



## IPHE Country Update April 2024 – Nov 2024: European Commission

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<b>Covered Period</b>	April 2024 to November 2024

### 1. New Initiatives, Programs, and Policies on Hydrogen and Fuel Cells

#### [The Hydrogen and gas markets decarbonisation package](#)

The EU hydrogen and gas decarbonisation package, consisting of [Directive \(EU\) 2024/1788](#) and [Regulation \(EU\) 2024/1789](#), was adopted in May 2024. These revised gas market rules were published in the EU Official Journal on 15 July and entered into force 20 days later. The package updates the rules on the EU natural gas market set out in the Gas Directive 2009/73/EC and the Gas Regulation 715/2009. It also introduces a new regulatory framework for dedicated hydrogen infrastructure. EU countries have until mid-2026 to transpose the revised Gas Directive into national law.

The revised rules create a level-playing field, based on EU-wide rules, for the hydrogen market and infrastructure and remove barriers that hamper their development. They also create the right conditions for some of the existing natural gas infrastructure to be decommissioned and if needed repurposed for hydrogen, which will lead to cost savings and support decarbonisation at the same time.

The package also sets out clear rules on energy imports, such as a requirement to adopt EU-level or MS-level agreements on the operation of hydrogen import pipelines. The package also empowers the Commission to establish a pilot mechanism to support the market development of renewable and low-carbon hydrogen. It will also use the information collected to provide insights on infrastructure development and facilitate financial support.

Additionally, the recast Gas Directive introduces a system of terminology and certification of low-carbon hydrogen, complementing the [revised Renewable Energy Directive](#) (EU/2023/2413).

**Low-carbon hydrogen** refers to hydrogen the energy content of which is derived from **non-renewable sources**, which meets the GHG reduction threshold of 70 % compared to 94 g CO<sub>2</sub>eq/MJ that is set out in the methodology for assessing their GHG savings



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from renewable fuels of non-biological origin (**RFNBOs**) and recycled carbon fuels under the EU Renewable Energy Directive.

### ENNOH

The revised Gas Regulation establishes the European Network of Network Operators for Hydrogen (ENNOH) to support the cost-efficient development and operation of hydrogen pipelines in the EU. This association for the EU-level cooperation of hydrogen transmission network operators will be responsible for the:

- development of draft network codes for hydrogen to ensure the optimal management of the Union hydrogen network, and
- Development of hydrogen ten-year network development plans (TYNDP) in cooperation with ENTSO-E and ENTSO-G in the framework of the EU-level integrated network planning.

### Renewable hydrogen

In September 2024, a [guidance on the RFNBO targets for industry and transport](#) was published. It explains the calculation of the targets, their scope and the interlinkage between the 2 targets for industry and transport.

A compliance certification system is in place, with six internationally operating certification schemes having applied for EU recognition. The adoption of the first delegated acts on recognition is expected by the end of 2024.

### Delegated Act on low-carbon hydrogen

As per the Directive, the Commission has to adopt a methodology for evaluating the emission savings of low-carbon fuels. In line with the legal mandate, this methodology must be aligned with the approach established for renewable fuels of non-biological origin (RFNBOs) and recycled carbon fuels (RCF) and will cover all relevant production pathways (e.g. hydrogen produced from low-carbon electricity and hydrogen produced from natural gas applying CCUs) and create a level playing field between various forms of hydrogen. The act will provide the last missing element for the methodology to identify what qualifies as low-carbon hydrogen.

The draft delegated act for a methodology for low-carbon hydrogen was published on 27 September for public consultation which closed on 25 October. The deadline for adopting the methodology is 5 August 2025. However, the Delegated Act is under preparation and is foreseen to be adopted before the end of 2024.

Upon finalisation, the text of the delegated act will be passed to the European Parliament and the Council of Ministers for a 2-month scrutiny period. If the Parliament and the Council do not object during this time, the delegated act is formally published in the Official Journal and enters into force.

### Publication of the Hydrogen Valleys roadmap

The Commission [Staff Working Document](#) *“Towards a roadmap for accelerating the deployment of Hydrogen Valleys across Europe: challenges and opportunities”* was



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published last June 2024. Building on the [work](#) done by the Clean Hydrogen JU, it outlines the strategic priorities and actions needed to reach the REPowerEU objective of doubling the number of Hydrogen Valleys in the EU.

