



## THE EUROPEAN COMMISSION'S HYDROGEN STRATEGY FOR A CLIMATE-NEUTRAL EUROPE

After several EU Member States have announced their national hydrogen strategies, the European Commission has shared its vision of how a union-wide hydrogen economy can contribute to the reduction of greenhouse gas emissions and to the recovery of Europe's economy. This briefing provides an insight into the European Commission's newly published roadmap for building a hydrogen economy for a climate-neutral Europe.

### A HYDROGEN ROADMAP FOR THE EU

The European Commission's roadmap for hydrogen reveals a holistic full life-cycle approach for developing a hydrogen ecosystem in the EU. Supporting investments in green hydrogen is intended to foster sustainable growth and jobs, which will be very important in the context of the recovery from the COVID-19 crisis.

Therefore, the European Commission's strategic long-term vision for a climate-neutral economy estimates that the share of hydrogen in Europe's energy mix will grow to 13-14% by 2050. This will require measures to be taken along the entire value chain with particular focus on the industrial and transportation sectors.

The European Commission recognises that this process will require the support not only of green hydrogen in the longer term, which already includes hydrogen produced through the reforming of biogas or biochemical conversion of biomass, but also of so-called 'low-carbon hydrogen' during a transition period in the short and medium term. In addition, the roadmap recognises the role of hydrogen-derived synthetic fuels as long-term measures for the decarbonisation of the transportation sector (in particular, aviation and shipping).

The European Commission's roadmap is structured in three phases:

- **Phase 1 (2020 to 2024):** Decarbonisation of existing hydrogen production by promoting the production of 1 million tonnes of green hydrogen with at least 6 GW of green hydrogen electrolyzers installed.
- **Phase 2 (2025 to 2030):** Integration of hydrogen in the energy system by expansion of renewable hydrogen to new industrial

#### Key points to note

- Increase of hydrogen's share in Europe's energy mix up to 13%-14% by 2050.
- Install at least 6 GW of renewable hydrogen electrolyzers by 2024 and 40 GW by 2030.
- Priority focus on green hydrogen but also recognition of low-carbon hydrogen as a transition in the short and mid-term.
- Support of hydrogen-derived synthetic fuels for the transportation sector (in particular aviation and shipping).
- Facilitation of public and private investments, e.g. by market based support schemes.

applications (in particular steel and transport), producing 10 million tonnes of green hydrogen with at least 40 GW of green hydrogen electrolyzers installed.

- **Phase 3 (2030 to 2050):** Deploying renewable hydrogen technologies at large scale to reach all hard-to-decarbonise sectors.

To achieve these goals, the roadmap addresses:

- the necessary investment agenda in order to boost the demand for and to scale up the production of green hydrogen along the entire hydrogen value chain
- designing a framework for hydrogen infrastructure and setting-up market rules with particular regard to the repurposing of existing gas transportation networks
- fostering further research and innovation along the entire hydrogen value chain
- the EU's strategic interest to strengthen its leadership position by increasing research and development cooperation as well as taking new opportunities for energy partnerships with EU-neighbouring countries.

## **INVESTMENT AGENDA**

The European Commission has identified certain measures along the entire hydrogen value chain which will require vast investments in order to achieve its ambitious goals. In addition, the mobilisation of the required funds by public and private investments is addressed. Similar to approaches by certain Member States (e.g. Germany), these measures and funds are targeted at large scale projects to provide for an effective kick-off of the new technology.

The roadmap provides estimates of investment needs in a number of areas:

- Development and construction of electrolyzers: EUR 24 billion to EUR 42 billion by 2030
- Scaling up of solar and wind energy production capacity to 80 GW-120 GW: EUR 220 to EUR 340 billion by 2030
- In contrast to the German National Hydrogen Strategy, the European Commission's roadmap recognises investments in the production of low-carbon fossil-based hydrogen by retrofitting half of the existing plants with carbon capture and storage: around EUR 11 billion
- Development of hydrogen transport, distribution, storage, and refuelling stations: EUR 65 billion
- Hydrogen production capacities: EUR 180 billion to EUR 470 billion by 2050.

Having identified the required estimated investments, the European Commission aims to facilitate corresponding public and private funding by various measures.

First, the European Clean Hydrogen Alliance (composed of investors and governmental, institutional and industrial partners) shall be taken forward in order to develop an investment agenda and to build a concrete pipeline of 'visible' projects along the hydrogen value chain which may benefit from state

aid where hydrogen is significantly and factually contributing to the EU's climate goals.

Second, the Strategic Forum for Important Projects of Common European Interest shall identify cross-border hydrogen projects that may be (financially) supported.

Third, hydrogen shall also be supported through, for instance, the Strategic European Investment Window of InvestEU whose capacities shall be doubled, and the European Regional Development Fund and Cohesion Funds.

Finally, a call for proposals is envisaged to launch mid-2020 under the Innovation Fund of the EU's Emission Trading System (**ETS**) which is pooling together around EUR 10 billion for supporting low-carbon technologies in the period between 2020 and 2030.

## **HYDROGEN VALUE CHAIN**

Following the value chain approach, the European Commission's roadmap emphasises the cost-competitive production-side, the creation of a strong demand-side and finally the transportation infrastructure for hydrogen.

