



FOCUS ON HYDROGEN: A ROLE FOR HYDROGEN IN ITALY'S CLEAN ENERGY STRATEGY

A national hydrogen strategy is now expected in Italy as early as Q1 2021 and many industry players are considering the implementation of hydrogen projects as a way to meet their ESG requirements. In this briefing we look at the future potential for hydrogen in Italy as a clean energy source.

LEGAL FRAMEWORK

Hydrogen was recognised by the Italian government as a renewable energy source in 2016, by the enactment of the Italian Legislative Decree No. 257 of 16 December 2016, which transposed the EU Directive 2014/94/EU concerning the deployment of alternative fuel infrastructures.

A further Ministerial Decree of 23 October 2018 removed a number of obstacles to the development of hydrogen in existing legislation, thanks to a joint commitment of several Ministries, the Italian Association for Hydrogen and Fuel Cells (H2IT) and various industrial players in Italy.

These new pieces of legislation have been much praised, as they have allowed a greater alignment of key technical conditions with other certifications and requirements (such as applicable ISO standards) and have eliminated existing limitations to the load pressure of hydrogen, which has enabled the deployment of hydrogen in, for example, the creation of hydrogen distributors for cars.

Further pieces of legislation are still required to set the framework for authorisation processes and incentive schemes.

NATIONAL STRATEGIES

National Integrated Energy and Climate Plan for 2030

In December 2019, Italy approved the National Integrated Energy and Climate Plan for 2030 (**PNIEC**), a fundamental tool that marks the beginning of an important change in the country's energy and environmental policy towards decarbonisation.

Among the various targets included in the PNIEC are actions aimed at increasing the production and use of hydrogen, particularly in the transportation sector, providing this sector with adequate regulation, and seeking to lower the costs of electrolysis technology by promoting the decarbonisation of industrial sectors.

Summary

- National hydrogen strategy for Italy expected in early 2021
- Great potential for green hydrogen production in Italy and it could be a hydrogen transportation hub with its strategic gas infrastructure
- Need for investment incentives focusing on clean energy, particularly in a post-Covid environment

The PNIEC aims to accelerate the decarbonisation process and sets a target for 2030 of abating approximately 130 MtCO_{2e}, more or less equal to 40% of current emissions. An extensive use of hydrogen in the energy mix is envisaged, among other things, to meet this target.

National Hydrogen Strategy

The Italian Minister of Economic Development has been working on guidelines for a National Hydrogen Strategy, which shall then be approved following consultation with stakeholders. The National Hydrogen Strategy is expected by early 2021.

DECARBONISING WORLDWIDE CHALLENGE BY 2050

Green hydrogen is expected to become an important source of energy for companies to reach decarbonisation and low-emission targets in the near future. Today, hydrogen production through electrolysis is still costly, but early developers and equipment suppliers are working to increase scale and make technological adjustments with the expectation of deploying affordable green hydrogen extensively in the value chain in a 5-10 year timeframe.

Decarbonisation targets

Decarbonisation of the global economy is one major challenge the world is facing, with an effort being made to avoid halting economic growth by reducing CO₂ emissions.

Following the Paris Climate Conference, the UN Sustainable Development Goals and the long-term climate action proposed by the EU Commission, targets have been set to cut emissions in the EU by at least 40% below 1990 levels by 2030 and a "Climate Neutrality" to be reached by 2050, ensuring net-zero greenhouse gas emissions.

Most recently, the EU Commission announced its intention to launch the "European Clean Hydrogen Alliance", to bring together investors with governmental, institutional and industrial partners to identify technology needs, investment opportunities and regulatory barriers and enablers.

A developing technology

According to a study published in March 2020 by Bloomberg New Energy Finance (Bnef), "*green hydrogen*" is a promising path but to make it economically viable, extensive public incentives are needed over the next ten years, since the technology is still very expensive and projects to produce electricity from hydrogen are not expected to reach breakeven of costs before 5-10 years.