### 2. Hydrogen and Fuel Cell R&D Update

#### [Launch of the 2024 Call for Proposals of Clean Hydrogen JU \(January 2024\)](#)

The Call for Proposals has an indicative total budget of EUR 113.5 million, plus EUR 60 million from Horizon Europe, to be directed towards Hydrogen Valleys topics according to the REPowerEU Plan. Synergies with other European partnerships and programmes as well as with Member States and regional programmes are at the core of a number of topics.

A total of 20 topics are part of the Call for Proposals, including 5 in renewable hydrogen production, 5 in hydrogen storage and distribution, 4 in transport and 2 in heat and power. In addition, 2 topics will support cross-cutting issues. This call also includes 2 Hydrogen Valleys topics.

The Clean Hydrogen JU received 151 proposals<sup>1</sup>. These projects will significantly advance research on hydrogen technologies across the whole hydrogen value chain: from continuous support to very innovative European electrolysis technologies, large-scale demonstration above-ground hydrogen storage, multi-purpose hydrogen refuelling stations, multi-MW fuel cells for maritime applications or fuel cell-based systems for Non-Road Mobile Machinery, next generation of onboard storage solutions for maritime applications, to guidelines for sustainable-by-design systems and the development of non-fluorinated components for fuel cells and electrolyzers.

The Clean Hydrogen JU Strategic Research and Innovation Agenda was amended last June 2024, to update the coverage in light of the new policy developments (Green Deal Industrial Plan, Net Zero Industry Act, Hydrogen Bank). A second amendment will follow in early 2025, this time on Key Performance Indicators.

### 3. Demonstration, Deployments, and Workforce Developments Update

#### [Demo4Grid: Demonstration of a 4 MW Pressurised Alkaline electrolyser for Grid Balancing Services](#)

The Demo4Grid<sup>2</sup> project developed an excellent hydrogen production, storage and use facility in Völs near Innsbruck, Austria, to help green local food industry MPREIS.

A single-stack 3.2 MW high pressure alkaline electrolyser was developed by IHT/Sunfire capable of providing 1.3 tons of H<sub>2</sub> per day. The electrolyser was developed through the replacement/refurbishment of parts of an existing electrolyser which was a great application of the circularity principle applied to electrolyzers. Hydrogen was stored in large storage tanks and used to displace fossil gas in an oil boiler. Green hydrogen is produced at times with a high share of renewable energy in the electricity grid, mostly from a local hydro power plant, with the hydrogen storage tanks used to time shift production and demand. The capability to dynamic operation of the electrolyser allowed it to take part in the intraday electricity balancing services market, helping reduce the cost of the produced green hydrogen. Particular emphasis paid to a remote control system for advanced maintenance and smart operation developed by

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<sup>1</sup> [https://www.clean-hydrogen.europa.eu/call-proposals-2024-closed\\_en](https://www.clean-hydrogen.europa.eu/call-proposals-2024-closed_en)

<sup>2</sup> [https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/demo4grid\\_en](https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/demo4grid_en)



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INCOM. The facility was expanded to include a hydrogen refuelling station and hydrogen trucks to distribute the products of MPREIS, establishing a complete hydrogen ecosystem.

### HyUSPRe: A roadmap for successful deployment of underground hydrogen storage

Project HyUSPRe<sup>3</sup>, funded by the Clean Hydrogen Partnership, published a roadmap<sup>4</sup> for successful deployment of underground hydrogen storage in porous reservoirs in Europe in June 2024. Underground hydrogen storage in porous reservoirs is a key enabler to unlock these benefits of hydrogen because it i) offers flexibility to balance supply and demand of hydrogen, maximise renewables integration and reduce curtailment, ii) enables optimisation of infrastructure sizing and increases system resilience, and iii) improves energy security and independence by enabling long-duration energy storage and maintaining strategic reserves.

HyUSPRe research finds that up to 270 TWh of storage capacity will be required in 2050 to support a fully developed hydrogen value chain, of which the majority (60%) is to be developed in porous reservoirs.

In the roadmap the consortium proposes actions grouped into five thematic areas that are required for timely deployment of this storage capacity: 1) technology development, upscaling and optimization; 2) management of environmental impacts; 3) establishing business models and economic viability; 4) regulatory framework; and 5) ensuring societal awareness and acceptance.

