



Mobile Hydrogen Refuelling Station in Port of Valencia

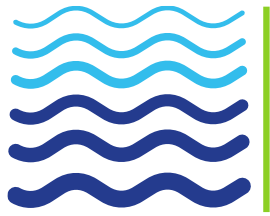
Hydrogen facilities in ports

03/12/2025

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This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 826339. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.



01 CNH2 Introduction – Mission & Vision



CENTRO NACIONAL DEL HIDRÓGENO (SPANISH HYDROGEN NATIONAL CENTRE)

The CNH2 is a research center focused on the development of hydrogen and fuel cell technologies. It was established in 2007 as a Public Consortium between the Ministry of Education and Science —currently the Ministry of Science, Innovation and Universities— and the Regional Government of Castilla-La Mancha.

- Hydrogen gas
- Energy carriers
- Liquid hydrogen
- Hydrogen distribution



STORAGE



PRODUCTION

- Low and high temperature electrolysis
- Alternative processes to electrolysis



TRANSFORMATION

- Polymer membrane fuel cells
- Solid oxide fuel cells
- Microbial fuel cells



APPLICATIONS AND USES

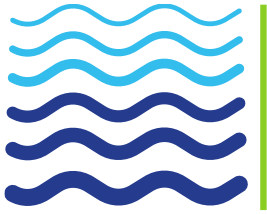
- Stationary systems
- Transport
- Regulations and safety



TECHNOLOGY IMPLEMENTATION

- Implementation of hydrogen applications
- Consultancy
- Technical advice
- Permitting
- Training and dissemination





02 HRS Overview

01

Location selection

Muelle Xità, Location has all the requirements needed by the HRS system



03

Land adaptation

Grounding grid and equipment's foundations, lightning rods, wall protection.



02

Official Authorization

Approval of port land occupation by APV on 21 December 2021.

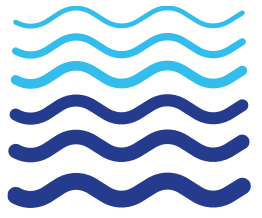


04

Construction and Commissioning

Equipment assembly, piping connection, pressure tests and commissioning.





02 HRS Overview





02 HRS Overview



STATIC UNIT

Buffer Tank 50m³ at 40 bar
Capacity of 180kg of Hydrogen
Compression system up to 450 bar

MOBILE UNIT

Cascade pressure storage
300/450 bar
Dispenser TK16HF at 350 bar
Capacity of 60 Kg of Hydrogen
Unit on a semitrailer





