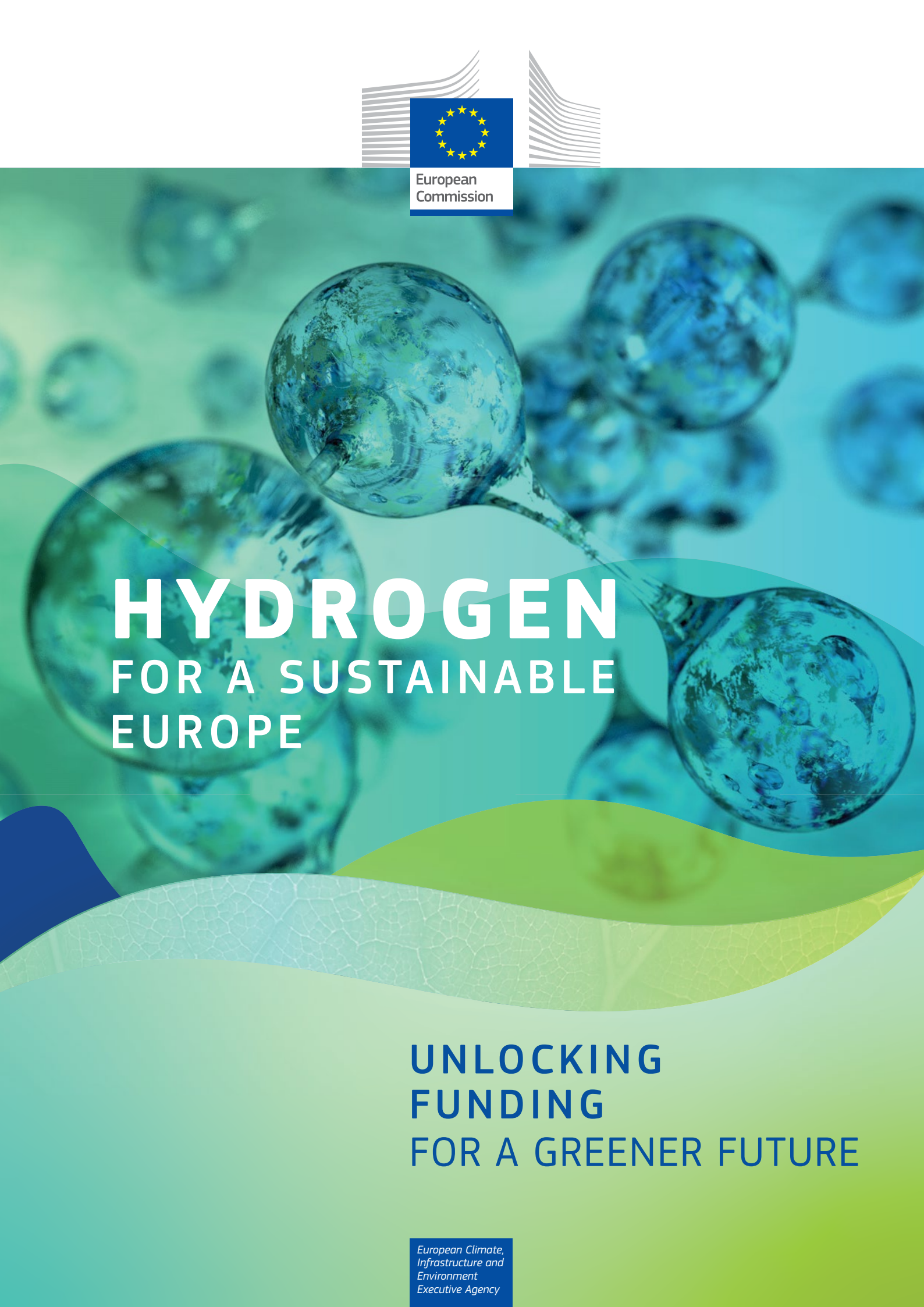

European Commission

HYDROGEN
FOR A SUSTAINABLE EUROPE

UNLOCKING FUNDING
FOR A GREENER FUTURE

European Climate, Infrastructure and Environment Executive Agency

EUROPEAN COMMISSION

HYDROGEN
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European Climate, Infrastructure and Environment Executive Agency

Hydrogen for a sustainable Europe - Unlocking funding for a greener future

European Climate, Infrstructure and Environment Executive Agency (CINEA)
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FOREWORD

I am delighted to introduce this publication, which showcases the wide range of EU funding opportunities available to support hydrogen-related solutions. As the European Climate, Infrastructure and Environment Executive Agency (CINEA), we are fully committed to supporting the European Union's ambition to reach climate neutrality by 2050. The introduction of hydrogen is set to play a crucial role in decarbonising European industries and building a competitive, resilient, and sustainable hydrogen ecosystem.