### JIVE 2: Success with 122 Hydrogen Buses and Counting

Project JIVE 2,<sup>5</sup> the successor of project JIVE<sup>6</sup>, both supported by the Clean Hydrogen JU, aims to upscale fuel cell bus deployment as one of very few options for the elimination of harmful local emissions and the decarbonisation of public transport. JIVE 2 has successfully deployed a fleet of 122 fuel cell buses so far across six countries, with an additional 37 expected by the end of 2024 (2 in Barcelona, 1 in Tartu, and 34 in Brighton). The project has also established nine hydrogen refuelling stations and gathered extensive data on hydrogen mobility.

The JIVE and JIVE 2 buses have collectively travelled over 17 million kilometres, dispensing 1,340 tonnes of hydrogen. These buses demonstrate low hydrogen consumption, ranging from 5.6 to 7.6 kg H<sub>2</sub>/100 km.

This data has facilitated an assessment of the economic and ecological impacts of hydrogen mobility and identified the challenges for further technology roll-out. JIVE 2 reached an enormous number of citizens and generated huge interest in hydrogen mobility across Europe by organizing several Bus Roadshows in Central and Eastern Europe in 2023 and 2024.

## 4. Events and Solicitations

<sup>3</sup> [https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/hyuspre\\_en](https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/hyuspre_en)

<sup>4</sup> [https://www.hyuspre.eu/wp-content/uploads/2024/06/HyUSPRe\\_D7.5\\_Roadmap-for-successful-deployment-of-H2-storage\\_2024.06.11.pdf](https://www.hyuspre.eu/wp-content/uploads/2024/06/HyUSPRe_D7.5_Roadmap-for-successful-deployment-of-H2-storage_2024.06.11.pdf)

<sup>5</sup> [https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/jive-2\\_en](https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/jive-2_en)

<sup>6</sup> [https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/jive\\_en](https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/jive_en)



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### Publications

#### [Final Report on synergies with Member States and Regions<sup>7</sup> \(November 2023\)](#)

In the context of the Technical Assistance provided to **generate synergies with Members States and regions**, a new report covers the national and regional/local hydrogen strategies of the EU-27, as well as of the Horizon Europe associated countries with representatives in the Clean Hydrogen Joint Undertaking State Representatives Group. The document combines the information retrieved via literature review with the information provided by the SRG representatives both via the tailor-made questionnaire and interviews.

The main take aways regarding the targets underlines that the main focus of the national H<sub>2</sub> strategies is on installed electrolyser capacity, In terms of funding instruments, despite the general openness of national programmes towards co-funding, further collaboration is necessary to enable synergies between the different funding opportunities and increase their impact. Finally, policy initiatives and measures (including tax incentives at national level) should remain in line with the REPowerEU target of 10 million tonnes of domestic renewable hydrogen, to facilitate the manufacturing scale-up of commercially available low-carbon technologies, equipment and components.

#### [Report on Development Assistance for Regions II for Hydrogen Valleys<sup>8</sup> \(June 2024\)](#)

The final report highlights that a total of 14 different projects from cities and regions in 9 different European countries were supported. Road transport applications, in particular buses, were the most common target end use. The projects seek to develop new hydrogen production facilities, typically electrolysers in the low megawatt / low tens of megawatts scale for the initial phases of deployment, linked to existing and / or new build renewable electricity generation assets (typically solar PV and wind turbines).

#### [Success Stories 2024<sup>9</sup> \(October 2024\)](#)

The Clean Hydrogen Partnership Success Stories publications for 2024 cover a wide variety of innovations and important breakthroughs, from new electrolysers to generate cheap, clean hydrogen, underground storage to support energy security and balance fluctuations, repurpose of Europe's gas grid to transport hydrogen, decarbonisation of inland waterway transport and portable generators using hydrogen, to supporting the sustainable, circular European hydrogen economy and the regions to grow their hydrogen economies. These success stories highlight how the Clean Hydrogen Partnership's projects and initiatives are making hydrogen a reality in Europe!

