Hydrogen Europe Research

HYDROGEN EUROPE RESEARCH IS COMMITTED TO REPOWER THE EU

The war of aggression that Russia is waging against Ukraine and its consequences on the energy market are yet another push to diversify and decarbonise the EU's energy mix and economy. With the REPowerEU Plan, the European Commission clearly stated its ambition to become independent from Russian fossil fuels by ramping up the production of green energy, by diversifying supplies of energy and by reducing the energy demand.

In this context, the relevance of hydrogen and its derivatives is once more highlighted to achieve the decarbonisation and the diversification of the energy mix, as well as to improve European industries competitiveness whilst meeting the European climate objectives. This plan is welcomed by the European community of researchers in the field of hydrogen.

1 The enhanced ambitions for the hydrogen market will be a challenging opportunity for the entire sector.

The increased ambition to produce renewable and low-carbon hydrogen is clearly stated as part of the Hydrogen Accelerator of REPowerEU. By 2030, 10 million tonnes of hydrogen produced in Europe and 10 million tonnes imported to the EU, among which 4 million tonnes in the form of ammonia or other hydrogen carriers, should be available for consumption in end-uses. This is a considerable increase in comparison to the 5,6 million tonnes initially foreseen in the Green Deal.

These targets will be a great challenge for industries as well as for researchers working on improving today's technologies, accelerating their deployment to the market and developing the next generations of technologies.

2 Different types of hydrogen are needed to meet the increased production targets.

When it comes to hydrogen production in Europe, the focus should clearly be on renewable hydrogen. This will be achieved by developing additional capacities for renewable electricity in the EU, which should be enabled, among others, by faster permitting of renewable energy projects. However, as stated in the Plan, Hydrogen Europe Research acknowledges that other forms of hydrogen will play a role in the transition period.

To this end, the definition of low-carbon hydrogen should quickly be adopted and the related methodology to calculate the GHG emissions should be set as soon as possible to provide clarity to stakeholders from the sector.

Furthermore, other production pathways than electrolysis will contribute to decarbonising and diversifying the EU energy mix. Among them, the gasification of wastes could contribute to hydrogen production in Hydrogen Valleys, with a considerable impact at distributed level. Other novel methods and technologies could also play a role in the mid to long term to produce hydrogen, such as pyrolysis processes or thermochemical routes.

3 Measures to stimulate hydrogen demand should be further explored.

The Plan clearly puts an emphasis on the supply of hydrogen, however other aspects of the value chain should not be neglected. Measures to stimulate hydrogen demand must come hand in hand with the increased production of hydrogen, in order to ensure prospects.

The proposed increased targets for using Renewable Fuels of non-Biological Origin (RFNBOs) in the transport sector and in industries are a good step in this direction and Hydrogen Europe Research strongly encourages the European Parliament and the Council to take them into consideration.

4 The assumption that 20 litres of water is needed to produce one kilogram of hydrogen is wrong.

In order to plan the rollout of hydrogen production capacity, the question of water must be taken into account. This aspect is mentioned in the Commission Staff Working Document accompanying the publication of REPowerEU. A footnote indicates that 20 litres of water are needed to produce 1 kilogram of hydrogen. This data should be reviewed and put into perspective.

A distinction must be drawn between the water consumed and the water processed. To produce one litre of hydrogen, up to 20 litres of water can be processed depending on the pre-treatment stages and the cooling processes, but only 9 litres of water are consumed. This is the stoichiometric value: to produce 1 kilogram of hydrogen, 9 litres of pure water is needed [1].

[1] https://www.researchgate.net/publication/283014981_Development_of_a_Life_Cycle_Inventory_of_Water_Consumption_Associated_with_the_Production_of_Transportation_Fuels

Then, it should be noted that the energy cycle of hydrogen is from water to water, which means that there is a global balance in hydrogen production. When hydrogen is produced and used in one place, there is a local water balance and circularity is ensured.

Finally, this data should be put in perspective with the production of other fuels that consume far more water than required for hydrogen production, for example for the production of biofuels.

5 Recycling will be the next priority to ensure a sustainable and resilient hydrogen sector.

The fast-paced development of hydrogen technologies must be accompanied with a clear strategy for the end of life of the technologies on the market. Different recycling and reuse schemes will have to be developed. Recycling all kind of fuel cells and stacks for electrolysers will allow to recover critical raw materials in the cell chemistry, for example from the catalysers, but also from other components. Then, recycling reinforced composite materials should be foreseen (e.g. components of high-pressure vessels, composite pipelines for the transport of hydrogen, etc.). However, in some applications, the composite materials are built in together which makes recycling challenging. Developing recycling paths will be relevant to develop the strategic autonomy of the sector and ensure its circularity.

6 Funding for research and development should be increased.

Today's biggest challenges are linked to the industrialisation and scaling up of the hydrogen value chain. Various funding schemes are available to overcome these challenges. The IPCEI, but also the Innovation Fund and other mechanisms will provide clear support and complement industrial investments. Furthermore, the additional 200 million Euros granted to the Clean Hydrogen Partnership to double the number of Hydrogen Valleys will be a push to widespread hydrogen hubs across Europe.

Additional to this support, investments in fundamental and applied research must remain a continued aspect of public policies. Well-designed European and national funding and support programmes covering the entire TRL chain are necessary to prepare the next generation of systems and technologies in the mid to long term, as well as to continuously reduce the cost of the technologies, and improve industry competitiveness.

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7 Alignment between European, national and regional levels must be ensured.

To make this plan a reality and to develop a strong and viable ecosystem over time, funding instruments available at European level must have a coordinated approach to cover all the priorities identified for the hydrogen sector. For example with the IPCEI, Horizon Europe funding, the ETS Innovation Fund, the Connecting Europe Facility, and the Clean Hydrogen Partnership, synergies between national and European levels must be ensured. Hydrogen Europe Research's members stand ready to work on the alignment of European, national and regional research priorities on hydrogen, based on their own work within the Clean Hydrogen Partnership, the ERA Green Hydrogen pilot and their own activities at national and regional levels.

The European research community on fuel cells and hydrogen, represented by Hydrogen Europe Research's 111 members, stands ready to support the deployment and scale up of the hydrogen value chain. The close interaction between industrial stakeholders, innovation and well-designed framework conditions from political players are needed to prevent carbon leakage and to maintain a European leadership in the hydrogen sector. Many challenges remain to be overcome with the industrialisation of the sector and industry must be supported by technology and applied research during this phase.

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