DOUBLE EU INVESTMENT FOR GREEN HYDROGEN TO SLASH CO_2 EMISSIONS

EUROPEAN HYDROGEN VALLEYS PARTNERSHIP

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Hydrogen is Europe's best opportunity for deep decarbonisation while boosting European innovation and competitiveness.

In the past years, over 600 million euros have been invested through the public private partnership of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU). Many successful projects have emerged from this. This marks a successful and important step into an energy system for clean and renewable energy that benefits industry, transport and homes and therefore adds to citizens' welfare.

In Europe's quest for climate action, hydrogen plays an inestimable role:

- Hydrogen stores renewable energy, not always readily available and making renewable energy less prone to weather conditions;
- Green hydrogen is clean and safe, without secondary emissions;
- Hydrogen is the only replacement for natural gas;

Hydrogen technology will help the energy transition, help enhance decarbonisation and provides thousands of new jobs. The further development of hydrogen infrastructure and techniques will foster innovation and help create a modern clean economy for Europe's energy demand.

We, the **European Hydrogen Valleys Partnership and all signatories**, want the European Commission to double the funding for the European Partnership for Clean Hydrogen the 2021-2027 period to 1.3 billion.

Dear Executive Vice President of the European Commission Frans Timmermans,

We urge you to include double the budget for the new European Partnership for Clean Hydrogen in the Horizon Europe contribution, especially in view of the European Green Deal. This will help Europe to reach its 2030 and 2050 targets and to remain the global leader in clean energy innovation.

Together, we can turn promises for cleaner Europe into a reality.

The European Hydrogen Valles Partnership

Gelderland
Normandy
Hauts-de-France
Grand Est
Bourgogne-Franche-Comté
Bretagne
Pays de la Loire
Nouvelle-Aquitaine
Auvergne Rhone Alpes
Provence Alpes Cote d'Azur
Occitanie
Aragon Castilla y Leon
Castilla y Leon
Castilla -La Mancha
Médio Tejo (centro)
Nordrhein-Westfalen
Sandviken
Baden- Wurttemberg
Hamburg
North Jutland
Gävleborgs Län
Hordaland County Council
Emilia Romagna
Piemonte
Anatoliki Makedonia-Thraki
Hieraklion
Yugoiztochen: Stara Zagora
Sogn og Fjordane County Municipality
North Denmark Region
Northern Netherlands
Lisboa
Sachsen-Anhalt

Supported by:

Executive Summary

Europe is set to embark on the world's most ambitious decarbonisation programme. As we have received Commission President Von der Leyen's European Green Deal, we know the headline targets should feature at least 50% greenhouse gas reduction target by 2030 and a pledge for Europe to become the first climate neutral economy by 2050. To achieve these objectives, the EU will need focused action across all its decarbonisation pathways: renewables, energy efficiency, electrification and carbon trading / pricing. We believe hydrogen will be an additional decarbonisation pathway to complement existing pathways to both accelerate the energy transition and enable the EU to meet its objectives as the world's climate action leader.

Increasingly, hydrogen is seen as a critical element in the future of sustainable energy supply. Hydrogen is necessary to achieve the climate objectives through deep decarbonisation. Due to this reason the number of hydrogen projects is increasing, led by both governments, local authorities and the industry. Fostering public-private collaboration the European Hydrogen Valleys Partnership - part of the S3 Industrial Modernisation platform - is a partnership led by four European regions, namely Aragon, Auvergne-Rhône-Alps, Normandy and the Northern Netherlands. We, as a partnership, stand by the European Green Deal, as we aim to address global warming and mitigate its effects on human societies and ecosystems by promoting the production of clean hydrogen via renewable energy sources and its use in several sectors such as energy, transport and industry feedstock.

We want to reinforce the growing interest for hydrogen in Europe's energy transition and therefore we respectfully ask the European Commission to double the Horizon Europe contribution to the European Partnership for Clean Hydrogen- the successor of FCH JU- from 650m Euro to 1.3 billion Euro for the 2021-2027 period. Europe has already made important investments in FCH technologies and has recognised the need to focus and leverage its investments through the public private partnership of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU).