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<sup>7</sup> [https://www.clean-hydrogen.europa.eu/media/publications/generate-synergies-member-states-and-regions-assessment-hydrogen-policies-and-funding-strategies\\_en](https://www.clean-hydrogen.europa.eu/media/publications/generate-synergies-member-states-and-regions-assessment-hydrogen-policies-and-funding-strategies_en)

<sup>8</sup> [https://www.clean-hydrogen.europa.eu/media/publications/final-report-project-development-assistance-regions-ii-cohesion-countries-outermost-regions-and\\_en](https://www.clean-hydrogen.europa.eu/media/publications/final-report-project-development-assistance-regions-ii-cohesion-countries-outermost-regions-and_en)

<sup>9</sup> [https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2024/european-hydrogen-week-2024-clean-hydrogen-ju-awards-2024/european-hydrogen-week-2024-shortlisted-success-stories\\_en](https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2024/european-hydrogen-week-2024-clean-hydrogen-ju-awards-2024/european-hydrogen-week-2024-shortlisted-success-stories_en)





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### Events & Initiatives

#### European Hydrogen Week (18-22 November 2024)<sup>10</sup>

The Clean Hydrogen Partnership, Hydrogen Europe, Hydrogen Europe Research and the European Commission have teamed up to bring the entire hydrogen sector in one place for a whole week of conferences, exhibition and networking opportunities.

In addition to the well-established policy sessions, it will feature the sixth edition of the Clean Hydrogen Partnership Awards, celebrating the best innovation, the best success story, the best project outreach, the European Hydrogen Valley of the year and Women in H2 Innovation.

This year, the European Hydrogen Week will include an Innovation Hub, that features an Innovation Forum, filled with exciting and interactive sessions.

The Innovation Forum complements the High-Level Policy Conference with sessions on Research and Innovation covering the whole value chain, focusing on EU competitiveness, skills and H2 Valleys. The sessions will include our programme review, presenting the latest developments and most groundbreaking projects in each pillar and interesting discussions involving relevant stakeholders. It will also highlight the international perspective, as we partner up with IPHE, NEDO and Mission Innovation to discuss global challenges on research and innovation.

The Innovation Hub will also feature a dedicated EU Projects Pavilion, including a Technical Forum where projects have the opportunity to showcase their achievements and present their activities.

#### Hydrogen Valley Days (17-18 June 2024)<sup>11</sup>

This first edition brought together stakeholders from industry, research, Member States and Regions, to accelerate cooperation for the development of Hydrogen Valleys across Europe. The event was an indication of how important hydrogen technology and the valleys have become to the European Commission's climate targets. It is likely to become an annual highlight on the hydrogen calendar.

Worldwide, close to 100 Hydrogen valleys are at different stages of completion, around 70 of them in the EU, according to the Mission Innovation Hydrogen Valley Platform. Starting with BIG HIT in the Orkney Islands, the Clean Hydrogen Partnership had been supporting 16 of these valleys in 15 EU countries with EUR 200 million in EU funding since 2015. Fifteen of them are ongoing and represent a total investment of over EUR 1 billion. They are expected to produce in excess of 21 000 tonnes of hydrogen per year to contribute to the EU's RepowerEU targets.

The first day of the event concluded with the signing of three memoranda of cooperation between the Clean Hydrogen Partnership and Croatia, the Friuli-Venezia Giulia Region of Italy and Bulgaria. Also, it was announced that the future Hydrogen

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<sup>10</sup> [https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2024\\_en](https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2024_en)

<sup>11</sup> [https://www.clean-hydrogen.europa.eu/media/news/hydrogen-valley-days-build-cooperation-developing-eus-local-hydrogen-economies-2024-06-26\\_en](https://www.clean-hydrogen.europa.eu/media/news/hydrogen-valley-days-build-cooperation-developing-eus-local-hydrogen-economies-2024-06-26_en)



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Valley Facility would be an extension of the Clean Hydrogen Partnership's support framework which aims to increase the maturity of hydrogen valleys projects through project development, technical, financial and legal assistance. The aim is for it to help valleys develop a plan to get through their pre-feasibility stage to final investment decision. The tender has been published by the partnership on 25 June 2024, following the event.

### **5. Investments: Government and Collaborative Hydrogen and Fuel Cell Funding**

#### **Innovation Fund**

The results of the last call were published on 24 October 2024. The Commission has selected 85 innovative net-zero projects to receive €4.8 billion in grants. This is the largest call since the start of the Innovation Fund in 2020, boosting the total amount of support to €12 billion and increasing the number of projects by 70% helping to put cutting-edge clean technologies into action across Europe. For the first time, projects of different scales (large, medium and small, alongside pilots) and with a cleantech manufacturing focus are awarded under this call for proposal.

The selected projects are set to enter operation before 2030 and over their first ten years of operation are expected to reduce emissions by about 476 million tonnes of CO<sub>2</sub> equivalent.

