Hydrogen Europe Research

HYDROGEN EUROPE RESEARCH FEEDBACK
NET-ZERO INDUSTRY ACT

The Net-Zero Industry Act (NZIA) has set important targets to ensure that the fuel cells and hydrogen sector will be developed for the benefit of the European economy. In a context of exacerbated world competition, ensuring that the manufacturing capacity of strategic net-zero technologies reaches at least 40% of the Union's annual deployment needs by 2030 is a clear commitment for a European strategic independence. For this, public procurements will be instrumental in promoting European technologies respecting certain sustainability and resilience criteria. **Hydrogen Europe Research fully supports the objectives of the Net Zero Industry Act.**

In the context of this proposal, Hydrogen Europe Research recommends that additional aspects should be pursued to ensure a comprehensive approach for the hydrogen ecosystem:

CONTINUING SUPPORT TO RESEARCH FOR A RESILIENT EUROPEAN HYDROGEN MARKET.

Currently, Europe benefits from a partial lead on some critical technologies in the field of hydrogen. As indicated in the Commission Staff Working Document **[1]** accompanying the publication of NZIA, Europe has "a clear lead in terms of Solid Oxide electrolysis and also hosts a very large number of companies producing electrolyser stacks or systems across every technological platform".

The dynamism of the European research and innovation sector is driving this leadership. **To continue securing leading positions for Europe, research and innovation is the flip side of a well-defined industrial development and market deployment strategy.** The availability of funding and a European coordination of R&I activities will benefit the industry as a whole in the mid to long term. Researchers are already developing the next generation of technologies and products. The hydrogen and fuel cells sector remains research intensive, and technologies will evolve in the coming decades to overcome current challenges linked to performances, sustainability, manufacturability and scalability. Multiple technologies would benefit from further funding for research in order to confirm Europe's lead in the hydrogen sector – for example Anion Exchange Membrane water electrolysers (AEMEL) and Proton-Conducting Ceramic electrolysers (PCCEL).

[1] COMMISSION STAFF WORKING DOCUMENT SWD(2023) 68 FINAL – INVESTMENT NEEDS ASSESSMENT AND FUNDING AVAILABILITIES TO STRENGTHEN EU'S NET-ZERO TECHNOLOGY MANUFACTURING CAPACITY, 23 MARCH 2023

IHorizon Europe and the Clean Hydrogen Partnership are instrumental frameworks in funding the whole hydrogen value chain, from low TRL research up to prototypes and ready-to-market innovations. Those instruments facilitate the development and consolidation of a fruitful European ecosystem between public and private entities, thereby securing the European industry's competitiveness.

Moreover, the coordination of national research activities will help **exploit synergies and ensure consistency across the European Research Area.** The launch of an **Implementation Working Group on hydrogen as part of the SET Plan** is a good concretisation of this ambition and a needed complement to the industrial policy.

Finally, essential tools to accompany the transfer of technology from research to the market are **technology infrastructures which should be supported in the remit of the Net Zero Industry Act.** Such facilities enable industrial innovation by allowing industry stakeholders to test and validate prototypes as well as optimise pilot production lines. This approach is already implemented in the EU Chips Act and would benefit from being extended to other strategic industrial sectors such as hydrogen. In order to fully enable the development of net zero technologies, Hydrogen Europe Research calls on mapping existing technology infrastructures for the hydrogen value chain. A preliminary work is currently ongoing based on Hydrogen Europe Research's members inputs. With a precise mapping, investment needs for the renovation of existing infrastructures or means to complement the current landscape should be identified. A dedicated programme to invest and grant access to these infrastructures, on a European level, would then need to be implemented to strengthen the industrial development of the hydrogen ecosystem.

WIDENING THE SCOPE OF NET ZERO TECHNOLOGIES IS NEEDED TO COVER THE ENTIRE HYDROGEN VALUE CHAIN

The inclusion of electrolysers and fuel cells in the list of strategic net zero technologies (Annex I) is a clear signal to foster the development of the sector. Furthermore, net-zero technologies entice other aspects of the hydrogen value chain, provided that the technologies have reached a technological readiness level (TRL) of 8 (article 3): renewable fuels of non-biological origin technologies; sustainable alternative fuels technologies; or storage technologies. However, not all technologies are covered.

Technologies satisfying these criteria but that would not meet a TRL of 8 would fall into the category of "innovative net zero technologies". They could benefit from regulatory sandboxes to promote their development (article 26).

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Hydrogen Europe Research argues that the **technologies encompassed in the Net Zero Industry Act should provide support to the entire hydrogen value chain** in order to develop a resilient hydrogen ecosystem.

