



# H2Ports

## Implementing Fuel Cells and Hydrogen Technologies in Ports

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**FUEL CELLS AND HYDROGEN**  
JOINT UNDERTAKING



*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.*



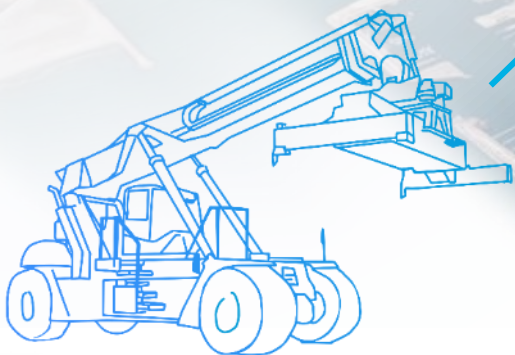


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*The knowledge centre for the leading port  
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## Reach Stacker in MSC Terminal

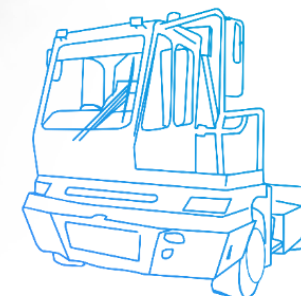
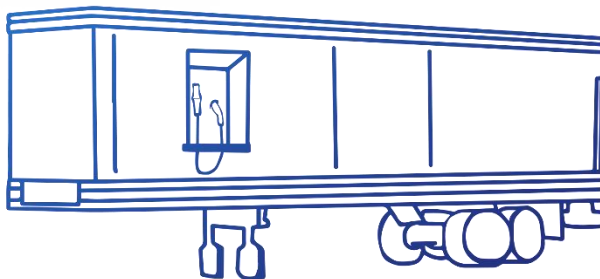
- 2 years / 5000 h of operation

### General features

- Total Budget: 4,117,197.5 EUR
- Duration: 2019-2023


## Mobile HRS

- Hydrogen supply logistics at ports
- Port regulatory framework
- Safety procedures



## Yard Tractor in Valencia Terminal Europa

- 2 years / 5000 h of operation

 First application in Europe  
of hydrogen technologies for  
port handling equipment in real  
operative conditions



# Partners



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Coordination:



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## Public authorities



## Research institutions

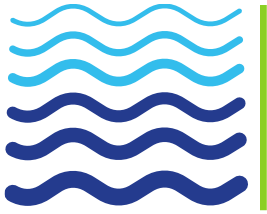


## End users



## Industry

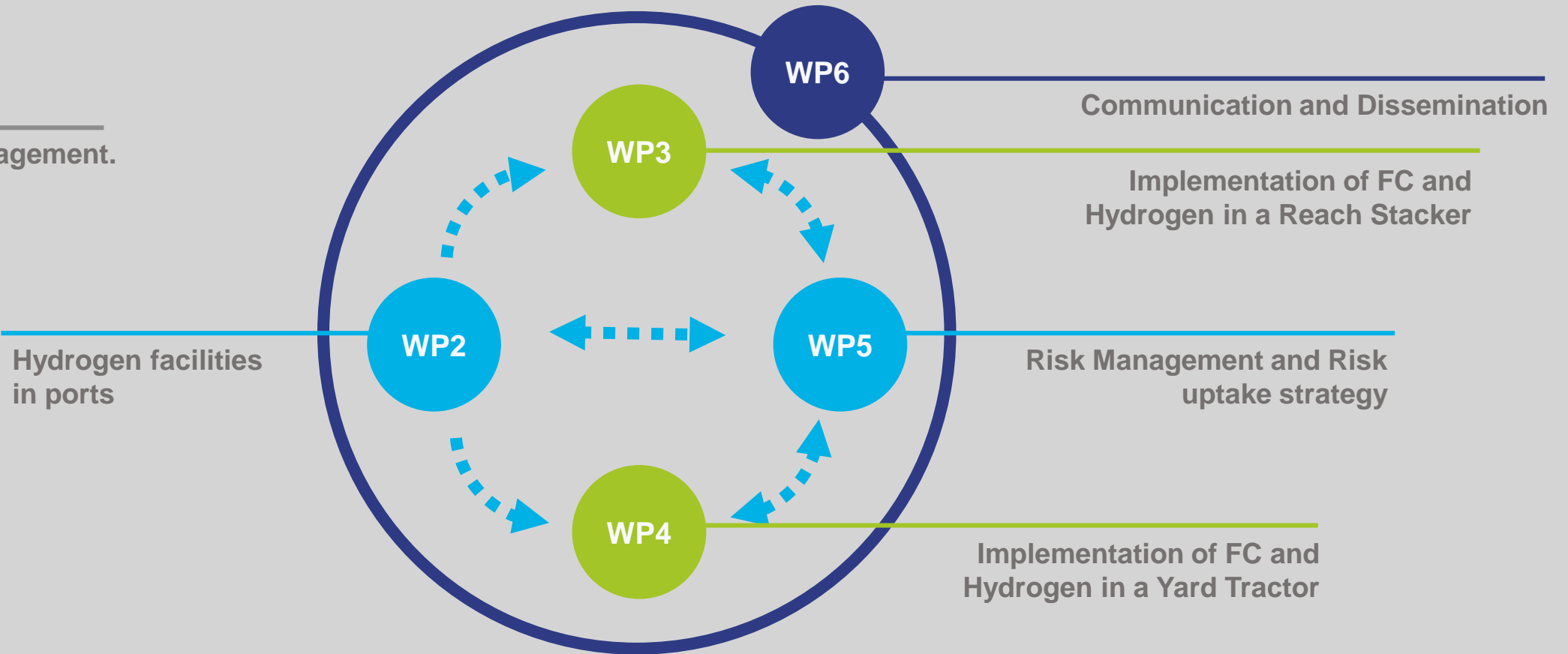


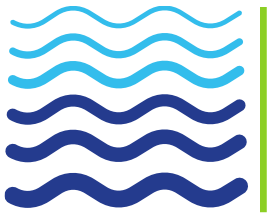


# Project Structure

**WP1**

Project Management.





# WP2. Hydrogen supply



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Gas Supplier



**Buffer Tank**  
50 m<sup>3</sup>; D:2450 L:11510  
10-40 bar  
180kg



**Compressor**  
50m<sup>3</sup>/h  
 $p_{in}$ : 10-40 bar  
 $p_{out}$ : 300-450 bar



FCHJU funding € 800,000 approx.



National Hydrogen Centre, Fundación Valenciaport, Valencia Port Authority, MSCTV, Hyster-Yale, Grimaldi, ATENA, Enagás



- Mobile hydrogen refuelling station
- Up to 60 kg of H<sub>2</sub> at 350 bar per day
- Hydrogen flow rate up to 3.6 kg/min
- Storage cascade at 300 and 450 bar use in order to save energy