03 HRS Performance



Preparation

360° Safety Check List
Analysis

Transport

Transfer of the semi-trailer
to the MSC or Grimaldi
terminal

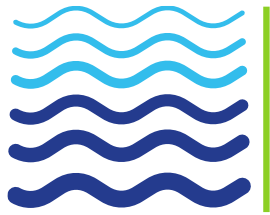
Refuelling

Protocol procedure as
SAEJ2601 350 bar

Return

Return to Muelle Xitá and
refill if it is necessary

HRS PERFORMANCE DURING 2024 AND 2025
HRS PERFORMANCE COMPLETED BEFORE 8.00 AM



04 HRS Performance Analysis

121

Complete Refuellings

289

Days on duty

74,8% operational
operability

1200

Kg of H₂ supplied

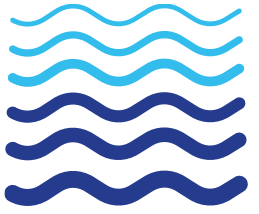
11,4 Kg average
refuelled

21

Buffer Fillings

76 Kg average filled

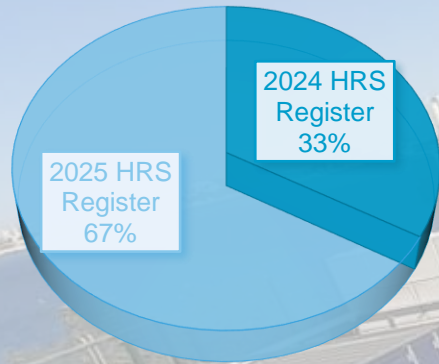




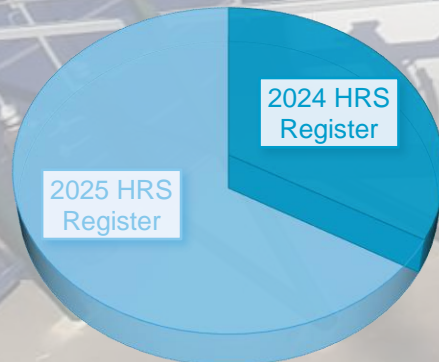
04 HRS Performance Analysis



NUMBER OF REFUELLINGS



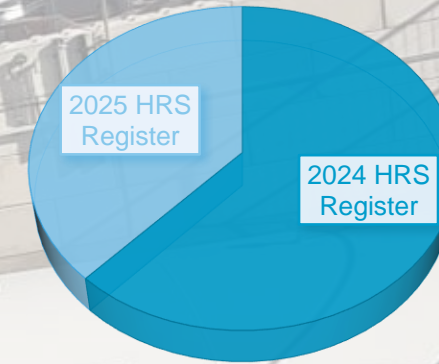
TOTAL OF KG REFUELLED



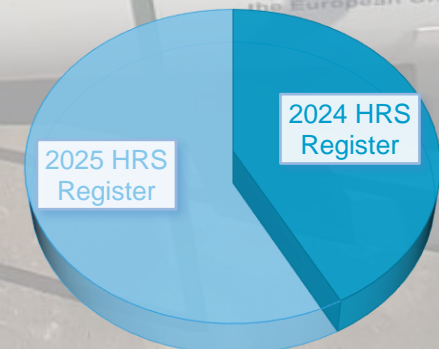
Performance Analysis

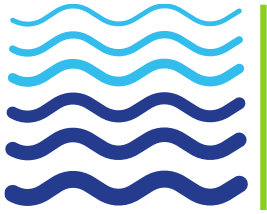
- Double refuellings performance in 2025.
- Less time HRS in service in 2025 due to equipment maintenance.
- Even though, more successful refuelling completed.
- Double H2 refueled
- More number of tanks. refueled completed.

TIME OF HRS IN SERVICE (DAYS)

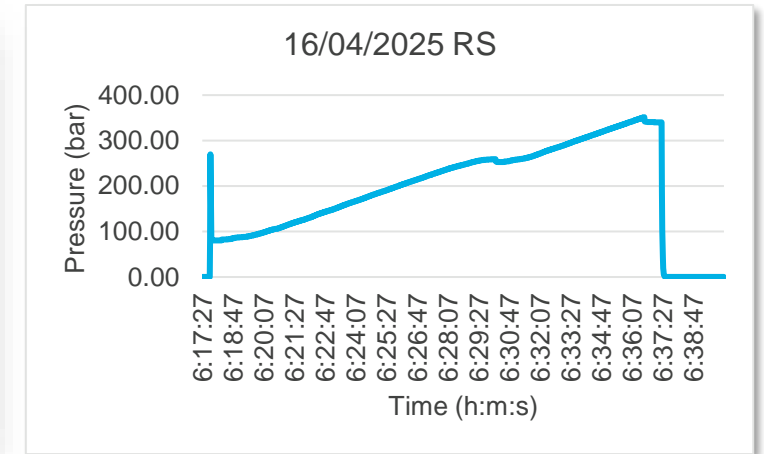
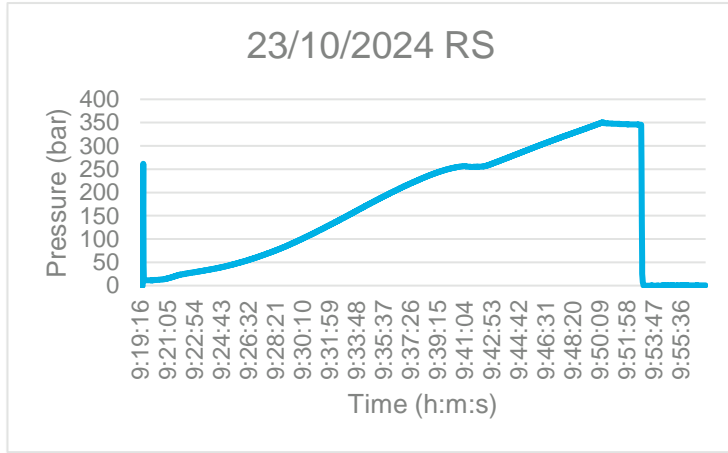


BUFFER TANK FILLINGS





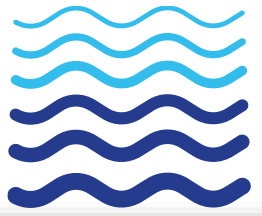
05 HRS Performance Analysis



2024-2025 Reach Stacker Refuellings

Refuelling time decreased from 2024 to 2025. We were able to reduce the time having the refuelling temperature less than 65C.

