【欧州】【Common】

Common - Environmental issues: The European Commission's Clean Hydrogen initiative and call for projects for renewable and low-carbon hydrogen technologies and solutions

Andrea Antolini Former Researcher JTTRI

【概要：Summary】

Based on the European Green Deal's objective to reach climate-neutrality by 2050 and net-zero GHG emissions, the development of renewable, green hydrogen as an energy source, produced by using mainly wind and solar energy is set as one of the priorities in the EU's energy policy. In an integrated energy system, hydrogen can support the decarbonisation of industry, transport, power generation and buildings across Europe, on the basis that it is produced by using renewable resources. However, currently most of the hydrogen production is still based on the utilization of fossil resources. The hydrogen production based on renewable energies is still cost intensive and only in the development stage. Therefore, the European Commission and the EU Member States will have to financially support the development of clean hydrogen, carbon capture and storage and hydrogen compatible infrastructures under the financing and funding programmes and plans. The EU's Hydrogen Strategy addresses how to transform the hydrogen energy's potential into reality, through investments, regulation, market creation and research and innovation. The Commission also initiated the European Clean Hydrogen Alliance with institutional and industrial partners, national and regional ministers, and the European Investment Bank for the promotion of the production of clean hydrogen. The Hydrogen Alliance follows the precedent set by the European Battery Alliance and has the purpose to develop clean hydrogen technologies, to deploy a range of trade, procurement, and competition policies among others.

On 12 April 2021, the European Commission launched an invitation to all members of the European Clean Hydrogen Alliance to submit projects for renewable and low-carbon hydrogen technologies and solutions. The aim is to build a pipeline of viable investment projects to deliver on the objectives set out in Hydrogen Strategy. The deadline for submitting projects was 7 May 2021. The next Hydrogen Forum meeting on 17-18 June 2021 will review the projects and provide the opportunity to prepare for their realisation.

【記事：Article】

1. Background of the Hydrogen Strategy

The European Green Deal of 11 December 2019 (COM (2019) 640) set the goal for the EU to become climate-neutral and to reach net-zero GHG emissions by 2050. To achieve this, the EU's energy system needs to be transformed into a

sustainable, affordable, efficient, and circular system. However, currently, 95% of the EU's energy mix is still based on fossil fuels. Therefore, initiatives need to be supported for increasing the supply of clean, affordable, and secure energy, based on the use of electricity or alternative fuels, including hydrogen. The so-called "clean" or "green" hydrogen is hydrogen produced by the electrolysis of water, powered by electricity, which is produced from renewable sources. In fact, hydrogen is considered being one of the alternative fuels that could replace fossil fuels and combustion engines in transport and other sectors if hydrogen itself was produced by using renewable energy. Therefore, the hydrogen's climate neutrality depends on what source of energy is used for its production. Only if hydrogen were produced from renewable energies, it would make hydrogen fuel cell power units carbon neutral.

In case of clean hydrogen, the full-lifecycle GHG emissions would be close to zero. However, currently, clean, or even low-carbon hydrogen, which needs a carbon capture and storage system, is not cost competitive, yet. Therefore, almost the entire supply of hydrogen derives from the production based on fossil fuels and less than 0.1% of the global hydrogen production comes from water electrolysis.

However, the future large-scale deployment of clean, green hydrogen, produced by using renewable energies is expected to become one of the key factors to achieving the EU's target of net-zero carbon neutrality. According to the European Commission, in 2050, renewable energies could supply up to 100% of the European energy mix and hydrogen could account for a share of about 20% in the EU's energy mix. It could also cover between 20% and 50% of the energy demand in the transport sector and between 5% and 20% in industry. However, the deployment of hydrogen as an energy still faces challenges. It still needs higher investment into the hydrogen development, an enabling regulatory framework, and a large-scale infrastructure network, among others, to reach a mass market for hydrogen. Therefore, the main objective of the Hydrogen Strategy and of the European Clean Hydrogen Alliance is to support the development and deployment of a clean and competitive hydrogen production industry.

