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Europe Looks To Become The Global Leader In Hydrogen

By [Alan Mammoser](#) - Jul 29, 2020, 12:00 PM CDT



The energy system of the future took clearer form this month when the European Commission, the EU's executive branch based in Brussels, adopted two closely related strategies. Its new Hydrogen Strategy is central to its Strategy for Energy System Integration, both adopted the same day. The new strategies presume that hydrogen will play an indispensable role in a future ultra-low carbon energy system.

Hydrogen will function as an 'integration' technology with applications across sectors that raise the efficiency of the Continent's entire energy system. It is a key component of the EC's Green Deal,

which aims for a strict 2030 emission-reduction target and the elimination of net greenhouse gas emissions by 2050.

The new strategies, taken together, show how a 'hydrogen economy' will actually work in Europe and elsewhere. And, considering that hydrogen accounts for less than 1% of Europe's energy consumption today, they show a remarkable commitment to it. Indeed, production of hydrogen, including low-carbon and 0-carbon hydrogen produced with renewable energy, will have to increase by multiples in just a few years.

The EU's new plans show a hydrogen economy that is continent-wide and international in scale. It moves massive amounts of the element by pipeline across international borders and even across continents, as Ukraine and North Africa emerge as significant suppliers. The Hydrogen Strategy sets out an ambitious timeline for this, which serves as a kind of roadmap for hydrogen's future.

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Ambitious targets

The world's current installed capacity of electrolyzers producing hydrogen from renewable power is approximately 1 GW. Europe's hydrogen strategy will expand this quickly and massively. It sets out targets for 2024, 2030 and 2050, seeking to drive down the cost of hydrogen fuel with increasing levels of production. This requires large expansion of numbers of electrolyzers, upgrading of distribution networks and the building of hydrogen transmission pipeline infrastructure. Producing vast quantities of green hydrogen will also require significant expansion of solar and wind power capacity.

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The current installation of clean energy electrolyser capacity will be increased six-fold to 6 GW by 2024, allowing the production of 1 million metric tons of hydrogen. This will allow the decarbonization of existing hydrogen production for industry and supply new uses such as heavy transport. Looking to 2030, there is a leap to 40 GW of renewable energy hydrogen electrolyzers producing ten million metric tons of hydrogen in the EU. This is to be matched by 40 GW of electrolyser capacity outside of the EU producing hydrogen for import into the EU.

To help scale up production of green hydrogen in Europe, the EU has launched a Clean Hydrogen Alliance of companies, industry experts, national governments and the European Investment Bank. At the same time, the EU will support the development of a market for green hydrogen by creating a standard classification system of types of hydrogen and a certification system to support its trade.

A 2x40 initiative

Frank Wouters, head of the EU-Gulf Cooperation Council (GCC) Clean Energy Network, has watched the EU's hydrogen ambition grow over time until taking the form of the current strategy. He notes that the 6 gigawatt target for 2024 is a significant increase from an earlier-reported 4 gigawatt target in the EU's strategy. The timeline for building a pan-European hydrogen gas infrastructure has also been moved up in the new strategy, with the system to be in place before 2030.

"The immediate ambition has increased by 50%," he says. "Given the combined global current production capacity of around 1 GW, one should relate this number (the hydrogen strategy target) to the last couple of years, in which less than 200 MW has been built per year."

"This implies an immediate boost for manufacturers," he adds. "And it recognizes the crucial role of infrastructure in kick starting a liquid hydrogen market."

The new EU hydrogen strategy also shows far-reaching ambition in its international dimension. Wouters contributed to a report published earlier this year, *Green Hydrogen for a European Green Deal, A 2x40 GW Initiative*. Supported by the EU-GCC Clean Energy Network, Hydrogen Europe, Dii Desert Energy and other industry groups, it proposes a '2 x 40 GW' target for 2030.

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This proposal was taken up in the EU's new strategy, which seeks partnerships with 'Eastern Neighborhood' and 'Southern Neighborhood' countries, to install 40 GW of electrolyser capacity in these countries. North Africa, and Ukraine, with their abundant renewable energy resources, are anticipated to become major suppliers in cross-border trade and export of hydrogen to Europe.

Wouters points out that having 2 x 40 GW of electrolyser capacity installed by 2030 would be more than what the Hydrogen Council has proposed for the entire world for 2030. That industry group, in its 2017 report called *Hydrogen, Scaling Up*, offers a scenario in which hydrogen will cover 18% of final energy demand by 2050, which would make it a \$2.5 trillion industry.

"This is more than the oil and gas industry combined," says Wouters. "The [European strategy](#) outpaces that ambition."

How hydrogen will work

The new European Hydrogen Strategy gives a good overall picture of what an emerging hydrogen economy will look like. It will be a much more integrated energy system, one that moves energy among the sectors of transport, industry, and buildings. The strategy gives the example of cars

powered by solar panels on roofs, while buildings are warmed with heat from a nearby factory, which is fueled by clean hydrogen produced from offshore wind energy.

What appears is a much more circular system with strong emphasis on energy efficiency. It will require far more electrification with electric vehicles, heat pumps for buildings and so forth. The re-use of waste heat from industry will also be important. A great and continuing expansion of solar and wind power will create the 'clean' electricity required to produce the hydrogen.

This will require a competitive hydrogen market and the strategy spells out a detailed investment agenda to spur supply and demand. An enormous expansion of hydrogen transport capacity will be needed for this market to work. A key role in stimulating market development will be played by the new European Clean Hydrogen Alliance.

The first phase to 2024 will emphasize the development of large electrolyzers of up to 100 MW in the vicinity of existing industrial centers of demand. The strategy asserts these will produce low and 0-carbon hydrogen with power from local renewables and the deployment of carbon capture and storage (CCS). It also emphasizes the development of refueling stations for hydrogen fuel cell busses and trucks. In the meantime, planning of transmission infrastructure will continue.

In the next phase to 2030, hydrogen will expand beyond the industrial base and begin to play an important role in power system flexibility and storage. This will be made possible with 40 GW of hydrogen electrolyzers installed in Europe, supplied by renewable energy, producing 10 million metric tons of renewable hydrogen annually. The long range transport of hydrogen will need to occur and the strategy document discusses a 'pan-European grid' with the existing, partially repurposed, natural gas grid and the development of large hydrogen storage facilities. This will link areas with large renewable energy potential to major demand centers in the EU countries.

The Hydrogen Strategy presents a less clear picture beyond 2030, but it asserts that the market for hydrogen will have reached maturity. It assumes that low-carbon and 0-carbon hydrogen applications will become widespread in shipping, aviation, and other hard-to-decarbonize sectors such as commercial buildings. A large market for hydrogen-derived synthetic fuels will also exist. And, in order to secure supplies of clean hydrogen for this mature market by 2030, the EU will

work closely with 'priority partners' in North Africa and Ukraine, with cooperation encompassing research, regulatory policy and even direct investment.

The new plans, which were released on July 8, [can be accessed on-line.](#)

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