This will contribute to European decarbonisation objectives, by reducing emissions from those sectors that are particularly difficult to decarbonise, strengthen European industrial manufacturing capacity and reinforce Europe's technology leadership and supply chain resilience.

Significant contribution of these projects to the EU objectives with 3 GW of solar photovoltaic manufacturing capacity in the EU, 9.3 GW of electrolyser manufacturing capacity, 13% of the 50 Mt NZIA CO<sub>2</sub> storing target, support of net-zero mobility in particular in maritime, support sustainable transport fuels with the production of 525 kilotonnes of renewable fuels per year.

#### **The European Hydrogen Bank**

In 2022, the Commission launched the European Hydrogen Bank to support the scale-up of production and deployment of renewable hydrogen across Europe, contributing to the decarbonisation of European industry. It consists of a domestic and an international leg and the mechanism to scale up the hydrogen market. Under the domestic leg, funding is awarded as a fixed premium in €/kg of verified and certified renewable fuel of non-biological origin (RFNBO) hydrogen produced.

The first-ever domestic auction for renewable hydrogen production under the European Hydrogen Bank was launched in November 2023 and closed in February 2024. Seven renewable hydrogen projects were selected and will receive nearly EUR 720 million in project support from the EU Innovation Fund, from a total of 132 bids submitted to the auction. 6 of 7 projects signed their respective grant agreements in October 2024. Resources for the Fund come from the European Emissions Trading System (EU ETS).

The projects must start producing renewable hydrogen within 5 years.



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Altogether, the selected projects will cover 1.5 Gigawatts electric (GWe) of electrolyser capacity and produce a total volume of 1.58 million tonnes of renewable hydrogen over ten years, avoiding more than 10 million tonnes of CO<sub>2</sub> emissions.

A second renewable hydrogen auction will open on 3 December 2024 and will award up to €1.2 billion support to renewable hydrogen producers located in the European Economic Area (EEA), contributing to the further creation of a European market for renewable hydrogen by de-risking investments with public support.

This call for proposal includes two topics subject to separate competitive bidding procedures:

- a general topic to support the production of RFNBO hydrogen regardless of the sector in which it will be consumed (€1.0 billion); and,
- a specific topic for the production of RFNBO hydrogen to be used in the maritime sector (€200 millions).

The international leg of the Hydrogen Bank is focusing efforts on a Team Europe approach to pool financial resources from Member States.

Under the Hydrogen Mechanism, the Commission is supporting the market development of hydrogen and accelerate investments. This mechanism is provided for under the Regulation for internal market rules for hydrogen. It will support the development of the European hydrogen market by (i) connecting off-takers and suppliers, (ii) informing on hydrogen infrastructure needs and (iii) connecting with the financial institutions to incentivize investments. The Hydrogen Mechanism is expected to be activated in mid-2025.

### Important Projects of Common European Interest (IPCEI) on Hydrogen

4 IPCEIs on hydrogen are now up and running, Hy2Tech, Hy2Use, Hy2Infra and Hy2Move representing huge public investments of €18.7 billion. The 4 IPCEIs correspond to a total of 116 active projects from 16 Member States and covering the entire value-chain from hydrogen production technologies, fuel cells technologies, hydrogen infrastructure, hydrogen storage and pipelines and hydrogen applications in industry and end use applications in mobility.

### 6. Regulations, Codes & Standards, and Safety Update

*Provide an update on any national or regional developments related to Regulations, Codes & Standards*

For the technical standardisation frame, the Joint Research Centre (JRC) of the European Commission and the Clean Hydrogen Joint Undertaking have published a new report of a series of reports aiming at harmonising electrolysers testing protocols and procedures. The goal is to enable the production of reliable and comparable data and to facilitate technology progress assessment and funding prioritisation: [EU harmonised accelerated stress testing protocols for low-temperature water electrolyser](#). This work introduces proposed accelerated stress testing (AST) protocols for assessing the performance degradation of water electrolyser stacks. It builds on previously published report, such as the [EU harmonised testing protocols for high-temperature steam electrolysis](#) and the [EU harmonised testing procedure: Determination of water electrolyser energy performance](#)





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On sustainability of hydrogen technologies, the JRC published in 2024 a study on the [Environmental life cycle assessment \(LCA\) comparison of hydrogen delivery options within Europe](#). It completes the previous work on techno-economic [Assessment of hydrogen delivery options](#).

