 43
secretariat@steelresearch-estep.eu

SRIA Summary: The Clean Steel Partnership will contribute to fighting climate change and moving towards climate neutrality by 2050. Hydrogen and/or electricity are considered to replace fossil carbon in steelmaking. If fossil carbon is used, CO_2 emissions will be captured and processed for utilisation or storage. In addition, higher levels of circularity will be explored. R&D&I activities are divided into:

- Three main Areas of Intervention: Carbon Direct Avoidance; Smart Carbon Usage including Carbon Capture, Utilisation and Storage and Process Integration of CO_2; Circular Economy.
- Twelve technology building blocks, which can contribute separately to the areas of intervention, or jointly to enable a higher level of CO_2 emission reduction in steel production.

Main objectives:

- Develop technologies at a high readiness level (TRL8) to reduce the CO2 emissions stemming from EU steel production by 80-95% compared to 1990 levels by 2050.
- Preserving the competitiveness and viability of the EU steel industry.
- Making sure that EU production will be able to meet the growing EU demand for steel products.

S3 Hydrogen Valleys Partnership

Geographical scope: EU

Initiative: Hydrogen Valleys S3 Partnership

Type of initiative: Institutional Platform; EC Platform under the Cohesion Policy

Scope: Promote the concept of "hydrogen valleys" and the role of local authorities within these projects

Date of establishment: 2019

Status: Ongoing

Membership: European Regions and cities, 4 leading and 64 partners, plus 9 Related entities and organisations. A list of members can be found here: https://ec.europa.eu/regional_policy/policy/communities-and-networks/s3-community-of-practice/partnership_industrial_mod_hydrogen_valleys_en

Brief Description: The European Hydrogen Valleys S3 Partnership is a collaborative initiative aimed at fostering the development of hydrogen economies across Europe that focuses on sharing information, promoting investment, and developing regional policies to enhance hydrogen production, distribution, and utilization within designated geographical areas known as Hydrogen Valleys. The Hydrogen Valleys S3 Partnership has a budget of EUR 14 million allocated specifically for the Hy2Market project, which is part of its initiatives to enhance hydrogen production, transport, and usage across Europe.

Structure: A Steering Committee between members of coordinating regions presides decisions and initiatives. The Regional Pillar serves as a body within Hydrogen Europe that facilitates EU-funded projects and investments. Meanwhile, Thematic Working Groups concentrate on specific areas of hydrogen, fostering collaboration on joint investment projects.

SRIA/Roadmap: A Position Paper is published on: https://ec.europa.eu/regional_policy/sources/policy/communities-and-networks/s3-community-of-practice/Position_Paper_on_H2_Valleys.pdf

Website: https://ec.europa.eu/regional_policy/policy/communities-and-networks/s3-community-of-practice/partnership_industrial_mod_hydrogen_valleys_en

Secretariat/Governing Board:

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Francisco Vigalondo: francisco.vigalondo@aragonexterior.es
Jeanne Fabreguettes, Auvergne Rhône-Alpes Region: jeanne.fabreguettes@auvergnerhonealpes.fr

Position Paper Summary:

The Partnership published a Position Paper with some recommendations for the European Commission such as: the speed up the notification of IPCEI hydrogen projects; a more tailored and dedicated support for small and medium-sized hydrogen projects; a clear definition of Hydrogen Valleys; more funding from the Clean Hydrogen Partnership on connecting Hydrogen Valleys between each other; clarify the benefits for participating regions and projects to Hydrogen Valleys; gather together the different initiatives on Academies; support to the S3 European Hydrogen Valleys Partnership.

Main objectives:

- Overcome the lack of access to information and expertise in the field hydrogen.
- Facilitate matchmaking and project set-up between European regions and their stakeholders.
- Strengthen the value chain for hydrogen technologies via interregional cooperation.
- Be an active stakeholder on EU policy making on hydrogen and increase the visibility of regions at EU level on hydrogen-related issues.
- Promote the concept of "hydrogen valleys" and the role of local authorities within these projects.

Processes4Planet Partnership

Geographical scope: EU

Initiative: Processes4Planet Partnership

Acronym: P4Planet

Type of initiative: Institutional Partnership; EU Partnership in HEU; Co-programmed partnership

Scope: Transform the European process industries to achieve circularity and overall climate neutrality at the EU level by 2050 while enhancing their global competitiveness. Although it has a wider aim, it includes significant effort towards hydrogen.

Date of establishment: 2021

Status: Ongoing

Membership: Companies, associations, SMEs, research and technology organisations, NGOs, Regional authorities, from ten process industry sectors.

Brief Description: P4Planet is a European co-programmed public-private Partnership established between A.SPIRE – as the private entity – and the European Commission in the context of the Cluster 4 (Digital, Industry and Space) of Horizon Europe funding programme. The Partnership has a budget of 2.6 billion €, of which half is provided by the European Union and half levered from partners contribution.

Structure: 36 detailed innovation programmes that are clustered in distinct innovation areas

SRIA/Roadmap: P4Planet SRIA is available at the following link: https://www.aspire2050.eu/sites/default/files/users/user85/p4planet_07.06.2022._final.pdf

Additional resources: https://projects.research-and-innovation.ec.europa.eu/sites/default/files/bmr-2022/ec_rtd_bmr-2022-processes4planet-fiche.pdf

Website: https://www.aspire2050.eu/p4planet/about-p4planet

Secretariat/Governing Board: Private members are represented by A.SPIRE. The Commission's contacts are DG RTD E3 and DG GROW.

Contact details:

Àngels Orduña, A.SPIRE Executive Director

Email: aor@aspire2050.eu and info@aspire2050.eu

SRIA Summary:

The SRIA outlines the innovation needed to enable climate neutral, circular and competitive process industries in 2050. It envisages:

- On the resources side: the recycling of all materials enabled by developing industrial processes, sorting/separating technologies, and circular value chains that leverage industrial urban symbiosis models.
- On the material side: materials of the future produced by the process industry, that can have significant effects on CO_2.
- On the energy side: new technologies for the integration of electricity (indirectly and directly), energy efficiency and waste energy re-use, including Hydrogen.

Main objectives:

- Developing and deploying climate neutral solutions.
- Closing the energy and feedstock loops.
- Achieving global leadership in climate-neutral and circular solutions, accelerating innovation and unlocking public and private investment.

ZEWT - Zero Emission Waterborne Transport

Geographical scope: EU

Initiative: Zero Emission Waterborne Transport

Acronym: ZEWT

Type of initiative: Institutional Partnership; EU Partnership in HEU; Co-programmed partnership

Scope: provide and demonstrate zero-emission solutions for all main ship types and services before 2030, which will enable zero-emission waterborne transport before 2050.

Date of establishment: 2022

Status: Ongoing

Membership: Companies, associations, SMEs, research and technology organisations, NGOs, Regional authorities, from ten process industry sectors.

Brief Description: the Zero Emission Waterborne Transport (ZEWT) Partnership is a European initiative aimed at developing and deploying zero-emission solutions for maritime and inland waterway transport by 2050. It focuses on accelerating research and innovation for sustainable technologies, such as alternative fuels (like hydrogen and ammonia), electrification, and energy-efficient systems. The partnership involves collaboration among the EU, industry stakeholders, research institutions, and governments, providing funding and resources to advance these technologies and create supportive regulatory and operational frameworks.

SRIA/Roadmap:
https://www.waterborne.eu/images/231229_SRIA_Zero_Emission_Waterborne_Transport_2.0_clean.pdf

Website: https://www.waterborne.eu/partnership/partnership

Secretariat/Governing Board: The main governance body is the Partnership Board which consists of both the EC and Delegates of the Waterborne Technology Platform that represents the private partners. The Commission's contacts are DG RTD and DG CLIMA.

Contact details: info@waterborne.eu

SRIA Summary: The document focuses on strategies for achieving zero-emission waterborne transport in Europe by 2050, emphasizing technological innovation, regulatory frameworks, and sustainable practices. It outlines specific goals in renewable energy adoption, emission reduction technologies, and improving overall efficiency for various types of vessels. Key areas include developing sustainable fuels, electrification, digitalization for operational efficiency, lifecycle analysis for minimizing environmental impact. Hydrogen is highlighted as a critical component for achieving zero-emission waterborne transport. It is considered both as a direct fuel source and as a basis for producing alternative fuels like ammonia and synthetic hydrocarbons. The document emphasizes hydrogen's potential in reducing greenhouse gas emissions for various vessel types, particularly those that cannot rely solely on batteries.

Additionally, it highlights the role of public and private sector collaboration in supporting research and large-scale implementation.

Main objectives:

- Develop and demonstrate deployable technological solutions which will be applicable for the decarbonisation and the elimination of other harmful emissions of main ship types and services.
- Facilitate the implementation of economically viable European new technologies and concepts regarding zero-emission waterborne transport.
- Facilitate the development of regulations and policies, including standards to enable the implementation of technological solutions for zero-emission waterborne transport by 2030.
- Facilitate the uptake of innovative zero-emission waterborne transport technologies and solutions within the European waterborne sector, supporting economic growth and European employment.

3.5 EU Funding Instruments

The section encompasses the main EU Funding instrument to support the development and deployment of hydrogen projects. These funding instruments collectively support the EU's climate, energy, and innovation goals by targeting different stages and types of clean energy and infrastructure projects. They are:

- **Connecting Europe Facility (CEF) – Energy:** CEF is an EU funding program that supports investments in energy, transport, and digital infrastructures. CEF-Energy specifically funds projects that enhance cross-border energy networks, improve energy security, and integrate renewable sources.
- **European Hydrogen Bank:** Recently established by the European Commission, the European Hydrogen Bank aims to accelerate the production and uptake of renewable hydrogen within the EU. It provides subsidies to bridge the price gap between renewable hydrogen and conventional fuels, making green hydrogen projects more financially viable and attractive. This funding tool supports the EU's Green Deal and climate neutrality goals by incentivizing hydrogen production and consumption across sectors.
- **Innovation Fund:** This EU fund finances projects that demonstrate innovative low-carbon technologies, primarily in energy-intensive industries, renewable energy, carbon capture and storage, and energy storage. With a focus on commercial viability and scalability, the Innovation Fund targets breakthrough technologies that reduce greenhouse gas emissions and promote the EU's climate objectives. It is one of the world's largest funding programs for clean technology and innovation.
- **EU-Breakthrough Energy Catalyst:** This partnership between the EU and Breakthrough Energy (founded by Bill Gates) co-funds large-scale demonstration projects in critical clean technologies, including green hydrogen, sustainable aviation fuels, direct air capture, and long-duration energy storage. The Catalyst program aims to reduce the cost and speed up the deployment of these technologies, focusing on projects that can transform sectors where emissions are hard to reduce. The partnership leverages both public and private investment to scale up clean energy solutions.