### **Production**

Upstream, the key aim is for hydrogen to become cost-competitive with fossil fuels by creating a supportive policy framework. In this vein, the European Commission is making several proposals:

- Strengthening of the ETS, including a potential expansion in scope and taking due account of the risk for carbon leakage
- Development of the ETS Directive and Renewable Energy Directive (by June 2021)
- Introduction of direct and transparent, market-based support schemes providing investment or operating subsidies for green hydrogen at an early stage which shall be allocated through competitive tenders. As an example for a potential support scheme, the European Commission highlights a tendering system for so-called carbon contracts for difference in relation to the relevant CO<sub>2</sub> prices
- Revision of the state aid guidelines for energy and environmental protection.

### **Infrastructure**

Hydrogen can be transported via non-network means (e.g. lorries and/or ships) or via pipelines. The European Commission recognises that growing demand for hydrogen will require corresponding transportation capacities on a regional, national and trans-European level. It is envisaged that elements of the existing gas infrastructure could be repurposed to provide for the necessary (cross-border) transmission infrastructure.

The expectation is that the demand for natural gas will decline after 2030 which, therefore, gives an opportunity to repurpose existing infrastructure for natural gas to provide for cost-effective large scale transmission of hydrogen. The corresponding planning of the hydrogen pipeline grid shall commence in 2021. However, there are still barriers to overcome. According to the European Commission, existing natural gas pipelines are owned by network

operators that are often not allowed to own, operate and finance hydrogen pipelines.

Against this background, the European Commission intends to design an enabling and supportive framework focussing on the revision of the relevant gas legislation. This concerns:

- the removal of barriers for efficient hydrogen infrastructure development (e.g. via repurposing)
- non-discriminatory third party access to liquid markets for all hydrogen producers and consumers.

The European Commission stresses in this regard, that the network operators should remain neutral.

In addition, the European Commission intends to ensure the full integration and interoperability of hydrogen infrastructure in EU infrastructure planning by including hydrogen in the Trans-European Networks for Energy and the Ten-Year Network Development Plans. The full integration shall also comprise the planning of a network of fuelling stations.

## **Demand**

On the demand-side, the roadmap recognises industrial applications (in particular in the steel and chemical sector) and transportation (in particular public transport, trains, commercial fleets (e.g. taxis), lorries, and shipping) as key markets for the scale-up of the production of clean hydrogen. These markets shall be activated by introducing, for instance, quotas or minimum shares of hydrogen.

Simultaneously to lowering costs for hydrogen on the production side, the European Commission recognises that it is essential to increase carbon prices to a range of EUR 55 to EUR 90 per tonne to put hydrogen in a competitive position to fossil fuels. It is stated that any market intervention of that kind would require the definition of clear rules in order to provide legal certainty for investors. Therefore, the European Commission proposes to formulate such definitions under the ETS Directive or the Renewable Energy Directive.

These definitions are expected to include common low-carbon thresholds or standards for the promotion of hydrogen production installations based on their direct greenhouse gas performance. Furthermore, a comprehensive terminology and Europe-wide criteria for the certification of hydrogen is required in order to enable initiatives for setting-up hydrogen guarantees of origin for green and low-carbon hydrogen.

## **RESEARCH AND INNOVATION**

Another important component of the European Commission's hydrogen roadmap is the intensified promotion of research and innovation in hydrogen technologies. EU research and innovation support is needed across the entire value chain. This includes:

- Increase of production capacities
- Development of hydrogen infrastructure (taking account of possible repurposing issues)
- Development of regional hydrogen ecosystems (so-called 'Hydrogen Valleys')

- Development of large scale applications in the industry and transportation sector (e.g. green airports and ports)
- Improvement and harmonisation of (safety) standards.

Consequently, the European Commission intends to launch a call for proposals for the development of a 100 MW electrolyser as part of the European Green Deal in Q3 2020.

It is also launching a Clean Hydrogen Partnership under the Research and Innovation Framework Programme Horizon Europe, i.e. a partnership where the EU participates in research and innovation funding programmes for green hydrogen production that are undertaken by EU countries.

## **INTERNATIONAL COOPERATION**

Finally, the European Commission's roadmap highlights opportunities for international cooperation on hydrogen with regard to research and innovation, regulatory policy, direct investments and trade.

As potential priority partners for such cooperation, the Eastern European countries (in particular Ukraine), Western Balkans, and the Southern Neighbourhood countries have been identified.

## **OUTLOOK**

The hydrogen roadmap reveals the European Commission's vision of a clean energy transition by putting forward green and low-carbon hydrogen as a new energy source.

It is important to note that the roadmap, first, contains no binding targets, and second, constitutes a communication addressed to the Council of the European Union where it will undergo discussions on Member State level. These discussions are expected to be prioritised by Germany which intends to emphasise the potential of hydrogen during its Presidency of the Council of the European Union in the second half of 2020.

In June 2020, the German government published its own National Hydrogen Strategy which also sets out an roadmap which largely aligns with the European Commission's roadmap (see [here](#) for our briefing on the National Hydrogen Strategy for Germany). It remains to be seen what the outcome of the discussions at Member State level will be, but given the positive reactions from several Member States to the opportunities associated with hydrogen over the last few months, we would expect general support for the European Commission's proposal.

## **ABOUT**

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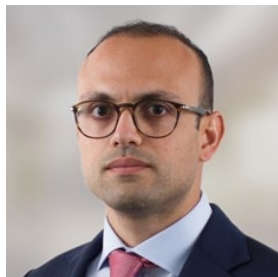
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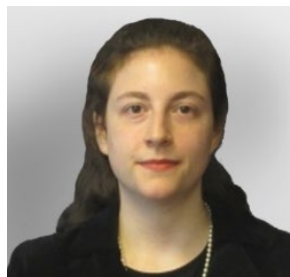
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