



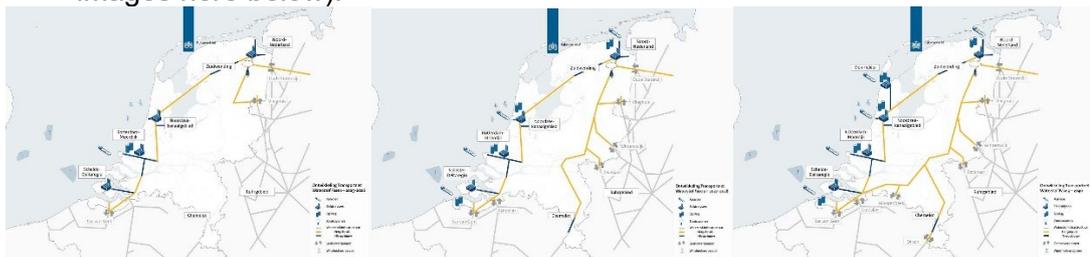
INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update November 2022: The Netherlands

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

- The National Hydrogen Program (“Nationaal Waterstof Programma” or NWP) started in January 2022 as a public-private partnership which contributes to achieving the large hydrogen ambitions. The members of the NWP developed a hydrogen [roadmap](#) which was in November presented to the Minister of Climate and Energy Policy, Rob Jetten. The Roadmap provides insight into the Netherlands' hydrogen ambitions and goals toward 2030 and beyond and describes what actions are needed (a management summary in English will soon be published on the website).
- In June 2022 Minister Jetten sent two letters to the House of Representatives about hydrogen. The first letter deals with the organization and development of the hydrogen market. The second letter deals with the development of a transport network for hydrogen.
 - The [letter on policy for the organization and development of the hydrogen market](#) describes the Cabinet's views on the market organization and which activities different parties are allowed to perform. The second part describes what steps the Cabinet has already taken, and will take this year, to stimulate the hydrogen market. This includes the necessary instruments, the Dutch import strategy and certification.
 - The letter on a transport network for hydrogen outlines the development of the hydrogen high-pressure transmission network in three distinct phases (see images here below).



This outlines in three phases how the transport network will evolve until 2030 (flexible approach, there might be changes in time). Furthermore, this letter outlines that Gasunie subsidiary HyNetwork Services (HNS) will be given the task of developing and managing the transport network. In time, HNS will be designated as a regulated system operator with the exclusive task of managing the transmission grid. The letter also indicates how the financial compensation for HNS will look like in light of the reservation of up to €750 million for the development of the transmission grid.

- [New policy guidelines on hydrogen safety](#). The Ministry of Economic Affairs and Climate Policy (EZK) has laid down the safety requirements for hydrogen projects in guidelines for safe handling of hydrogen. There is a generic hydrogen safety guideline and an additional specific guideline on hydrogen pilots in the built environment.



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- [Declaration of Energy Ministers on The North Sea as a Green Power Plant of Europe](#) between Netherlands, Denmark, Germany and Belgium with increased targets for offshore wind production and to work together on the development of energy hubs, including offshore hydrogen production. Joint target of 150 GW offshore wind in 2050.
- [Incentive policies for hydrogen in mobility](#). Support for the development of hydrogen tank stations and increased (heavy-duty) fleet.
- The Netherlands continues to develop its international import strategy, for which it has developed several joint statements in 202 with Portugal, in 2021 with [Chile](#), [Uruguay](#), [Namibia](#), [Canada and, in 2022, with UAE](#) and [Oman](#). The Netherlands is also participating in the international discussions on trade, certification, upscaling, market development and more via de multilateral forums, such as IPHE, IRENA, IEA H2 TCP, Clean Energy Ministerial and the Hydrogen Ministerial. The Netherlands has also expressed interest in joining the German H2Global Initiative for kickstarting the first international h2 supply chains.

2. Hydrogen and Fuel Cell R&D Update

TKI Nieuw Gas published a summary on the hydrogen innovation projects of the past 10 years in The Netherlands. [130 subsidized projects](#) were carried out in the period 2012-2021, some of which are still on-going. The most important conclusions are:

- There is a change of interest from specific technologies to projects with a more integrated perspective.
- There are relatively a large amount of research projects on small scale water electrolysis (0,1-1MW)
- A small amount of projects are focused on the realization of water electrolysis on the scale of 10-20 MW
- There are several integrated hydrogen projects on local scale (production, storage and use in residential heating, mobility, industry and agriculture)
- Hydrogen application in mobility is the most developed from all the applications. The last 2 years the focus has shifted from tank stations and fleet development to maritime applications and agriculture vehicles (related to the NOx emission problems in The Netherlands).
- Too little innovation projects on hydrogen application in the industry, given the importance of it in this sector.
- There is a lot of attention to hydrogen measurement, quality and the development of sensors. Good results have been delivered on this topic.
- There is a good cooperation between research institutes, universities and small and large companies within the projects carried out.

The report can be found [here](#) (in Dutch).

3. Demonstration, Deployments, and Workforce Developments Update

There are numerous amount of projects undertaken by Dutch industry, small and medium enterprises, research institutes, consultants, NGOs and regional governments aiming at realizing the potential role of hydrogen as established in the National Hydrogen Strategy. TKI New Gas has published a new update of the projects overview with over 165 active Dutch pilots and demonstration projects on hydrogen (an increase of 25% with respect to last year). This overview can be found [here](#).



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They have also recently provided a summary of national and international hydrogen activities/organisations and relevant developments in The Netherlands. This report can be found [here](#).

Since the last update we would like to highlight the following projects:

- [8 Dutch projects for large-scale hydrogen production received approval](#) from the EC for the second wave of IPCEI (Important Projects of Common European Interest). In total these projects account to over 1200 MW of electrolysis.
- [10 homes in Lochem are being heated with Hydrogen](#). The pilot in the Lochem neighbourhood of Berkeloord is the first pilot project in the Netherlands to transport hydrogen through existing gas pipelines all the way to the combi boiler in the home. During the pilot in the monumental district, experience will be gained with hydrogen through the existing natural gas grid and with the new technology of hydrogen boilers in preparation for a natural gas-free future.
- [Holland Hydrogen I](#). Shell took FID to contract a 200 MW electrolyser in the Port of Rotterdam. The electrolyser will be operational in 2025 and will produce 60.000 kg of hydrogen per day
- [Dutch RFNBO Certification pilot](#) organized by the Ministry of Economic Affairs and Climate Policy and the Netherlands Enterprise Agency (RVO). Audits are performed against two certification schemes (ISCC and REDcert) in line with the concept EU Delegated Acts and is performed on 6 hydrogen projects. Final report to be finalised before end of 2022.
- [Issue of first Guarantee of Origin for hydrogen](#). Hydrogen exchange initiative HyXchange presents successful pilot of Guarantees of Origin for green hydrogen, operational in the Netherlands as of October this year. Netherlands is the first country in Europe with such a system. The associated system was evaluated in recent months in a pilot by hydrogen exchange initiative HyXchange in cooperation with Vertogas, the certifying body for biogas, now also for green hydrogen. A total of eighteen market parties participated in this successful pilot (practical test). HyXchange aims to rapidly expand certificate and hydrogen trading, aimed to also facilitate trade between European countries and hydrogen imports from countries outside the EU.
- [Offshore hydrogen storage feasibility analysis](#). (summary available in English) Underground storage of hydrogen in the North Sea appears to be a technically feasible and relevant option according to a study by Energie Beheer Nederland (EBN) and TNO. For the realization of the storage, however, a number of preconditions must be met and further research is required.