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Connecting Europe Facility – Energy

Geographical scope: EU

Initiative: Connecting Europe Facility - Energy

Acronym: CEF Energy

Type of initiative: EU Financing Facility.

Scope: The Connecting Europe Facility is a key EU funding instrument to promote growth, jobs and competitiveness through infrastructure investment at European level.

Date of establishment: 2014

Status: Ongoing

Brief Description: The Connecting Europe Facility for Energy (CEF Energy) is the EU funding programme to implement the Trans-European Networks for Energy (TEN-E) policy. It aims to support investments in building new cross-border energy infrastructure in Europe or rehabilitating and upgrading the existing one. As a financing instrument, CEF Energy contributes to the further integration of the European energy market, improvements to the interoperability of energy networks across borders and sectors, facilitation of the low-carbon economy, and ensuring energy security. The CEF programme for 2021-2027 allocates a total budget of €5.84 billion to the energy sector to help the transition towards clean energy and complete the Energy Union. CEF Energy supports:

- Energy infrastructures: it covers new infrastructure categories eligible for EU support such as offshore electricity grids, hydrogen infrastructure and smart grids in electricity and gas.
- Cross-border Renewable Energy Projects: Cross-border projects in the field of renewable energy complement other EU renewable energy funding opportunities, focusing specifically on cross-border cooperation to optimize national efforts for deployment of renewable energy and to enhance the security of supply.

Website: https://cinea.ec.europa.eu/programmes/connecting-europe-facility/energy-infrastructure-connecting-europe-facility-0_en

Additional resources: Projects of common interest & Projects of mutual interest - Interactive map

Secretariat: CINEA is the implementing agency on behalf of DG ENER.

Contact details: Contact Points for CEF Energy are established in the 27 EU Member States:

https://cinea.ec.europa.eu/document/download/8ae4aaa3-e3be-420c-886b-13a622d914e1_en

Main objectives:

The general objectives of the CEF Energy are to build, develop, modernize and complete the trans-European networks in the energy sector and to facilitate cross-border cooperation in the field of renewable energy, taking into account the long-term decarbonization commitments and the goals of increasing European competitiveness; smart, sustainable and inclusive growth; territorial, social and economic cohesion; and the access to and integration of the internal market, with an emphasis on facilitating the synergies among the energy sector. Specific objectives:

- To contribute to the development of Projects of Common Interest relating to the further integration of the internal energy market, the interoperability of networks across borders and sectors, the facilitation of decarbonisation and the guarantee of security of supply.
- To facilitate cross-border cooperation in the field of renewable energies.

EU-Breakthrough Energy Catalyst Partnership

Geographical scope: EU

Initiative: EU- Breakthrough Energy Catalyst Partnership

Type of initiative: Investment programme; Partnership

Scope: The EU – Breakthrough Energy Catalyst Partnership aims to develop large-scale green tech projects based in Europe and boost investments in critical climate technologies. It seeks to mobilize up to €840 million between 2023 and 2027 to support projects with high potential for impact & cost-down in different energy field, including Green Hydrogen.

Date of establishment: 2021 at COP26, Glasgow

Status: Ongoing

Membership: European Commission, Breakthrough Energy, European Investment Bank.

Brief Description: the EU–Breakthrough Energy Catalyst is a novel platform based on a partnership between the European Commission and the Breakthrough Energy Catalyst that funds and invests in project companies utilizing emerging climate technologies that reduce emissions. Investments will be directed towards a portfolio of EU-based projects with high potential, in 5 sectors: clean hydrogen; sustainable aviation fuels; direct air capture; long-duration energy storage; decarbonisation of industry (steel and cement).

The initiative complements the actions launched in the framework of the European Green Deal and National Recovery and Resilience Plans financed by NextGenerationEU as well as the Net Zero Industry Act and REPowerEU.

Structure: The European Investment Bank acts as implementing partner of the European Commission under InvestEU. The EIB has been tasked to deploy for the benefit of this partnership up to €420 million from EU funding, made available from both Horizon Europe and the Innovation Fund.

Website: https://www.breakthroughenergy.org/our-work/catalyst/eu-catalyst-partnership/

Strategic lines of investment:

Catalyst both funds large demonstration projects and invests in first-of-a-kind commercial-scale projects that use key emerging climate technologies.

Breakthrough Energy Catalyst, the EIB, and the EC will fund two types of projects under the partnership: Demonstration Projects and Large First-of-a-Kind ("FOAK") Projects:

- Demonstration Projects – Small projects that de-risk earlier-stage emerging climate technologies (TRL 5-7; Project Size between ~€30M-100M)
- Large FOAK Projects – First-of-a-Kind projects focused on emerging climate technology scale-up & market creation (TRL 6+; Project Size between ~€100M-1B)

Main objectives:

Seeks to accelerate the adoption of clean energy technologies worldwide and reduce their Green Premiums.

European Hydrogen Bank

Geographical scope: EU

Initiative: Hydrogen Bank

Acronym: EHB

Type of initiative: EU Financing Facility

Scope: unlock private investments in hydrogen value chains, both within the EU and globally, by connecting renewable energy supply to EU demand and addressing the initial investment challenges.

Date of establishment: 2022

Status: Ongoing

Brief Description: In 2022, the European Commission launched the European Hydrogen Bank to create investment security and business opportunities for European and global renewable hydrogen production. The European Hydrogen Bank will establish an initial market for renewable hydrogen, offering new growth opportunities and jobs. It is not designed to be a physical institution, but is a financing instrument, run internally by European Commission services.

Structure: The European Hydrogen Bank is based on four pillars (EU domestic market creation, International imports to the EU, Transparency and coordination, Streamline existing financing Instruments), which will be implemented by the European Commission. It consists of two new financing mechanisms to support renewable hydrogen production within the EU and internationally.

The Commission runs a centralized auction platform, where successful bidders could access the Innovation Fund and Member States could further support renewable hydrogen deployment through their own budgets via the platform. The Hydrogen Bank provides increased demand visibility by linking with off-takers, parallel Member State initiatives and existing data centres. The Bank plays a coordination role and facilitates blending with the existing financial instruments to support hydrogen projects.

The first pilot Innovation Fund auction (IF23 Auction) was launched on 23 November 2023 and closed on 8 February 2024, was the first EU-wide auction to allocate EU funding for the production of renewable hydrogen categorised as Renewable Fuel of Non-Biological Origin (RFNBO). After evaluation, seven renewable hydrogen projects were selected to receive nearly EUR 720 million in project support from the Innovation Fund, which will be disbursed over a ten-year period.

Innovation Fund 24 Auction will be launched on 3 December 2024 to support producers of hydrogen categorized as RFNBO across the European Economic Area (EEA) and will award up to €1.2 billion support.

Website: https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/european-hydrogen-bank_en

Main objectives:

The Hydrogen Bank is a financing instrument to accelerate the establishment of a full hydrogen value chain in Europe. Main objectives are:

- Cover and lower the cost gap between renewable hydrogen and fossil fuels for early projects.
- Play a coordination role and facilitate blending with the existing financial instruments at EU and national level.
- De-risk hydrogen projects, maximise leverage of private capital and increase confidence of investors, financing institutions and industry.
- Increase transparency on hydrogen flows, transactions and prices, gather demand and supply information, provide transparent price information and develop price benchmarks.
- Support infrastructure planning and provide visibility on hydrogen infrastructure needs.
- Support the coordination of cooperation and trade with third countries, develop Team Europe Initiatives.

Innovation Fund

Geographical scope: EU/EEA

Initiative: Innovation Fund

Type of initiative: EU Financing Facility

Scope: Supporting the deployment of innovative net-zero technologies for climate neutrality. The Innovation Fund projects cover a wide range of innovative technologies in areas such as energy- intensive industries, renewables, energy storage, net-zero mobility and buildings, hydrogen, and carbon capture, use and storage.

Date of establishment: The Innovation Fund was established by Article 10a(8) of Directive 2003/87/EC to support across all Member States innovation in low-carbon technologies and processes. Previously implemented as NER300 Programme.

Status: Ongoing

Brief Description: The Innovation Fund is one of the world's largest funding programmes for the demonstration of innovative low-carbon technologies. It is financed by the EU Emissions Trading System revenues. The Fund focuses on highly innovative clean technologies and big flagship projects with European added value that can bring significant emission and greenhouse gas reductions.

Funding mechanisms: The Innovation Fund awards grants through calls for proposals and competitive bidding procedures (auctions).

- Calls for proposal: The Fund aims to finance a varied project pipeline achieving an optimal balance of a wide range of innovative technologies in all eligible sectors (energy intensive industries, renewable energy, energy storage, carbon, capture, use and storage, and net-zero mobility and buildings) in EU Member States, Iceland, Norway, and Liechtenstein.
- Auctions: The Innovation Fund runs auctions to provide cost-efficient support to renewable fuel of non-biological origin (RFNBO) of hydrogen producers within the European Union and the European Economic Area. It will kick-start the development of the European hydrogen market and contribute to meeting Europe's ambitious climate targets.

Website: https://cinea.ec.europa.eu/programmes/innovation-fund_en

Additional resources: Innovation Fund Project Portfolio

Contact details: national contact points are established in the EU/EEA Countries. A list can be found here: National Contact Points

Main objectives:

- Help businesses invest in clean energy and industry.
- Boost economic growth.
- Create future-proof jobs.
- Reinforce European technological leadership on a global scale.