We believe that the EU should take advantage of this already successful public-private partnership in order to accelerate the development and the deployment timelines of hydrogen solutions by increasing its funding. No other emerging technology has the possibility or opportunity to support European efforts for a rapid decarbonisation across many different areas:

- Hydrogen's promise is not only limited to a decarbonisation pathway but could also become a strategic, transformative industrial sector for Europe, boosting innovation, jobs, enhance growth, and promote competitiveness globally;
- The European Partnership for Clean Hydrogen will enable Europe to maintain the global frontrunner position on the hydrogen technology and enhance investments in research and development. Europe is well positioned to reap the benefits of technological leadership;
- To accelerate developments around hydrogen, structural cooperation between companies and regions is necessary and the partnership plays a crucial role crucial in this. This already resulted in the successful Hydrogen Valley Partnership;
- In order to decarbonize heavy duty and heavy industries technologies should be further developed;
- Hydrogen can play an important role in Just Transition; by increasing the amount of EU funds, central and Eastern European countries would be able to join the winning calls and develop projects that succeed, and thereby bring many benefits in energy systems and citizens welfare.

To conclude, research and development is needed to bring FCH technologies to a scale allowing for commercialisation and mass market deployment. The European Partnership for Clean Hydrogen is a proven platform to promote the development of the hydrogen technologies. As such hydrogen will be

Europe's opportunity for deep decarbonisation while boosting European innovation and competitiveness. Therefore we call on the European Commission to double its funding and accelerate Hydrogen development in the EU.

Hydrogen is Europe's best opportunity for deep decarbonisation while boosting European innovation and competitiveness

Hydrogen is a key technology for achieving a truly carbon neutral economy and offers bright perspectives for the European economy generally. The public-private partnership of the Fuel Cell Hydrogen Joint Undertaking ("FCH JU") has done a great job in advancing Fuel Cell and Hydrogen ("FCH") technology development and bringing it to the point where we can now envisage a real scaling up of the technology. Still, the job is far from done and other regions around the world are stepping up their investments and are outspending the EU on FCH technology development. **In order to maintain the EU's competitive position in this field, the European Hydrogen Valley Partnership calls upon the Commission to endow the successor of the FCH JU, the European Partnership for Clean Hydrogen, with at least a doubling of its current funding.**

Europe is set to embark on the world's most ambitious decarbonisation programme. As we have received the specific elements of Commission President von der Leyen's European Green Deal, we know the headline targets should feature at least a 50% greenhouse gas reduction target by 2030 and a pledge for Europe to become the first climate neutral economy by 2050. To achieve these objectives, the EU will need focused action across all its decarbonisation pathways: renewables, energy efficiency, electrification and carbon trading / pricing. We believe hydrogen will be an additional decarbonisation pathway to complement existing pathways to both accelerate the energy transition and enable the EU to meet its objectives as the world's climate action leader.

The European Commission has recently recognised the potential role that FCH technologies have to play to kick-start Europe's energy transition[1]. The future revisions of both the gas package and the TEN-E Regulation are meant to integrate hydrogen, and more specifically green hydrogen, into their core programmes. It is therefore essential that this regulatory ambition is matched at the same pace with sufficient investment in hydrogen to scale production and infrastructure and ensure its widespread availability so the EU can speed up clean energy production and modernise energy demand.

FCH technologies provide a safe and competitive zero-emission solution for a large number of applications in energy-intensive industries, industrial and domestic heating and cooling, and transport – all areas where current decarbonisation efforts have difficulty reaching the reduction targets. No other technology has the possibility or opportunity to support European efforts for a rapid, deep decarbonisation across so many different areas.

