Hydrogen for a Carbon Neutral Europe

Recommendations from the Fuel Cells and Hydrogen Research Community

Hydrogen Europe

Research

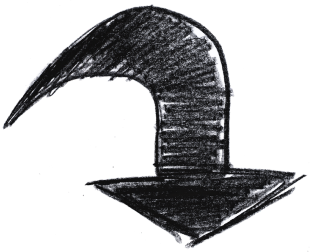
Who we are

Hydrogen Europe Research

A European scientific community

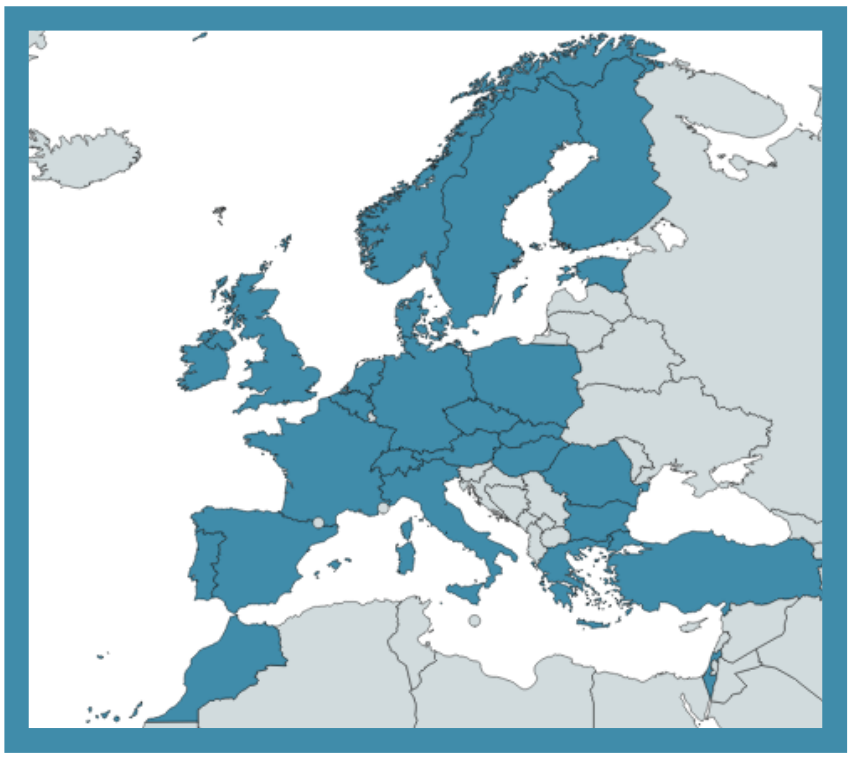
97 Member organisations
46 Higher education establishments
51 Research organisations

400+ scientists
sharing knowledge and involved in defining priorities for the FCH sector



Present across
26 countries

In 20 EU
Member States



Who we are

Hydrogen Europe Research

A dynamic organisation in great expansion...

In 13 years...

Our membership basis has doubled

...so did our geographic coverage

2008

42 members

2021

97 members

...and open to new members!

Who we are

Hydrogen Europe Research

An active actor on the European hydrogen scene

Hydrogen Europe Research is one of the three members in the **European partnership for Fuel Cells and Hydrogen (FCH) technologies**, alongside its industry counterpart Hydrogen Europe and the European Commission.

From 2008 to 2020, the **Fuel Cells and Hydrogen Joint Undertakings** (FCH JU & FCH 2 JU) have proven to be successful public-private partnerships supporting Research, Technological development and Demonstration (RTD) activities in fuel cell and hydrogen technologies in Europe.

In 2020...

One third of Hydrogen Europe Research members were **awarded projects from the FCH 2 JU.**

21 projects awarded by the FCH 2 JU included **Hydrogen Europe Research members.**

€150 million

IKAA audited by research members between 2014 and 2019

In-kind additional activities (IKAA) are actions in Europe contributing to the FCH 2 JU's objectives but undertaken outside its work plan.

Hydrogen Europe Research will continue to participate in the future joint undertaking on hydrogen, entitled **Clean Hydrogen Joint Undertaking** (CH JU), from 2021 to 2027.

Hydrogen Europe Research shares the **European Research Area (ERA)** objectives to help countries be more efficient by aligning research policies and programmes.

Hydrogen Europe Research is a member of the **European Clean Hydrogen Alliance** and aims at promoting the voice of research within it.

Our recommendations

To support the development of a new industrial ecosystem based on hydrogen, R&I is needed all along the value chain. Hydrogen Europe Research's member organisations concentrate a rich expertise and knowledge of the FCH sector and are involved in all research segments, from fundamental to applied research, within a wide spectrum of applications. Well-aware of the challenges ahead to produce clean hydrogen and make it available to the consumers in different end-uses, the FCH research community is calling to share its expertise with policy makers.

1 Secure funding for basic and applied research

Although some hydrogen technologies are mature and already present on the market, hydrogen remains an emerging industry with many innovations to come in the next decade. Therefore, **low Technology Readiness Level (TRL) research is still needed to develop the next generations of materials, components and products.** Technological innovation is indeed of paramount importance in order to improve current hydrogen technologies and solve the challenges they face for their uptake. For example, undertaking fundamental and applied research aiming at the reduction of critical raw and toxic materials in FCH technologies is a vital step for the sustainable development of hydrogen. Research is also required to drive innovation in new technologies which have the potential to decarbonise hard to abate sectors but are currently at low TRL.