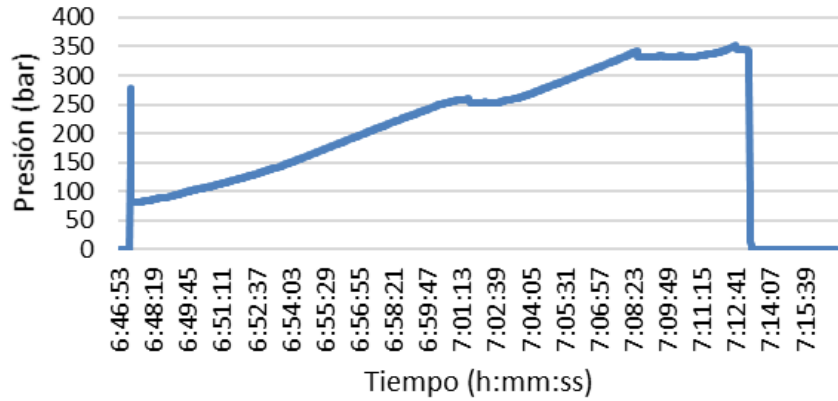




06 Performance Analysis



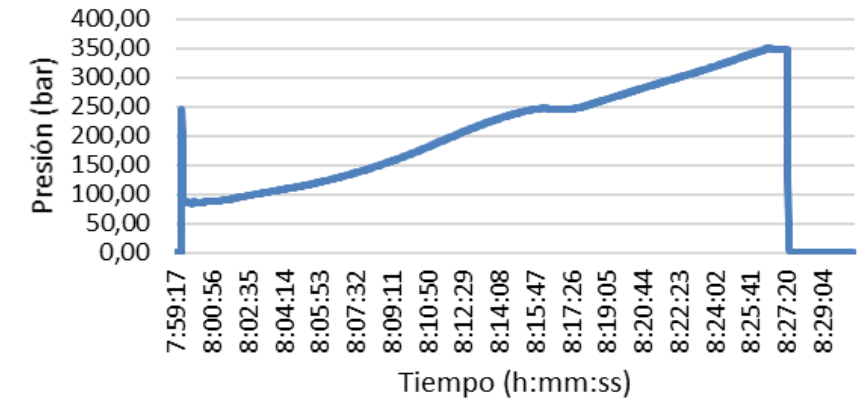
11/04/2025 RS

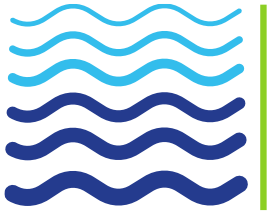


**Refuelling Reach
Stacker and Yard Tractor.**

**Refuelling performance time
20-30min per vehicle.**

11/04/2025 YT





05 HRS Lessons learned

Direct connection between the hydrogen supply truck and the semi-trailer.

Direct platform-to-compressor interface.

Increased operational continuity of both machines.

Importance of preventive inspections of the gas system.



The H2Ports project demonstrates the technical viability of hydrogen in port operations. With 69 refuelling events in 2025 (doubling the 2024 figure), 1200 kg of H₂ supplied, and refuelling times below half an hour, the results confirm that hydrogen is a clean and efficient alternative for the decarbonization of the European port sector.



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Energy Transition – Business Development Manager
Carbueros Metálicos (Grupo Air Products)



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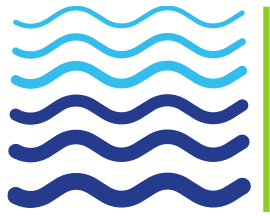
01 Introduction

02 Hydrogen supply

03 Daily Hydrogen Refueling Operations

**04 Technical Support & Maintenance
Expertise**

05 Lessons learned & Conclusions



01 Carbueros Metálicos (Air Products Group)



Air Products at a glance

Carbueros Metálicos (over 125 years leading the industrial and medical gas market in Spain) forms part of Air Products Group, a world-leading industrial gases company in operation for over 85 years.