The EU is taking significant steps to support the integration of hydrogen into its energy landscape by aligning policy, funding, and investment across multiple sectors. CINEA proudly manages a EUR 3.1 billion portfolio of hydrogen-related projects. This portfolio, funded through EU programmes such as the Innovation Fund, Connecting Europe Facility (Energy and Transport), Horizon Europe, and the LIFE Programme, exemplifies the EU's strategic approach to advancing hydrogen technologies. Our projects cover the entire hydrogen value chain, from supply and production to the development of electrolyser manufacturing, refuelling infrastructure, and end-use applications.

This brochure provides a detailed overview of the EU's funding mechanisms and an inspiring look at real projects managed by CINEA. These examples illustrate how diverse stakeholders, from industry leaders to research institutions, are translating hydrogen ambitions into impactful, on-the-ground solutions that address both technological and societal needs.

We are proud of the progress made by these projects and the role they will play in accelerating Europe's clean energy transition. I hope that you will find this brochure both informative and inspiring, encouraging new ideas and partnerships to shape Europe's hydrogen future.

Paloma Aba Garrote
Director of CINEA

INTRODUCTION

The European Union is committed to becoming climate-neutral by 2050, as outlined in the European Climate Law (Regulation (EU) 2021/1119) a cornerstone of the European Green Deal. Hydrogen, particularly renewable hydrogen produced from renewable energy sources, is a key enabler in the transition to a climate-neutral economy, as confirmed by the European Commission's Strategy on Hydrogen (COM/2020/301) and reinforced by the REPowerEU plan (COM/2022/230). It is particularly important for decarbonising industries that are difficult to electrify, such as energy-intensive industries and long-haul transport, including maritime and aviation, and for achieving the targets set out in the Renewable Energy Directive (RED) II Delegated Act on Renewable Fuels of Non-Biological Origin (RFNBO). By integrating renewable hydrogen into its energy mix, the Member States and the EU aim to significantly reduce their carbon emissions while ensuring security of supply and sustainability. The EU hydrogen and gas decarbonisation package, consisting of Directive (EU) 2024/1788 and Regulation (EU) 2024/1789, was adopted in May 2024. The revised rules recognise the role of low-carbon hydrogen compliant with the threshold of 70% of greenhouse gas emission savings, as compared to fossil fuels.

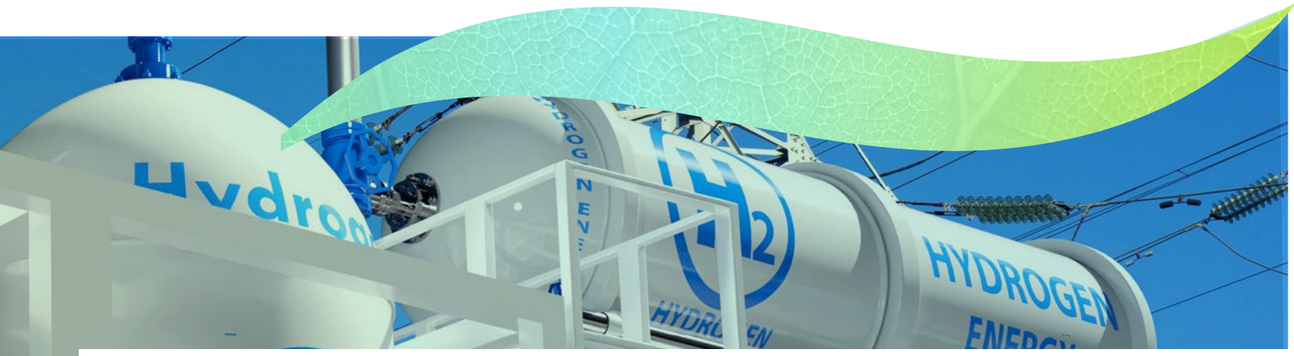
The rapid growth of renewable energy generation creates opportunities for the large-scale production of renewable hydrogen. Hydrogen can contribute to the integration of renewable energy into the energy system. The European Union has been actively supporting the development of a hydrogen economy through a range of measures. By aligning policy, funding, and investment, the EU seeks to establish hydrogen as a key factor in the transition to a low-carbon economy. The EU's efforts contribute to a more sustainable energy future and reduce greenhouse gas emissions in line with its climate ambitions.

