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The EU Commission's Hydrogen Strategy: A turning point?

July 2020

On 8 July 2020, the Commission published its "*strategic roadmap*" for "*building a hydrogen economy for a climate-neutral Europe*"[1]. This is one of the key actions of the EU "Green Deal" initially proposed by the EU Commission in December 2019 with the overarching goal of achieving climate neutrality by 2050. It also echoes the "New Industrial Strategy for Europe" published in March 2020 and the expected "Recovery plan" currently under discussion in the context of the COVID-19 crisis.

The 20-page communication sets out a number of "**key actions**" the Commission will take over the next few months. These include legislative proposals, regulations, public consultations, as well as concrete initiatives such as the development of new policy tools to support hydrogen projects. In parallel, a **Clean Hydrogen Alliance** (CHA, comprising public and private stakeholders) is set to launch this summer to support and coordinate investments and support across sectors.

Many hydrogen players and observers hope this may finally kick-start long-awaited projects and initiatives. The actual impact will depend on the ability to build consensus among Member States on the chosen strategy and to coordinate both private and public investment as well as burgeoning national strategies.[2]

Ambitious objectives and timeline

Focus on renewable hydrogen

The strategy focuses on both the production of clean hydrogen, as well as its transportation and storage. To achieve the goal of producing low-carbon hydrogen at competitive prices, the Commission places emphasis on "**renewable hydrogen**" (mostly from wind and solar),[3] deemed the "*most compatible option with the EU's climate neutrality goal in the long term*". This has attracted **some criticism from industry**, with different voices stressing that renewables hydrogen alone will not suffice to meet production goals, and arguing that fossil-based hydrogen should play a bigger role, in combination with carbon capture utilisation and storage (CCUS).

The expected volume of (public and private) **investment in the next 10 years is significant**: €24-42 billion for electrolysers alone; €220-340 billion in renewables to supply the required electricity; €11 billion for retrofitting existing fossil-based hydrogen plants with CCUS; and €65 billion for hydrogen transport, distribution and storage and hydrogen refuelling stations.

A three-step approach on the road to 2050

– **2020-2024**: The focus is to build 6GW of renewable hydrogen electrolyser capacity (using units of up to 100MW each) and to retrofit existing fossil-based production units with CCUS. Local production will be key pending the development of transportation infrastructure, with an adapted regulatory framework to be developed, and funding from the Recovery Plan to be used.

1 https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf.

2 For instance, on 10 June 2020 Germany unveiled its national hydrogen strategy, which includes a €7 billion investment plan in businesses and research. One goal is to increase the production capacity to 5 GW by 2030 and 10 GW by 2040, using several sources including wind energy.

3 Defined as "*Renewable hydrogen' is hydrogen produced through the electrolysis of water (in an electrolyser, powered by electricity), and with the electricity stemming from renewable sources. The full life-cycle greenhouse gas emissions of the production of renewable hydrogen are close to zero. Renewable hydrogen may also be produced through the reforming of biogas (instead of natural gas) or biochemical conversion of biomass21, if in compliance with sustainability requirements*"

- **2025-2030**: Renewable hydrogen capacities should grow tenfold to 40GW with new applications ranging from steelmaking to transportation and energy storage. Infrastructure will need to be developed.
- **2030-2050**: The goal is a fully matured hydrogen economy and the development of a trans-European hydrogen network. New sectors like aviation should be involved by then as well as hard-to-decarbonise sectors.

Innovative tools to make renewable hydrogen competitive

The communication outlines several policy tools to mobilise industry and private investment, ranging from new regulations to research programmes.

Setting up the "Carbon Contract for Difference" (CCfD) to make low-carbon and renewable hydrogen cost-competitive

The current problem: Clean hydrogen (€2.5-5/kg) is more expensive than fossil-based hydrogen (€1.5-1.7/kg). Hydrogen producers are included in the EU-ETS regulation, meaning that they must hold (or purchase on the market) quotas for each ton of emitted CO_2. As "clean" hydrogen emits less CO_2 than fossil-based hydrogen, producers have lower CO_2 costs. However, the EU-ETS is not enough as carbon prices are both unstable[4] and too low.[5]

The proposed solution: The CCfD subsidises the carbon price so that the money saved on the EU-ETS costs compensates the additional costs associated with using a cleaner production technology. It does that by providing investors with a fixed price for emissions reductions compared to fossil-based hydrogen. Projects will be selected in competitive tenders.

To that end, a fixed carbon price (so-called "strike price") is set in a long-term contract to reflect the required level of financial support. The governmental subsidy is then calculated as (i) the difference between the average carbon price on the EU-ETS and the strike price, multiplied by (ii) the number of avoided tons of CO_2 emissions (compared to fossil-based hydrogen).