#1 Supply position in hydrogen, largest pipeline network

\$ 12.1
Billion dollars in sales

~23,000
Employees worldwide

~50
Countries where we operate

\$ >60
Billion dollars in market cap

>8
Decades in business

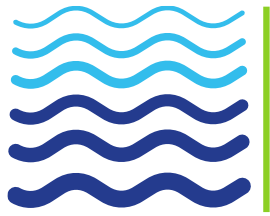
>250,000
Customers

1,800
Miles of industrial gas pipeline

750+
Production facilities

30+
Industries served





01 Carbueros Metálicos – Key partner

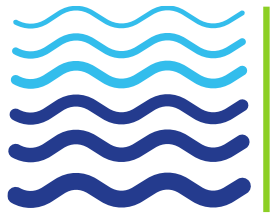
Overview of Carbueros Metálicos' Role:

- Strategic partner in hydrogen supply and infrastructure.
- Delivered critical technical solutions and operational support.
- Ensured safety, reliability, and efficiency throughout the project lifecycle.

Three Pillars of Contribution:

- Hydrogen Supply via Tube Trailers
- Daily Hydrogen Refueling Operations
- Technical Support and Maintenance





02 Hydrogen supply

Hydrogen Logistics:

- H₂ sourced delivered via specialized tube trailers.
- Trailers designed to carry compressed hydrogen at ~200 bar in modular tube configurations.

Infrastructure Contribution:

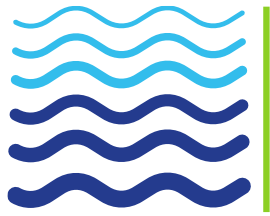
Carbueros Metálicos designed and installed:

- Discharge panel for trailer-to-installation connection.
- Pressure regulation panel built by technical team in Barcelona.
- Complete piping and integration with buffer tank.

Project Outcomes:

- Total deliveries to buffer tank: +20
- Media hydrogen supplied to buffer tank : 76 kg of H₂





03 Daily Hydrogen Refueling Operations

Operational Routine:

Refueling service aligned with stevedores' schedule (Monday–Friday, before 8:00 a.m.)

Driver from Sagunto depot arrives ~5:45 a.m. for daily operations.

Safety & Procedure:

Development and creation of Operating Procedure for drivers
360° safety checklist performed before each refueling.

HRS disconnected from compressor and transport it to the terminals

Sequential refueling of: Reach Stacker and Yard Tractor

Automation & Safety:

Refueling process is automated and stops upon full tank detection.

Driver departs with HRS before 8:00 a.m.

Project Outcomes:

~121 H2 refuelings





04 Technical Support & Maintenance Expertise

Engineering & Safety Leadership:

Carbueros Metálicos provided expert guidance on hydrogen handling and safety protocols.

Led execution, assembly, testing, and commissioning of hydrogen infrastructure.

Key Technical Milestones:

Buffer tank installation and commissioning performed per Carbueros Metálicos-Air Products procedures.

Inerting process ensured safe initial fill (low O₂ concentration).

Defined safety distances during HRS construction phase and terminal sites

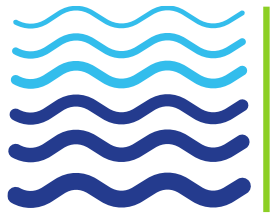
HRS Maintenance Commitment:

Responsible for both preventive and corrective maintenance execution

Monthly preventive maintenance tasks (~ 3 hours/month)

Corrective protocol ensures rapid response and minimal downtime.





05 Lessons learned & Conclusions

Mobile Hydrogen Refuelling Stations in Port Settings

During the initial stages, mobile hydrogen refueling stations enable the deployment of small vehicle fleets within port terminals.

This solution allows for coverage of various operational zones throughout the terminals without interfering with port logistics.

Safety Measures and Protocols

Development and implementation of hydrogen-specific protocols and procedures in collaboration with port personnel. Provision of training and awareness programs focused on hydrogen handling and storage within port environments.

Environmental Considerations

Ports typically experience high levels of salinity and humidity, conditions that affect the longevity and safety of equipment. Hydrogen and fuel cell technologies are particularly suited to these environments, offering an effective pathway for decarbonising the sector.

Primary Advantages

Reduction of emissions in critical operational areas.

Adaptability to the complexities inherent in port activities.

Advancement of sustainability goals and support for the energy transition within port operations.

The logo for H2 PORTS features a stylized blue wave icon to the left of the text. The 'H' is blue, the '2' is green, and 'PORTS' is in blue. The background of the top right is a blurred image of industrial machinery with blue and red pipes.

H₂ PORTS

Funded by:



Partners:

