



## FOCUS ON HYDROGEN: SPAIN'S BID TO PLAY A LEADING ROLE IN NEW ENERGY

The Spanish government's Hydrogen Roadmap contains a total of 60 measures designed to develop Spain's capacity to become one of the main European powers in the production and exportation of renewable hydrogen.

### USES AND ADVANTAGES OF RENEWABLE HYDROGEN

On 6 October 2020, the Spanish government approved the "*Hydrogen Roadmap: a commitment to renewable hydrogen*". The Roadmap was proposed by the Ministry for the Ecological Transition and the Demographic Challenge (MITECO) and, as its name suggests, has a focus on hydrogen produced from renewable sources (clean or 'green' hydrogen). The Roadmap provides a Vision 2030 and 2050, establishing ambitious country targets in 2030.

Clean hydrogen has huge potential to contribute to the target of climate neutrality set for 2050 and presents a clear opportunity to develop new industrial value chains. Spain can be a key player in this space if an appropriate regulatory framework is implemented and the operators involved received the necessary signals and incentives.

The main uses of hydrogen are:

- In the industrial sector, clean hydrogen can be used as a raw material in industrial processes (Spain currently consumes around 500,000 tonnes of hydrogen in chemical installations and refineries), and as a source of clean energy for processes requiring a major heat capacity and where electrification is not effective (such as metallurgy).
- In the transport sector, it is used for fuel cells, and has advantages over electrical batteries, as in addition to weighing less, charging times are shorter and it is possible to travel further without refuelling. Hydrogen engines, due to their characteristics, also have lower maintenance costs.
- In the residential and service sector, clean hydrogen can, in the long term, be a cleaner alternative to natural gas.

### REGULATORY AND ECONOMIC BARRIERS

At present, the main administrative obstacle for the development of clean hydrogen is environmental regulation. Industrial facilities devoted to the production of hydrogen are required, except in cases of projects experimenting with new products and processes, to obtain an integrated

#### Key points

- Roadmap targets 4GW of electrolyser capacity by 2030
- EUR 8.9 billion investment planned, focusing on clean hydrogen use in industry, transport and energy storage
- Plans for a regulatory framework with appropriate incentives to enable development of clean hydrogen

environmental authorisation (AAI). This requires the provision of a financial guarantee (as of 16 October 2021) to cover potential environmental liability. In the case of small electrolysers, current legislation means they perform an industrial activity, for the purposes of the requirement of the AAI, and must provide the mandatory guarantee. Storage facilities may also have to obtain an environmental impact statement and comply with the regulations on monitoring measures for the risks inherent in serious accidents where hazardous substances are involved.

From an energy regulatory standpoint, the production of hydrogen and the storage and transport are currently subject to a significant number of administrative procedures for obtaining the required authorisations or permits. Permits are required for production, storage and distribution of hydrogen by pipeline, and if an associated renewable facility is used to generate the electricity used by the electrolysers, it will also be necessary to obtain permits for the production of electricity and for access and connection to the electricity grid.

Economic components can also act as a barrier to the implementation of clean hydrogen. Factors such as the current price of renewable electricity (with its tolls and charges), the need to write off plant and O&M, together with the current low cost of natural gas and the high cost of hydrogen transport, could – in the absence of proper incentives – slow down the development of clean hydrogen.

A clean hydrogen certification system will contribute to the development of this technology, and the possible imposition of minimum renewable hydrogen consumption quotas would also contribute to this objective. In addition, the development of a network of hydrogen pipelines would at least require recognition of the public utility of the deployment of such infrastructure.

## **ROADMAP TARGETS FOR 2030**

### **2030 Targets**

With an estimated investment of EUR 8.9 billion, the following targets have been set for 2030:

- **Production of renewable hydrogen:** the installation of at least 4GW of electrolyser capacity, with an estimated installed capacity of between 300MW and 600MW in 2024.
- **Industry:** 25% of total hydrogen consumed will be renewable.
- **Transport:** Directive (EU) 2018/2001 provides that the quota of renewable energy in the end consumption of energy in the transport sector will be at least 14% in 2030. Moreover, the IPCEI (Important Projects of Common European Interest) establishes a far more ambitious quota of 28%. In order to contribute to meeting these targets, the following milestones are envisaged by 2030:
  - A fleet of at least 150-200 buses with renewable hydrogen fuel cells.
  - At least 5000-7500 light and heavy hydrogen fuel cell vehicles for the transport of goods.
  - A network of at least 100-150 hydrogen stations situated in easily accessible locations distributed all over the country with a maximum distance of 250 km between them.