2. The Hydrogen Strategy for Europe and the roadmap towards clean hydrogen

Clean hydrogen technologies have the potential to achieve decarbonisation of some of Europe's most emitting industries and sectors. However, the production of hydrogen through electrolysis of water remains a very expensive production process. As part of its new Industrial Strategy, the European Commission presented the new initiative to support the utilization of hydrogen on 10 March 2020. The new Industrial Strategy is expected to help the Europe's industry in its transition processes towards climate neutrality and digital leadership. Since the deployment of hydrogen still faces important challenges, all actors, public and private, at European national and regional level must work together to build a dynamic hydrogen ecosystem in Europe and to reach the critical mass of investment. The increase in the use of hydrogen also needs a sufficient regulatory framework, new lead markets, sustained research, and innovation into breakthrough technologies. Therefore, the European Commission presented its Communication on the Hydrogen Strategy "A hydrogen strategy for a climate-neutral Europe" (COM(2020) 301 final) on 8 July 2020 . The Communication contains a vision of how clean hydrogen could become a viable solution to decarbonise different sectors in the EU. According to the Hydrogen Strategy, currently, neither renewable hydrogen nor low-carbon hydrogen, which is defined as fossil-based hydrogen with carbon capture, are cost-competitive against fossil-based hydrogen. Therefore, the Hydrogen Strategy also presents a

roadmap of necessary actions to change this in the coming years. In the next decades, it is the EU's priority to develop renewable hydrogen, produced using mainly wind and solar energy. It is seen as the most compatible option to reach the EU's climate neutrality and zero pollution goal in the European Green Deal. However, in the short- and medium-term, other forms of low-carbon hydrogen are needed, primarily to rapidly reduce the GHG emissions from existing hydrogen production and for preparing for the future uptake of renewable hydrogen.

In a first phase until 2024, the Hydrogen Strategy COM (2020) 301 final sets the policy focus on laying down the regulatory framework for a liquid and well-functioning hydrogen market and on incentivising both supply and demand in lead markets. This preparation work will push concrete plans for the setting up of large wind and solar plants. The strategic objective is to install 6 GW of renewable hydrogen electrolysers and to produce up to 1m tonnes of renewable hydrogen.

In a second phase, from 2025 to 2030, hydrogen needs to become part of an integrated energy system with the objective to install at least 40GW of renewable hydrogen electrolysers by 2030. This could secure the production of up to 10 million tonnes of renewable hydrogen in the EU. In this second phase, renewable hydrogen is also expected to gradually become cost-competitive with other forms of hydrogen production. By 2030 the EU will aim at completing an open and competitive EU hydrogen market, with cross-border trade and efficient allocation of hydrogen supply. However, policies will need to include the support of new applications, including steelmaking, trucks, rail, and some maritime transport applications, among others, according to the Commission Communication COM (2020) 301 final.

In a third phase, from 2030 to 2050, renewable hydrogen technologies should reach maturity and large-scale production to reach all hard-to-decarbonise sectors. In this phase, renewable electricity production will need to be massively increased, as about a quarter of renewable electricity might be used for renewable hydrogen production by 2050. Hydrogen and hydrogen-derived synthetic fuels, based on carbon neutral CO2, could be used across a wider range of sectors of the economy, from aviation and shipping to hard-to-decarbonise industries and commercial buildings.

On 29 October 2020, the European Parliament's Committee on the Environment, Public Health and Food Safety (ENVI Committee) presented its draft opinion on the Hydrogen Strategy for a climate - neutral Europe, emphasizing the importance of a clear commitment to the transition to renewable and ultra-low-carbon hydrogen production as one of the keys to achieve the EU's 2050 climate neutrality target.

3. The Clean Hydrogen Alliance and roundtables

To achieve the goals described in the Hydrogen Strategy and to support the necessary investments for the deployment of a whole hydrogen eco-system, the European Commission launched the European Clean Hydrogen Alliance on 8 July 2020. Following the precedent of establishing the European Battery Alliance, the Clean Hydrogen Alliance brings together the investors, industry, national, regional, and local public authorities, and the civil society to build on existing work and to identify technology needs, investment opportunities, and regulatory barriers, among others. The Clean Hydrogen Alliance is expected to play a crucial role in supporting investments to scale up production and demand for renewable and low-carbon hydrogen. It will enhance the funding support and help bridge the investment gap for renewables caused by the COVID-19 pandemic crisis. As part of the European Commission's recovery plan, funding instruments of Next Generation EU, including the Strategic

European Investment Window of the InvestEU programme and the ETS Innovation Fund, this Clean Hydrogen Alliance initiative is expected to help Europe's industry with its transition towards climate neutrality and digital leadership in the post-pandemic era. It is also expected to help in the decarbonize process of heavy-duty transportation such as aviation, maritime and long-haul trucking.

Furthermore, there exist six roundtables of thematic working groups under the European Clean Hydrogen Alliance, covering all operations of the hydrogen value chain. The roundtables' themes include hydrogen production, clean hydrogen transmission and distribution, clean hydrogen in industrial applications, clean hydrogen for mobility, clean hydrogen in the energy sector and a roundtable on clean hydrogen for residential applications. The roundtables provide input to the work on related regulations, standardisation, and research and innovation priorities. They are tasked with building projects and the investment agenda in their area, while ensuring the interdependence with the other round tables.