3.6 IPCEI

IPCEIs (Important Projects of Common European Interest) are an EU-backed framework that allows EU countries to jointly support projects deemed vital for Europe's competitiveness and strategic interests. These projects focus on key areas like technology innovation, environmental sustainability, and energy, and they encourage collaboration among member states, companies, and research institutions. IPCEIs are designed to support breakthrough innovations and foster economic growth while helping the EU achieve its strategic goals in sustainability and technological leadership.

The EU has launched four IPCEIs focused on building a comprehensive hydrogen economy:

- **IPCEI Hy2Tech** (launched in July 2022): This project is dedicated to developing hydrogen-related technologies primarily for end users. It covers innovations in hydrogen technologies.
- **IPCEI Hy2Use** (approved in September 2022): Aimed at fostering industrial uses of hydrogen, Hy2Use supports projects focusing on hydrogen applications within manufacturing and industrial processes. This includes green hydrogen production for industries like steel and chemicals, helping to decarbonize traditionally high-emission sectors.
- **IPCEI Hy2Infra** (approved in February 2024): This initiative addresses the need for hydrogen infrastructure, such as pipelines, storage, and refueling stations. By supporting the expansion of hydrogen infrastructure, it ensures that hydrogen supply chains can be both reliable and scalable.
- **IPCEI Hy2Move** (launched in May 2024 – in the approval phase): The latest addition, Hy2Move, is focused on hydrogen mobility and transport solutions. This project involves applications across road, maritime, and aviation transport and supports the development of technologies such as fuel cells and storage solutions optimized for transport. The goal is to support zero-emission transport and align with the EU's climate neutrality goals.

Together, the four IPCEIs are projected to trigger significant public and private investments and support the EU's hydrogen strategy and climate goals, targeting key aspects from innovation to infrastructure and industry.

IPCEI Hydrogen 1 – HY2TECH

Geographical scope: EU

Initiative: IPCEI Hydrogen Technology

Acronym: Hy2Tech

Type of initiative: EU project; IPCEI

Scope: IPCEI Hy2Tech is intended to serve as front runner and enabler for all further integrated projects by advancing the relevant technologies in the areas of hydrogen production, infrastructure and utilization for commercial and economic exploitation.

Date of establishment: July 2022

Status: Ongoing

Membership: 35 companies from 15 Member States: Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Italy, the Netherlands, Poland, Portugal, Slovakia and Spain

Brief Description: Hy2Tech is the first of four clusters of projects (called waves) notified to the European Commission under State Aid rules. The focus of IPCEI Hy2Tech is the development of innovative technologies to produce renewable and low-carbon hydrogen using mainly electrolysis. The IPCEI covers a wide part of the hydrogen technology value chain, including (i) the generation of hydrogen, (ii) fuel cells, (iii) storage, transportation and distribution of hydrogen, and (iv) end-users applications, in particular in the mobility sector. It is expected to contribute to the development of important technological breakthroughs, including new highly efficient electrode materials, more performant fuel cells, innovative transport technologies, among which first time roll out hydrogen mobility ones.

Structure: Hy2Tech is a cluster of 41 integrated projects organised in workstreams. The IPCEI is organised along four Technology Fields (TFs):

- TF1 – Development of Hydrogen Generation Technologies
- TF2 – Development of Fuel Cell Technologies
- TF3 – Development of Technologies for Storage, Transportation and Distribution
- TF4 – Development of Technologies for End Users

Website: https://ipcei-hydrogen.eu/page/view/d85ef96a-4ae9-4f03-b51d-6e9bc4caf094/hy2tech

Main objectives:

- Scale up production capacity for electrolysers, fuel cells, key enabling technologies and critical components and for renewable and decarbonized hydrogen production and storing capacity.
- Create a cost-optimized and stable hydrogen value chain in Europe through standardized, automated and robust production processes.
- Establish large-scale First Industrial Deployment of innovative hydrogen technologies.
- Transfer knowledge to new or improved applications as well as new RDI in the different sectors.
- Create new jobs and sustainable growth in a high-potential market of the future.
- Coordinate and integrate hydrogen activities in Europe to create a hydrogen ecosystem.

IPCEI Hydrogen 2 - HY2USE

Geographical scope: EU

Initiative: IPCEI Hydrogen Use

Acronym: IPCEI Hy2Use

Type of initiative: EU project; IPCEI

Scope: IPCEI Hy2Use is expected to boost the supply of renewable and low-carbon hydrogen, thereby reducing dependency on the supply of natural gas.

Date of establishment: September 2022

Status: Ongoing

Membership: 37 projects from 31 companies from 13 Member States plus Norway: Austria, Belgium, Denmark, Finland, France, Greece, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain and Sweden.

Brief Description: IPCEI Hy2Use follows and complements the first IPCEI on the hydrogen value chain, the IPCEI "Hy2Tech", approved on 15 July 2022. While both IPCEIs address the hydrogen value chain, Hy2Use focuses on hydrogen-related infrastructure and hydrogen applications in the industrial sector.

IPCEI Hy2Use will cover a wide part of the hydrogen value chain by supporting (i) the construction of hydrogen-related infrastructure, notably large-scale electrolysers and transport infrastructure, for the production, storage and transport of renewable and low-carbon hydrogen; and (ii) the development of innovative and more sustainable technologies for the integration of hydrogen into the industrial processes of multiple sectors, especially those that are more challenging to decarbonise, such as steel, cement and glass.

Structure: The work carried out by the Direct Participants is organised in two Technology Fields:

- TF1 Infrastructure
- TF2 Hydrogen Technologies for Industry

Website: https://ipcei-hydrogen.eu/page/view/d85ef96a-4ae9-4f03-b51d-6e9bc4caf094/hy2tech

Main objectives:

- Install large scale electrolysers as infrastructure powered with renewable and low-carbon energies along the emerging future hydrogen backbone and next to industrial centres.
- Scale up capacity for renewable and decarbonised Hydrogen production.
- Perform research to integrate renewable Hydrogen into industrial processes in different sectors
- Scale up the integration of hydrogen into industrial plant operation as FID in different industrial sectors.
- Transfer knowledge to new or improved applications as well as new RDI in the different sectors and disseminate knowledge within the industry at large by fostering collaboration among stakeholders on overarching topics.
- Create new jobs and sustainable growth in a high-potential market of the future and thereby greatly contributing to post-pandemic economic reconstruction and a socially just energy transition.
- Coordinate and integrate Hydrogen activities in Europe to create a hydrogen ecosystem.

IPCEI Hydrogen 3 - HY2INFRA

Geographical scope: EU

Initiative: IPCEI Hydrogen Infrastructure

Acronym*:* Hy2Infra

Type of initiative: EU project; IPCEI

Scope: Hy2Infra concerns infrastructure investments. The IPCEI will support the gradual emergence of an EU-wide hydrogen infrastructure starting from different regional clusters.

Date of establishment: February 2024

Status: Ongoing

Membership: IPCEI Hy2Infra was jointly prepared and notified by seven Member States: France, Germany, Italy, the Netherlands, Poland, Portugal, and Slovakia. As part of Hy2Infra, 32 companies with activities in one or more Member States, including small and medium-sized enterprises will participate in 33 projects.

Brief Description: IPCEI Hy2Infra complements the first and second IPCEIs on the hydrogen value chain. IPCEI Hy2Infra covers a wide part of the hydrogen value chain by supporting:

- the deployment of 3.2 GW of **large-scale electrolysers** to produce renewable hydrogen;
- the deployment of new and repurposed **hydrogen transmission and distribution pipelines** of approximately 2,700 km;
- the development of large-scale **hydrogen storage facilities** with capacity of at least 370 GWh;
- the construction of **handling terminals** and related port infrastructure for **liquid organic hydrogen carriers** ('LOHC') to handle 6,000 tonnes of hydrogen a year.

Participants will also collaborate on **interoperability and common standards** to prevent barriers and facilitate future market integration.

Structure: The work carried out by the Direct Participants is organised in the following workstreams:

- Electrolysers
- Pipelines
- Storage
- LOHC handling terminals
- Cross-workstream collaboration

Website: https://ec.europa.eu/commission/presscorner/detail/en/ip_24_789

3.7 EU Project-based Platforms

This cluster comprises relevant EU projects designed to strengthen the EU's hydrogen economy through standardization, workforce development, and technological innovation.

The **EIC Green Hydrogen Portfolio** includes projects funded by the European Innovation Council (EIC) to advance green hydrogen technology. It emphasizes innovations in sustainable hydrogen production, such as electrolysis powered by renewable energy, and targets sectors like heavy industry and transportation.

The **European Hydrogen Academy** aims to establish a large alliance of universities and institutions that can provide certified educational training and continuously update the teaching materials to train the workforce required by the European hydrogen industry by 2030.

The **Green Skills for Hydrogen Project** addresses the need for a skilled workforce in the hydrogen sector by developing training programs and certified curricula, certifications, and educational partnerships. It aims to equip professionals with the technical knowledge required for hydrogen production, storage, and deployment, ensuring that the EU has the human capital needed to drive the hydrogen economy.

The **H2Excellence Project** is focused on establishing best practices, standards, and benchmarks for the hydrogen industry across Europe. By defining high-quality and safety standards throughout the hydrogen value chain—from production to end-use—it aims to create a reliable and efficient hydrogen economy. H2Excellence also contributes to certification, regulatory frameworks, and knowledge sharing across the EU, promoting a unified approach to hydrogen standards.

EIC - Green Hydrogen Portfolio

Geographical scope: EU

Initiative: European Innovation Council - Green Hydrogen Portfolio

Acronym: EIC Green Hydrogen Portfolio

Type of initiative: EU projects; EIC funded projects

Scope: Position Europe strategically at the forefront of the sustainable technologies for energy decarbonisation and net-zero industrial districts development through hydrogen-based solutions.