Additionally, hydrogen's promise is not only limited to a decarbonisation pathway but it could also become a strategic, transformative industrial sector for Europe boosting innovation, jobs and European competitiveness globally. The Strategic Forum for Important Projects of Common European Interest ("Strategic Forum")[2], a group of experts mandated by the Commission to facilitate agreements between public authorities and key stakeholders from Member States to take forward Important Projects of Common European Interest (IPCEIs), has recently identified and recommended hydrogen technologies and systems as one of its six strategic and future-oriented industrial sectors for joint EU-Member State

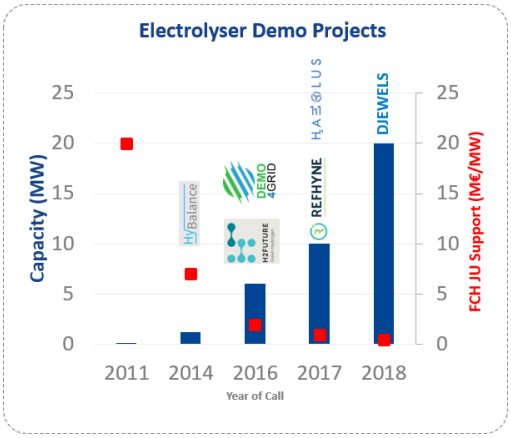
[1] European Parliament's Committee for Industry, Research and Energy - Exchange of views with Ms Kadri Simson, Commissioner for Energy, on the delegated act setting the Union list of Projects of Common Interest (PCIs) - https://www.europarl.europa.eu/ep-live/en/committees/video?event=20191205-0900-COMMITTEE-ITRE

[2] Commission Decision of January 2018 (2018/C 39/03).

coordination and investment in its value chains.[3] Hydrogen should thus become a focus for innovation and competitiveness in the new Commission's Industrial policy.

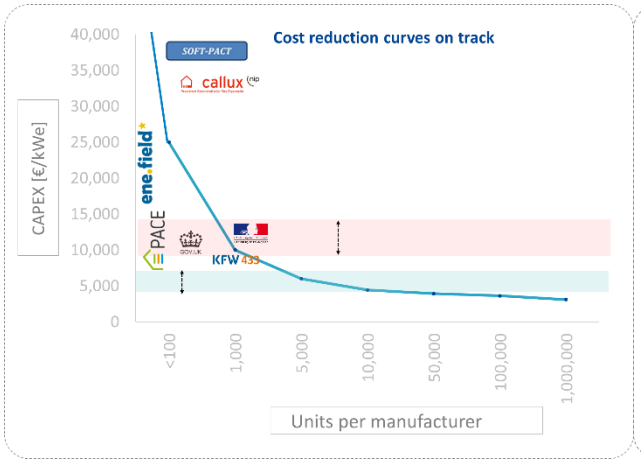
I. FCH Technologies are advancing rapidly to demonstration and maturation

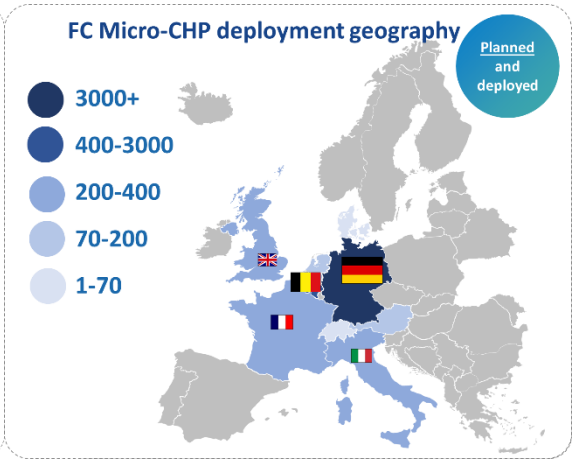
FCH technologies are developing at varying paces across the value chain from production to transmission, storage and use, and the deployment of hydrogen in some applications is already substantial. Certain sectors and applications, such as transport where the focus is on buses and light-duty vehicles, have achieved a technological maturity sufficient for scaling where deployment is now possible. Certain uses of hydrogen in industrial feedstock, such as in the petro-chemical and chemical industries, are also well advanced and being increasingly deployed in commercial applications. Other applications such as heating homes and powering long-haul transport (including trains, heavy-duty vehicles, maritime and aviation) remain at different technology readiness levels but are advancing rapidly.



