



FUNDACIÓN  
VALENCIAPORT

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# THE MARITIME LANDSCAPE OF AMMONIA

European Fuel Cell Forum, Lucern, Switzerland, July 2024

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# The Port of Valencia





SAGUNTO

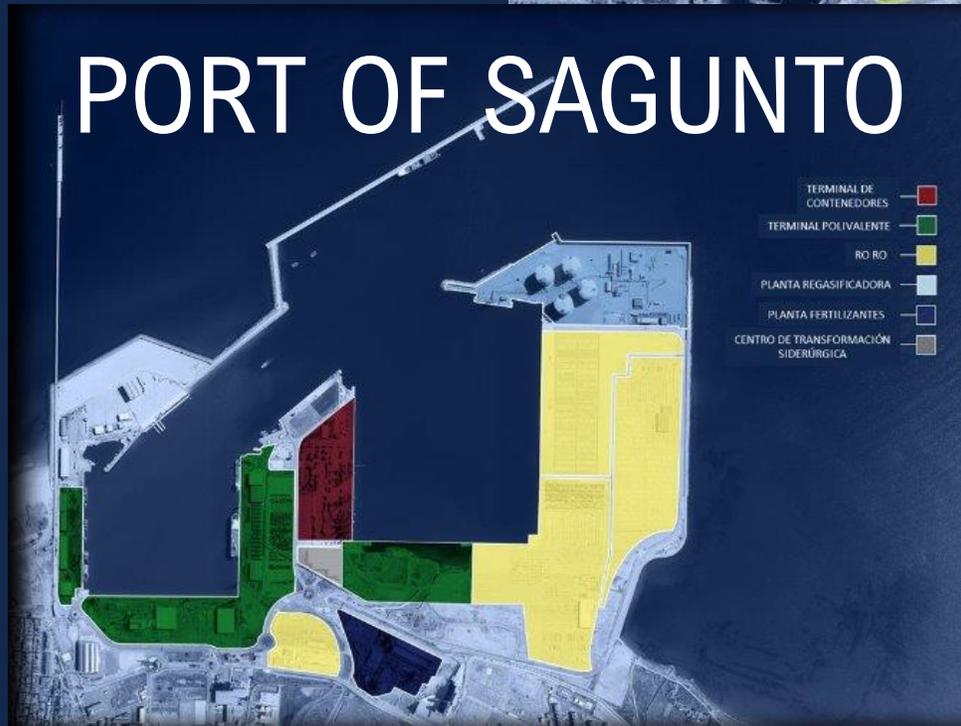
VALENCIA

GANDIA

# PORT OF VALENCIA



# PORT OF SAGUNTO

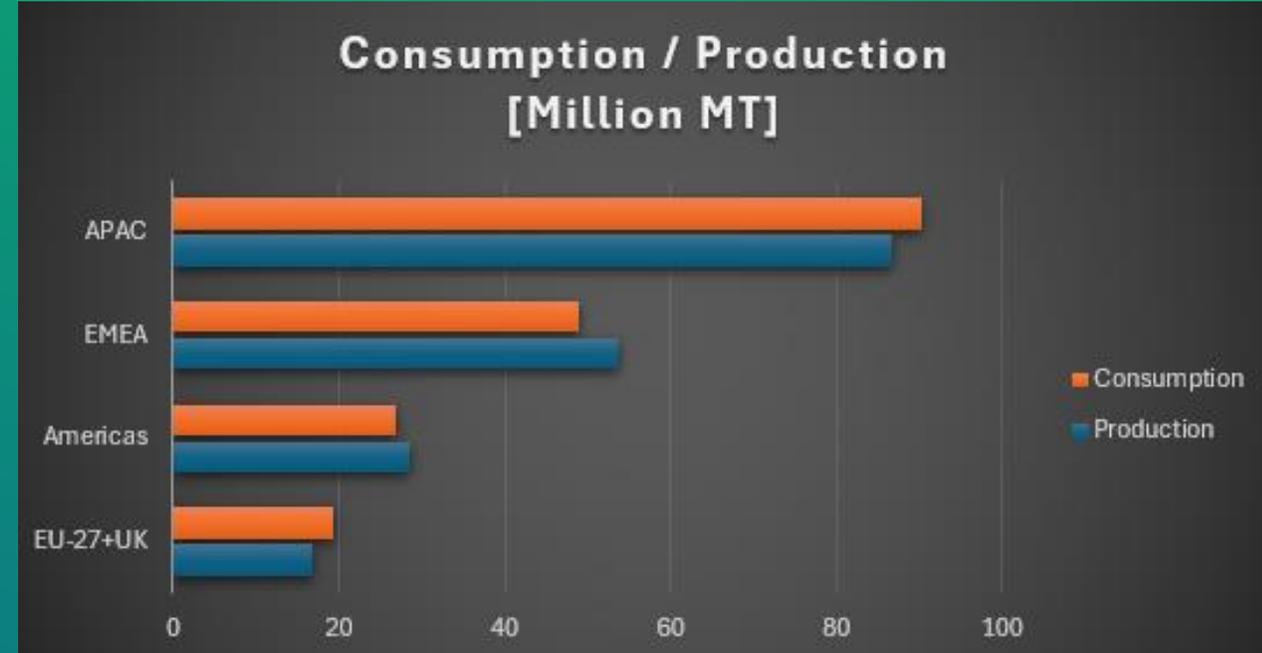
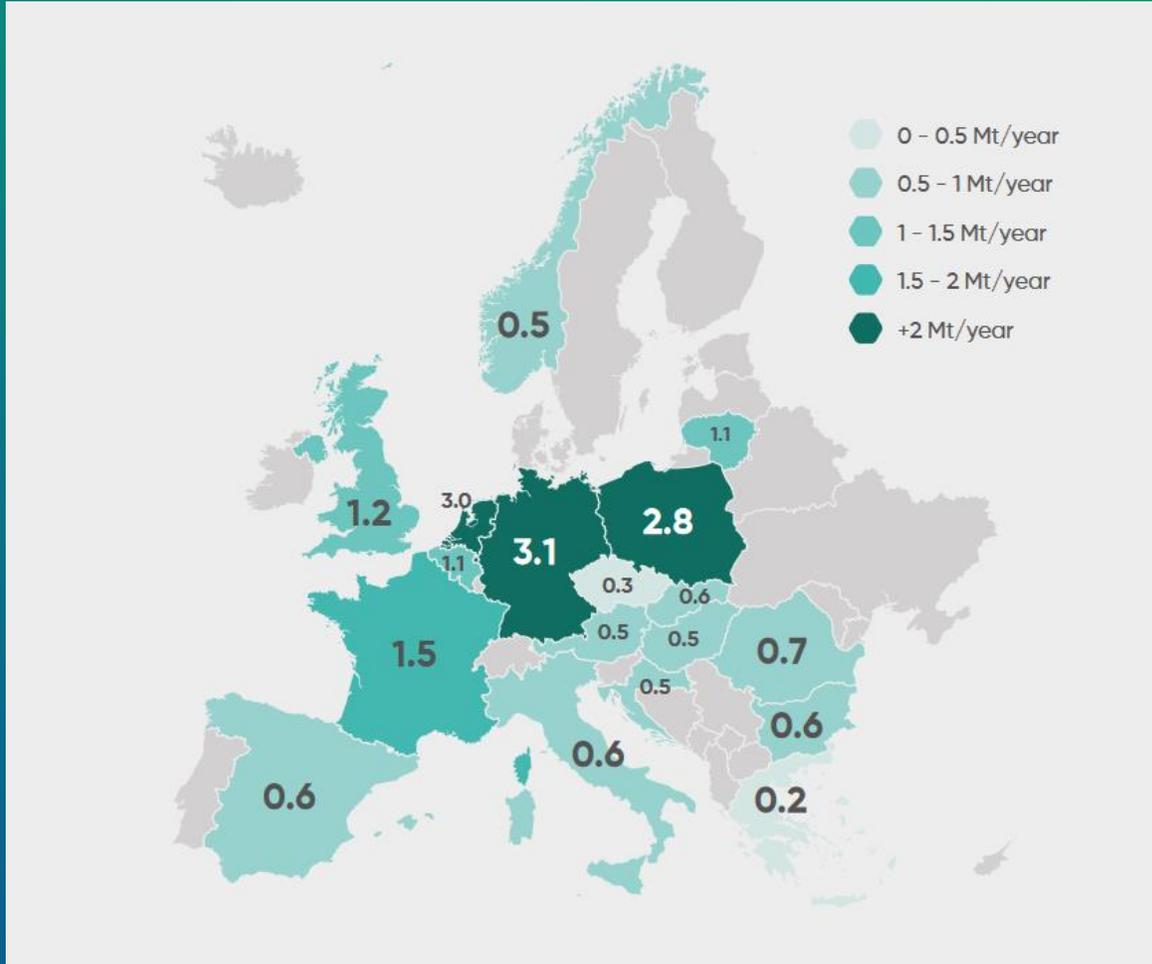


