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The EU's Hydrogen Market Landscape

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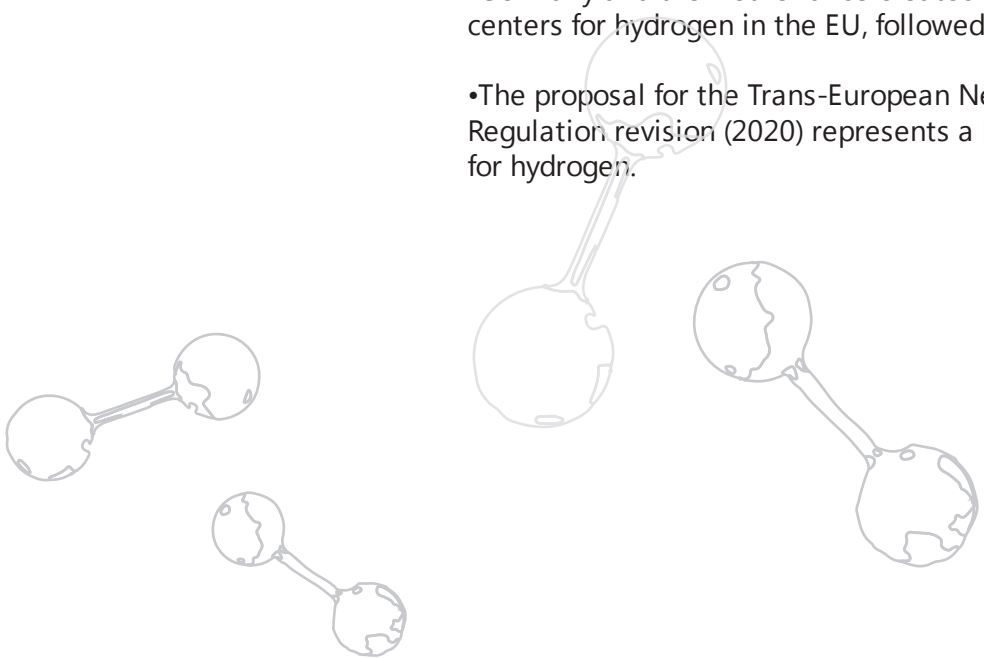
OVERVIEW

The EU's Hydrogen Market Landscape

•According to the International Energy Agency (IEA), hydrogen may be used as an alternative fuel in industries that are difficult to electrify and emit significant GHG emissions, such as the steel and chemical industries.

•Germany and the Netherlands created the largest demand centers for hydrogen in the EU, followed by Poland and Spain.

•The proposal for the Trans-European Network–Energy (TEN-E) Regulation revision (2020) represents a key legislative milestone for hydrogen.



The drive to net-zero is accelerating as we speak, and hydrogen is one alternative fuel that could be used to achieve this momentous goal. Several reasons make hydrogen the perfect candidate to accomplish net-zero. First and foremost, hydrogen is the most abundant and naturally occurring element in the universe- and the third on Earth, following oxygen and silicone. Since the 1800s, hydrogen has had widespread applications, including as an important fuel and feedstock in industries such as ammonia production, the petrochemical and refining process, and as chemical feedstock and a catalyst for chemical processes.

According to the International Energy Agency (IEA), hydrogen may be used as an alternative fuel in industries that are difficult to electrify and emit significant GHG emissions. These include the steel and chemical industries. Hydrogen can unleash renewable energy potential as it may be stored for long periods of time as hydrogen. Furthermore, it can contribute towards the decarbonization of economies, notably in industry and transport, and, thus, make renewables more relevant in areas that were inaccessible until the recent past. Finally, hydrogen can be a cost competitive solution, especially grey hydrogen.

This whitepaper aims to understand the demand and supply landscape for hydrogen, a valuable alternative fuel, in Europe, in addition to compiling all hydrogen related policy making in the region.