Meanwhile, the MEPs of the ITRE Committee adopted two reports setting out measures to help Europe decarbonise its energy system, industry, and transport sectors, in response to the European Commission's hydrogen and energy system related strategies. The ITRE Committee pointed out that because hydrogen is not yet competitive, the Commission and Member States should incentivise the value chain and market uptake of the hydrogen fuel, when produced from renewable energy sources. Furthermore, the focus of hydrogen demand should be on sectors for which its use is close to being competitive or that cannot be decarbonised by other technological solutions, such as air, maritime and heavy-duty transports. A rapid agreement on a uniform EU-wide terminology is also necessary, as the distinction between renewable and low-carbon hydrogen needs to be clearly defined. The MEPs also called for assessing the possibility of repurposing existing gas pipelines for the transport and underground storage of hydrogen. The repurposing of gas infrastructures could be relevant in certain sectors of emissions-intensive industries, and any potential future gas infrastructure should be compatible with pure hydrogen. The EU Member States now need to invest accordingly and incentives for the international partnerships would also be necessary to create a global market for hydrogen.

4. Hydrogen projects for the Clean Hydrogen Alliance investment pipeline

On 12 April 2021, the European Commission launched an invitation to all members of the European Clean Hydrogen Alliance to submit projects for renewable and low-carbon hydrogen technologies and solutions. This is expected to be an important step for building a pipeline of viable investment projects to deliver on the Hydrogen Strategy's objectives, and for reaching the carbon neutrality target in 2050. The deadline for submitting projects was 7 May 2021. The next Hydrogen Forum meeting on 17-18 June will review the projects and provide opportunities for matchmaking.

According to the European Commissioner for Internal Market, Thierry Breton, clean hydrogen plays a key role in the race to decarbonise numerous sectors of the EU's economy, while it also contributes to a more resilient and competitive EU industry. This call for projects for renewable and low-carbon hydrogen technologies and solutions is an important step forward in the work of the Alliance. It will help build the project pipeline and assess and address gaps and bottlenecks in the clean hydrogen value chain. Meanwhile, at the conference "Hydrogen in Our Societies - Building Bridges" on 7 April 2021, the European energy ministers highlighted the need to create a stable regulatory framework for hydrogen in the EU, capable of attracting

private investors for a competitive and predictable market. According to Portugal's minister of environment and climate action, João Pedro Matos Fernandes, public and private investment should ally, and governments have the responsibility to give the right signals, creating the regulatory framework and conditions for the private sector to invest into clean hydrogen projects.

5. Conclusion

The European Green Deal has singled out hydrogen as central for reaching the EU's independency from fossil fuels and for delivering on the target to achieve carbon neutrality by 2050. Hydrogen has a potential to enable industry, transport, and energy sectors to decarbonise. A clear commitment to the transition towards renewable and ultra-low-carbon hydrogen production is one of the key steps to achieve this 2050 climate neutrality target. The priority is to develop renewable hydrogen, produced by using renewable energies like wind and solar energy.

However, although hydrogen has the potential to decarbonise industry, transport, and energy sectors, currently, almost 96% of all the hydrogen utilised are still made from natural gas and less than 0.1% of the global hydrogen production comes from water electrolysis. Accordingly, the hydrogen production is still emitting significant amounts of GHG. The future choice of the primary energy source for producing hydrogen will decide how clean or GHG emission-free it will be.

A first step towards decarbonising the hydrogen production and the mass production of clean hydrogen will be to produce low carbon hydrogen and the necessary infrastructure for capture and storage of the GHG emissions.

The Hydrogen Strategy explores the potential for clean hydrogen to help decarbonise the EU economy in a cost-effective way, and the Clean Hydrogen Alliance intends to bundle actions on deploying the renewable hydrogen. In this way, the Hydrogen Strategy also sets out a vision of how to install in Europe at least 6 GW of renewable hydrogen electrolysers by 2024, and 40 GW of renewable hydrogen electrolysers by 2030. Apart from setting out the strategy guidance on hydrogen, the EU is now looking at how to scale up the cost-efficient production, transport, and consumption of renewable hydrogen for achieving the clean energy transition.

The call for projects on renewable and low-carbon hydrogen technologies and solutions is expected to be an important step for selecting viable investment projects to deliver on the Hydrogen Strategy's objectives, and for reaching the carbon neutrality target in 2050.

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