Date of establishment: 2021

Status: Ongoing

Brief Description: The 'Green Hydrogen portfolio' gathers 9 projects funded through the EIC Pathfinder challenge call "Novel Routes to Green Hydrogen Production", launched in 2021. The portfolio projects share common topics and objectives, in this case the efficient generation of green hydrogen, and extend for a period of up to 60 months until September 2027. The total funding from the EIC sums almost €29 million.

Structure: The Portfolio is created to support sharing between the recipients of EIC Pathfinders' funds on "Novel Routes to Green Hydrogen Production". Programme Managers work cooperatively with the beneficiaries to define the governance structure of the Portfolio, to establish expectations from the projects collaboration, to define rules for resource and data sharing. The objective is to enhance research, prepare transition to innovation, stimulate business opportunities.

Website: https://eichydrogen.eu/

Contact details: EIC Green Hydrogen Portfolio can be contacted through a form found on their website: https://eichydrogen.eu/

Key Objectives and Areas of Focus

- **Scaling Green Hydrogen Production:** Projects in this portfolio focus on advancing methods like electrolysis, where renewable energy sources (e.g., solar or wind power) split water molecules to produce hydrogen without emissions. The aim is to improve efficiency, reduce costs, and enable large-scale hydrogen production.
- **Developing Storage and Distribution Technologies:** Since hydrogen is challenging to store and transport, EIC projects also explore innovative storage solutions and infrastructure developments that make hydrogen safer and more cost-effective for widespread use.
- **Supporting Hydrogen Use in Hard-to-Decarbonize Sectors:** Projects target sectors such as heavy industry, shipping, and aviation, where green hydrogen can play a critical role as a clean energy source, replacing fossil fuels in applications where electrification is difficult.
- **Boosting Market and Supply Chain Development:** The EIC Green Hydrogen Portfolio also includes projects that work on building the supply chains and market conditions necessary to support a robust hydrogen economy within the EU.

European Hydrogen Academy

Geographical scope: EU

Initiative: European Hydrogen Academy

Acronym: HyAcademy.EU

Type of initiative: EU Project

Scope: The project aims to establish a large alliance of universities and institutions that can provide certified educational training and continuously update the teaching materials.

Date of establishment: 1st of January 2024 (ending on 30th June 2028)

Status: Ongoing

Membership: University and Research Institutions. More details on project partners can be found here: https://hyacademy.eu/aboutus/

Brief Description: HyAcademy.EU is a European project bringing together 15 partners (plus 4 associate partners) with the aim of making a strong contribution to the training of the workforce required by the European hydrogen industry by 2030. The project intends to coordinate and support training actions on hydrogen and its technologies through the establishment of a network of over 600 European educational institutions (100 universities and 500 schools of all levels) that will be able to share innovative teaching materials, training paths, various events, etc. The project also aims to establish a network of over 5 training laboratories used jointly for hydrogen technologies.

Website: https://hyacademy.eu/

Project Coordinator: Ysoka Skola Chemicko-Technologicka V Praze. Project Lead: Prof. K.Bouzek, Prof. Steinberger-Wilckens

Contact details:

admin_ya@hyacademy.eu

Strategy Summary:

The project is expected to contribute to the following outcomes: Providing continued (digital) access to high-quality educational material in the area of FCH technologies; Supporting the build of an adequate and capable highly skilled workforce; Creating more and better jobs, strengthening the FCH industry, research and innovation across all fields of FCH technologies, different energy carriers, and whole system integration; Increasing general acceptance of hydrogen technologies.

It will also seek alliances and synergies with other initiatives, such as the Green Skills for Hydrogen project (see after), to implement actions outlined in the Hydrogen Skills Strategy.

Main objectives:

- Build a network of over 100 universities offering qualifications, specializations, and degrees in hydrogen technologies.
- Build a network of over 500 schools integrating hydrogen topics in their science teaching.
- Provide free training materials across European languages to teachers and teachers in order to enable educational staff to deliver the vast body of educational measures necessary.
- Create a network of hands-on, physical training laboratories.
- Offer a portal for prospective trainees to find accurate information about and access the educational programmes available.
- Prepare the European Net-Zero Hydrogen Academy.

Green Skills for Hydrogen

Geographical scope: EU

Initiative: Green Skills for Hydrogen

Acronym: GreenSkills4H2

Type of initiative: EU Project; ERASMUS+ project

Scope: The primary objective of this project is to design and implement a highly innovative, effective, and sustainable Hydrogen Skills Strategy for Europe that will ensure the skills needs of the rapidly expanding and evolving Hydrogen Value Chain can be met in the short, medium, and long term. GreenSkillsforH2 will help meet REPowerEU2030 targets by accelerating the upskilling and reskilling of students and members of the workforce across Europe.

Date of establishment: 01st July 2022 (ending on 30th June 2026)

Status: Ongoing

Membership: Industry and Research Institutions. More details on project partners can be found here: https://greenskillsforhydrogen.eu/consortium-members/

Brief Description: The project includes the establishment of a long-term partnership between Industry and Education; the design of an innovative and sustainable Hydrogen Skills Strategy; the development, testing and roll-out of VET curricula and training programmes in line with latest market needs and consistently linked with EU instruments and tools; continuous skills and career development that empowers technical professionalism in both green and digital competences; and the widespread dissemination and rollout of the VET training to maximise European impact.

Structure: GreenSkills4H2 is an Alliance of Hydrogen sector partners led by the Karlsruher Institut für Technologie (KIT), Hydrogen Europe and Hydrogen Europe Research, bringing together key Industry and Education stakeholders from across the sector

SRIA/Roadmap: the Green Skills for Hydrogen Strategy was published featuring an executive summary, and can be found here: https://greenskillsforhydrogen.eu/wp-content/uploads/2023/10/Green-Skills-for-Hydrogen-European-Hydrogen-Skills-Strategy-last-update-24102023.pdf

Website: https://greenskillsforhydrogen.eu/

Secretariat/Governing Board: Project Coordinator is the Karlsruher Institut Fuer Technologie

Contact details: info@greenskillsforhydrogen.eu

Strategy Summary:

It is estimated that 1 million jobs will be created by the hydrogen value chain by 2030. The Green Skills for Hydrogen project intends to comprehensively understand, document, and outline the existing and future demand for hydrogen-related occupational profiles. The Strategy focuses on: Develop modular trainings; Improve access to continuing professional development; Encourage the uptake of mobility for education in hydrogen; Define training standards for hydrogen; Establish an online hydrogen community. It will also seek alliances and synergies with other initiatives, such as the future European Hydrogen Academy, to implement actions outlined in the Hydrogen Skills Strategy.

Main objectives:

- Design and implement a Hydrogen Skills Strategy to meet current and future skills needs of the hydrogen value chain.
- Develop, test and rollout Vocational and Educational Training (VET) programmes across Europe according to the latest market needs to empower workers and technical professionals.
- Establish a European Hydrogen Skills Alliance, a lasting partnership between Industry and Education.

H2Excellence

Geographical scope: EU

Initiative: H2Excellence: Fuel Cells and Green Hydrogen Centers of Vocational Excellence towards affordable, secure, and sustainable energy for Europe

Acronym: H2Excellence

Type of initiative: EU Project; ERASMUS+ project

Scope: H2Excellence aims to establish a platform of centres of vocational excellence (CoVEs) in the field of fuel cells and green hydrogen technologies that will forge a collaborative educational, training and development program designed to close the existing industry skills gaps

Date of establishment: 15.06.2023 – 14.06.2027

Status: Ongoing

Membership: 24 partners between VET schools, industrial partners, and governmental bodies from 9 different Erasmus+ countries (Finland, Italy, Spain, Portugal, France, Germany, Poland, Greece, Romania) and 1 international partner (Canada). More details on members can be found here: https://h2excellence.eu/consortium/

Brief Description: The H2Excellence project will establish the H2Excellence Platform of Vocational Excellence in the field of fuel cells and green hydrogen technologies. The Platform will create and implement lifelong learning opportunities, including online learning, and develop national and international curricula and training programmes. The project will establish several local clusters, i.e., Centres of Vocational Excellence (CoVEs), fully integrated into the innovation, skills, and job ecosystem in green hydrogen and FCH technologies in six Erasmus+ countries (Italy, Spain, Finland, Portugal, Poland, and France) and two support/associated CoVEs in the other two Erasmus+ countries (France and Poland).

Structure: European project consortium

Website: https://h2excellence.eu/

Secretariat/Governing Board: Project Coordinator is Oy Vaasan Ammattikorkeakoulu - Vasayrkeshogskola Ab – Finalnd (https://www.vamk.fi/en)

Contact details: info@h2excellence.eu

Main objectives:

- To create Centre of Vocational Excellences (CoVEs) dedicated to fuel cells and green hydrogen technologies, founding a collaborative network to bridge industry skill gaps.
- To design, pilot, and implement several trainings for students at different levels at vocational education training (VET) institutes.
- To offer teacher upskilling programmes and training and technical support initiatives for Small and medium-sized enterprises (SMEs) across CoVEs in green hydrogen technologies, addressing technical, training, and reskilling topics.
- To establish world-class reference points for training in green hydrogen technologies for young people, engineers, and adults.
- To establish a solid collaborative education-business-research network.
- To develop an international collaborative online platform/Knowledge hub for knowledge sharing about green hydrogen technologies.

INTERNATIONAL COOPERATION

4 INTERNATIONAL COLLABORATION

4.1 Policy, Regulation and Standardisation

IPHE - International Partnership for Hydrogen and Fuel Cells in the Economy

Geographical scope: Global

Initiative: International Partnership for Hydrogen and Fuel Cells in the Economy

Acronym: IPHE

Type of initiative: International Platform

Scope: Facilitate and accelerate the transition to clean and efficient energy and mobility systems using fuel cells and hydrogen (FCH) technologies *across applications and sectors*

Date of establishment: 2003 (as The International Partnership for the Hydrogen Economy).

