

R&I-driven initiative on Green Hydrogen

The challenge

The COVID-19 crisis is the biggest challenge that the European Union has had to face since its foundation. We will only be able to overcome the crisis if we act together with speed, determination and in the spirit of solidarity. This is particularly important for the recovery of Europe's economy.

In order to implement the climate ambitions of the European Green Deal and building on the Commission's New Industrial Strategy for Europe and its Next Generation EU recovery plan, the Commission presented the Communication on "A hydrogen strategy for a climate-neutral Europe" on 8 July 2020. This highlights the Commission's vision of how the EU can turn clean hydrogen into a viable solution for decarbonising different sectors over time. It identifies the challenges that must be overcome, lays out the levers that the EU can mobilise and it submits a roadmap of actions up to 2050.

Europe is about to take a landmark decision. We must direct the forthcoming public recovery investments at national and EU level towards modernising the EU and increasing its competitiveness so that we can lead the way in the transition to the post-fossil age with a sustainable industrial sector. The transition of the energy sector is of particular relevance in this context, not only in view of current climate targets but also concerning Europe's sovereignty.

Green hydrogen plays a crucial role for two reasons:

- Firstly, due to its sustainable production using renewable electricity, (green) hydrogen from electrolysis is a key factor in establishing a climate-friendly European and global energy system that will replace coal, oil and gas. Solutions for the generation, transport and further use of green hydrogen are therefore of considerable strategic importance for the whole of the European industry.
- Secondly, consistent European cooperation on the strategic and critical energy infrastructure for green hydrogen is urgently needed in order to strengthen cohesion and the integration of member states in the post-coronavirus era. We must now take the next step from being a Union based on coal and steel towards becoming a European Hydrogen Community.

A proposal for a European approach

In order to present ground breaking solutions quickly and to obtain global leadership, we need better coordination along the entire hydrogen value chain, from supply to end-use, as well as stronger networks among stakeholders from science, industry, civil society and politics within a more systematic and coherent approach. Only an R&I-driven European initiative will be able to speed up the industrial and economic transitions to the requisite pace. In the spirit of a “whole of government” approach, the initiative should be closely coordinated with other policy areas, especially energy, for example by employing instruments of science-driven policy advising. The initiative on green hydrogen could serve as a pilot for the newly activated ERA by setting up smart cooperation structures that allow for co-creation, inclusiveness and directionality. We want to use our Presidency to launch joint actions in this vital field in cooperation with all member states¹, the European Commission and Parliament.

As well as the member states, the EU has supported research and innovation on hydrogen for many years, through collaborative projects and with the Fuel Cell and Hydrogen Joint Undertaking (FCH JU). Alongside the development of high-profile

¹ This includes all EFTA countries who are invited to participate in the initiative.

projects in promising applications, these efforts have enabled several technologies to come close to maturity and to achieve EU global leadership for future technologies.

The Commission's strategic roadmap is of particular importance with regard to the EU level. This document provides a proposal on the policy framework within which the Clean Hydrogen Alliance, a collaboration between public authorities, industry, research and innovation organisations and civil society, will develop an investment agenda and a series of specific projects. An institutionalised Clean Hydrogen Partnership was proposed as part of the EU's Research and Innovation Framework Programme Horizon Europe. This would primarily focus on renewable hydrogen production, transmission, distribution and storage in addition to selected fuel cell end-use technologies. While the Clean Hydrogen Partnership will support research, development and demonstration of technologies to bring them to market readiness at a competitive cost, the Clean Hydrogen Alliance will pool resources to bring scale and impact to industrialisation efforts, in order to achieve further cost reductions and ensure competitiveness.

Close cooperation with European partners and with partners outside Europe (especially Africa) is essential to ensure that the potential of this technology can be fully exploited and swift progress can be made. In terms of R&I, central aspects of this work are as follows:

- 1. Achieve global leadership in hydrogen research.** Research and development are key to creating a European hydrogen economy. We must pool the knowledge and link the infrastructures of universities, research institutions and companies from industrial enterprises to SMEs throughout the member states. As industrial-scale applications are yet not available and need to be developed in a timely manner, production, transport and distribution are of interest to all of Europe.
- 2. Establish a European hydrogen industry.** A strong domestic market is key. If the EU is to become a leader of innovative hydrogen technology, science and industry must carry out the industry-led demonstration and implementation of key technologies such as water electrolysis from lab to large-scale

application by 2030 in order to succeed in the already strong global competition for the leadership in hydrogen technologies. Different regions have different capabilities in terms of production capacities (wind, sunshine), expertise and areas for usage. The aim is to build an R&I-based European approach for Europe's pioneering green hydrogen activities.