To implement the EU's vision for a hydrogen economy, the European Commission has launched several initiatives to promote the production, distribution, and consumption of renewable and low-carbon hydrogen.

A key development is the establishment of the European Hydrogen Bank, which provides financing instruments and serves as a coordination platform to secure the domestic and international supply of renewable hydrogen in the EU. The domestic production of Renewable Fuel of Non-Biological Origin (RFNBO) hydrogen is financed via the Innovation Fund with revenues for the EU Emission Trading system and implemented through the dedicated auctions. The selected projects receive grants aimed at addressing the financing gap by reducing the risk for private investors, thereby accelerating the roll-out of hydrogen technologies.

Additionally, the EU has created funding opportunities to support hydrogen initiatives and projects as described in the following pages.

EU FUNDING OPPORTUNITIES FOR HYDROGEN



The EU budget supports the deployment of renewable and low-carbon hydrogen along the entire value chain. Several EU programmes support the production of hydrogen as a Renewable Fuel of Non-Biological Origin (RFNBO), produced by electrolysers from renewable energy sources such as wind or solar energy. Some programmes support the manufacturing of electrolysers or their components. Others support the transport of hydrogen through pipelines or ships from the place of production to the place of use, where users can also obtain EU support for the replacement of traditional fossil fuel-based manufacturing with hydrogen. Many of these programmes are implemented by the European Climate, Infrastructure, and Environment Executive Agency (CINEA).

CONNECTING EUROPE FACILITY TRANSPORT

Let us start with developing the appropriate infrastructure. The Connecting Europe Facility for Transport (CEF-T) is a funding instrument for standard railway projects and projects aiming at removing bottlenecks and ensuring cross border connections in the transport sector. Thereby promoting sustainable and innovative mobility solutions across Europe. Additionally, CEF Transport supports alternative fuel supply networks through the Alternative Fuel Infrastructure Facility (AFIF). The AFIF requires the combination of grants and financing from financial institutions.

In the field of hydrogen, CEF-T supports refuelling infrastructure for all modes of transport. In particular, the funding supports investments in hydrogen refuelling infrastructure along the Trans-European Networks for Transport (TEN-T) road and rail networks, as well as in urban areas and at TEN-T maritime ports. It also covers the deployment of hydrogen alternative fuels for inland waterways and inland ports. Via the AFIF, CEF-T supports hydrogen supply, and production and storage to a limited extent, for airports. This is one of the priorities of the ongoing AFIF call.

https://europa.eu/!gFxXK6

CONNECTING EUROPE FACILITY ENERGY

In addition to supporting transport infrastructure the Connecting Europe Facility finances cross-border energy infrastructure and renewable energy projects at European level in the energy sector (CEF-E). It primarily supports the implementation of the Regulation on Trans-European Networks for Energy (TEN-E), which focuses on electricity, hydrogen, and carbon dioxide networks and aims to interlink the energy infrastructure of EU Member States. The TEN-E regulation contributes to the integration of the internal energy market and the decarbonisation of the energy system, improves security of supply, and fosters competition.

For the period 2021-2027, the CEF-E programme has a budget of EUR 5.84 billion to finance strategic energy infrastructure projects, including “projects of common interest” (PCIs) within the EU, “projects of mutual interest” (PMIs) with third countries, and cross-border renewable energy projects. The programme provides grants for studies and construction costs to support the projects. Priority is given to projects that provide significant benefits at European level, such as completing cross-border links or removing bottlenecks.

A call for proposals, covering for the first time hydrogen infrastructure PCIs and PMIs (pipelines, reception, terminals, and storage), closed at the end of October 2024.

https://europa.eu/!nnqtpF

HORIZON EUROPE

The European Union is committed to funding research and innovation to support the advancement of hydrogen technologies. Horizon Europe 2021-2027 is the EU’s primary funding programme for research and innovation (R&I). The programming work of Horizon Europe is organised in ‘Clusters’, with Member States being represented in the Programme Committees.

Cluster 5 ‘Climate, energy and mobility’ of Horizon Europe’s Pillar II (Global Challenges and European Industrial Competitiveness), supports hydrogen research and development in several key areas. It includes the development of sustainable hydrogen production methods, focusing on advancing hydrogen storage and transportation solutions, crucial for widespread adoption. The Cluster also supports the creation of hydrogen-powered vehicles and industrial processes, while prioritising hydrogen safety and standardisation to ensure safe production, transportation, and use.

Additionally, the Cluster considers the impact of these decarbonisation activities. It funds projects investigating the extent to which large-scale deployment of hydrogen could help mitigate climate change but also what the increased use of hydrogen would mean for the processes in our atmosphere and if that could counteract some of the emission reduction efforts. Beyond the climate impact, projects also look at the effects on soils, air pollution, and land-use as well as water quality and water consumption.

While some of the R&I projects on hydrogen within Horizon Europe are managed by CINEA, others are managed by the Clean Hydrogen Partnership. The **Clean Hydrogen Partnership** is an EU body established by the Council Regulation ((EU) 2021/2085) under Horizon Europe. This partnership is funded with EUR 1 billion for the 2021-2027 period and covers the whole value chain, with the focus on the production of clean renewable

hydrogen, bringing together the European Commission and public private stakeholders.

One of the strategic goals of the Clean Hydrogen Partnership, in this programming period, has been the support to the development of Hydrogen Valleys, where the production, storage, transport and end-use take place in the full ecosystems.

By the second semester of 2025, the new work programmes will be published, announcing the new calls for proposals.

Additionally, the European Innovation Council (EIC) provides support for the upstream research and deployment of innovative solutions that are not in the scope of the Clean Hydrogen Partnership.

https://europa.eu/!QwCKdV

INNOVATION FUND

The Innovation Fund is one of the world's largest funding programmes for the deployment of net-zero and innovative technologies. It is funded by revenues from EU Emissions Trading System (EU ETS). The Innovation Fund is the EU fund for climate policy, with a focus on energy and industry. It aims to bring to the market solutions to decarbonise European industry and support its transition to climate neutrality while fostering its competitiveness. It supports innovative projects focusing on innovative low-carbon technologies and processes in energy-intensive industries, innovative renewable energy generation, energy storage, Industrial Carbon Management (ICM) and net zero mobility and buildings.

In the area of hydrogen, the Innovation Fund finances the innovative production of low-carbon and renewable hydrogen for different applications such as mobility or Energy Intensive Industries. In addition, it also funds the manufacturing of electrolysers and their components.

Since 2023, the Innovation Fund has a new financing mechanism in the form of competitive bidding (Auctions) established via the European Hydrogen Bank, as mentioned before.

https://europa.eu/!kBpyVx

LIFE PROGRAMME

The LIFE programme is the only EU funding programme exclusively dedicated to the environment, climate action, and clean energy. It consists of four sub-programmes for actions related to nature and biodiversity, circular economy, climate change and clean energy production. Hydrogen can be targeted through the LIFE environment - zero pollution and climate change subprogrammes. LIFE projects focus on early phase demonstrations, governance, and on catalyst projects for the large-scale deployment of sustainable solutions.

The programme is available for funding of hydrogen-related projects. Financial support is addressed at actions aimed at developing innovative solutions, deploying best practices, improving coordination and capacity building, supporting the implementation of air quality and climate plans developed at regional, multiregional, and national levels.

https://europa.eu/!96n39t

OTHER EU FUNDING OPPORTUNITIES

Alongside the programmes managed by CINEA, there are other EU funding partnerships and instruments that can support hydrogen projects.

EUROPEAN REGIONAL DEVELOPMENT (ERDF), COHESION FUND (CF), and **RECOVERY ASSISTANCE FOR COHESION AND THE TERRITORIES OF EUROPE (REACT-EU)**

Although hydrogen is not specifically mentioned in the objectives or the key priorities of the funds, they have set specific targets to support innovation and entrepreneurship in the transition to a climate-neutral economy. Therefore, opportunities for funding hydrogen projects will depend on priorities identified in the national and regional programmes.

JUST TRANSITION FUND (JTF)

is another Cohesion Policy fund that aims to mitigate the economic and social impact of transitioning to climate neutrality in regions most affected by this shift, particularly those depending on fossil fuels or on carbon-intensive industries. The Fund focuses primarily on diversifying the local economies and the reskilling or upskilling of workers and people. Under certain conditions (listed in the JTF Regulation) the Fund can give support, in industrial facilities, to investments reducing GHG emissions from activities listed in the EU Emissions Trading System (ETS) Directive. Therefore, in industrial processes, hydrogen use is an example that could be considered.