**Panel dispenser**  
Up to 3.6 kg/min  
Tmax 85 °C

## Mobile Unit

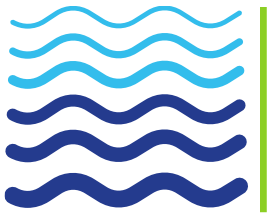
High pressure storage



300 bar  
153 L  
151 Kg

450bar  
135L  
841 Kg

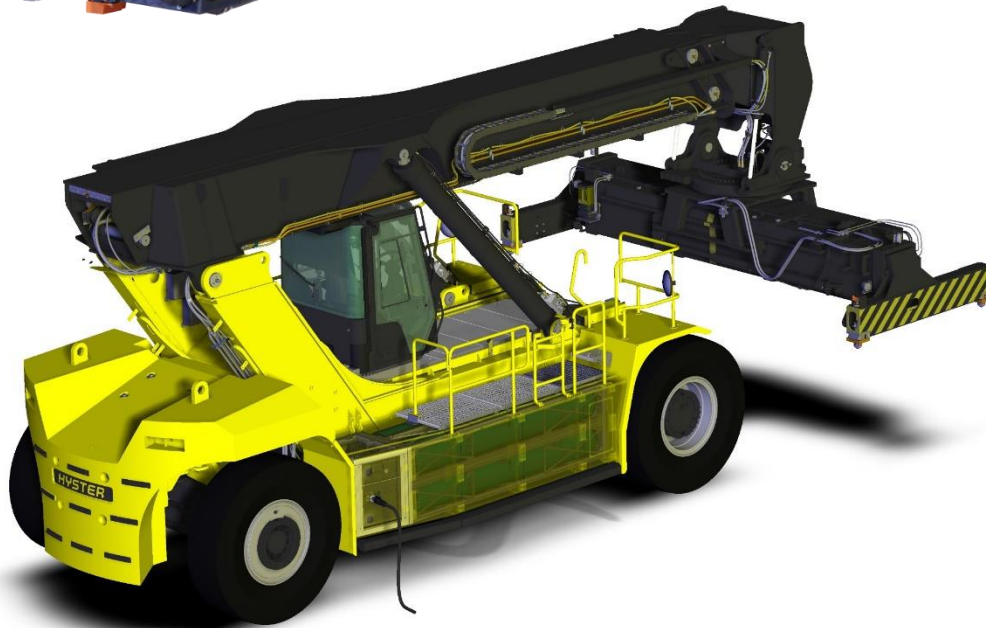




# WP3. REACH STACKER



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FCHJU funding € 1,300,000 approx.

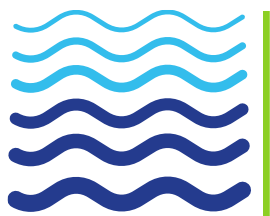


Hyster-Yale Nederland B.V., MSCTV,  
Port Authority of Valencia, Fundación  
Valenciaport, National Hydrogen Centre



Expected achievements

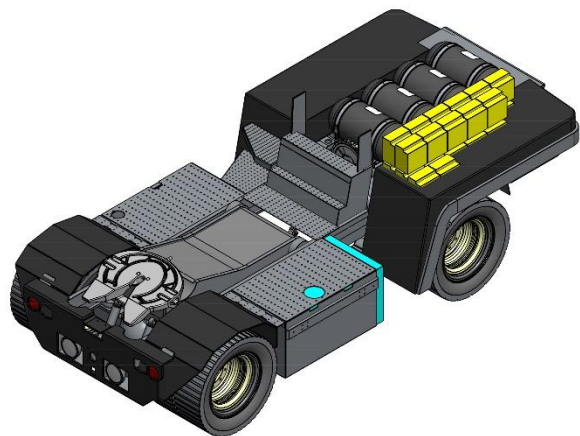
- Average CO<sub>2</sub> reduction of 128,000 kg per year per vehicle (3000 h & 16 L/h)
- Lower TCO
- Improved productivity



# WP4. 4x4 Terminal Tractor



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FCHJU funding € 1,100,000 approx.



ATENA, Grimaldi Group, Ballard, National Hydrogen Centre, Fundacion Valenciaport



Development and deployment a 4x4 Yard Tractor equipped with a Fuel Cells and test it in Valencia Terminal Europa (Grimaldi Group). It involves three tasks:

- Design of the new FCEV YT
- Assembling of new components in the YT
- Testing and Piloting of the FCEV YT in Valencia, Spain





# Market uptake strategy and risk management

## Objectives

Analysis of the technical and financial feasibility of the use Hydrogen Fuel Cells in ports machinery.



