

THE EUROPEAN HYDROGEN BANK AS AN ELEMENT OF SUPPORT FOR THE EU HYDROGEN STRATEGY

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ABSTRACT

The European Hydrogen Bank is a new platform intended to connect users with producers and stimulate the private sector's interest in new, environmentally friendly, hydrogen technologies. One of the purposes of this new institution is to reduce the cost difference between hydrogen produced in accordance with the guidelines of the delegated acts of the REDII (renewable hydrogen) and hydrogen produced from fossil fuels, and to increase the predictability of producer incomes. The institution is also designed to play a coordinating role, for instance, by collecting information on demand and supply, providing transparent information on prices and developing hydrogen market price benchmarks.

The bank is expected to become operational by the end of 2023. Particular emphasis is put on the financing of projects that contribute to the objectives of the European Green Deal, such as decarbonisation of industrial sectors that are difficult to electrify. The EHB is a key tool for driving the development and deployment of hydrogen technologies from renewable sources across the European Union. By providing financial support for hydrogen projects and

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supporting cooperation between EU Member States, the EHB can streamline the transition to a green hydrogen economy and contribute to Europe's climate and energy objectives.

I. INTRODUCTION

The global energy mix includes fewer and fewer fossil fuels and more and more renewable sources. The energy transition and the implementation of the so-called Green Deal are gaining momentum, new energy ecosystems are being created, and new technologies are emerging. These changes help develop renewable energy sources, develop new energy carriers, improve energy efficiency, reduce emissions and create new markets for coal and other by-products as part of a circular economy. At the same time, many of the decarbonisation measures being undertaken, such as increasing the share of electricity, the large-scale use of renewable energy and intensification of energy efficiency measures, constitute a unique challenge.

The European Union (EU) aims to achieve climate neutrality by 2050. The efforts towards a zero-emission net economy are the cornerstone of the European Green Deal and are in line with the EU's commitment to global climate action under the Paris Agreement. The European Clean Hydrogen Alliance has identified 840 hydrogen projects in all parts of the value chain, referred to as the 'project pipeline'.¹

The Commission is currently designing an auction system under the new competitive tendering mechanism. The first round is to take place in autumn 2023 with an initial budget of €800 million and is open for domestic producers and exporters outside the EU. The funds will be distributed as a fixed premium per kilogram of hydrogen produced for a maximum of 10 years. The new funds will be made available at a later stage. It is estimated that €1 billion will allow producing 50,000 tons of hydrogen from renewable sources, a fraction of what the Commission is seeking. The Commission's preliminary estimates suggest that €90-115 billion is needed to offset the green hydrogen cost gap and to fund 20 million tons by 2030.²

The target of producing 10 million tons of hydrogen from renewable sources would require 80-100 GW of installed power in electrolyzers (currently the figure

¹ Project pipeline of the European Clean Hydrogen Alliance <https://single-market-economy.ec.europa.eu/industry/strategy/industrial-alliances/european-clean-hydrogen-alliance/project-pipeline_en> accessed 10 April 2023.

² EU Hydrogen Bank could bring renewable hydrogen costs below 1 euro/Kg <<https://fuelcellsworld.com/news/eu-hydrogen-bank-could-bring-renewable-hydrogen-costs-below-e1-kg/>> accessed 10 April 2023.

is approx. 160 MW). This means that the EU market of green hydrogen is facing numerous investment challenges, including increasing the production capacity of electrolysers, increasing new hydrogen production capacity, opening up new sectors of demand for renewable and low-carbon hydrogen, and developing hydrogen infrastructure.

Europe currently is the location of more than 30% of the world's hydrogen projects.³

I. DECARBONISATION AND HYDROGEN ECONOMY

In just a few decades, all energy needs (including electricity, industry, transport, buildings, agriculture) will have to be met using emission-free sources. This entails the necessity of enormous changes within little more than one generation and will require innovative solutions, technologies and policies. To achieve its climate goals and comply with the recommendations of the IPCC2, the EU has committed to transforming its electricity, transport, buildings and industry sectors to become fully or nearly carbon-neutral by 2050. Moreover, the pressure to decarbonise the European economy, including the use of green hydrogen, has been increased by Russia's invasion of Ukraine and the ensuing energy crisis. In the medium and long term, the importance of renewable energy sources (RES) and their derivatives will continue to grow, offering not only the most competitive energy generation costs, but above all the much-desired energy independence. However, renewable and nuclear energy sources alone will never be able to meet all our energy needs, therefore hydrogen is likely to play a key complementary role. The hydrogen economy will probably become an integral part of the EU economy much sooner than expected.⁴

In the context of decarbonisation of the energy system, over the last 2 years there has been a very rapid increase in interest from industry, governments and other stakeholders in the potential of hydrogen.⁵ The tendency towards decarbonisation in general, and the development of hydrogen technologies in particular, is strongest in Europe, although other continents have also begun to

³ Hydrogen Insights Report, September 2022. Report authored by Hydrogen Council with McKinsey and Company, p. 5-8. Available at <<https://hydrogencouncil.com/en/hydrogen-insights-2022/>> accessed 15 April 2023.

