European Commission

All images © Holland Hydrogen.

INNOVATION FUND

Driving clean innovative technologies towards the market

HH – Holland Hydrogen

The Innovation Fund is 100% funded by the EU Emissions Trading System

Project summary

Holland Hydrogen (HH) plans to build a 400 megawatt (MW) electrolyser in the Port of Rotterdam, in the sub-municipality of Pernis, to produce green hydrogen, using renewable electricity from offshore wind farms in the North Sea. HH will be developed in two 200 MW phases and will be the first electrolyser project of this scale. Overall, the project will demonstrate a complete, end-to-end, integrated renewable hydrogen system proof-of-concept at an industrial scale, developed with world-leading sustainability credentials. The green hydrogen will initially be supplied to a refinery and, later on, to the mobility sector. This will allow for about 100% relative greenhouse gas (GHG) emission avoidance over the first ten years of operation.

COORDINATOR
Rotterdam Hydrogen Company B.V.

BENEFICIARY
Shell Hydrogen Operations & Production B.V.

LOCATION
Rotterdam, The Netherlands

SECTOR
Hydrogen

GHG EMISSION AVOIDANCE
5.1 Mt CO_2 eq

AMOUNT OF INNOVATION FUND GRANT
EUR 89 000 000

STARTING DATE
1 January 2023

PLANNED DATE OF ENTRY INTO OPERATION
1 July 2027

Climate Action

Integration of renewable energy, hydrogen production and industrial use at unprecedented scale

HH will build an electrolyser that is ten times larger than any electrolyser in construction or operation in Europe today (October 2022) already in its first phase. The electrolyser will be the first of its size to be fully integrated into an industrial cluster, producing as much as 60 000 kilograms of renewable hydrogen every day. Phase 1 of the project will be using novel, high current density Thyssenkrupp electrolyser modules designed for large scale, decreasing the cost and use of raw materials.

The hydrogen will initially replace existing fossil-based hydrogen in the adjoining refinery; and, it will also use flexibility in the hydrogen demands of Pernis to manage renewable power intermittency in an innovative manner. It will be transported to the refinery in a new, high capacity, open-access 40km pipeline build and operated by Gasunie (Dutch natural gas infrastructure and transportation company), that will help kick start an ecosystem of hydrogen production and use in Rotterdam. As the mobility market develops, increasing volumes of hydrogen will be diverted from the refinery to refuel zero emission hydrogen trucks and enable their uptake. The project will avoid 5.1 Mt CO_2 equivalent over the first ten years of operation.

Stimulating renewable development and setting a world leading standard for sustainability and circular economy

HH, and follow-on integrated electrolyser projects, will enable the development of offshore wind farms by providing a flexible user of their electricity in an increasingly volatile energy system. This project will catalyse in a unique manner activities to meet crucial REPowerEU targets of 45% renewable energy in 2030 and reaching 10 million tonnes per year of renewable hydrogen in the EU.

Embedded in the landscape of the Tweede Maasvlakte area in Rotterdam, the HH site is being constructed in line with circular economy principles and high environmental standards using a significant proportion of circular materials, with minimal environmental impacts and to even support the local bio-diversity.

A positive impact for the local community and economy

The HH site is designed to be visually stunning, showcasing innovation in beautiful architecture to encourage visits and learning about hydrogen and how technology and nature can co-exist in harmony in a visitor experience centre. HH will also serve as a catalyst for investments and follow-up developments in the Port of Rotterdam. Moreover, Shell is committed to maximising local contracts, retaining investments and skills in the Netherlands and the EU. The project is also a critical step to unlocking gigawatt-scale electrolysis in the Netherlands and the EU. This project will allow the build up of critical expertise in hydrogen technologies and unlock the 17 000 jobs modelled (study commissioned by Shell) to be available from green hydrogen in the Netherlands by 2030.