Status: Ongoing

Membership: EU and Third countries (24 countries). The list of partners is available here: https://www.iphe.net/partners

Brief Description: IPHE, established in 2003, informs broad stakeholder groups, including policymakers and the public, on the benefits and challenges to establishing widespread commercial hydrogen and fuel cell technologies in the economy. It shares information and helps facilitate multinational research, development, and deployment initiatives that advance the introduction of hydrogen and fuel cell technologies on a global scale. IPHE partner countries have committed to accelerate the development of FCH technologies to enhance the security and efficiency of their energy systems, address environmental objectives, and to grow the economy.

Structure: Working Groups: Education & Outreach (E&O); Regulations, Codes, Standards & Safety; International Collaboration. Task Forces: Hydrogen Environmental Impact Analysis (HEIA), Hydrogen Certification Mechanisms (H2CM); Hydrogen Skills (H2 Skills), Hydrogen Trade Rules (H2TR).

SRIA/Roadmap: IPHE did not produce a SRIA but gathers the national Strategies and Roadmaps of its members, which are available here by clicking on the map: https://www.iphe.net/partners

Website: https://www.iphe.net

Secretariat/Governing Board: The Chair of IPHE is elected by IPHE members and serves a 2-year term.

- Current Chair: Dr. Rebecca MASERUMULE, South Africa
- Current Vice-Chair: Dr. Noé van HULST, The Netherlands; Tomohiko ADACHI, Japan; and, Dr. Sunita SATYAPAL, United States of America
- Executive Director: Dr. Laurent Antoni

Contact details:
IPHE Secretariat Office | Avenue de la Toison d'Or 56-60, 04/16 B-1060
Brussels, Belgium
Phone: +32 (0)2 541 82 76
secretariat@iphe.net

Main objectives:

- Accelerate market penetration and early adoption of hydrogen and fuel cell technologies.
- Share information, lessons learned and best practices among member countries.
- Provide accurate factual and unbiased information to policy-makers.
- Monitor hydrogen, fuel cell and complementary technology developments worldwide.

IRENA Collaborative Framework on Green Hydrogen

Geographical scope: Global

Initiative: IRENA Collaborative Framework on Green Hydrogen

Acronym: IRENA CFGH

Type of initiative: International Organisation; platform

Scope: The Collaborative Framework serves as an effective vehicle for dialogue, co-operation and coordinated action to accelerate development and deployment of green hydrogen and its derivatives for the global renewable energy transformation.

Date of establishment: 2011 (IRENA); 2021 (IRENA CFGH)

Status: Ongoing

Membership: Meetings of the Collaborative Frameworks are open-ended to all IRENA Members and States in Accession. Members of the private sector, associations, research communities, International Governmental Organisations and Non-governmental Organisations, among others, involved in this thematic area of work may also be invited to participate.

Brief Description: The International Renewable Energy Agency (IRENA) serves as the principal platform for international co-operation; a centre of excellence; a repository of policy, technology, resource and financial knowledge; and a driver of action on the ground to advance the transformation of the global energy system. The Collaborative Framework on Green Hydrogen leverages the Agency's work on green hydrogen, the wealth of knowledge and expertise within IRENA's Membership, and the benefits that may be reaped through wider global cooperation. The platform focuses on the infrastructure, investment and certification aspects needed to enable global hydrogen trade and more broadly, the enabling measures needed to achieve a large-scale deployment.

Website: https://www.irena.org/How-we-work/Collaborative-frameworks/Green-Hydrogen

Secretariat/Governing Board: Co-facilitators for 2023 are Germany and United Arab Emirates

Contact details: cfhydrogen@irena.org

CFGH Summary: IRENA established the Collaborative Frameworks as platforms for dialogue and co-ordinated action to support the global energy transition. In 2023, the CFGH focused on taking stock of global hydrogen deployment, supporting the Global Stocktake process of the 2023 United Nations Climate Change Conference (COP28). It identified some overarching themes: Strategy launches and updates; Standards and certification; Sustainability.

Main objectives: The scope of work for the Collaborative Framework is divided into nine areas:

- A global knowledge database for green hydrogen
- Cooperation with existing hydrogen initiatives and other relevant actors
- Nexus between electrolysers and renewable power
- Transportation and distribution of hydrogen
- Standards and Regulatory frameworks
- Financial support
- End-use Sectors
- Environmental, safety aspects and social acceptance of hydrogen development
- Applicability and relevance of hydrogen in small markets (e.g. small countries).

UNIDO Global Programme on Green Hydrogen in Industry

Geographical scope: Global

Initiative: UNIDO Global Programme on Green Hydrogen in Industry

Type of initiative: International organisation; Global programme

Scope: The Global Programme for Hydrogen in Industry (GPHI) is dedicated to driving net-zero industrial development in developing countries by leveraging the hydrogen economy's potential.

Date of establishment: 2021

Status: Ongoing

Membership: Industry, academia, governments, donors. A list of partners is reported here: https://hydrogen.unido.org/our-partners

Brief Description: UNIDO is a specialized agency of the United Nations with a mandate to promote, dynamize and accelerate industrial development. In 2021, UNIDO, supported by the Governments of Austria, Germany, and Italy, launched its Global Programme for Hydrogen in Industry (GPHI) to support developing countries in overcoming various challenges that hinder hydrogen development and encourage a just hydrogen transition that puts social and environmental aspects in focus. Through GPHI, UNIDO aims to influence and guide the development of policies, standards, skills, innovation, financing and investment, and coordination between key stakeholders.

Structure:

The Programme consists of The Global Partnership for Hydrogen in Industry and the Technical Cooperation (with country-specific tailored interventions). The Global Partnership for Hydrogen in Industry is a global platform for Member States, industries, private sector, investors, research and academic institutions. Technical Cooperation adapts and applies knowledge and tools developed globally to country-specific interventions for green hydrogen in industry. The Countries in which the Programme operates are reported here: https://hydrogen.unido.org/country-overview

The Programme also benefits from the technical support and know-how of the International Hydrogen Energy Centre (IHEC) in Beijing, launched by UNIDO and the Government of China in 2021. The Centre supports the creation of hydrogen value chains and focuses on the R&D, application and demonstration of key hydrogen technologies.

Additional resources:

- https://hydrogen.unido.org/publications-and-studies;
- https://hydrogen.unido.org/experts-database

Website: https://hydrogen.unido.org/

Secretariat: The team of the Programme is reported here: https://hydrogen.unido.org/unido-team

Contact details: **UNIDO** - Wagramerstrasse 5, A-1400, Vienna, Austria - hydrogen@unido.org

Main objectives:

- Produce conducive policies and regulations for promoting a hydrogen ecosystem to underpin investor and market confidence and accelerate hydrogen projects.
- Identify appropriate standards and quality infrastructure to facilitate global trade and drive the offtake of green and low carbon hydrogen.
- Promote financial instruments to incentivise investments in hydrogen and renewable energy projects.
- Develop skills and know-how to boost resilient and sustainable industry based on green hydrogen.
- Provide coordination between key stakeholders at the national, regional and global level to resolve the bottlenecks.

4.2 R&I International Platforms

MED GEM

Geographical scope: EU and South Mediterranean Area

Initiative: MED GEM: Support to Green Electrons and Molecules' development in the Southern Neighbourhood

Acronym: MED GEM

Type of initiative: EU project; International Network

Scope: By convening dialogue and collaborative activities between key energy stakeholders, MED-GEM activities facilitate and promote the growth of the GEM industry, in particular Renewable & Green Hydrogen, at regional level. The Network also aims at increasing public awareness on the imperative need for an accelerated clean energy transition.

Date of establishment: 2023

Status: Ongoing

Membership: The MED-GEM project involves several countries from the Southern Mediterranean region: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, Syria, Tunisia.

Brief Description: The MED-GEM Network, an EU-funded initiative, brings together experts and stakeholders in renewable energy and green hydrogen, catalysing the green energy transition between the EU and the Southern Mediterranean. The project aims to create and operate a sustainable and self-sustaining Network in the Southern Neighbourhood region to accelerate the uptake of hydrogen. The Med-GEMs project is expected to provide expertise, analysis and recommendations on: policy reforms to boost renewable electricity generation; potential for renewable and low-carbon gas production and trade in the region, and feasibility of the deployment of various forms of power to gas technologies; market failures and barriers (legal and regulatory, administrative, technical, financial) to public and private investments; financing mechanisms for pilot/demonstration projects; capacity building.

Structure: The MED GEM Network is funded by the EU and implemented by GIZ International Services. It also involves an Industry Advisory Board and relevant Regional Stakeholders. It is structured around four thematic working coordination groups (CG): Policy, Industry, Infrastructure, Financial Support.

SRIA/Roadmap: The MED GEM Project did not publish a SRIA. A FactSheet summarizing its objective is available here: https://med-gem.eu/sites/default/files/documentation/FactSheet_En.pdf

Additional resources: https://med-gem.eu/resources

Website: https://med-gem.eu/

Secretariat: Frank Wouters, Director

Contact details:
33 Rue de la Charité, B-1210 Brussels - Belgium
+32 2 229 24 54
info@med-gem.eu

Main objectives:

- Accelerate the deployment of renewable power generation.
- Support the elaboration and implementation of policies for the production and trade of Power-to-X products (hydrogen and derivatives).
- Assess and exploit the potential for biogas, bio-methane and other forms of renewable gas.

Mission Innovation - Clean Hydrogen Mission

Geographical scope: International

Initiative: Mission Innovation - Clean Hydrogen Mission

Type of initiative: Institutional Partnership

Scope: Increase the cost-competitiveness of clean hydrogen by reducing end-to-end costs to a tipping point of 2 USD/kg by 2030.

Date of establishment: 2021

Status: Ongoing

Membership: 23 Nations and EU

Brief Description: The Clean Hydrogen Mission is part of MI's commitment to a decade of clean energy innovation to galvanise action that will enable every country to set ambitious clean energy and climate targets. The Mission builds a dynamic, ambitious, and delivery-focused alliance between countries, corporations, investors and research institutes to accelerate innovation on clean hydrogen. The goal is to increase the cost-competitiveness of clean hydrogen by reducing end-to-end costs to a tipping point of 2 USD/kg by 2030, and facilitate the delivery of 100 large-scale integrated hydrogen valleys worldwide.