INVESTEU

offers a budgetary guarantee to the European Investment Bank (EIB) Group and selected implementing partners with the aim to facilitate access to finance for riskier projects. It finances sustainable infrastructure; research, innovation, and digitalisation; SMEs; and social investment skills. Specifically for hydrogen, InvestEU sets investments in clean hydrogen as part of its main policy priority, within the sustainable infrastructure window.

MODERNISATION FUND

supports the transition to climate neutrality in ten lower-income EU countries by modernising their energy systems and improving energy efficiency. It supports investments in energy storage, renewable energy generation, and energy networks.

RECOVERY AND RESILIENCE FACILITY (RRF)

is the centrepiece of the EU's recovery plan, NextGenerationEU. Its goal is to support the green and digital transition, making EU economies and societies more sustainable. Funding for projects depends on the specific plans developed by individual EU countries.

FROM OPPORTUNITIES TO REAL-LIFE HYDROGEN PROJECTS

While the array of available EU funding programmes gives an indication of the support that can be provided to hydrogen-related projects, the true impact of these initiatives can be seen in action. Across Europe, numerous projects are leveraging EU funding to pioneer hydrogen technologies, scale up infrastructure, and push innovation boundaries. These project examples can serve as inspiration for future developments, highlighting how policy frameworks coupled with funding support, translate into tangible progress towards the EU's climate goals.

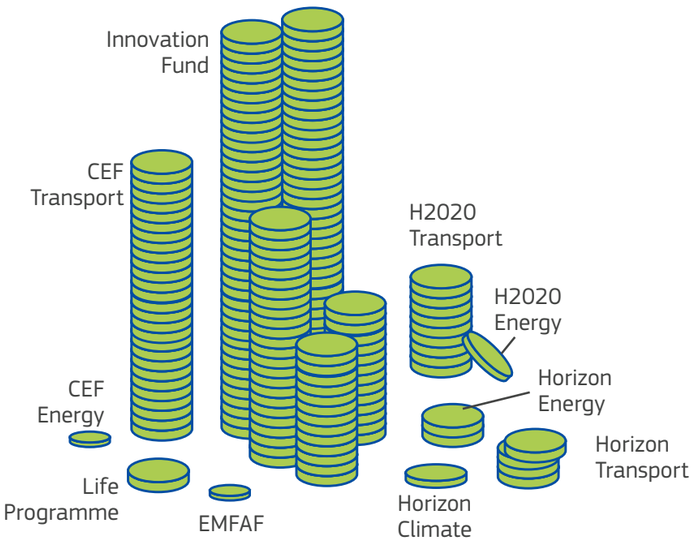
The following pages highlight some hydrogen projects financed through various EU initiatives. These projects represent various aspects of the hydrogen value chain—from production and refuelling infrastructure to fuel cell innovation and urban mobility solutions. Each demonstrates the transformative potential of hydrogen technologies and the role they play in driving Europe's clean energy transition.

CINEA currently manages a portfolio of 141 hydrogen-related projects across all the programmes managed by the Agency.*

EU INVESTMENT

+€3.1 billion

TOTAL of EU funding*



* The data presented in this graph is accurate as of the date of publication. Any subsequent changes in the underlying data or context do not affect the validity of the analysis at the time of publication.

The projects span the entire **hydrogen value chain**, addressing areas such as:

- hydrogen supply and production
- manufacturing of electrolysers
- refuelling stations
- end-use applications

GET **INSPIRATION** FROM REAL LIFE

PROJECT EXAMPLES

LIGHT HYDROGEN MOBILITY STATIONS TO DECARBONISE URBAN TRANSPORT

The **H2F4P** (Hydrogen Fuel for Paris) project, funded under the Connecting Europe Facility (CEF) Transport programme, illustrates a forward-thinking approach to integrating hydrogen into urban mobility systems. Led by HYSETCO, a pioneering hydrogen mobility company, this project focuses on the installation of 8 large-scale Hydrogen Refuelling Stations (HRS) in the Paris area, to support the market uptake of fuel cell electric vehicles (FCEV), especially taxi fleets with the aim to reach at least 5% zero-emission vehicles (e.g., approximately 2500 FCEVs) operating for the transport of persons by 2024.