Research institutes and universities are active actors in the development of the next generation of products. They are working in intelligence with industry stakeholders who provide them expertise on the market developments and needs, as well as policy-makers and institutions, who set objectives and directions for the future of these developments. **Research institutes and universities are a cornerstone of this ecosystem, and the funding of their activities over the entire TRL spectrum is an important consideration for the ecosystem as a whole.**

In light of this, Hydrogen Europe Research wishes to stress that **this connection between industry and research should further be promoted in order to enhance technology transfer**. University graduates and PhDs working on fundamental and applied research areas may become a workforce reservoir for the industry. Furthermore, technology transfer is deeply rooted in the FCH sector and spin-offs from research institutions and academia have been the seed of many companies in the field. **This permeability between both worlds contributes to boost the application of research outcomes in marketable H_2-related technologies provided by a European industry.**

2 Support the development of common research and technology infrastructures

The development of research and technology infrastructures is an essential aspect to bring new technologies to the market. **Open Technology Platforms can be the cornerstone of a successful European FCH deployment.** Through these platforms, industrial stakeholders benefit from an open access to physical facilities, capabilities and services required for the development, testing, validation and upscaling of technologies.

Such platforms have three main benefits:

1. They offer possibilities to **test components and validate materials in industrial conditions** (e.g. extreme temperature and/or pressure, large scale tests, etc.) using state of the art infrastructures;
2. They **create bridges between applied research and European industrial actors**;
3. They **mutualise initial investment costs** in cooperation with the European Commission and Member States, to speed up the development and upgrade of hydrogen technologies. The objective is to advance from validation in a laboratory (TRL 4) to prototypes in industrial environments (TRL 7), whilst simultaneously improving the Manufacturing Readiness Level (MRL) of these technologies.

Having a clear picture of the existing landscape of research and technology infrastructures in Europe is a first step towards the identification of gaps and trends in view of building bridges between research and industry stakeholders. In this view, **Hydrogen Europe Research welcomes the opportunity to cooperate with the European Commission, the European Strategy Forum on Research Infrastructures (ESFRI), and the Green Hydrogen pilot action within the European Research Area to map such infrastructures in the field of hydrogen and fuel cells.**

3 Promote a sound approach to evaluate the carbon footprint related to the production, distribution and usage of hydrogen

To provide consumers a choice by disclosing the origin of the energy they are using, **a European or international standard must be developed together with a comprehensive classification and certification framework**.

This standard must include information on sustainability as well as greenhouse gas (GHG) emissions across the whole life cycle. This includes the production, the transportation mode, the conversion and the use of hydrogen. **To implement a comprehensive framework, the whole carbon footprint needs to be taken into account and not only the CO_2 emissions.**

Such activities have already been initiated through the European CertifHy projects and with a specific task force in the International Partnership for Hydrogen and fuel cells in the Economy (IPHE). **Hydrogen Europe Research strongly supports the development of a methodology based on scientific and technical approaches to calculate the direct and indirect GHG emissions.**

This approach should be based on:

1. **Inclusiveness** – no potential primary energy source should be excluded;
2. **Flexibility** – considering unique specific circumstances should be possible;
3. **Transparency** – the assumptions taken must be transparent to build confidence;
4. **Comparability** – comparability across technologies and energy vectors should be a cornerstone of the methodologies to allow coherent comparisons on carbon footprint;
5. **Applicability** – the methodologies must be practical and applicable to facilitate its implementation by the industrial sector.

Whereas several international standards define elements to consider for a life-cycle assessment and for the quantification of greenhouse gas emissions and removals, they remain generic and need further specifications for hydrogen.

In this context, **Hydrogen Europe Research strongly encourages the development of a methodology for hydrogen footprint assessment.** This assessment should be undertaken **for each aspect of the hydrogen value chain: production, conditioning and storage, as well as transport and usage.** In this regard, the projects funded by the FCH JU and the FCH 2 JU in relation to Life Cycle and Sustainability Assessment (LCSA) and emission calculations are a great resource to build on.

As mentioned previously, whilst the carbon footprint is today a priority in European and international discussions, **Hydrogen Europe Research also supports the consideration of other sustainability criteria to provide a comprehensive overview of what is at stake.** For example, the reduction of air pollution, the preservation of biodiversity and the limitation of land-use are aspects to consider when evaluating the environmental cost of a technology.

4 Build a strategy for education and social acceptance of hydrogen and fuel cells

In parallel to the sector's market uptake, **the issue of skills, education and social acceptance should be a central consideration of European and national policies for the FCH sector.**

It is estimated that the hydrogen sector will employ approximately one million people in Europe by 2030. In addition, jobs in other sectors will be impacted by the development of an FCH ecosystem. As a result, a trained workforce will be needed for these new jobs. Upskilling and reskilling opportunities must be provided to workers impacted by these technological evolutions. In this context, **Hydrogen Europe Research welcomes the EU's Pact for Skills initiative and encourages a European cross-sectoral cooperation to identify the needs in terms of skills and the means to provide adequate trainings.**

Public awareness on hydrogen is also crucial. Hydrogen is still a relatively unknown energy vector for many European citizens and interrogations regarding the safety of hydrogen technologies are still recurring questions today. The role hydrogen can play in the energy transition should be further promoted. **A coherent educational and communication framework could play a vital role in increasing the societal awareness on hydrogen technologies.**

Hydrogen Europe Research calls for a coordinated approach at European level and with Member States to promote knowledge on hydrogen and to ensure that appropriate training opportunities are available.

Hydrogen Europe Research

secretariat@hydrogeneuroperesearch.eu