- TERMINAL DE CONTENEDORES
- TERMINAL POLIVALENTE
- RO RO
- PLANTA REGASIFICADORA
- PLANTA FERTILIZANTES
- CENTRO DE TRANSFORMACIÓN SIDERÚRGICA



# The New Fuels Paradigm

# AMMONIA PRODUCTION CAPACITY



Limited production: 230 million MT HFO [2022]

Source: Ship and Bunker

Ammonia production in Europe [million MT/year]

Source: Hydrogen Europe

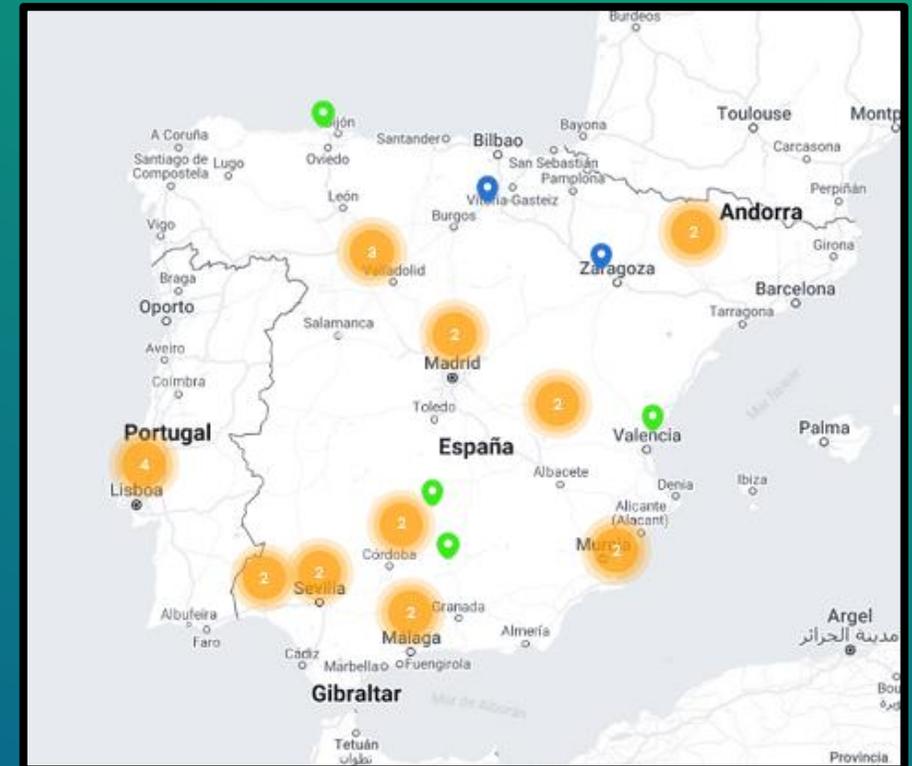
# AMMONIA SAFETY STUDY



LNG to AMMONIA A perspective to learn  
Safety of Ammonia as Fuel in Shipping

LNG capacity 3.3 million m3  
Core LNG as HIVE

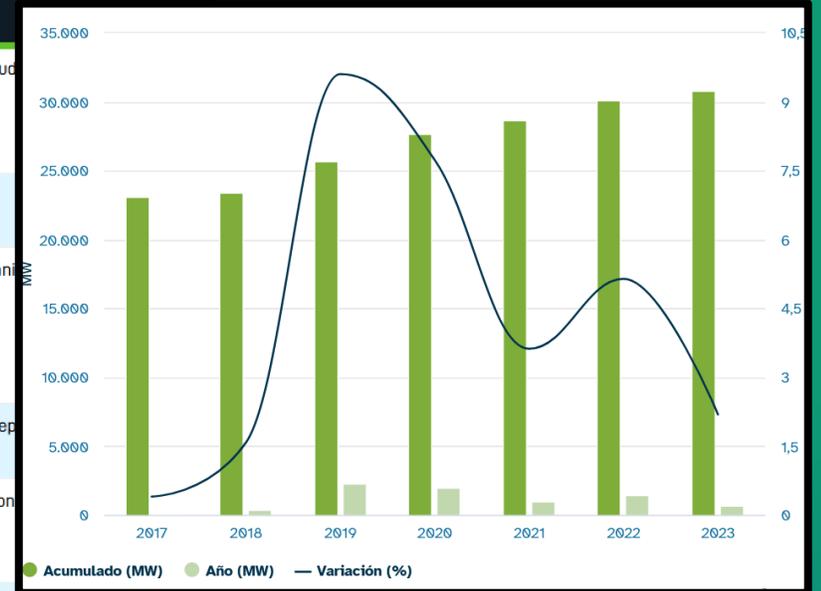
Global: 150 million MT / year  
Fertiberia: 2.5 million MT / year  
NH3 Capacity: 60,000 MT (20,000 Sagunto)  
Palos de la Frontera 400,00 MT / year





# SHORTLIST OF H2 PROJECTS (SPAIN)

NAME	LEAD DEVELOPER	INVESTMENT VOL.	MAIN LOCATION	H2 PROD.	STATUS