Demand for Hydrogen in the EU

In 2019, the total demand for hydrogen in the European Union (EU) totaled 8.4 Million metric tons. Of this demand, 80% was generated from refineries and ammonia production. Germany and the Netherlands created the largest demand centers, followed by Poland and Spain. A natural reason for this is the fact that the largest number of refineries and ammonia production facilities in Europe are concentrated in Germany and Spain.

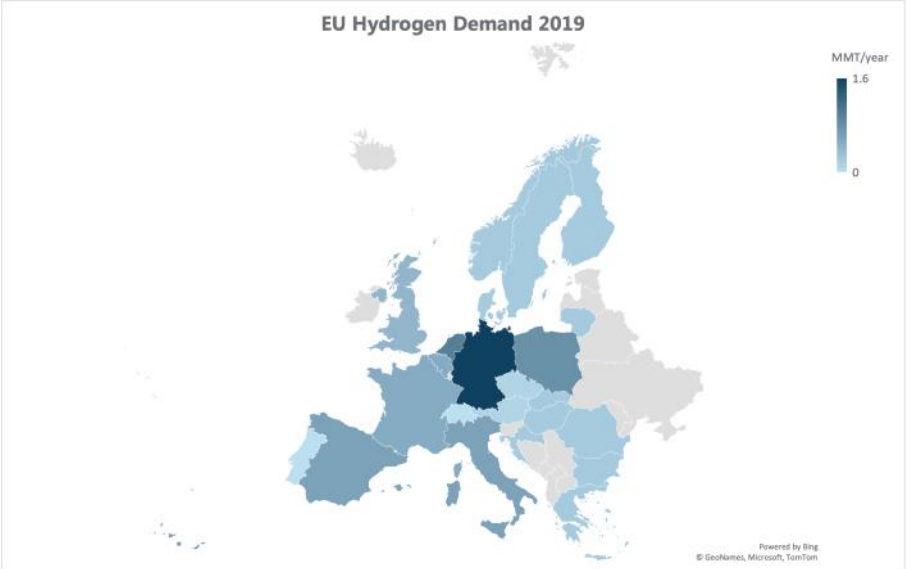


Figure 1: EU Hydrogen Demand 2019.
Source: Fuel Cell and Hydrogen Observatory

According to the Fuel Cell and Hydrogen Joint Undertaking's forecasts, hydrogen could provide up to 24% of total energy demand, or up to around 2,250 TWH of energy in the European Union. In fact, by 2050, as much as 56% of Europe's hydrogen demand will come from heating and power needs of buildings and transportation.

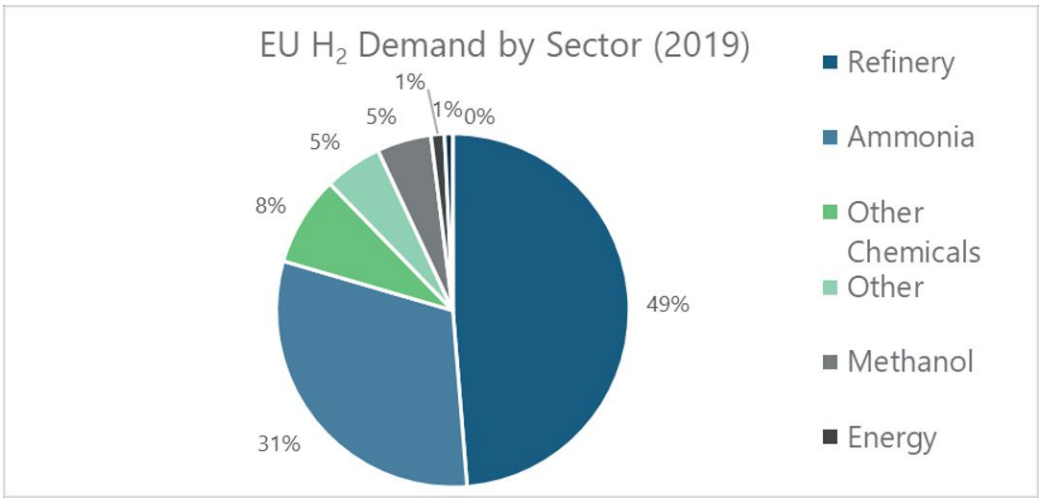


Figure 2: EU Hydrogen Demand, by Sector.
Source: Fuel Cell and Hydrogen Observatory

Hydrogen Supply in the EU

Germany and the Netherlands also dominate the European market as far as the supply for hydrogen is concerned, with the former's hydrogen supply capacity totaling 6,524 metric tons per day, followed by the Netherland's 4,523 metric tons per day supply. Of the 536 hydrogen production plants in Europe, 270 produce hydrogen from reforming processes, 95 by water electrolysis and 71 by chlor-alkali. Hydrogen is obtained a by-product in chlor-alkali production, which is the start of many value chains including green energy and construction.

A study, commissioned by the European public private partnership Fuel Cells and Hydrogen Joint Undertaking, has developed demand and production scenarios for green hydrogen in EU countries based on their infrastructure, economic structure, and policy environment. On scenario average, projected capacities for Germany, amounting to 8.35 GW, are more than twice as high as those of the second largest producer France, amounting to 3.25 GW. Moreover, Spain, with 2.55 GW, and the Netherlands, coming up to 2.2 GW, are also predicted to become relevant producers in absolute terms, according to Trinomics and LBST (2020).

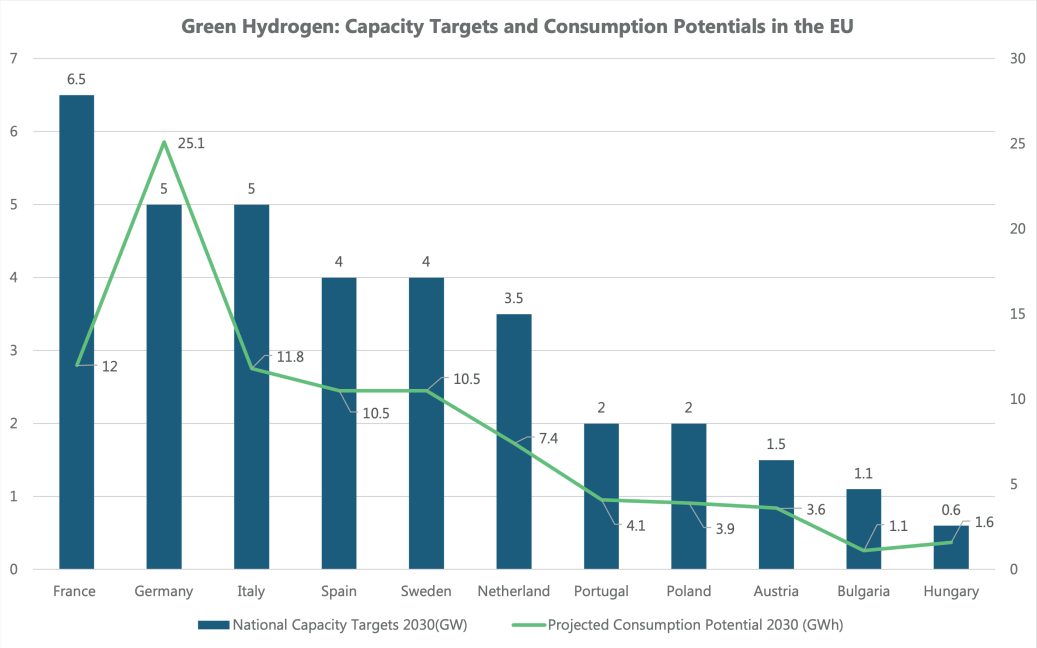


Figure 3: Green Hydrogen: Capacity Targets and Consumption Potentials in the EU. Source: Intereconomics

Hydrogen Policy Developments in the EU

Following are descriptions of the EU policy undertakings as far as hydrogen is concerned.