⁴ Mainstreaming green hydrogen in Europe (2020) Material Economics 4 <<https://materialeconomics.com/latest-updates/mainstreaming-green-hydrogen-in-europe>> accessed 10 April 2023.

⁵ See e.g. Martin Lambert, 'Hydrogen and decarbonisation of gas: false dawn or silver bullet?' (2020) 66 *The Oxford Institute for Energy Studies. Energy Insight* 5 et seq; Ralf Dickel, 'Blue hydrogen as an enabler of green hydrogen: the case of Germany' (2020) 159 *The Oxford Institute for Energy Studies. OIES Paper* 3 et seq.

develop the potential of renewable hydrogen. National hydrogen strategies have been published by Japan (2017), South Korea (2019), New Zealand (2019), Australia (2019), Netherlands (2020), Norway (2020), Portugal (2020), and Germany (2020).

On 8 July 2020, the European Commission published the EU's Hydrogen Strategy,⁶ identifying this energy carrier as a priority for the European Green Deal⁷ and the Community's energy transformation. The document provides for the creation of incentives to increase both production and demand for hydrogen under the EU economy conditions. Following the strategy, an extensive revision of the existing regulations, and the enacting of new ones to provide a favourable environment for the development of hydrogen infrastructure, have been launched. Currently, the green hydrogen market is in the development phase – individual parts of the value chain begin to connect one with another, and the implementation of hydrogen technologies is no longer just a pilot project.

The publication of the EU's Hydrogen Strategy has become an important step towards decarbonising the energy system, and provides a framework for further, more detailed work on implementation plans. It clearly demonstrates the enormous extent of the challenge and, if the ambition is to be realised, the urgent need for government action to support individual large-scale renewable hydrogen production projects. It is worth noting that, unlike certain previous documents, the strategy recognises the potential role of low-carbon fossil fuel-derived hydrogen, at least in the period of transition towards the end goal of renewable hydrogen. While the strategy provides for an open, competitive and liquid hydrogen market with unrestricted cross-border trade in the long term, it is not yet certain how this will be achieved after the period of subsidies and incentives needed to justify the very significant investment to build the infrastructure as needed.⁸

As made clear by the provisions of the REPowerEU plan,⁹ renewable hydrogen will be of crucial importance for replacing natural gas, coal and oil in industries and transport where decarbonisation poses difficulty. REPowerEU has set a target of 10 million tonnes of internal renewable hydrogen production and

⁶ Communication of 8.7.2020 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A hydrogen strategy for a climate-neutral Europe, COM (2020) 301 final.

⁷ Communication of 11.12.2019 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The European Green Deal, COM (2020) 640 final.

⁸ Martin Lambert, 'The EU Hydrogen Strategy. A case for urgent action towards implementation' (2020) The Oxford Institute of Energy Studies. Oxford Energy Comment 5 et seq.

⁹ Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions of 18.05.2022 rePowerEU Plan, COM (2018) 230 final.

10 million tonnes of renewable hydrogen imports by 2030. The Commission invited the European Parliament and the Council to adjust the sub-targets for non-biological renewable fuels under the Renewable Energy Directive in industry and transport to the REPowerEU's ambition (75% in industry and 5% in transport)¹⁰ and to rapidly complete the revision of the hydrogen and gas market package; to make complementary subsidies for investments under Horizon Europe for the Hydrogen Joint Undertaking (€200 million) in order to double the number of hydrogen valleys. The European Commission has published (for the purposes of collecting public feedback) two delegated acts on the definition and production of renewable hydrogen; it has completed the evaluation of the first major hydrogen projects of common European interest; and it continues to urge industry to speed up work on the missing standards for hydrogen (in particular on hydrogen production, hydrogen infrastructure and hydrogen end-use equipment). In addition, it declares the intention, in close cooperation with Member States, to report regularly, from 2025 onwards, on progress in the use of renewable hydrogen in devices used in industry and transport, the areas in which it is difficult to reduce emissions.