### Logistics

Define the most adequate logistic chain for supplying hydrogen. Estimate potential aggregated demand



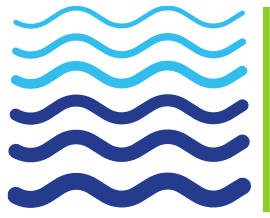
### Regulatory

Analyse all aspects related to safety. Study the permitting process



### Market uptake

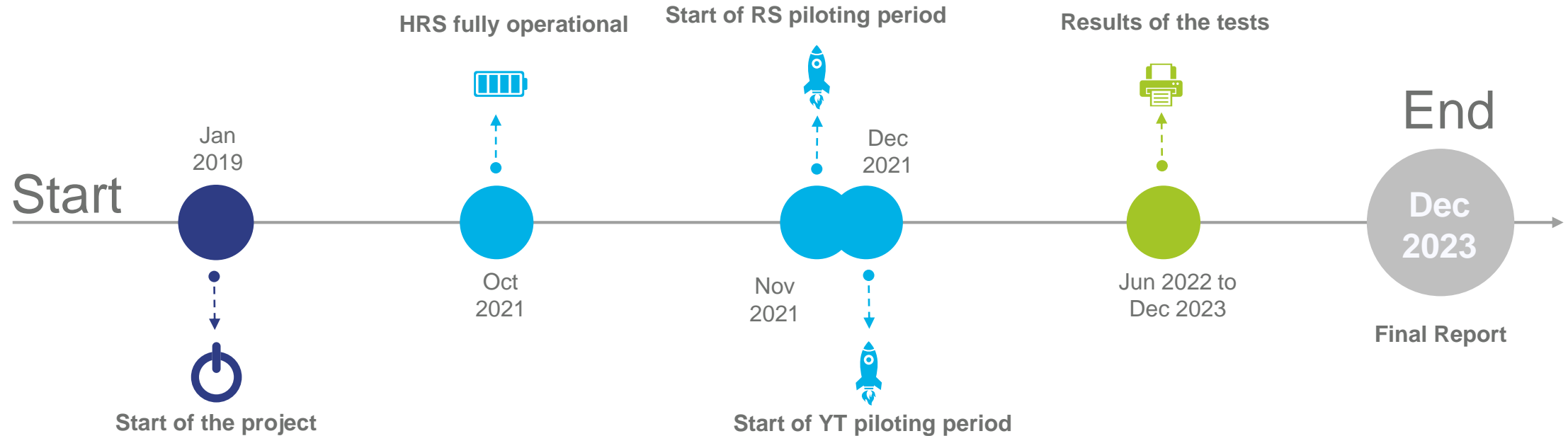
Assess the financial feasibility. Propose a path for the introduction of FC in the port maritime sector. Define the most probable implementing scenarios.



# H2Ports current planning



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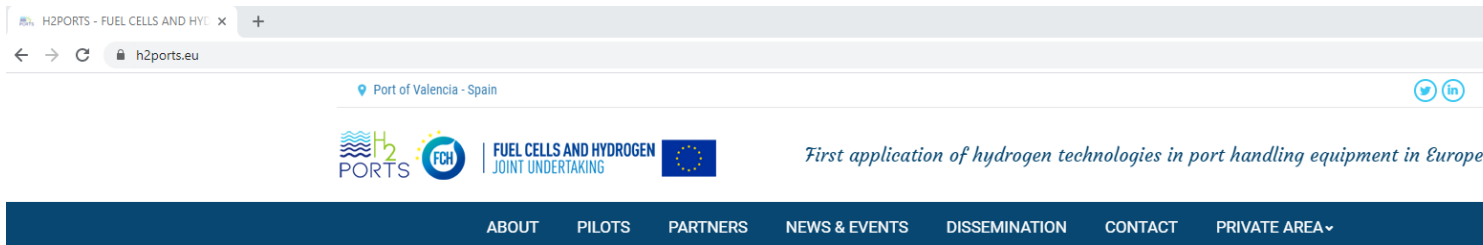






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