The EU Hydrogen Strategy

From today up to the year 2024, the hydrogen strategy outlines that EU will support the installation of at least 6 GW of renewable hydrogen electrolyzers in the EU, in addition to the production of up to 1 Million tons of renewable hydrogen. The strategy goes on to emphasize that in the period 2025-2030, hydrogen

will need to have become an intrinsic part of EU integrated energy system, with at least 40 GW of renewable hydrogen electrolyzers and the production of up to 10 Million tons of renewable hydrogen. Finally, from 2030 and onwards, renewable hydrogen will be deployed at a large scale across all hard-to-abate sectors. This will include the expansion of hydrogen-derived synthetic fuels.

The Offshore Renewable Strategy:

The EU's Offshore Renewable Strategy considers offshore hydrogen production and hydrogen pipelines to deliver energy produced offshore to onshore demand centers.

The Sustainable and Smart Mobility Strategy:

This outlines the EU's first clean targets for hydrogen refueling station; the goal outlines 500 refueling stations in 2025 and 1000 in 2030, up from 176 in 2021.

Fit-for-55 package:

The Fit-for-55 package is the EU's plan for the green transition. Following is the sector-wise plan as far as hydrogen is concerned. For Industries, a targeted 50% share for Renewable Fuels of Non-Biological Origin (RFNBO) in energy and feedstocks by 2030, excluding production of oil products. Hydrogen fits in this category. In the Transportation sector, an amendment has been made to the regulation setting CO_2 emission standards for cars and vans, known as the Renewable Energy Directive (RED). The revised RED stipulates a 2.6% target share of RFNBOs in transportation by 2030, with a preference for use in the aviation and maritime sectors. As far as the aviation sector is concerned, a revision of the EU ETS is set to include a 2% target share of sustainable aviation fuel (SAF) by 2025, which is made from hydrogen. Finally, the ETS Innovation Fund is targeted towards projects that produce and use hydrogen, especially in industrial settings.

The Energy Taxation Directive (ETD):

The ETD heavily incentivizes a switch to renewable and low carbon hydrogen. The proposal foresees a preferential minimum tax rate of €0.15/GJ (where 1 EUR=0.97 USD) for renewable and low carbon hydrogen, during a decade long transition period for the latter. In contrast, non-renewable fuels of nonbiological origin (i.e., fossil hydrogen) are taxed at a minimum rate of €7.17/GJ.

Looking Ahead

The FuelEU Maritime and RefuelEU Aviation are regulation proposals to promote the use of clean fuels in the maritime and air transport in order to decarbonize those sectors. Targets are set based on the fleet average GHG intensity of the energy used onboard by large ships (above 5,000 gross tonnage), for maritime. Emission levels are reduced by 2% from 2025 to 75% from 2050 for all intra-EU voyages and stays in within a port of call covered, and half of the voyages between the EU and non-EU ports of call will also be included (aligned with the scope of the EU ETS extension).

For aviation, from 2023 onwards, fuel suppliers will be obliged to provide sustainable aviation fuels (SAF) to airlines at all EU airports. This obligation only considers SAF such as biofuels, advanced biofuels, and RFNBOs, which are chemically identical to the fossil fuels they are replacing. After 2030, it introduces a

minimum share of e-fuels (RFNBOs). By 2050, the objective is a minimum of 63% SAF, of which at least 28% are synthetic fuels.

Even though it is not a part of the Fit-for-55 package, the proposal for the Trans-European Network – Energy (TEN-E) Regulation revision (2020) represents another key legislative milestone. Formerly, the legislation considered four energy infrastructure categories: electricity, gas, oil, and carbon dioxide. The 2020 proposal proposes the following five categories: electricity, smart gas grid, hydrogen, electrolyzers, and carbon dioxide.

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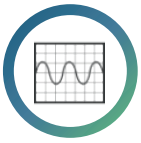

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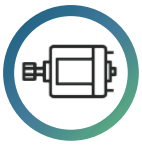

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