This initiative not only contributes to reducing greenhouse gas emissions in a major European city but also serves as an example for other municipalities looking to decarbonise urban transport. Moreover, the integration of renewable hydrogen into Paris's mobility system aligns with the city's wider climate commitments, demonstrating the potential for hydrogen to play a crucial role in urban decarbonisation strategies.

FUNDING PROGRAMME:
CEF Transport

EU FUNDING:
EUR 6 740 000

COORDINATED BY:
HysetCo (France)

DATES:
August 2020 to June 2024

WEBSITE:
https://europa.eu/!fnw8xF

A CROSS-BORDER HYDROGEN REFUELLING NETWORK ACCELERATES HYDROGEN MOBILITY IN BENELUX

As hydrogen-powered mobility continues to gain traction, the **H2Benelux** project addresses one of the key challenges: ensuring adequate refuelling infrastructure for hydrogen vehicles. The project focuses on accelerating the development of hydrogen refuelling infrastructure across the Benelux countries (Belgium, the Netherlands, and Luxembourg).

H2Benelux aims to create a transnational network of hydrogen refuelling stations, facilitating the cross-border adoption of hydrogen-powered transport within the Benelux region. By enhancing the availability of hydrogen refuelling points along major road corridors, the project encourages the deployment of hydrogen-fuelled vehicles, especially in sectors such as heavy-duty transport and logistics, where decarbonisation efforts are critical.

The project's success lies in its collaborative approach, bringing together industry stakeholders, policymakers, and transport operators from multiple countries. This cooperation across borders serves as a model for other regions looking to build hydrogen ecosystems and promote hydrogen mobility. Additionally, H2Benelux plays a vital role in improving public acceptance of hydrogen technologies by demonstrating their practicality in everyday use, driving momentum for further investments in hydrogen infrastructure and vehicles.

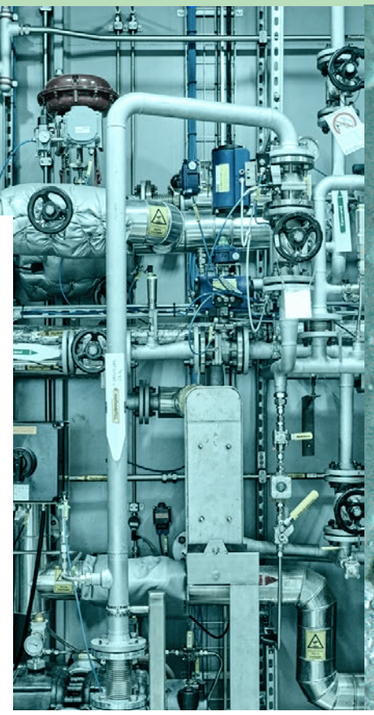
FUNDING PROGRAMME:
CEF Transport

EU FUNDING:
EUR 7 183 181

COORDINATED BY:
WaterstofNet vzw (Belgium)

DATES:
February 2017 to December 2023

WEBSITE:
https://europa.eu/!Jxdg9X



A NEW GENERATION OF ENERGY-EFFICIENT ELECTROLYSER COMPONENTS BOOSTS RENEWABLE HYDROGEN PRODUCTION

Moving beyond transport, the **TopSOEC** project is a leading example of Europe's ambition to innovate within hydrogen production technologies. This project focuses on developing high-efficiency electrolysis components, specifically targeting Solid Oxide Electrolysis Cells (SOECs). TopSOEC's advanced technology aims to make hydrogen production from renewable energy sources more cost-effective and energy efficient.

The SOEC technology used in this project operates at high temperatures, allowing for a more efficient conversion of electricity into hydrogen. By optimising these electrolyser components, TopSOEC contributes to the broader goal of producing renewable hydrogen on an industrial scale while reducing energy consumption and costs. This makes renewable hydrogen more competitive with fossil-based alternatives, thus enhancing the economic viability of renewable hydrogen.

The project will start operations by the end of 2024, the SOEC Stack Module factory shell is completed and is currently installing equipment. The initial manufacturing capacity will be 500 megawatts (MW) of SOEC electrolysers and is projected to grow to an annual production of 1.4 gigawatts (GW) after 2031.

In addition to its technological achievements, TopSOEC also showcases how the European Union supports high-impact projects that have the potential to revolutionise the clean energy landscape. Projects like TopSOEC are instrumental in shaping the future of hydrogen production, helping Europe achieve its climate neutrality goals while maintaining its global leadership in hydrogen technologies.