Structure: Three main pillars: 1. Promotion of research, development and innovation; 2. Demonstration through building Clean Hydrogen Valleys; 3. Coordination for an enabling environment.

SRIA/Roadmap: A Joint Mission Statement has been published and can be found here: https://mission-innovation.net/wp-content/uploads/2021/05/Clean-Hydrogen-Joint-Mission-Statement.pdf

Website: https://explore.mission-innovation.net/mission/clean-hydrogen/

Secretariat/Governing Board:

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

Contact details:

secretariat@mission-innovation.net

SRIA Summary:

With the Joint Mission Statement, Members of the Clean Hydrogen Mission commit to stimulate joint research and development activities on technologies and industrial processes. The Mission will test the delivery of different production, storage and transport methods and end use applications. In addition, the Mission will help identifying 'demand-pull' efforts, facilitating the creation and diffusion of non-technological and non-commercial knowledge and generating 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.

Main objectives:

- Deliver 100 clean hydrogen valleys worldwide by 2030.
- Preparing the ground for the scale-up of the hydrogen economy by building a coalition of partners.
- Hydrogen Exchange: A new peer-learning network to enable policymakers to rapidly access insights on hydrogen.

Mission Innovation - Hydrogen Valley Platform

Geographical scope: Worldwide

Initiative: Mission Innovation Hydrogen Valley Platform

Type of initiative: Online Platform; Webtool

Scope: A platform for project developers to create a global collaboration and go-to-platform for all information on large-scale hydrogen flagship projects (Hydrogen Valleys – H2Vs). The platform features comprehensive insights into the most advanced and ambitious Hydrogen Valleys around the globe.

Date of establishment: Launched on 19th January 2021

Status: Ongoing

Brief Description: The Hydrogen Valley platform is a joint initiative by the Clean Hydrogen Joint Undertaking and Mission Innovation. The Hydrogen Valley platform is a global collaboration platform for all information on large-scale hydrogen flagship projects and aims to facilitate a clean energy transition by promoting the emergence of integrated hydrogen projects along the value chain as well as by raising awareness among policy makers. On this platform, the most advanced Hydrogen Valleys around the globe provide insights into their project development. Exploring the world map it is possible to discover the profiles of the Hydrogen Valleys represented on the platform, or consult the analysis section to find out more about the projects on an aggregate level.

Additional resources:

- https://h2v.eu/analysis
- https://h2v.eu/toolbox
- https://h2v.eu/hydrogen-valleys
- https://www.clean-hydrogen.europa.eu/get-involved/mission-innovation-hydrogen-valleys-platform_en

Website: https://h2v.eu/

Contact details:

H2V@clean-hydrogen.europa.eu

Main objectives:

- Connect and transform regional clusters into a backbone for the worldwide hydrogen economy.
- Help develop first H2 projects in new markets and geographies.
- Connecting existing Hydrogen Valleys (e.g., NL and DE) can enable the market.
- Pioneering more mature and innovative derisking and financing models.
- Raising awareness and social acceptance on local and regional level.

4.3 Industry Platforms

Hydrogen Council

Geographical scope: Global

Initiative: Hydrogen Council

Type of initiative: Sectoral Association; Industry Platform

Scope: Global CEO-led initiative that brings together leading companies with a united vision on hydrogen as a global energy solution.

Date of establishment: 2017

Status: Ongoing

Membership: Industry (140 multinational companies) representing the entire hydrogen value chain. A list of members can be found here: https://hydrogencouncil.com/en/members/

Brief Description: Using its global reach to promote collaboration between industry, governments, investors, and civil society, the Council provides insights on and pathways for accelerating the deployment of hydrogen ecosystems around the world. It also supports the development of international safety and sustainability standards, paving the way for the deployment of reliable hydrogen solutions at scale.
The Hydrogen Council brings together a diverse group of 140 companies from North America to Asia-Pacific, Europe, Africa and MENA region, across the entire hydrogen value chain, including large multinationals, innovative SMEs, and investors. Its studies and reports are used as a reference by international institutions in the area of new energies

SRIA/Roadmap: Indications on Hydrogen Council view can be derived from its article on its Founding Story: https://hydrogencouncil.com/en/founding-story/

Additional resources: https://hydrogencouncil.com/en/intelligence/

Website: https://hydrogencouncil.com/en/

Secretariat/Governing Board: Jaehoon Chang (Hyundai Motor Company President and CEO) Sanjiv Lamba (CEO of Linde). The Team members can be found here: https://hydrogencouncil.com/en/about-the-council/

Contact details:
Hydrogen Council
Rdpt Robert Schuman 6, 1040 Bruxelles (Belgium)

Main objectives:

- Increase visibility and recognition of hydrogen.
- Unlock impediments to progress in the realization of the great potential of hydrogen.
- Work with and provide recommendations to key stakeholders.

GLOBAL PROGRAMMES

5 Global/Regional Platforms

ESMAP- Energy Sector Management Assistance Program

Geographical scope: Global

Initiative: Energy Sector Management Assistance Program

Acronym: ESMAP

Type of initiative: International Programme, World Bank Support Programme

Scope: ESMAP strives to expedite the energy transition necessary to ensure access to affordable, reliable, sustainable, and modern energy for all. It includes significant effort towards hydrogen.

Date of establishment: 1983 | **Status:** Ongoing

Membership: 20 partners, including governments and foundations. A list of partners can be found here: https://www.esmap.org/esmap_donors

Brief Description: Since 1983 ESMAP collaborates with the World Bank and over 20 partners to assist developing and emerging-market countries in addressing their energy challenges. ESMAP focuses on transformation, starting with government policies, and regulatory and operational frameworks. It has a diversified agenda including national policy reform and integration of cutting-edge clean energy technologies and solutions. The Programme offers:

- Knowledge & Expertise: ESMAP collects data and produces analytics. Its data repository includes a wide range of global information, such as wind and solar maps, geospatial data on electricity access, energy consumption patterns, policy and regulation, and institutional governance.
- Finance Mobilization: ESMAP status, as part of the World Bank Group, enables it to leverage concessional financing that incentivizes private investment in challenging sectors / regions. It supports the structuring of project pipelines, with blended and layered financing.
- Catalyst: Studies, test projects, conferences, study tours, technical partnerships, and knowledge exchanges combine to catalyse action on integrating energy technologies and creating markets.
- Policy Laboratory: ESMAP offers analysis of energy markets, utility performance, policy and regulatory incentives, tariffs, standards, operational protocols, and rules around the world, identifying effective practices to offer countries innovative solutions.

In the field of hydrogen, it created the Green Hydrogen Support Programme and Hydrogen for Development Partnership (H4D) (see dedicated page).

Additional resources:

- https://www.esmap.org/activities
- https://www.esmap.org/resources

Website: https://www.esmap.org/

Secretariat: Chair of ESMAP is the World Bank Senior Managing Director: Axel van Trotsenburg

Contact details:
Energy Sector Management Assistance Program
The World Bank
1818 H Street, NW - Washington DC 20433 USA
esmap@worldbank.org

Main objectives:

- Strengthening policy frameworks, and reforming energy prices and subsidies.
- Facilitating the transition to lower carbon and resilient energy systems, de-risking investments, and integrating variable renewable energy into power grids.

ESMAP - Green Hydrogen Support Programme

Geographical scope: Global

Initiative: ESMAP - Green Hydrogen Support Programme

Type of initiative: International Programme; World Bank Support Programme

Scope: Deliver strong analytical work to catalyse the deployment of renewable hydrogen projects. The program aims to raise awareness about the potential for green hydrogen to create economic opportunities in developing countries and decarbonize energy-consuming activities.

Date of establishment: 2020

Status: Ongoing

Brief Description:

The Green Hydrogen Support Programme is a programme of the Energy Sector Management Assistance Program (ESMAP). It addresses the challenges associated with the deployment of renewable hydrogen projects, such as technology risks, capacity building, regulatory requirements, and economic analyses. In collaboration with local teams from the Energy and Extractives and Transport Practices, and the International Finance Corporation (IFC), the Hydrogen Support Program works at the country level, to prioritize projects that that could use renewable hydrogen or its derivatives as fuels or feedstock in developing countries. It has a strong focus on regions with excellent renewable resources, and countries producing and consuming hydrogen and derived products such as ammonia and methanol.

Structure: The Programme supports, through grant funding, World Bank recipient countries to create an enabling environment to scale up green hydrogen projects through three main workstreams:

- **Technical Assistance:** directly funded in-depth analytical work and activities to support the green hydrogen industry in more than 30 countries. The Programme is currently offering technical support to governments in Latin America, Europe, Central Asia, Africa, Middle East, South Asia and East Asia.
- **Global Knowledge:** The Programme leads knowledge creation on green hydrogen across the World Bank Group. It uses knowledge-sharing activities and advisory to support teams preparing hydrogen technical assistance and lending engagements.
- **Capacity building:** Technical government officials involved in green hydrogen industry have access to study tours, trainings, and global webinars in support of the efficient and effective implementation of green hydrogen projects, to help achieve SDG 7 and commitments from the Paris Agreement.

Additional resources: https://www.esmap.org/resources?program=1663

Website: https://www.esmap.org/green_hydrogen_support_program

Secretariat: The Energy Sector Management Assistance Program (ESMAP) provides the secretariat.

Contact details:
Energy Sector Management Assistance Program
The World Bank
1818 H Street, NW - Washington DC 20433 USA
esmap@worldbank.org

Main objectives:

- Raise awareness about the potential for green hydrogen.
- Create economic opportunities in developing countries.
- Decarbonize energy-consuming activities.
- Assist governments in developing countries to identify short- and long-term green hydrogen opportunities.

ESMAP - Hydrogen for Development Partnership

Geographical scope: Global

Initiative: ESMAP - Hydrogen for development partnership

Acronym: H4D

Type of initiative: International Programme; World Bank Support Programme

Scope: The Hydrogen for Development Partnership (H4D) was created to offer a global platform to accelerate clean hydrogen deployment in developing countries. It provides client countries with practical advice and technical assistance on how to develop policies in order to advance clean hydrogen efforts in their respective economies.