4. Events and Solicitations

- [OEEC 2022 - Offshore Energy \(offshore-energy.biz\)](#) 29 and 30 November 2022 in Amsterdam, NL
- [World Hydrogen Summit and Exhibition](#) 9-11 May 2023 in Rotterdam, NL

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

A details summary of the subsidy possibilities is presented at the [website](#) of the National Hydrogen Programme (info in Dutch).

In 2020 an analysis on innovative hydrogen projects in de period between 2012 and 2019 was carried out. A total of 76 projects, supported by different government subsidies were analysed. The total amount subsidized accounted to € 27,916,303. De total investment is



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estimated to be approximately €46.5. 13% of the total budget was awarded to 32 projects in concept phase (research of ideas and new products) and 87% of the budget was destined for technology development projects where the TRL of a specific product was improved. More information can be found in the [report](#) (in Dutch).

A specific subsidy of TKI Nieuw Gas for innovative hydrogen technologies granted 13 projects a total budget of 3 million euro in January 2022. The projects can be divided in the following categories:

- Electrolysis and electrolyser systems: 3 projects
- Sensors and measurement technologies: 3 projects
- Burners and modeling of burner technology: 2 projects
- Storage and liquefaction: 2 projects
- Production of electrolyzers and fuel cells: 2 projects
- Complete systems and system integration: 1 project

[Here](#) is the public summary of the projects which received the grants.

500 million euro were granted from the second round of the National Growth Fund (April 2022) to the project GroenvermogenII (Green Capacity II), focused on the realisation of green hydrogen production projects of at least 100 MW in The Netherlands.

Further €1,3 billion were reserved for hydrogen projects in the second and third wave of IPCEI (Important Projects of Common European Interest)

As well, [three Dutch Hydrogen projects](#) received subsidy from the European Innovation Funds (Holland Hydrogen, Furec and ELYgator)

Recently (21 November 2022) €22 mln have been announced for subsidies to support hydrogen mobility (in particular filling stations for heavy duty transport).

In the National Climate Fund, 15 billion euro has been allocated for stimulating renewable energy including hydrogen production. Mid 2023 first proposals will be decided on.

6. Regulations, Codes & Standards, and Safety Update

The National Climate Agreement mandates that statutory and regulatory flexibility can be created for experiments to allow regional and national network operators to gain experience in the transport and distribution of hydrogen. It has been announced that the Gas law will be amended to allow gas network operators to distribute hydrogen, given that the conditions of security of supply and safety are guaranteed. This trajectory will soon be started and could take up to 1.5 years until it can be implemented.

The Netherlands is facing a great reorganization of the environmental laws per July 2022, which also include the Hydrogen Refueling Stations (HRS) safety regulations. An unofficial translation of this "Environment and Planning Act" is available [here](#). Together with the implementation of the Environment and Planning Act the determination of safety distances might change: it is expected that fixed safety distances will be obligatory for HRS rather than requiring Quantitative risk Assessments (QRA).

At the start of 2020, the Netherlands launched the four-year Hydrogen Safety Innovation Programme, which is a public-private partnership between the national government, network



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operators, emergency services, knowledge institutes and companies. The programme identifies safety issues in the area of hydrogen and proposes policies and agreements that allow these issues to be adequately addressed.

The Safety Programme focuses on the national level but aims to implement international developments. The work concentrates around six working packages:

1. WP1: harmonization of the permitting process for HRS by developing guidelines
2. WP2: risk and incident management
3. WP3: legal aspects, including the finding of white spots
4. WP4: safety risks inventory for production, storage, transport and hydrogen use
5. WP5: HAZID-studies on the use of hydrogen in public spaces
6. WP6: International knowledge and lessons learnt

The Dutch government published [New policy guidelines on hydrogen safety](#). The Ministry of Economic Affairs and Climate Policy (EZK) has laid down the safety requirements for hydrogen projects in guidelines for safe handling of hydrogen. There is a generic hydrogen safety guideline and an additional specific guideline on hydrogen pilots in the built environment.