While all these applications move toward commercialisation, upscaling hydrogen production and infrastructure (transmission and storage) is needed to bring down the costs for market uptake and make hydrogen competitive with fossil fuels.

We have already seen that the cost per MW of installed electrolyser capacity has been steadily decreasing over time and while the cumulative installed electrolyser capacity of the demonstration projects has been increasing (see picture at the left). Likewise, for micro combined heat and power fuel cell systems (FCmCHP) the cost has been steadily dropping whilst the number of deployed units is increasing (see pictures below). Similar economies of scale are being achieved in all relevant applications where the market is growing rapidly, such as with buses and other transport segments. Increased funding will accelerate these gains toward maturation and lead to improved competitiveness against incumbent technologies in the market.





II. The European Partnership for Clean Hydrogen is a proven platform to support hydrogen's decarbonisation pathway

Commercialisation of FCH technologies can only be accomplished by government and industry acting jointly in concerted action. Europe has made important investments in FCH technologies and has

[3] Strengthening the strategic value chains for a future-ready EU Industry, Report of the Strategic Forum, European Commission - DG Internal Market, Industry, Entrepreneurship, SMEs, Directorate F, Unit 1, 5 November 2019. On Hydrogen, the Report states " Hydrogen will support improved competition and innovation in industries, contribute to reaching climate and energy objectives and provide high skilled jobs for Europeans, while also strengthening autonomy in energy and materials." Ibid at p. 64.

recognised the need to focus and leverage its investment through the FCH JU, which has been supported with up to €1.3 billion from Horizon 2020, including an EU contribution of €650 million for the period 2014-2020.[4] The FCH JU – soon to be renamed European Partnership for Clean Hydrogen ("EPCH")[5] - brings together all relevant stakeholders in the FCH value chain. It supports research, promotes innovation, and demonstrates emerging technologies to help achieve scale which can bring the costs of hydrogen technologies down for mass market penetration. Since 2008, the FCH JU has funded over 246 hydrogen research and demonstration projects supporting more than 1000 beneficiaries with in excess of €1.8 billion in total investment. It is a proven platform to coordinate and mange funding and assist companies with European FCH projects, and is recognised internationally for its work, namely while acting on behalf of the European Commission under the Mission Innovation's Hydrogen Innovation Challenge 8 (Renewable and Clean Hydrogen), launching a Platform for exchanges between Worldwide initiatives on Hydrogen Valleys.[6]

Understanding the need to support and strengthen the hydrogen value chains and integrate the different sectors and applications, the FCH JU has promoted the construction of a new eco-system – the Hydrogen Valley -- by organising a major €20 million call for a single project in 2019. This project required the successful applicant to contribute co-financing of a minimum of €60 million with a view to bringing together the largest possible hydrogen value chain to demonstrate the technological readiness of many applications and achieve a scale for competitive market pricing. The winning bid grouped some 33 different hydrogen projects with a co-financing commitment of €70 million, making a total of €90 million for the single project. While it is too early to draw any conclusions about the winning project, the process itself was a substantial success attracting 6 proposals each involving multiple hydrogen projects with a combined €435 million in total potential investment.

III. Regional partners are set to lead a successful hydrogen strategy

Regional authorities have an important role in developing Hydrogen Valleys by offering a direct link between developed innovative solutions and end-users. By supporting demonstration projects locally across all the stakeholders of the value chain, Regional Authority involvement also fosters synergies between the different funding streams and speeds up the demonstration and efficient deployment of innovative solutions across the EU. For that reason, regions should be fully involved in the strategic organization of the new EPCH, and in its calls for proposals.

Building on the FCH JU's Regions and Cities Initiative[7] and the concept of a Hydrogen Valley, the European Hydrogen Valleys Partnership was created as a Smart Specialisation Strategy (S3) Platform for Industrial Modernisation[8] to share information, promote investment and develop regional policy planning around hydrogen. All 31 member regions will include hydrogen in their Regional Innovation Strategies thereby providing to the EPCH a critical mass for new call applications with different hydrogen projects involving more than €1.8 billion in investment planned to be initiated in the next five years.[9] There are many more projects amongst the Hydrogen Valleys Partnerships already with private finance commitments that could be unlocked in the short term with additional EU and public funding.