Date of establishment: 2022

Status: Ongoing

Brief Description: the Partnership supports the implementation of policies and regulations that will accelerate investments in clean hydrogen projects. The Partnership's goal is to ensure that developing countries and emerging markets can participate in the growing hydrogen economy across the value chain in support of their climate and energy goals, while ensuring sustainable development and socioeconomic benefits. The H4D Partnership will work closely with partners, observers, and stakeholders, which may include research institutions, technical laboratories, industry associations, policy makers and regulators, international institutions, and civil society.

Structure: H4D has four work streams: Technology, infrastructure, and systems integration; Policy frameworks and regulations; Investment, financing, business models and procurement; Socioeconomics and sustainability

Additional resources: https://www.esmap.org/resources

Website: https://www.esmap.org/Hydrogen_for_Development_Partnership_H4D

Secretariat: The Energy Sector Management Assistance Program (ESMAP) provides the secretariat of the H4D and works closely with partners, stakeholders and observers.

Contact details:
Energy Sector Management Assistance Program
The World Bank
1818 H Street, NW - Washington DC 20433 USA
esmap@worldbank.org

Main objectives:

- Convening international cooperation to increase the knowledge base in clean hydrogen technologies for developing countries.
- Building capacities in the public sector by following a global public goods approach.
- Understanding of emerging markets' requirements for the deployment of clean hydrogen and its derivatives.
- Creating platforms to boost policy dialogue with countries participating in the clean hydrogen industry and boost North-South and South-South exchanges.
- Accessing to country- and project-specific information.

H2LAC

Geographical scope: Latin America and Caribbean (LAC)

Initiative: H2LAC - Plataforma para el desarrollo del hidrógeno verde en Latinoamérica y el Caribe.

Acronym: H2LAC

Type of initiative: Platform; Regional Platform

Scope: becoming a regional initiative to promote green hydrogen in Latin America and Caribbean (LAC)

Date of establishment: 2021

Status: Ongoing

Membership: 50 partners in 16 LAC countries, including public institutions, the private sector, hydrogen and renewable energy associations, European chambers of commerce in LAC and knowledge institutions. A list of members is available here: https://h2lac.org/asociados/

Brief Description: H2LAC is a collaborative platform dedicated to promoting the growth of green hydrogen and its derivatives in Latin America and the Caribbean (LAC). The mission is to foster connection and collaboration among diverse stakeholders to promote sustainable development and the adoption of hydrogen in the region. The platform works on 5 pillars:

- *Information:* Facilitate the exchange of information on the regional development of green hydrogen and serve as a trusted platform for various stakeholders.
- *Articulation and collaboration*: Promote synergies between countries to boost regional cooperation.
- *Dialogue*: Promote multi-level and multi-stakeholder dialogue within LAC countries, as well as between LAC and the European Union.
- *Positioning*: Promote the region as a leading player in the production, trade and use of green hydrogen and its derivatives worldwide.
- *Capacity building*: Strengthening the understanding of green hydrogen and its value chain in the LAC region.

Structure: The implementation of the platform is supported by the Euroclima Programme, funded by the European Union and co-financed by the German Federal Government through the Federal Ministry for Economic Cooperation and Development (BMZ). It is composed by 50 partners in 16 LAC countries and it collaborates closely with five key strategic allies: the International Energy Agency (IEA), the United Nations Environment Programme (UNEP), GIZ's International Power-to-X Hub and the Spanish Agency for International Development Cooperation (AECID)

Additional resources:

- https://h2lac.org/h2lac-review/
- https://h2lac.org/atlas-h2lac/

Website: https://h2lac.org/

Secretariat: EUROCLIMA+ Programme, Economic Commission for Latin America and the Caribbean (ECLAC), World Bank, the Hydrogen Alliance

Contact details: H2LAC can be contacted though this form: https://h2lac.org/contacto/

Main objectives:

- Promote cooperation and exchange between diverse actors.
- Advance towards a green hydrogen economy in Latin America and the Caribbean (LAC).
- Catalyse a significant change in the region's energy matrix, committing to a fair energy transition, ensuring that no group is left behind in this process.

ANNEXES

ANNEX 1 – The EU hydrogen Ecosystem. Visual representation

Fig. 1: The EU hydrogen Ecosystem

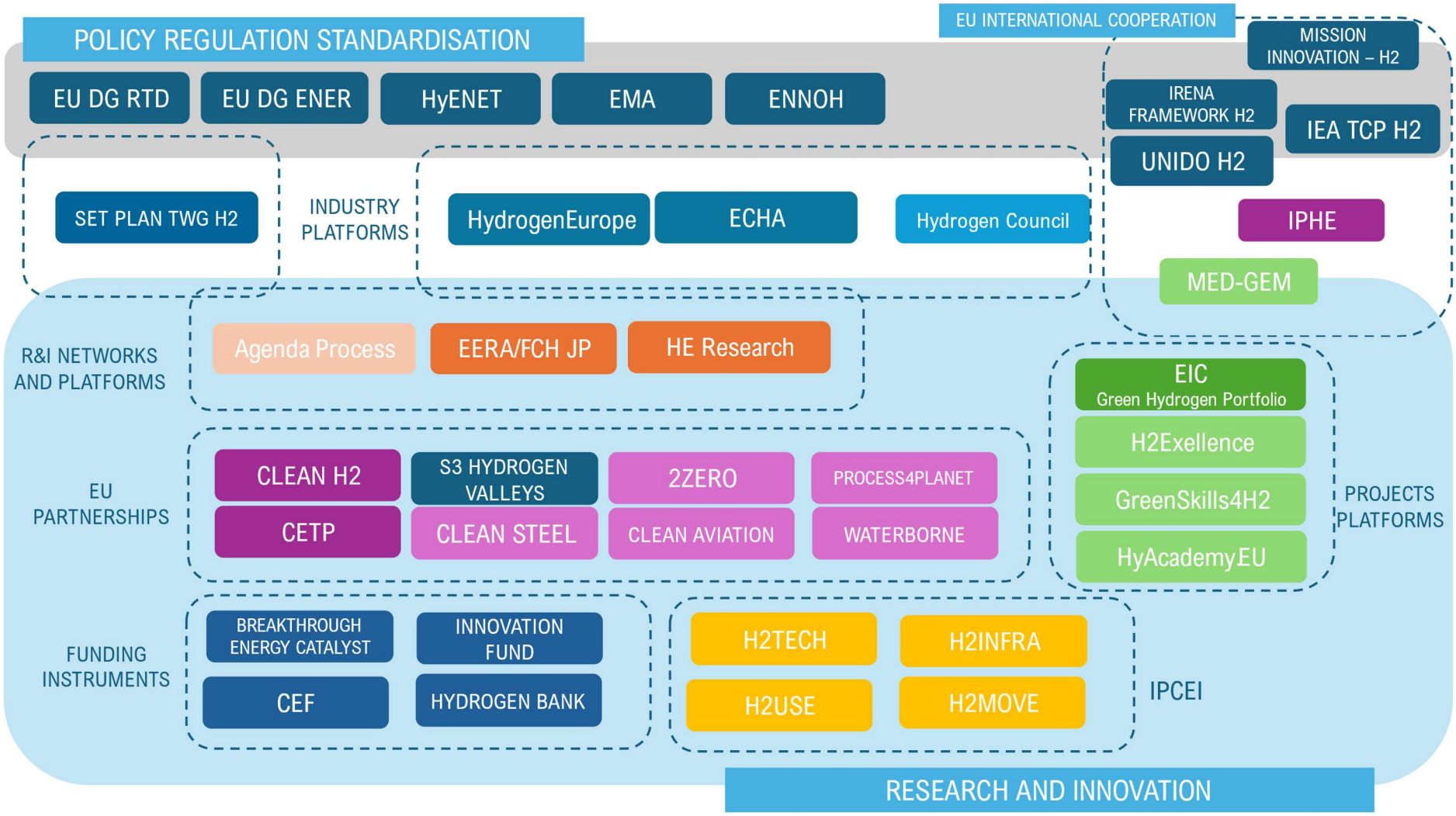
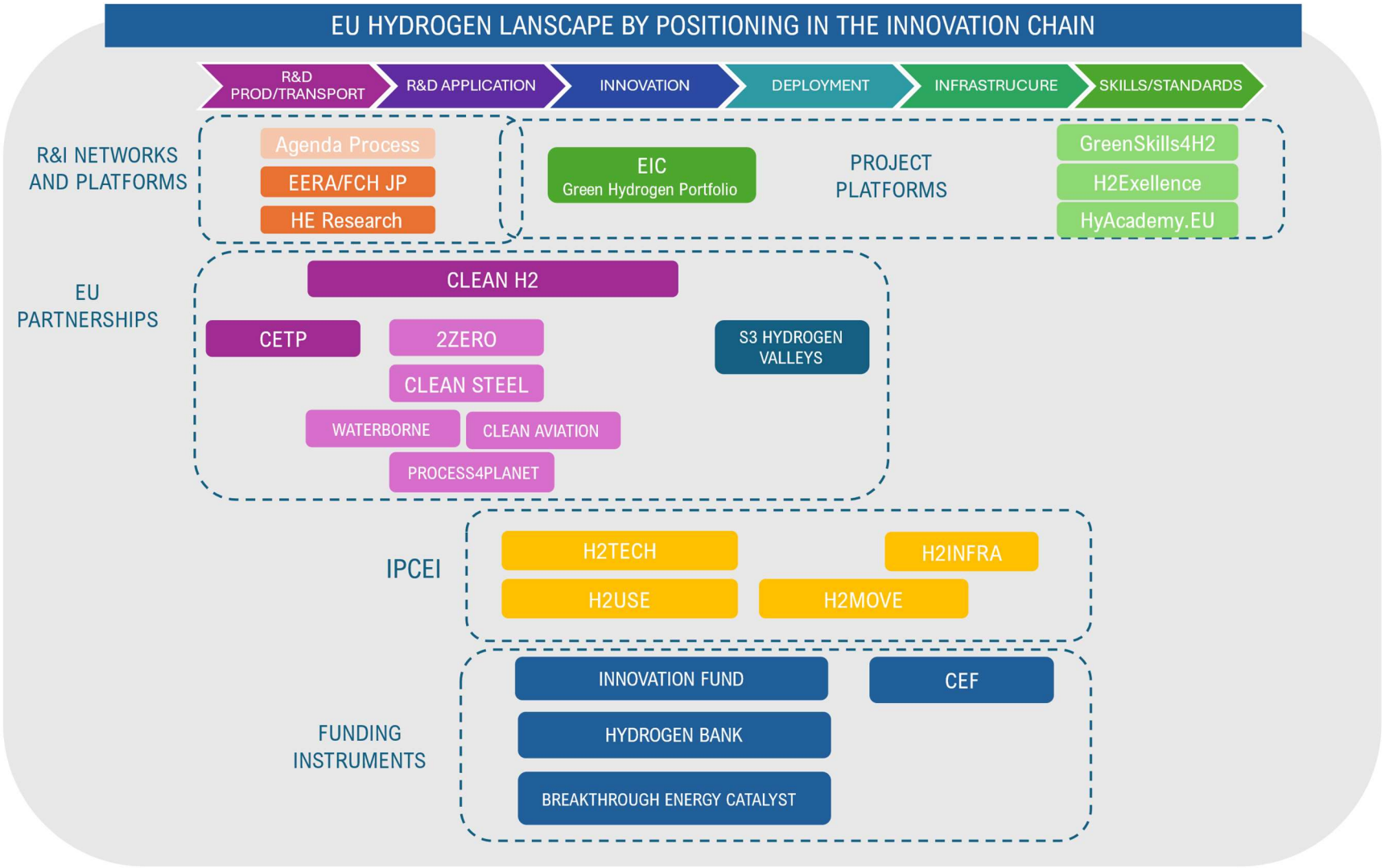