Summary Country Update November 2022: The Netherlands

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Support Mechanism
Fuel Cell Vehicles ¹	2.000 by 2020 15.000 by 2025 300.000 by 2030	579 as of October 2022	<ul style="list-style-type: none"> The province of Utrecht has recently signed a covenant with business developers, knowledge institutes, regional governments to stimulate the use of green hydrogen in the province. There are targets established for the period from 2021-2025 that cover 10% of the national ambitions from the Dutch Climate Agreement. 	<ul style="list-style-type: none"> New subsidy for FCEVs and tank infrastructure
FC Bus	100 by 2020 300 by 2025	54 as of 31-10-2022		<ul style="list-style-type: none"> No new updates since last update
Fuel Cell Trucks ²	500 by 2020 3500 by 2025	14 commercial vans (<3.5 ton) and 25 commercial Trucks as of 31-10-2022		No new updates since last update
Forklifts	No target	0		<ul style="list-style-type: none"> No new updates since last update

¹ Includes Fuel Cell Electric Vehicles with Range Extenders

² As above



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H ₂ Refueling Stations	Target Number	Current Status	Partnerships, Strategic Approach	Support Mechanism
70 MPa On-Site Production	20 by 2020 50 by 2025 (target on total HRS)	- 1 HRS with on-site production as of June 2021 (Helmond, dual 70/35 MPa) - 8 dual delivered 35/70 MPa HRS as of 31-01-2022 - 1 HRs 700 MPa only (Amsterdam) - 1 HRs 35 MPa only (Amsterdam)		• Up to 100% subsidy of the investment costs for a public HRS. No subsidy for operation.
70 MPa Delivered				• e.g., No Subsidy for installation • e.g., Subsidy for operation
35 MPa On-Site Production				• e.g., Subsidy for installation through a tax measure of an annual 50% capital expenditure write-off
35 MPa Delivered				
Stationary	Target Number ³	Current Status	Partnerships, Strategic Approach	Support Mechanism
Small ⁴	No Target	0	-	• -
Medium ⁵	No Target	0	-	-
Large ⁶	No target	0	-	-

³ Targets can be units installed and/or total installed capacity in the size range indicated

⁴ <5 kW (e.g., Residential Use)

⁵ 5kW – 400 kW (e.g., Distributed Residential Use)

⁶ 0.3MW – 10 MW (e.g., Industrial Use)



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District Grid ⁷	No Target	0	-	• -
Regional Grid ⁸	No Target	0	-	-
Telecom backup	No target	0	-	-
H ₂ Production	Target ⁹	Current Status	Partnerships, Strategic Approach	Support Mechanism
Fossil Fuels ¹⁰	Climate neutral H ₂ by 2050	175 PJ/year (Total hydrogen supply in NL)		
Water Electrolysis ¹¹ (PEM, Alkaline, SOEC)	500 MW by 2025 4 GW by 2030	4 MW	National Climate Agreement and H ₂ Programme	EIA (45 % fiscal deduction), DEI+, SDE++ & new upscaling instrument, National Growth Fund
By-product H ₂	No target	A small part of the 175 PJ/ year	Production based on chlorine-alkali production process where H ₂ comes as by product in Rotterdam and Groningen harbour area.	

⁷ 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)

⁸ 30MW plus (e.g., Grid Storage and Systems Management)

⁹ Target can be by quantity (Nm³, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target

¹⁰ Hydrogen produced by reforming processes

¹¹ Please indicate if targets relate to a specific technology (PEM, Alkaline, SOEC)



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Energy Storage from Renewables	Target ¹²	Current Status	Partnership, Strategic Approach	Support Mechanism
Installed Electrolyser Capacity	500 MW by 2025 4 GW by 2030	4 MW	National Climate Agreement and H ₂ Programme	EIA (45 % fiscal deduction), DEI+, SDE++ & new upscaling instrument
Power to Power ¹³ Capacity	No target	-	-	-
Power to Gas ¹⁴ Capacity	No target	-	-	-

¹² Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity

¹³ Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity

¹⁴ 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)