- 3. Create a legal framework that is conducive to innovation:** Innovations depend on a suitable regulatory framework. A major precondition for the industrial-scale use of green hydrogen technologies is their capacity to achieve greater cost-effectiveness than fossil-based options in the medium term. European legislation can play an important role in facilitating the use of green hydrogen. Comprehensive and independent scientific policy advice can play an important role in this context and indicate regulatory obstacles and solutions at national and European level, for example regarding the organisation of global (green) hydrogen markets or legal and taxation boundaries, as well as highlight aspects of societal acceptance in different varieties.
- 4. Build reliable and secure hydrogen value chains:** The COVID-19 crisis has shown that Europe must pay greater attention not only to the efficiency of supplies but also to reliability and resilience. This applies in particular to goods and infrastructures that are of critical relevance to society such as the energy sector. As regards green hydrogen, we must develop and provide the required key-technologies and resources within Europe, while keeping in mind the objective to increase the EU's autonomy in critical steps of value chains. On the other hand, Europe will most likely have to rely on energy imports from outside in future. The import of green hydrogen from third countries might therefore be of key importance. With regard to the global competition for a secure energy supply the establishment of a fruitful cooperation with many and diverse partners at an early stage is of possible geostrategic importance to the EU. Therefore, the opportunities of a potential European hydrogen partnership with Africa should in particular already be evaluated during the mapping exercise (see below). Investments in European technologies for renewable energy in Africa and the export of

surplus energy in the form of green hydrogen can lead to a win-win situation for all parties involved.

Steps towards the goal

We propose an R&I-driven process consisting of **three phases**:

1. Mapping the potential of green hydrogen for Europe (2020–2021)

A short-term, comprehensive analysis of the economic, ecological, social and political conditions for the development of green hydrogen could include the following aspects:

- Potential for the generation of green hydrogen
- Available infrastructure for the transport and import of green hydrogen
- Key technologies for implementation and application and their level of maturity (technology screening)
- Collection of current schemes, initiatives, measures and financing instruments concerning green hydrogen in the member states and at EU level (e.g. Horizon Europe and the Clean Hydrogen Partnership in particular, the proposed IPCEI, Emissions Trading System Innovation Fund etc.) aiming at coherence and complementarity

Mapping the potential of hydrogen for Europe could start soon under a collaborative project carried out jointly by research institutions as well as civil society and industry stakeholders from interested member states.

2. Initiating a transnational agenda process leading to an innovation roadmap for green hydrogen (2021–2022)

A roadmap is to be developed through an agenda process whereby stakeholders from science, industry (including SME), civil society and politics from participating member states as well as the Commission work together

in a bottom-up process to identify priority research fields of action for establishing a European hydrogen economy.

Goal of the agenda process is the joint development of a green hydrogen innovation roadmap, which will lay out priority areas for action. In doing so the roadmap will – wherever possible – draw upon and integrate existing initiatives, measures in the Member States and at EU level in order to develop a coherent and systemic European R&I-approach. The roadmap should not only address technological issues but – in the in the sense of a broad understanding of innovation – also take legal, economic or social questions into consideration in order to identify the necessary investment and financing frameworks for hydrogen infrastructure in Europe.

3. Defining multilateral pilot projects

The green hydrogen innovation roadmap (2021–2022) would build the basis for drafting regional plans for piloting multilateral implementation projects of different sizes and along the entire value chain. These projects should include all types of research and innovation actors, for instance research organisations, universities, industrial partners and particularly smaller and medium-sized enterprises.

Swift implementation is a priority in the face of international competition and with a view to planning economic stimulus measures. Therefore, a European innovation roadmap on green hydrogen could act as a driving force for the multilateral development of suitable regional projects. E. g. concepts for the production of green hydrogen on an industrial scale in windy or sunny areas, transport to and usage of significant amounts of green hydrogen in the chemical industry, studies on the environmental effects of transport, and research on other aspects that could stimulate market uptake.

The Informal Council Meeting of Research Ministers on 21 July will provide an opportunity to discuss the critical steps for building an R&I-driven initiative on

green hydrogen. During the Informal Council it is envisaged to seek views which member states and EFTA countries would like to participate in this initiative and to develop a joint approach. Following the logic of variable geometry, the initiative is open for all other member states to join at a later stage.

We would like to seek an agreement on the following points by autumn 2020

1. Consensus to go ahead with an R&I-driven initiative on green hydrogen
2. Development of the overall policy approach
3. Identification and prioritisation of the next steps for developing this initiative

Slido questions

During the Informal Council Meeting, Slido questions will be presented in order to gather information from all participating countries. Slido questions will be sent out in good time before the meeting.