Next steps for the Commission include (i) a dedicated State aid framework to be achieved through revisions to the State aid guidelines for environmental protection (foreseen in 2020); and (ii) developing a pilot scheme (preferably at EU level) for a CCfD programme, with particular focus on supporting the production of low carbon and circular steel, and basis chemicals.

The Commission identifies the following priority targets for the CCfD: accelerating the replacement of existing hydrogen production in refineries and fertiliser production, low carbon and circular steel; supporting the deployment in the maritime sector of hydrogen and derived fuels such as ammonia; supporting the deployment of synthetic low-carbon fuels in the aviation.

Open questions: At this stage, in the absence of any CCfD "real life" precedents, the communication leaves many questions open, such as the criteria for the tender process (strike price only?), the need for an additional grant element in the early years of the contract to cover learning costs, the methodology for determining contract prices (including appropriate benchmarks against which emissions reductions would be assessed) and the need for a profit sharing mechanism.[6]

Incentivising renewables hydrogen initiatives through an adapted Emissions Trading Scheme

As part of the scheduled adjustment to the EU's ETS system (phase 4), the communication stresses the need to create an incentive to produce clean hydrogen,[7] while taking into account the risk for "carbon leakage" for hydrogen production and industries using hydrogen.[8]

4 The carbon market provides insufficient visibility for investment (the price of carbon has fluctuated between 0 and 30 euros per ton).

5 The money saved is not sufficient to compensate extra costs because carbon prices remain too low (depending on technology, size, etc. a €55-90 range is needed).

6 To comply with State Aid regulations and maximise the efficiency of public spending, profit sharing clauses are proposed. If the actual carbon price on the EU-ETS exceeds the strike price, governments will receive a share of the resulting profit.

7 Fossil-based hydrogen production is already part of the ETS system.

8 Whereby activities are moved to non-EU countries with less stringent emissions rules.

One option contemplated to address this is to reduce free allowances for fossil-based hydrogen (thus reducing the price gap with renewables hydrogen). However, the Commission emphasises that it is ready to use the "Carbon Adjustment Border Mechanism" discussed as part of the Green Deal in order to reduce carbon leakage risks.

Leveraging the "Important Projects of Common European Interest" (IPCEI) mechanism

IPCEI allow Member States to grant subsidies to companies without having to comply with "normal" (usually stringent) State aid rules, with a dedicated procedure: Member States prepare the proposed funding and typically will invite companies to submit proposals; Member States notify the proposed funding for approval to the EU Commission, which then decides whether or not to approve the proposals.

The communication refers several times to this tool, seen as key to achieving the objectives the hydrogen sector strives for. This follows in the footsteps of the recent batteries initiative (another strategic initiative of the EU, for which the EU Commission validated in December 2019 a total of €3.2 billion in Member State aid for 17 companies). The newly created Clean Hydrogen Alliance is expected to play a major role in structuring and coordinating projects. Several EU Member States are already starting to invite companies to submit proposals.

Building trust and standardisation around renewable hydrogen

The Commission will propose a comprehensive reference framework. European-wide criteria for certifications of renewable hydrogen should contribute to consumer information and targeted production support. Such a framework would rely on the already existing Renewable Energy Directive as well as on the proven Guarantees of Origins (GoO) system.

Necessity for a hydrogen infrastructure

From 2030, natural gas demand is expected to decline, while the development of the hydrogen economy will require long-distance transportation of hydrogen from producers to end-consumers, using a mixture of pipelines, trucks and adapted LNG terminals.

While this is expected to be a key part of the strategy's third and final phase (after 2030), the communication stresses the need to act now in particular as regards planning future infrastructure needs and identifying key projects. The Commission contemplates revising the Trans-European Transport Network (eg networks refuelling stations for heavy-duty trucks) and the Trans-European Networks for Energy (eg cross-border pipelines) policies towards this end.

After some structural adjustments, existing gas transportation systems may be used to transport hydrogen, including cross-border.

In that respect, the communication refers to the possibilities in the Netherlands and Germany to repurpose the L-cal gas network into an hydrogen network[9]. The Communication from the Commission in relation to an EU Strategy for Energy System Integration[10] emphasises that a hydrogen infrastructure is also important in an integrated energy system, since it can help integrate large shares of variable renewable generation, by offloading grids in times of abundant supply of renewable electricity.

These trends will require significant technical standards harmonisation across the EU energy market. The communication also stresses the need to ensure non-discriminatory access to the infrastructure.

[9] On 15 June 2020 the Dutch government, Gasunie and TenneT announced that they started a research to use the existing gas network for hydrogen. This research is called HyWay27.

[10] https://ec.europa.eu/energy/sites/ener/files/energy_system_integration_strategy_.pdf

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