- Use of hydrogen-powered trains on a continuous basis on at least two commercial medium- and long-distance routes on lines that are not currently electrified.
- Introduction of handling machinery that uses renewable hydrogen fuel cells and supply points at the top five ports and airports by volume of goods and passengers.
- **Electricity sector/energy storage:** commercial hydrogen projects operational in 2030 are needed for the storage of electricity and/or use of the surplus renewable energy according to the guidelines established in the Storage Strategy.

### **Key steps to achieving the targets**

The Roadmap sets out the following key steps to achieve the above goals:

- **Guarantees of Origin:** developing a system of Guarantees of Origin of renewable hydrogen will be key to providing appropriate signs on price.
- **Hydrogen valleys:** the creation of "hydrogen valleys" that concentrate the production, transformation and consumption of hydrogen is a priority objective.
- **Transport:** promoting the use of hydrogen in public transport, urban services and intermodal transport hubs at an early stage is seen as key for competitiveness.

Achieving the targets set for 2030 will make it possible to reduce emissions of 4.6 Mton of CO<sub>2</sub>eq into the atmosphere in 2020-2030. Likewise, it is envisaged that it will avoid the emission of 1.125 million tonnes of CO<sub>2</sub>eq into the atmosphere in 2030.

### **VISION 2050**

The production of clean hydrogen is set to skyrocket from 2030, with technological developments and economies of scale facilitating a surge in clean hydrogen consumption in industries that are difficult to decarbonise and creating new uses for clean hydrogen in the aviation and maritime transport industries, among others.

Clean hydrogen is also expected to play a key role in power production management from 2030 onward. When demand spikes in Europe, while Spain's production capacity increases, it is set to become a clean hydrogen exporter to the rest of Europe. Consequently, the admissible hydrogen concentrations in the natural gas network should be standardised, and we should determine whether Spain's exports will be transported via hydrogen pipelines or by heavy goods vehicles / tankers.

### **PROJECTS UNDERWAY**

The Roadmap identifies five projects that have earned public funding to date and 28 that have presented submissions to the call for expressions of interest to identify projects eligible to participate in the IPCEI mechanism.

The five that have already earned public funding are as follows:

1. **H2PORTS** (Port of Valencia): viability studies for the development of a clean hydrogen supply chain at the port to reduce the environmental impact of its operations (EUR 4 million).

2. **SUN2HY** (Móstoles): precommercial demonstration of hydrogen production by electrolysis.
3. **SEAFUEL** (Tenerife): viability demonstration of fuelling local transport networks with fuel produced using renewable sources and fuel from seawater.
4. **HIGGS** (various locations): analysis of the existing potential and the requirements on infrastructure, its components and management entailed by injecting hydrogen into the current high-pressure natural gas networks.
5. **GREEN HYSLAND** (Mallorca): clean hydrogen production using electricity from the same source with multiple applications on the island.

The 28 other projects include the following noteworthy examples:

- **A Coruña**: project to produce clean hydrogen for various industrial applications.
- **Asturias**: production of clean hydrogen and subsequent use in producing iron ore, replacing coke gas.
- **Ciudad Real**: industrial-scale clean hydrogen production for use in the production processes of fertilisers that use hydrogen as a raw material.
- **Huesca**: industrial-scale clean hydrogen production for use in transport.
- **Vizcaya**: industrial-scale demonstration plant for producing synthetic fuels using clean hydrogen and CO<sub>2</sub> captured from industrial processes.

## CONCLUSION

The Hydrogen Roadmap aims to identify the challenges and opportunities for the full development of renewable hydrogen in Spain, providing a series of measures aimed at boosting investment action and taking advantage of the European consensus on the role hydrogen should play in the green recovery.

It is now up to the regulators to eliminate the existing barriers that may prevent the different actors from investing in this sector and provide the right signals to stakeholders and consumers who will in the long-term benefit from a decarbonised economy.

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