FUNDING PROGRAMME:
Innovation Fund

EU FUNDING:
EUR 94 000 000

COORDINATED BY:
Topsoe (Denmark)

DATES:
March 2023 to December 2029

WEBSITE:
https://europa.eu/!6GvQVK

DEVELOPING COST-EFFICIENT PHOTOELECTRO-CHEMICAL CELLS FOR A CLEANER, SUSTAINABLE PRODUCTION OF HYDROGEN

The **FreeHydroCells** project exemplifies the EU's commitment to supporting research and innovation in hydrogen fuel cell technologies. This project is working on a new technology to efficiently convert sunlight into chemical energy, in a comparable way to plants. The system uses advanced materials to create thin layers, which are designed to absorb sunlight and split water into hydrogen and oxygen when placed in water. This process, known as photoelectrochemical water splitting, allows the energy from sunlight to be stored in the form of hydrogen gas, a clean and renewable fuel.

FreeHydroCells seeks to address this challenge by developing innovative, high-performance alternative materials. The project aims to drastically reduce the dependency on expensive and scarce resources, thereby lowering the costs associated with photoelectrochemical cell production. This is a crucial step in making hydrogen production more accessible and competitive in a variety of applications, from transportation to stationary energy generation. This project underscores the importance of continued research and development to overcome technical and economic barriers in the hydrogen sector.

FUNDING PROGRAMME:
Horizon Europe Energy

EU FUNDING:
EUR 3 748 300

COORDINATED BY:
University College Cork - National University of Ireland (Ireland)

DATES:
October 2022 to February 2026

WEBSITE:
https://europa.eu/!3wgyqf

INNOVATIVE AVIATION LIQUID HYDROGEN PROJECT UNDERWAY

GOLIAT (Ground Operations of LIquid hydrogen AircrafT) project will demonstrate how liquid hydrogen (LH_2) handling and refuelling technologies can be developed and used safely and reliably for airport operations.

Developing aircraft using hydrogen is seen as a major lever to reaching the EU target of net-zero CO_2 emissions by 2050 and to securing the long-term sustainability of air travel. Hydrogen will also be a solution to decarbonise short- and medium-haul aviation and will be crucial for the advancement of low-carbon aviation operations.

If generated from renewable energy through electrolysis, hydrogen emits no CO_2 emissions, thereby enabling renewable energy to potentially power large aircraft over long distances without this undesirable by-product.

FUNDING PROGRAMME:
Horizon Europe Transport

EU FUNDING:
EUR 10 800 157

COORDINATED BY:
Airbus (France)

DATES:
May 2024 to April 2028

WEBSITE:
https://europa.eu/!rpKNck

DRIVING CLEAN: PIONEERING HYDROGEN-POWERED WASTE COLLECTION FOR A GREENER FUTURE

Traditional diesel-powered garbage trucks are known for emitting a sizeable portion of the CO_2 from road transport and contributing to health hazards like particulate matter and nitrogen oxides (NOx). Additionally, they generate disruptive noise, especially in dense urban areas. Seeking an innovative solution, the **LIFE'N Grab HY!** project turned to hydrogen as a sustainable energy source. By using hydrogen fuel cells, these trucks produce zero tailpipe emissions, running almost silently and offering an eco-friendly alternative to diesel engines.

The project involved creating two 26-tonne hydrogen-electric hybrid garbage trucks and testing them across various cities. Despite technical hurdles, the project saved 6 500 litres of diesel, reduced CO_2 by 45 tonnes, and inspired further hydrogen truck developments. Additionally, feedback from drivers showed the trucks not only reduce environmental impact but also improve working conditions by lowering noise and vibration—offering a promising vision for the future of sustainable heavy-duty transport.

FUNDING PROGRAMME:
LIFE Programme

EU FUNDING:
EUR 1 644 229

COORDINATED BY:
WaterstofNet vzw (Belgium)

DATES:
September 2015 to March 2021

WEBSITE:
https://europa.eu/!476Ng3

These EU funded projects aim to demonstrate and scale up innovative hydrogen technologies, supporting the European Union in building a competitive and sustainable hydrogen ecosystem. They showcase various technological approaches, deployment strategies, and partnerships, providing practical insights into hydrogen's advancing role in contributing to the achievement of the EU's climate goals.

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