The documents published by the EU bodies clearly show that one of the priorities has become the implementation of hydrogen infrastructure for the production, import and transport of 20 million tonnes of hydrogen by 2030. The cross-border hydrogen infrastructure is still underdeveloped, but the basis for planning and development has already been laid by integrating hydrogen infrastructure into modernised trans-European energy networks. It is estimated that total investment needs for the main categories of hydrogen infrastructure range between €28 billion and €38 billion for EU internal pipelines and between €6 and €11 billion for storage. Furthermore, to facilitate the import of up to 10 million tonnes of renewable hydrogen, the Commission plans to support three main hydrogen transport corridors across the Mediterranean, the North Sea area and, as soon as conditions allow, from Ukraine.

II. HYDROGEN ACCELERATOR AND THE EUROPEAN HYDROGEN BANK

By publishing the REPowerEU plan, the European Commission has completed the hydrogen strategy, which affirms Europe's growing ambitions concerning renewable hydrogen as an important energy carrier with the aim of abandoning imports of fossil fuels from Russia. In the Commission staff working

¹⁰ Commission Staff Working Document Implementing the REPowerEU Action Plan: Investment needs, Hydrogen Accelerator and Achieving the Bio-methane Targets, accompanying the rePowerEU Plan.

document accompanying the plan,¹¹ the Commission outlines the concept of ‘hydrogen accelerator’ intended to increase the deployment of renewable hydrogen technologies.

Activities planned as part of the accelerator focus on speeding up the introduction of renewable hydrogen, ammonia, and other derivatives in sectors where emission reduction is difficult (such as transport) and in energy-intensive industrial processes. Increasing the development of hydrogen infrastructure and supporting investment in hydrogen have been identified as key areas to support the promotion of hydrogen in the EU.

One of the measures for accelerating hydrogen technologies is to create a global European Hydrogen Bank as a guarantor of investment security and business opportunities for European and global production of hydrogen from renewable sources.¹² The establishment of such a bank was announced by European Commission President Ursula von der Leyen in a speech on the state of the Union in 2022¹³ and the initiative was included in the Commission work programme 2023. The Communication on the European Hydrogen Bank¹⁴ published on 16 March 2023 takes into account its concept, tasks and structure.

Objectives

The European Hydrogen Bank is intended to support private investment in hydrogen value chains in the EU and in third countries by combining the supply of renewable hydrogen with the emerging demand from European distributors, thereby creating a first market for renewable hydrogen. The Bank will support both the production of renewable hydrogen in the Member States and its import from international producers to European consumers. In the absence of sufficient support for novel, innovative projects, the adopted strategy is to cover or reduce the cost difference between renewable hydrogen and fossil fuels, which may thereby be replaced.

¹¹ Commission staff working document implementing the RePower EU Action Plan: Investment needs, hydrogen accelerator and achieving the bio-methane targets, accompanying the document Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and the Social Committee and the Committee of the Regions REPowerEU Plan, 18.5.2022, (SWD/2022/230).

¹² The European Hydrogen Bank. Kickstarting the European hydrogen market. Hydrogen Europe Position Paper, March 2023 <https://hydrogeneurope.eu/wp-content/uploads/2023/03/2023.03_Hydrogen-Bank_H2Europe_paper.pdf> accessed: 29 March 2023.

¹³ 2022 State of the Union Address by President von der Leyen, Speech of 14 September 2022, Strasbourg <https://ec.europa.eu/commission/presscorner/detail/en/speech_22_5493> accessed 5 April 2023.

¹⁴ Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and the Social Committee and the Committee of the Regions on the European Hydrogen Bank, 16.3.2023 COM (2023) 156.

The European Hydrogen Bank is supposed to focus on four key activities: supporting the production of hydrogen from renewable sources by financing it using two different mechanisms; providing greater demand visibility by linking to vendors, parallel Member State initiatives and existing data centres; and coordinating and facilitating the use of existing financial instruments to support hydrogen projects.¹⁵ The Commission plans a leading role for the Bank in unlocking private sector investment, market creation, and pricing by creating competition in terms of funding, as well as increasing investor confidence and gaining knowledge about project funding in the sector. In the long term, the purpose of the bank is to reduce the cost difference to a level that private suppliers would be willing and able to pay. The bank is to become operational by the end of 2023.¹⁶

Auctions

The Commission has planned that the first pilot auctions for renewable hydrogen production be launched under the Innovation Fund in autumn 2023 under a new tendering mechanism, in compliance with the rules set out in the Financial Regulation¹⁷ and the revised EU Emissions Trading System (ETS) Directive.¹⁸ The auctions are designed to link supply and demand for hydrogen from domestic renewable sources in the EU and to most effectively bridge the cost gap between hydrogen from renewable sources and hydrogen produced from fossil fuels. They have proven to be a good solution in the energy sector, reducing the required funding for renewable energy generation through price competition.

