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From:	General Secretariat of the Council
To:	Permanent Representatives Committee/Council
Subject:	A hydrogen strategy for a climate-neutral Europe - Exchange of views

Delegations will find in Annex the Presidency Background note on the Evolution of the Hydrogen Strategy in Europe in view of the TTE (Energy) Council on 11 June 2021.



Background note on the Evolution of the Hydrogen Strategy in Europe

The European Green Deal outlines the main policy initiatives for reaching net-zero greenhouse gas emissions by 2050.

Hydrogen is considered therein as a key instrument to guarantee that Europe is “climate neutral”, enabling the sector coupling and integration as well as ensuring a clean, affordable and secure energy supply.

In this path, it is needed a smart infrastructure, where an increased cross-border and regional cooperation will be instrumental to achieve the benefits of the clean energy transition at affordable prices, with an adequate regulatory framework for energy infrastructure, including the TEN-E Regulation already under revision, to ensure consistency with both the climate neutrality and the circularity objectives and foster the deployment of innovative technologies and new and smart infrastructures.

The mobilization of Industry around clean and circular economy, is fundamental in order to develop commercial applications of breakthrough technologies in key industrial sectors, such as clean hydrogen and hydrogen-based clean fuels, fuel cells, energy storage, and carbon capture, storage and utilization, which are priority areas in the energy transition. The design and implementation of a full range of instruments are also available in the Horizon Europe framework program to support the R&I efforts with a particular catalytic effect on societal challenges and holistic missions and involving a wide range of stakeholders.

The EU Strategy for Energy System Integration aims at building an integrated energy system to achieving climate neutrality by linking various energy carriers with each other and with the end-use sectors, impacting in the optimisation of the energy system as a whole, rather than decarbonising and making separate efficiency gains in each sector independently. It is involving various existing and emerging technologies, processes and business models, such as ICT and digitalisation, smart grids and meters and flexibility markets.

The EU Hydrogen Strategy aims to turn hydrogen into a key solution to achieve an integrated energy system fit-for-climate neutrality by enabling the decarbonising of certain hard-to-decarbonise sectors. It outlines a hydrogen roadmap for the EU with clear objectives for - among others, hydrogen production technology upscaling and deployment, improving cost-competitiveness of hydrogen in particular renewable hydrogen produced by electrolysis, will demand a market and infrastructure framework, all embedded in a holistic view of the potentials of stronger synergies between the energy carriers and end-use sectors. It provides a first and crucial step towards setting the regulatory framework for a European hydrogen market, and therein for hydrogen - and green hydrogen produced from renewable energy sources in particular, being assumed as a key priority to achieve the European Green Deal and Europe's clean energy transition.

While holding the Presidency of the Council of the European Union, Portugal is committed to stimulate the opportunities arising from the necessary energy transition, particularly building on the EU Hydrogen Strategy, and the EU High-Level Conference on Hydrogen (April 7th) enabled to discuss the role of hydrogen and to provide insight on how to move from ideas and plans towards the market with real life projects.

It is clear today that different gaps need to be fulfilled at different levels, namely addressing the following issues:

- a) The need for a strategy and legal and regulatory framework being more dynamic and available was stressed to allow the implementation of green hydrogen production, storage, transport, and distribution;
- b) If green hydrogen is to be adopted in order to become mainstream, a governance system and enabling policies are key, so policies should cover its integration into the broader energy system;

- c) Strategies that cover both a national gas grid with high adaptation potential, as well as wide hydrogen applications and downstream conversion to other energy carriers and products, provide more flexibility in ways to achieve decarbonisation.
- d) More hydrogen pathways also help create larger economies of scale and faster deployment, leading to a virtuous circle of increasing both demand and supply. Standardization and Certification/ Verification schemes, , provides a necessary condition for a green hydrogen market to work with transparent practices;
- e) The rollout of an investment agenda is needed, where different tools are involved: Clean Hydrogen Alliance, InvestEU, Important Projects of Common European Interest (IPCEI), State aid, Cohesion policy, and Taxonomy (e.g. Hydrogen CO2 threshold under sustainable finance taxonomy);
- f) Boosting demand: Civil society and industry should be involved to maximise the benefits. The technology options available vary according to National strategies. National contexts, namely as described in National Energy and Climate Plans (NECP), that give greater weight to the social, political and sustainability challenges of carbon capture, use and storage, and bioenergy anticipate limited contributions from those technologies to the energy transition, and thus require greater green hydrogen use;
- g) Production costs will very much depend on local geographical conditions. In addition, the limitations due to the lack of dedicated infrastructure, makes the current revision of the EU Regulation TEN-E and the expected proposal for a set of rules governing network operations and the repurposing of existing assets for hydrogen, a key opportunity to address the necessary upgrade. One key issue is to ensure the annual pace of development of the solar and wind potential will be fast enough to meet the needs for both the electrification of end-uses and the development of a global supply chain in green hydrogen, and the cost that this additional capacity will entail.
- h) R&I addressing the full value chain: A proposal for the Clean Hydrogen Partnership has already been published, a H2020 call addressing the electrolyser was finalized, and a first round is closed regarding the ETS Innovation Fund;
- i) The international dimension: Different international organizations are involved (IEA, IRENA, CEM, G20) as well as cooperation dialogue is under way (e.g. EU-Africa Green Energy Initiative);

- j) Lack of value recognition is still an issue, as there is no green hydrogen market yet; having no green steel, or no green shipping fuel (i.e. basically no valuation of the lower GHG emissions that green hydrogen can deliver); hydrogen is not yet accounted in official energy statistics of total final energy consumption, and there are no internationally recognised ways yet of differentiating green from grey hydrogen. At the same time, the lack of targets or incentives to promote the use of green products inhibits many of the possible downstream uses for green hydrogen. This limits the demand for green hydrogen;
- k) There is a need to ensure Sustainability conditions: Electricity can be supplied from a renewable energy plant directly connected to the electrolyser, from the grid, or from a mix of the two. Using only electricity from a renewable energy plant ensures that the hydrogen is “green” in any given moment. Grid-connected electrolysers can produce for more hours, reducing the cost of hydrogen. However, grid electricity may include electricity produced from fossil fuel plants, so any CO₂ emissions associated with that electricity will have to be considered when evaluating the sustainability of hydrogen. As a result, for producers of hydrogen from electrolysis, the amount of fossil fuel-generated electricity can become a barrier, in particular if the relative Carbon emissions will be measured on the basis of national emission factors.

Questions for debate:

1. *How can Member States cooperate to create conditions to foster the market and speed up regulation regarding end-use technologies to increase hydrogen uptake, particularly in the hard-to-decarbonize sectors?*
 2. *What are the funding priorities in terms of hydrogen and how to joint support for exports, given its potential to strengthen European partnerships?*
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