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[4] Fuel Cells and Hydrogen 2: factsheet, http://ec.europa.eu/research/press/jti/factsheet_fch2-web.pdf

[5] Under the next Multi-Annual Financial Framework covering the period 2021-2027, the Commission has proposed to renew and reconstitute the FCH JU as the European Partnership for Clean Hydrogen. Budget allocation is still under discussion.

[6] In May 2018 (Malmö, Sweden) a new Hydrogen Innovation Challenge (IC8: Renewable and Clean Hydrogen - http://mission-innovation.net/our-work/innovation-challenges/hydrogen-challenge/) was launched under Mission Innovation (MI) to accelerate the development of a global hydrogen market by identifying and overcoming key technology barriers to production, distribution, storage, and use of hydrogen at gigawatt scale. MI is a global initiative of 23 countries and the EC (on behalf of the EU) working to reinvigorate and accelerate global clean energy innovation with the objective to make clean energy widely affordable. Considering the resource constraints of MI Members, and the limitations imposed by the timeline of Mission Innovation, during the March 2019 MI workshop focused on the concept of "Hydrogen Valleys" as a pathway for demonstrating the significance of hydrogen in the energy transition (https://www.fch.europa.eu/page/mission-innovation-antwerp-2019) it was deemed crucial to identify actions that will generate maximum impact in the short term. In this context, the EC (through its public-private partnership, FCH JU) is setting-up a global Information Sharing Platform within MI-IC8, to facilitate the emergence and implementation of large-scale hydrogen projects (H2 Valleys) and leveraging the knowledge where IPR issues are less sensitive.

[7] https://www.fch.europa.eu/page/about-initiative

[8] https://s3platform.jrc.ec.europa.eu/hydrogen-valleys

[9] More information on this initiative and the study's final report available at https://www.fch.europa.eu/publications/fuel-cells-and-hydrogen-green-energy-european-cities-and-regions.

IV. Investment in hydrogen can play an important role in a Just Transition

Europe's climate ambitions and its unity are often challenged by the enormities of the energy transitions required in some EU Member States. The EU is rightly considering different financing and other options the ensure that the European Union can move forward together on decarbonisation. Through the different FCH JU calls it has become apparent that there are many opportunities for hydrogen projects in central and eastern Europe but the bids frequently come in second to winning bids from Western European or Nordic countries with better co-finance or advanced infrastructure under existing project criteria. Many of these bids have been in the area of transport and port infrastructure, where FCH technologies are mature and private co-finance is available. These projects could succeed with many benefits to energy systems and citizens' welfare if additional EU funds were available. Enabling these regions to benefit from hydrogen's decarbonisation potential should be a priority for the new Commission in meeting the EU's climate and energy targets.

The recently proposed €100bn Just Transition Fund should make use of the EPCH as the vessel to channel more money to less decarbonised regions and contribute to both energy transition and low-carbon goals. Moreover, in light of the on-going negotiations on the Multi-Annual Financial Framework (MFF), the Commission should also provide synergies through Horizon Europe, European Structural and Investment Funds, Connecting Europe Facility and other EU funding and financing instruments, which could play a pivotal role in speeding the deployment of green hydrogen solutions and thus contribute to the decarbonisation of Regions, Cities and Islands across the EU and Associated Countries. These projects could set the backbone of the EU infrastructure for an inclusive EU, enabling the usage of green indigenous sources of energy converted into green hydrogen and made available wherever needed supporting a just transition.

V. The EU is well positioned to reap the benefits of technological leadership on Hydrogen

A recent FCH JU study concluded that hydrogen can contribute up to 24% of Europe's energy needs, reduce CO2 emissions by 650 million metric tons, create 5.4 million jobs and generate €820 billion annually in Europe by 2050.[10] These numbers clearly reflect the significant contribution hydrogen could make to decarbonise and boost our economy, but also signal an opportunity for the EU to become the technological global leader on hydrogen.

The EU was early to support hydrogen and has been rewarded by being the home of new cutting-edge technologies. The EU, for example, has become the world leader in innovative electrolysers, which use electricity to split water. Such electrolysers are needed to produce the green hydrogen necessary to bring costs down for mass market uptake and support the EU's renewable-energy ambitions. Europe has already seen marked increases in capacity for electrolysers in recent years (up to 10MW), and in July 2019 construction began in Germany on a single 10MW electrolyser.[11] Moreover, due to the success of FCH JU calls, upcoming innovations in FCH technologies are expected to be even larger and this will be reflected in the calls for proposals of the new partnership.

With commitments from local authorities and major companies, with production ramping and with the European Hydrogen Valleys Partnership playing a strong supporting role in integrating sectors and uses, Europe is well positioned to become the world's FCH technology leader. This is not a foregone conclusion, however, as the rest of the world is not standing by idly. Public investments in Asia, Australia and the US are increasingly rapidly. On a Euro per capita basis, China, Japan and the US are currently outspending the EU (and its Member States) by up to 3 to 1. [12] Europe needs to increase its investment in hydrogen to maintain its leadership role globally.

[10] Fuel Cells and Hydrogen Joint Undertaking, Hydrogen Roadmap Europe: A sustainable pathway for the European Energy Transition, https://www.fch.europa.eu/sites/default/files/Hydrogen%20Roadmap%20Europe_Report.pdf

[11] https://refhyne.eu/weltgrosste-wasserstoff-elektrolyse-entsteht-in-der-rheinland-raffinerie/

Therefore, supported by the aforementioned reasons, the European Hydrogen Valleys Partnership **respectfully requests the Commission to double the Horizon Europe contribution to the European Partnership for Clean Hydrogen (from €650 million to €1.3 billion for the 2021 – 2027 period).** We recommend this in order to **accelerate the development and deployment timelines for hydrogen solutions**.

In particular, additional funding can be used to:

- **Scale-up large green hydrogen production and import-and export facilities, aimed at making green hydrogen become the alternative to replace fossil energy vectors and fuels;**
- **Increase innovation into critical decarbonisation areas such as heavy duty-vehicles, shipping and port infrastructure, as well as in steel, cement, refinery industries, chemical industry;**
- **Successfully implement the Just Transition Fund in order to realise hydrogen projects in Central and Eastern Europe;**
- **Retrofit the existing gas grid (or build a dedicated new one) to enable direct injection of hydrogen large scale-storage;**
- **Become the backbone of the hydrogen transport infrastructure, including a hydrogen refuelling station network for road transportation, a similar network for ports;**
- **Continue support of the hydrogen smart specialization platform-based where regions are working together on hydrogen and smart specialization, strengthening the involvement of regions and cities;**
- **Create societal impact for the development of an EU-wide hydrogen economy by including and activating SMEs and other economic actors;**
- **Raise awareness and stimulate knowledge development and sharing on FCH technologies.**

The International Energy Agency has recently stated about hydrogen: "hydrogen is today enjoying unprecedented momentum. The world should not miss this unique chance to make hydrogen an important part of our clean and secure energy future."[13] We agree. Accordingly, we urge the Commission to act now on hydrogen and secure for Europe the world's technological leadership on this important fuel and decarbonisation pathway.

[13] IEA (2019), "The Future of Hydrogen", IEA, Paris https://www.iea.org/reports/the-future-of-hydrogen

The European Hydrogen Valleys Partnership is a new thematic interregional partnership on Fuel Cells and Hydrogen within the Industrial Modernisation Smart Specialisation Strategies (S3) Platform. Despite only launched in May 2019, Partnership is already the largest and widest thematic interregional partnership implemented so far. It aims at enhancing the role of green hydrogen in the European energy transition process.

Contact details of the four Regions leading the European Hydrogen Valleys Partnership:

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