Also published recently, a [LCA Checklist: a tool to improve the communication of the environmental sustainability of the Clean Hydrogen Joint Undertaking projects](#), a checklist aiming at ensuring a minimal level of completeness and documentation of LCA studies of hydrogen-related projects, with provision of examples referred to a specific hydrogen case study.

On hydrogen safety: The hydrogen incident database HIAD has been revamped, updated and upgrade, and is publicly available of download and quick on-line assessment at <https://minerva.jrc.ec.europa.eu/en/shorturl/capri/hiadpt>. It contains almost 900 events covering all hydrogen end uses and supply chains, and a timeline of more than a century. It is both a statistical and a narrative tool enabling sectorial return of experiences on hydrogen safety, End of this year a new version will be uploaded, with findings made available till end-2024. Engagement with HIAD users has occurred throughout the year, with positive impact on several research studies.

Finally, following the publication of the EU Clean Hydrogen Alliance (ECH2A) roadmap on hydrogen standardisation and its handover to CEN/CENELEC on 01/03/2023, it was deemed important for CEN/CENELEC and National Standardisation Bodies to try to better coordinate standardisation activities – That lead to the creation of the CEN/CENELEC Coordination Group on hydrogen which first met end of August 2024.



**Summary Country Update November 2024: European Commission<sup>12</sup>**

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support <sup>13</sup>
Fuel Cell light duty Vehicles	No target	Total size of fleet in EU27 for passenger cars (M1) and vans (N1) is 4399.	To a large degree addressed through Clean Hydrogen JU Demo projects	
FC Bus	No target	Total size of fleet in EU27 for buses and coaches (M2 & M3) is 293.	Mostly addressed through Clean Hydrogen JU Demo projects	
Fuel Cell Trucks	No target	Total size of fleet in EU27 for Trucks (N2 & N3) is 65.	Mostly addressed through Clean Hydrogen JU Demo projects	
Forklifts	No target	To the JU knowledge, 335 units have been deployed in Europe (of which 273 via Clean Hydrogen JU).	Mostly addressed through Clean Hydrogen JU Demo projects	

<sup>12</sup> Source for all data: Data are mainly coming from the European Hydrogen Observatory, unless they do not exist there, in which case the ones of the Clean Hydrogen JU funded projects are mentioned (clarified in the fourth column). Most of the data collected in the first half of 2023 concern the status by the end of 2022, although some updated data for 2023 are included (when possible). Please note that unless noted otherwise, the data from the European Hydrogen Observatory are reported only for EU27 – and they are not limited to the ones of the Clean Hydrogen JU projects-, while the ones of the Clean Hydrogen JU cover also UK, EFTA, etc.

<sup>13</sup> In terms of all related projects funded by the Clean Hydrogen JU, the support was given in the form of a grant. Other types of support could also have been provided, but at EU level these concerned mostly EU funding from different instruments.



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Aviation & Maritime	No target	Based on the JU knowledge of R&I projects deploying vessels, 8 vessels have been implemented. Also 1 pilot aircraft was implemented and tested, funded by the JU.	Partly through Clean Hydrogen JU Demo projects. As of today marginal activity.	
H <sub>2</sub> Refueling Stations	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
70 MPa On-Site Production	No target	<p>By the end of 2022, in EU27 there were a total of 166 HRS<sup>14</sup> with public access, of which:</p> <ul style="list-style-type: none"> <li>- 82 operating only at 700 bar for cars</li> <li>- 14 operating only at 350 bar, 8 of which only for cars, 3 only for buses and 3 for both</li> <li>- 70 operating at dual 350 and 700 bar (serving either cars or buses)</li> </ul>	Addressed through CEF and Clean Hydrogen JU Demo projects	
70 MPa Delivered	No target		Addressed through CEF and Clean Hydrogen JU Demo projects	
35 MPa On-Site Production	No target		Addressed through CEF and Clean Hydrogen JU Demo projects	
35 MPa Delivered	No target		There is no information on private HRS.	Addressed through CEF and Clean Hydrogen JU Demo projects

<sup>14</sup> Data in the Observatory are currently validated, there may be slight differences in the reported numbers.