Competitive auctions with a simple and transparent structure make the costs more transparent and create valuable comparative price points that can be used to launch the European hydrogen market, reduce the risk of European hydrogen projects, lower capital costs and use private capital. Given the extent of the investment, support from the Innovation Fund should be seen as seed funding for

¹⁵ Communication on European Hydrogen Bank COM (2023) 156 final 6. See also: Igor Hanas, Rafał Pytko, 'Europejski Bank Wodorowy – czy UE sfinansuje wodorową rewolucję?' (3 April 2023) *Cire.pl Centrum Informacji o Rynku Energii* <<https://www.cire.pl/artykuly/serwis-informacyjny-cire-24/europejski-bank-wodorowy--czy-ue-sfinansuje-wodorowa-rewolucje>> accessed 15 April 2023.

¹⁶ Rainer Lütkehus, 'European Hydrogen Bank takes shape' (17 March 2023) *EnerGate Messenger* <<https://www.energate-messenger.com/news/231391/european-hydrogen-bank-takes-shape>> accessed 5 April 2023.

¹⁷ European Commission, Directorate-General for Budget, 'Financial regulation applicable to the general budget of the Union' July 2018 (Publications Office 2019) <<https://data.europa.eu/doi/10.2761/816722>> accessed 17 April 2023.

¹⁸ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ L.2003.275.32.

private and corporate investment. By significantly reducing administrative burdens and costs and through short, inexpensive and transparent procedures, the EU will be able to play a leading role in the development of the hydrogen market, taking into account support mechanisms provided by third countries.

The first pilot auction will support the production of hydrogen from renewable sources, as defined in the final versions of the delegated acts of the Renewable Energy Directive.¹⁹ As part of the auction, hydrogen producers will be granted a subsidy in the form of a fixed premium per kilogram of hydrogen produced for up to 10 years of operation. Closing the cost gap and increasing revenue stability will make the projects more attractive for investors and reduce overall capital costs. Payments will be based on actual performance, that is, made upon delivery of certified and verified renewable hydrogen volumes.

The indicative budget for the first auction will be €800 million, which was set after market research and in order to guarantee an appropriate level of competition. The experience gained after the first pilot auction will help determine the size of future auction rounds.

The auction model adopted assumes simplicity, transparency, and prompt implementation. The Commission shall continue to consult stakeholders, including on the use of bonds related to the offer or implementation in accordance with the legal framework set out in the revised ETS Directive, the maximum price and maximum implementation periods. Upon their completion, the Commission will determine the auction conditions, including eligibility, auction clearance, payments, and penalties, and publish them in the summer of 2023. Such a timetable will give bidders the opportunity to learn about the concept of the auction and to prepare bids. The first full cycle of the auction project was entrusted to the European Climate, Infrastructure and Environment Executive Agency (CINEA).

Coordination

Through its activities, to increase confidence in the developing market, the European Hydrogen Bank is expected to ensure transparency on hydrogen flows, transactions and prices. The Bank will collect and supplement information on the demand and supply of renewable hydrogen in the EU and globally based on existing sources and structures; for instance, through the European Clean Hydrogen Alliance, the Renewable and Low-Carbon Fuels Value Chain Industrial Alliance or the Alliance for Zero Emission Aviation; as well as through existing

¹⁹ Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, PE/48/2018/REV/1, OJ L 328 of 21.12.2018, 82–209.

project funding mechanisms and monitoring of the industry and the operation of the Fuel Cell Hydrogen Observatory as part of the Clean Hydrogen Joint Undertaking and the Green Hydrogen Partnerships. Moreover, the Bank will cooperate with the International Energy Agency (IEA) and the International Renewable Energy Agency (IRENA).

The rapid development of dedicated hydrogen infrastructure within the EU and into the EU, linking supply and demand, is crucial for achieving decarbonisation objectives. The revised TEN-E Regulation²⁰ is a unique instrument for planning European energy infrastructure. The European Hydrogen Bank will support infrastructure planning with information on hydrogen flows to be collected by it as part of its activities (such as information on delivery points).