Within its study, Bnef calculated that the cost of producing hydrogen from renewable energy through electrolysis could fall from the current \$2.53/4.57 per kilo to a range of \$1.14/2.71 per kilo, until 2050, when production costs could fall to \$0.8-1.6 in most parts of the world, bringing hydrogen to a strong level of competitiveness with gas.

Despite the foregoing, our current experience is that several private sector actors are challenging these notions of the cost of green hydrogen by planning to rely on falling solar PV power prices and scaling of green hydrogen electrolysis facilities to lower prices in the next 5-10 years to be competitive with natural gas when carbon costs of gas are included. The biggest

bottleneck in planning these projects remains the transport of green hydrogen from production sites where the sun shines (like Italy) to off-takers where it does not.

HYDROGEN: WHY ITALY?

The Italian market will be extremely attractive for investments in hydrogen for a number of reasons.

Italy is a champion of emission cuts

Italy has proved to be a champion of emission cuts as it has consistently over the years achieved a steady trend towards decarbonisation.

Over the last 30 years, greenhouse gas emissions in Italy have decreased at a rate of 0.7% per year, mostly thanks to the combined effect of a strong development of renewable energy, increased energy efficiency, and the delocalisation of industrial production. However, in order to achieve the “net zero” target by 2050, an acceleration is necessary and, together with private sector entrepreneurship, additional initiatives will need to be agreed.

Estimates are that hydrogen could supply as much as 23% of Italy's total energy consumption by 2050, meaning almost a quarter of the entire energy demand.

Italy's good availability of renewables to produce green hydrogen

Given its vast renewables portfolio, Italy seems to be well-positioned to deploy its solar and wind resources to produce low-cost green hydrogen. By using electricity from the grid or directly connected to renewables plants, the electrolysis process offers a flexible way to supply green hydrogen from renewable plants, instead of the so-called “grey hydrogen”, whose production requires natural gas or coal, thus causing CO₂ emissions.

Italy's gas infrastructure and strategic bridge between Africa and Europe

Italy has over 34,000km of existing natural gas pipelines for transmission and over 250,000km of existing natural gas pipelines for distribution. By upgrading the existing infrastructure, hydrogen can be blended in the current gas mix distributed by the pipelines, while work continues on pipeline conversion and new builds to handle ever larger volumes of hydrogen as natural gas consumption decreases.

Furthermore, Italy could use its existing pipelines to North Africa, where hydrogen can be generated from low-cost solar power, and then transported to Italy, and from Italy to the rest of Europe. This would increase Italy's strategic role at the heart of the Mediterranean and provide an intermediary (together with Spain) for transferring hydrogen from North Africa to Europe, as well as providing Italy with an almost unlimited potential supply of hydrogen at a lower cost of production domestically, including transportation costs.

Earlier than other European markets

Given Italy's potential access to low-cost green hydrogen, the country should be one of the first in Europe where green hydrogen will outcompete grey hydrogen from 2030 onward. Compared to Germany, for example, the breakeven could happen 5-10 years earlier, making Italy the ideal place to begin the deployment of green hydrogen for industrial and other uses.

However, Italy currently lags behind other countries in respect to hydrogen-fueled stations and infrastructure, which leaves significant space for investments in the development of new infrastructure. Italy also still remains without a specific national clean hydrogen strategy, pending its approval which is expected in early 2021 (see above).

MAIN IMPLEMENTATION AREAS

Transport and Mobility

Hydrogen can play a key role in the future of road transportation and bring related improvements in air quality in urban environments in Italy: fuel cell electric vehicles (FCEVs) emit neither CO₂ nor other pollutants.

Long-haul trucks and buses

Hydrogen long-haul trucks and buses can become cost competitive with alternative technology trucks and buses (diesel, electric, LNG). As the fleet turnover rate for trucks and buses is, on average approximately 10 years, a rapid uptake of hydrogen trucks and buses can be expected between 2030-2040. In this respect, during summer 2019 the first 12 hydrogen buses became operational in the city of Bolzano in Trentino-Alto Adige Region.

Trains

Hydrogen trains are a cost-effective option to replace diesel trains, especially on low-utilised non-electric tracks to avoid investment in electrification infrastructure. Today, examples of hydrogen trains in operation already exist (Alstom is one of the main producers) and are being used (e.g. in Northern Germany). Italy currently has no hydrogen trains, yet we are witnessing strategic proposals for joint ventures between national champions to develop hydrogen trains and this may well become a solid trend in the near future.

Passenger vehicles

Passenger cars and vehicles are also expected to move towards hydrogen, even though in 2019 only 7 hydrogen cars were registered in Italy (1 in 2018) between Rome, Milan and Trento.

Marine and aviation

Hydrogen-based fuels are expected to become cost competitive in 2040-2050. In marine transport, hydrogen can be used to make ammonia, which can replace oil in order to fuel ship engines. In aviation, carbon-neutral "synfuel" made from hydrogen and re-used CO₂ can be used instead of kerosene.

Buildings

Blending hydrogen in the gas grid will become a cost-competitive way to decarbonise gas heating systems from late 2020 onwards, especially in old town centers. As soon as 2030, many distribution networks could start blending hydrogen into the gas mix, thereby partly decarbonising the Italian heating mix.

The rest of urban building heating will be decarbonised by e.g. heat pumps or district heating.

Hydrogen micro-CHP (Combined Heat and Power units) fuel cells can become a cost competitive heating source for rural buildings by 2040-2045, especially as they can provide not only heat but also power, reducing the costs of connecting to both the gas and the power network.

Industrial energy

Refineries and ammonia

Existing raw materials used in industry is expected to switch to green hydrogen around 2030, driven by the improving economics of hydrogen and the increase of the EU Emissions Trading System price (ETS).

Iron and steel

Reducing iron use by applying hydrogen via the Direct Reduced Iron (DRI) process instead of coal in a blast furnace offers one of the few carbon-neutral alternatives for producing steel. Driven by decreasing hydrogen costs and increasing ETS CO₂ prices, DRI process can become the most cost competitive way to make steel by 2045. Many European steel companies are developing this technology (e.g. SSAB's Hybrid project), and the first at-scale plant conversions to hydrogen should happen by 2030-2035.

IMPACT OF COVID-19 EMERGENCY

The spread of the Covid-19 pandemic in 2020 has reduced the demand for coal and oil, with a consequent material decrease of emissions. According to environmentalists, however, this temporary reduction in emissions could in fact lead to an opposite effect, should governments react by increasing factory production to compensate for economic losses. This was the case with the global financial crisis of 2008, which showed a reduction in emissions of several countries during the crisis, but eventually delayed the green agenda in order to speedily stimulate the recovery of economies around the world.

Considering the impact this scenario could have on the green economy, it should be noted that 70% of the world's investment in clean energy depends on public finances. Consequently, it will be essential that incentive measures aimed at restarting global industry give priority to the green agenda. This could represent an important window of opportunity for hydrogen development.

First political responses appear encouraging, with pledges to continue to foster the green economy. The latest news that a new National Hydrogen Strategy is expected to be approved as early as the first quarter of 2021, represents a strong sign of commitment for the Italian policy-makers to keep hydrogen at the very top of the energy agenda.

ABOUT

Focus on Hydrogen is a Clifford Chance briefing series covering hydrogen-related developments globally. 1.008 is the standard atomic mass of hydrogen.

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HYDROGEN LEADS



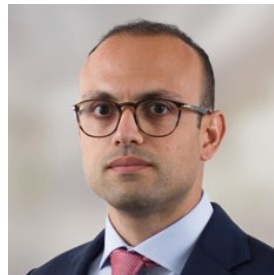
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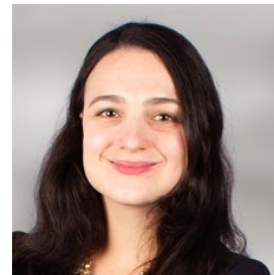
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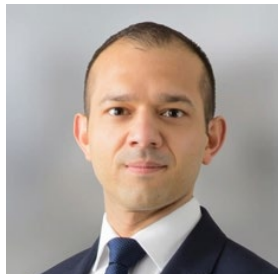
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