Indeed, certain aspects are not taken into account in the Net Zero technologies. **Hydrogen Europe Research advocates to expand the list of Net Zero technologies** to include the following:

- Hydrogen production – the list of hydrogen production pathways should be expanded to cover pyrolysis and waste to hydrogen.
- Hydrogen storage – this could be covered under the storage technologies already mentioned;
- Hydrogen transportation via existing or new grid infrastructures – such technologies will cover aspects linked to energy system integration; therefore, it makes sense not only to focus on electricity grid but on gas grid and sector coupling as well;
- Hydrogen compressors;
- Hydrogen for power generation (e.g.: turbines, stationary fuel cells);
- Hydrogen derivatives (for hydrogen transport as well as for direct use), Hydrogen industrial furnaces and heating boilers – these might be covered under the technologies for renewable fuels of non-biological origin (RFNBO) already mentioned in net-zero technologies.

Among these technologies, the ones listed below should be included in the list of **Strategic Net Zero technologies:**

- Hydrogen storage and transportation – this category should encompass fixed or mobile storage tanks, hydrogen grids/pipelines and compressors.
- Carbon capture utilisation storage – carbon utilisation technologies should be added to the CCS technologies currently mentioned.

Furthermore, the notion of "advanced materials" should be included in the scope of the NZIA, as they will be crucial in the scaling up of hydrogen technologies manufacturing and will play a key role in the next generation of products. Within the hydrogen sector, advanced materials could cover ionomers, materials for electrocatalysts, alternative and novel membranes, alternative bipolar plates and porous transport layers, diffusion layers, materials for hydrogen storage and pipelines, electrolytes, etc.

The list of net zero technologies covered in the NZIA should be regularly reviewed to include novel results from research and innovation and account for technology development.

ENSURING CONSISTENCY BETWEEN EUROPEAN POLICIES IN ORDER TO BOOST HYDROGEN DEPLOYMENT AND THE DECARBONISATION OF THE EUROPEAN ECONOMY.

Whereas the NZIA sets clear ambitions for the deployment of electrolysers and fuel cells, other legislations may jeopardise the development of the sector. In this regard, the **restriction proposal forper- and polyfluoroalkyl substances (PFAS)** submitted to the European Chemicals Agency (ECHA) by five Member States **would, if implemented, become a showstopper for a major segment of the hydrogen sector**. Currently, PFAS are mainly used in Proton Exchange Membrane (PEM) technologies for both fuel cells and electrolysers. PEM is one of the dominating technologies on the market. Research activities are ongoing to find substitutes to PFAS, but currently, no alternatives achieve the same KPIs and TRLs. Without PFAS, deployment of PEM technologies will be severely hampered, thus jeopardising the Green Deal objectives. Evidence of the situation will be provided as part of the ECHA consultation process.

To be consistent with the ambitious European objectives set up in the NZIA, the EU must give itself the means to achieve these targets. This implies having a realistic approach to chemicals substitution in order to maintain the development of an industry-in-the-making facing fierce international competition. Announcements of the potential banning of all PFAS can contribute to creating uncertainty and fear for market actors as the latter are currently facing investment decisions. This situation may, in the worst-case scenario, discontinue planned projects and the further development of hydrogen technologies. Such a scenario should be avoided at this pivotal moment. In parallel, funding in **research activities shall be increased to ensure that PFAS can be phased out and/or reduced from the current membrane chemistry of fuel cells and electrolysers in the medium-term**.

ENGAGING WITH SECTORAL EXPERTS, AND LOCAL PARTNERS TO DEVELOP NET-ZERO ACADEMIES

Skills are a prerequisite to concretise European ambitions to deploy hydrogen technologies and valleys. Finding qualified workers is a challenge for the hydrogen sector just as in other net-zero industries. This can be overcome by setting up the proposed Net-Zero academies. They should:

- Ensure that accredited learning programmes and materials are available to train, upskill and reskill students and workers;
- Promote the attractivity and the career opportunities of net zero industries.

To achieve this two-fold objective, **the net zero academies should rely on the expertise of relevant sectoral representations** gathering engineers, technicians, researchers, employers, and teachers actively developing the sector and cutting-edge technologies. In the field of hydrogen and fuel cells, a wide pool of experts is working on these questions in the remit of Hydrogen Europe and Hydrogen Europe Research's Skills Working Group. Their experience in project deployment and industrialisation, as well as their insights on the next generation of technologies, will allow to keep close connections with market reality and foreseen technology developments.

Furthermore, the Skills Academy on hydrogen should build on existing initiatives and projects, among which the Erasmus + project, GreenSkillsforH2, and the upcoming "Hydrogen Academy" project funded by the Clean Hydrogen Partnership. These projects will lay the foundations for academic & vocational education and continuous professional development. The European Hydrogen Observatory training and materials section should also be embedded in the future Academy. Hydrogen Europe Research is open to foster and coordinate these efforts at European level.