Fig. 2: The EU hydrogen ecosystem by positioning in the innovation chain



ANNEX 2 – Clean Hydrogen JU State Representative Group. Composition

Nomination of Member States and Associated Countries representatives to the States Representative Group of the Clean Hydrogen JU						
N.	**Country**	**Main Rep / Alternate**	**Title**	**First Name**	**Last Name**	**Company/Institution**
1	Austria	Main Representative	Mr.	Arno	Gattinger	Austrian Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology
	Austria	Main Representative	Ms.	Sarah	Neumann	Austrian Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology
	Austria	Alternate	Mr.	Constanze	Kiener	Austrian Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology
	Austria	Alternate	Mr.	Theodor	Zillner	Austrian Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology
2	Belgium	Main Representative	Ms	Lut	Bollen	Vlaamse overheid
	Belgium	Alternate	Mr	Frank	Vancayemberg	SPW Territoire, Logement, Patrimoine, Énergie
3	Bulgaria	Main Representative	Mr	Blagoy	Burdin	Ministry of Education and Science
4	Croatia	Main Representative	Prof. Emer.	Frano	Barbir	FESB University of Split
	Croatia	Alternate	Mr	Vjekoslav	Jukic	Ministry of Economy and sustainable development
5	Cyprus	Main representative	Mr	Evgenios	Epaminondou	Deputy Ministry of Research, Innovation and Digital Policy

	Cyprus	Main representative	Mr	George	Partasides	Ministry of Energy, Commerce and Industry
	Cyprus	Alternate	Mr	Loizos	Solomou	Permanent Representation of Cyprus to the EU
	Cyprus	Alternate	Ms	Anastasia	Kalaika	Ministry of Energy, Commerce and Industry
6	Czech Republic	Main Representative	Prof	Karel	Bouzek	University of Chemistry and Technology, Prague (UCT Prague)
	Czech Republic	Alternate	Mr	Ales	Doucek	ÚJV Řež - Nuclear research Institute
7	Denmark	Main Representative	Mr	Jonas Toft	Ludvigsen	Danish Agency for Higher Education and Science
8	Estonia	Main Representative	Ms	Maria	Habicht	Estonian Research Council
	Estonia	Alternate	Ms	Liis	Kasemets	Ministry of the Environment
9	Finland	Main Representative	Mr	Reijo	Munther	Business Finland
	Finland	Main Representative	Mr	Timo	Ritonummi	Ministry of Economic Affairs and Employment
	Finland	Alternate	Mr	Juho	Korteniemi	Ministry of Economic Affairs
	Finland	Alternate	Mr	Tero	Ijäs	Business Finland
10	France	Main Representative	Mr	Xavier	Montagne	Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation
	France	Main Representative	Ms	Annabelle	Rondaud	Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation
11	Germany	Main Representative	Dr	Christiane	Pyka	BMBF

	Germany	Main Representative	Mr	Tobias	Heffels	BMBFi
	Germany	Alternate	Ms	Marie-Theres	Bort	BMVI
	Germany	Alternate	Mr	Simon	Serowy	Project Management Jülich
12	Greece	Main Representative	Dr	Athanasios	Stubos	National Centre for Scientific Research "Demokritos"
	Greece	Alternate	Dr	Antonios	Gypakis	General Secretariat of Research and Technology
13	Hungary	Main Representative	Ms	Kuttel	Orsolya	National Research, Development and Innovation Office
14	Ireland	Main Representative	Mr	Philip	Cheasty	Enterprise Ireland
15	Italy	Main Representative	Mr	Antonino Salvatore	Arico'	National Research Council of Italy
16	Latvia	Main Representative	Dr	Svetlana	Jesiļevska	Ministry of Education and Science
	Latvia	Alternate	Dr	Baiba	Švāne-Upmale	scientific Affairs at the Estonian Permanent Representation
17	Lithuania	Main Representative	Mr	Danys	Zilvinas	Ministry of Energy of the Republic of Lithuania
	Lithuania	Main Representative	Mr	Kerezis	Daumantas	Ministry of Energy of the Republic of Lithuania
18	Luxemburg	Main Representative	Ms	Rebecca	Damotte	Luxinnovation
	Luxemburg	Alternate	Mr	Stefano	Pozzi Mucelli	Luxinnovation
19	Malta	Main Representative	Ms	Laura Sue	Mallia	Transport Malta

	Malta	Alternate	Ms	Donna	Borg Micallef	Ministry for Transport, Infrastructure and Capital Projects
20	Netherlands	Main Representative	Mr	Rodrigo	Pinto Scholtbach	Ministry of Economic Affairs and climate
	Netherlands	Alternate	Mr	Achim	Eberspächer	Netherlands Enterprise Agency
	Netherlands	Alternate	Mr	Dirk	Schaap	Ministry of Infrastructure
21	Poland	Main Representative	Mr	Szymon	Byliński	Ministry of Climate and Environment
	Poland	Main Representative	Mr	Maciej	Kiełmiński	Ministry of Education and Science
	Poland	Alternate	Ms	Maria	Śmietanka	National Centre for Research and Development
	Poland	Alternate	Ms	Monika	Chojnowska	Ministry of Climate and Environment
22	Portugal	Main Representative	Ms	Cristiana	Leandro	MCTES/ANI
	Portugal	Alternate	Mr	Luís	Maia	MCTES/ANI
	Portugal	Alternate	Ms	Sofia	Simões	MAAC/LNEG
	Portugal	Alternate	Mr	Paulo	Partidário	MAAC/DGEG
23	Romania	Main Representative	Mr	Ioan	Iordache	National Research and Development Institute for Cryogenic and Isotopic Technologies
	Romania	Alternate	Ms	Madalina	Borceanu	Ministry of Research, Innovation and Digitalization
24	Slovakia	Main Representative	Mr	Maroš	Halama	Tehnical University of Kosice
	Slovakia	Alternate	Mr	Andrej	Kurucz	Permanent Representation of the Slovak Republic to the EU

25	Slovenia	Main Representative	Ms	Sabina	Dolinšek Popadič	Ministrstvo za infrastrukturo
	Slovenia	Alternate	Ms	Dragana	Todorovič	Ministrstvo za infrastrukturo
26	Spain	Main Representative	Ms	Cristina	Garrido	CDTI - Ministry of Science and Innovation
	Spain	Alternate	Ms	Maria Luisa	Revilla Trujillo	CDTI - Ministry of Science and Innovation
	Spain	Alternate	Dr	Joaquin Angel	Serrano Agejas	AEI - Ministry of Science and Innovation
27	Sweden	Main Representative	Dr	Mikael	Lindqvist	Statens energimyndighet
	Sweden	Alternate	Dr	Emma	Westsson	Statens energimyndighet
Associated countries						
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	Georgia	Main Representative	Mr	Nikoloz	Kholodov	Ministry of Economy and Sustainable Development of Georgia
2	Iceland	Main Representative	Mr	Jón B.	Skúlason	Iceland New Energy
	Iceland	Alternate	Ms	Elisabet	Andresdottir	Icelandic Centre for Research
3	Israel	Main Representative	Mr	Aharon	Asaf	IIA
	Israel	Alternate	Mr	Hagit	Schwimmer	IIA

4	Moldova	Nominated	Mr	Ion	Marin	Science Researcher at Inst. of Chemistry of the Academy of Science of Rep. of Moldova
5	Montenegro	_				
6	North Macedonia	_				
7	Norway	Main Representative	Mr	Åse	Slagtern	Research Council of Norway
	Norway	Alternate	Mr	Grunne	Tore	Norwegian Ministry of Petroleum and Energy
8	Serbia	_				
9	Turkey	Main Representative	Dr	Hanife	TUZCUOĞLU	TUBITAK (The Scientific and Technological Research Council of Turkey)
	Turkey	Alternate	Mr	Cagri	Yildirim	Scientific and Technonological Research Council of Turkey - TUBITAK
	Turkey	Alternate	Prof.	Ceylan	Abdullah	TENMAK