III. CONCLUSIONS

The EHB will offer financial support for hydrogen projects, attenuating one of the fundamental barriers to economic development, and can indeed become a catalyst for private sector investment in hydrogen production, infrastructure and end uses. In the initial period of market development, support is also necessary to eliminate significant differences in financing between the production costs and the willingness to pay among green hydrogen recipients.²¹

By supporting innovation and technological progress, the Bank may contribute to reducing the costs related to the production and use of hydrogen. But it should be noted that the initial funding granted to EHB may prove insufficient to support investments that will stabilise the EU's green hydrogen economy. To maximise its impact, the EHB may need additional funding from EU Member States. Extending the support to a minimum of 15 years should also be considered, which would ensure sufficient financial visibility and depreciation for production assets. Therefore, taking into account the level of support of €3 Kg for 15 years, the sum of €3 billion would be enough to support the annual production of only 66,667 tonnes of hydrogen.²² This means that the budget of

²⁰ Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013, OJ L 152 of 3.6.2022, 45–102.

²¹ Mateusz Kubiak, 'Europejski Bank Wodoru. Warto uzupełnić go również polskim mechanizmem wsparcia' (22 March 2023) BiznesAlert <<https://biznesalert.pl/europejski-bank-wodoru-mechanizm-gaz-wodor-energetyka/>> accessed 5 April 2023.

²² Calculations by Hydrogen Europe (March 2023), available at <https://hydrogeneurope.eu/> accessed 10 April 2023. Hydrogen Europe is the European association representing the interest of the hydrogen industry and its stakeholders and promoting hydrogen as an enabler of a zero-emission society.

the EHB should be increased to ensure stable and long-term financing for hydrogen projects.

Moreover, the EHB may face challenges in selecting the most promising projects for financial support, which may lead to the allocation of resources to less efficient or unsustainable projects. The only criterion during internal auctions will be the price, which may lead to the concentration of support in regions where, thanks to geographical conditions favourable to RES, hydrogen production is the cheapest. Moreover, the mechanism as announced does not provide for the indexing of premiums, which may expose the beneficiaries to price risk. It should also be noted that the EHB's focus on large projects and cross-border cooperation may unintentionally exclude smaller players, such as local hydrogen producers and start-ups, who could also benefit from financial support. The EHB should consider implementing mechanisms to support smaller-scale projects and promote a more diverse hydrogen ecosystem.²³

Over time, the original concept of green premium auctions could be extended to further reduce the risks arising from the uncertainty of reception agreements by establishing an intermediary to hold bilateral auctions. Such an intermediary would sign contracts with both the producer and the recipient. This approach is already being pursued by a German foundation, H2Global.

IV. CLOSING REMARKS

The stability, predictability and reliability of the framework for additional renewable energy and hydrogen projects in a potential supplier country is a key factor for future hydrogen recipients who make large-scale investment decisions and provide long-term financing.

The main objective behind the establishment of the European Hydrogen Bank is to support private investment in the hydrogen value chain, both in EU countries and in third countries, by linking the supply of renewable energy with demand in the EU and by addressing the initial investment problems – the sum of €3 billion has been assigned for this. The Bank is intended to establish an initial market for renewable hydrogen, which will open up new opportunities for development and generate jobs. In February 2023, the EC announced that the Bank would support production of green hydrogen under the model of contract for difference, offering to projects competing in the auction a fixed premium for every kilogram of hydrogen produced in the period of 10 years.

²³ Bartłomiej Kupiec, 'Europejski Bank Wodoru to game changer czy utracona szansa?' (6 April 2023) BiznesAlert <<https://biznesalert.pl/europejski-bank-wodoru-zeop-energetyka-gaz-wodor/>> accessed 7 April 2023.

The European Hydrogen Bank and the support provided by it in the form of competitive auctions may become a central axis for the development of the EU hydrogen market. The experience with auctions for renewable energy generation shows that they can significantly contribute to a rapid reduction in the costs of technologies being supported. The proposed system may facilitate the development of hydrogen technologies by providing a clear and transparent mechanism of funding, and this in turn could help build a more diversified energy system in which hydrogen plays a complementary role to other low-carbon energy sources.

The EU will support partner countries in accelerating their transition towards green energy by, *inter alia*, technical assistance and support in creating a favourable governance, legal and business environment, as well as mobilising the investments needed in renewable energy and energy efficiency.

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