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Stationary <sup>15</sup>	Target Number <sup>16</sup>	Current Status	Partnerships, Strategic Approach	Policy Support
Small <sup>17</sup>	No target	4,165 contracted via Clean Hydrogen JU of which 3,677 deployed	Medium-scale deployment through Clean Hydrogen JU demo project	Grant with maximum contribution from Clean Hydrogen JU
Medium <sup>18</sup>	No target	128 contracted of which 123 deployed	Small-scale deployment through demo projects via Clean Hydrogen JU	Grant with maximum contribution from Clean Hydrogen JU
Large <sup>19</sup>	No target	Based on the JU knowledge of R&I projects, 1 deployed		Clean Hydrogen JU Grant
District Grid <sup>20</sup>	No target			
Regional Grid <sup>21</sup>	No target			
Telecom backup	No target	10 deployed via Clean Hydrogen JU, of which 9 medium and 1 small	Small-scale demo projects via Clean Hydrogen JU	Grant with maximum contribution from Clean Hydrogen JU

<sup>15</sup> At the moment no such data are available on the Observatory, so only Clean Hydrogen JU projects are reported.

<sup>16</sup> Targets can be units installed and/or total installed capacity in the size range indicated

<sup>17</sup> <5 kW (e.g., Residential Use), excl. telecom backup

<sup>18</sup> 5kW – 400 kW (e.g., Distributed Residential Use), excl. telecom backup

<sup>19</sup> 0.3MW – 10 MW (e.g., Industrial Use)

<sup>20</sup> 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)

<sup>21</sup> 30MW plus (e.g., Grid Storage and Systems Management)



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H <sub>2</sub> Production	Target <sup>22</sup>	Current Status	Partnerships, Strategic Approach	Policy Support
Fossil Fuels <sup>23</sup>	No target	Produced 6.66 Mt of hydrogen in 2023 in EU27 <sup>24</sup> .		
Water Electrolysis <sup>25</sup> (PEM, Alkaline, SOEC)	Renewable hydrogen: 6 GW by 2024, 40 GW by 2030 (EU Hydrogen Strategy <sup>26</sup> )	Produced 26 kt of hydrogen in 2023 in EU27 <sup>27</sup> .  This corresponds to 215.7 MW of water electrolysis capacity in EU27. A further 58 projects are under construction and are expected to deliver an additional 1,806.6 MW <sub>el</sub> of water electrolysis capacity once operational (by 2026).		
By-product H <sub>2</sub>	No target	Produced 574 kt of hydrogen in 2023 in EU27 <sup>28</sup> .		

<sup>22</sup> Target can be by quantity (Nm<sup>3</sup>, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target

<sup>23</sup> Hydrogen produced by reforming processes

<sup>24</sup> Based on the European Hydrogen Observatory latest updated data

<sup>25</sup> Please indicate if targets relate to a specific technology (PEM, Alkaline, SOEC)

<sup>26</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0301&from=EN>

<sup>27</sup> Based on the European Hydrogen Observatory latest updated data

<sup>28</sup> Based on the European Hydrogen Observatory latest updated data





## INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

Energy Storage from Renewables	Target <sup>29</sup>	Current Status	Partnership, Strategic Approach	Policy Support
Power to Power <sup>30</sup> Capacity	No target			
Power to Gas <sup>31</sup> Capacity	No target	<p>As of May 2024<sup>32</sup>, in EU27 72 water electrolysis projects (with a production capacity of 215.3 MW/MW<sub>el</sub>) are already operating and 52 water electrolysis projects (with a production capacity of 1763.2 MW/MW<sub>el</sub>) are under construction and expected to be operational by 2026. The end-uses are as follows:</p> <ul style="list-style-type: none"> <li>- E-fuels 5 projects, 38.55 MW/MW<sub>el</sub></li> <li>- Blending 12 projects, 24.75 MW/MW<sub>el</sub></li> </ul>		

<sup>29</sup> Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity

<sup>30</sup> Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity

<sup>31</sup> Operator has the opportunity to provide the stored energy in the form of hydrogen back to the energy system through multiple channels (e.g., merchant product, enriched natural gas, synthetic methane for transportation, heating, electricity)

<sup>32</sup> Based on the data of the European Hydrogen Observatory



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		<ul style="list-style-type: none"><li>- Industrial heat 6 projects, 40.6 MW/MW<sub>el</sub></li><li>- Residential heat 2 projects, 5 MW/MW<sub>el</sub></li><li>- Mobility 45 projects, 114.91 MW/MW<sub>el</sub></li><li>- Power generation 8 projects, 26.8 MW/MW<sub>el</sub></li><li>- Industrial use 34 projects, 1692.5 MW/MW<sub>el</sub></li><li>- Use not defined 5 projects, 17.2 MW/MW<sub>el</sub></li></ul>		
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