

Hydrogen does the heavy lifting in Europe's ports



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Europe's ports are hubs of industrial activity and economic growth, and therefore major polluters. To help meet the EU's climate change goals, the Clean Hydrogen Partnership is funding the development of zero-emission technology to replace the diesel-powered vehicles that move freight around container terminals and to provide clean power to ships while they are docked.

Reaching for zero emissions

Port logistics operations are energy intensive and contribute to pollution of the surrounding urban and coastal environments. The biggest sources of emissions are the diesel-powered cranes and vehicles used to load and unload cargo, and the large auxiliary power systems used on ships.

The H2Ports project has developed two heavy-duty hydrogen fuel cell vehicles to move cargo in the Port of Valencia, Spain: a reach stacker to stack shipping containers, and a yard tractor with a fuel cell/battery hybrid powertrain. The four-wheel-drive yard tractor loads and unloads cargo, including truck trailers, from ships. A mobile hydrogen refueling station supplies them with 12 and 30 kg of hydrogen daily. Testing of the yard tractor began in April 2023 and the testing of the reach stacker was scheduled for August 2023, both in demanding conditions.

Separately, Green Hysland plans to install a 100 kW hydrogen fuel cell system in the Port of Palma to supply heat and power for a ferry terminal. Developed by the Everywh2ere

consortium, a 100 kW, portable hydrogen-fuelled generator providing power to a rescue vessel while it is docked is expected to be demonstrated in the Port of Tenerife later in 2023.

A first for Europe's ports

H2Ports is the first application of hydrogen technologies in port handling equipment in Europe in real operations. The project will study the best strategy for refuelling of port machinery and other applications. The Port of Valencia already has hydrogen refuelling infrastructure, which makes it perfect for testing potential future uses of fuel cells in ports and the maritime sector.

Data collected over the two years of testing of the vehicles and refuelling station will inform further development of fuel cell technology, as well as maintenance, safety and refuelling protocols.

PROVING THE CASE FOR HYDROGEN

Widespread adoption of hydrogen in ports requires significant infrastructure development. The new vehicles need to match the power and reliability of their diesel counterparts, have comparable refuelling times and contribute to safe and efficient port operations.

CLOSING THE GAP BETWEEN PROTOTYPE AND FINISHED PRODUCT

H2Ports is bridging the gap between prototypes and pre-commercial products. Through its project funding, the Clean Hydrogen Partnership is encouraging manufacturers of heavy-duty industrial equipment to develop zero-emission alternatives. Demonstration in demanding conditions should convince port authorities and logistics operators of their environmental and economic value.

The goal? To show that hydrogen fuel cells are a promising alternative to diesel engines and offer scalability, flexibility and high efficiency, especially when coupled with lithium-ion batteries – as in the case of the H2Ports yard tractor.

Key results? Port authorities from as far afield as Hong Kong and South Africa have expressed interest in the H2Ports vehicles. The company manufacturing the reach stacker, Hyster Yale, is already receiving orders and intends to scale up production. The yard tractor retrofitting was developed from scratch by Italian research institute Atena. Although it has no plans to commercialise it, the institute is receiving queries from manufacturers and other organisations.



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https://www.clean-hydrogen.europa.eu/projects-repository_en

<https://h2ports.eu/>

<https://greenhysland.eu/>

<https://www.everywh2ere.eu/>



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Clean Hydrogen Partnership

KEY ACHIEVEMENTS

EUR 4 MILLION

investment in H2Ports

9

commercial, industrial and research partners involved in H2Ports

6 HOURS

of continuous operation by H2Ports yard tractor before refuelling

10-15-MINUTE

refuelling time for the H2Ports reach stacker

15 %

kinetic energy recovery achieved by the hybrid powertrain of the yard tractor

50 M³

buffer tank with capacity for 180 kg of hydrogen developed for the H2Ports refuelling station

IMPACTS

The **PORT OF VALENCIA** is the first in the world to use a hydrogen-powered four-wheel-drive tractor unit.

H2Ports was awarded the title of **BEST RENEWABLE GAS INNOVATION PROJECT** at the Green Gas Mobility Summit 2023. The award recognises transformative and disruptive initiatives in the new renewable and synthetic gaseous fuels value chain.

The Port Authority of Valencia received the **GREEN4SEA 2019 PORT AWARD** for becoming the first port in Europe to use hydrogen to reduce the environmental impact of its operations by supporting H2Ports.

The yard tractor runs efficiently under **CRITICAL OPERATING CONDITIONS:** loading of 30-tonne and 70-tonne trailers onto the upper deck of a vessel.

H2Ports' **FOUR-WHEEL-DRIVE YARD TRACTOR** is the first such hydrogen-powered unit in the world, developed by Italy's Atena research and technology hub.



Co-funded by
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