Andalusian Green Hydrogen Valley, with two main locations, Huelva (with ONUBA and the Methanol Plant projects) and Algeciras (CARTEIA Project)	Cepsa	3,000.00 M€	Spain	300,000 T/year	Feasibility stud
Basque Hydrogen Corridor BH2C	Petronor (Repsol Group)	1,100.00 M€	Spain	21,000 T/year	N.A.
BenortH2	Hy.Five Hydrogen S.L.U.	60.00 M€	Spain	3,200 T/year	pre-FID (planni risking, etc.)
Green Crane (Western route)	Enagás Renovable	1,470.00 M€	Spain	N.A.	Project concep
Green Hysland	Enagás	50.00 M€	Spain	300 T/year	Fully operation
HyVal	bp	2,000.00 M€	Spain	N.A.	pre-FID (planning, engineering, de- risking, etc.)
Orange.bat	Smartenergy	135.00 M€	Spain	13,000 T/year	pre-FID (planni risking, etc.)

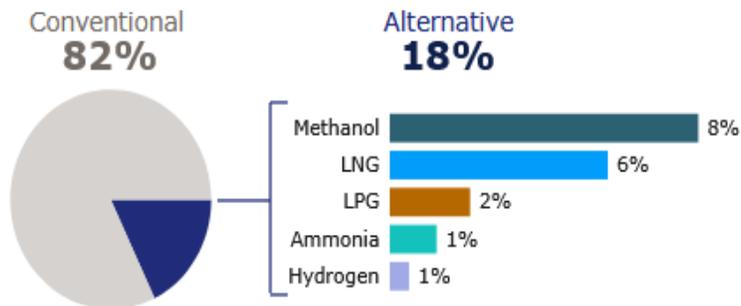


## Bottlenecks

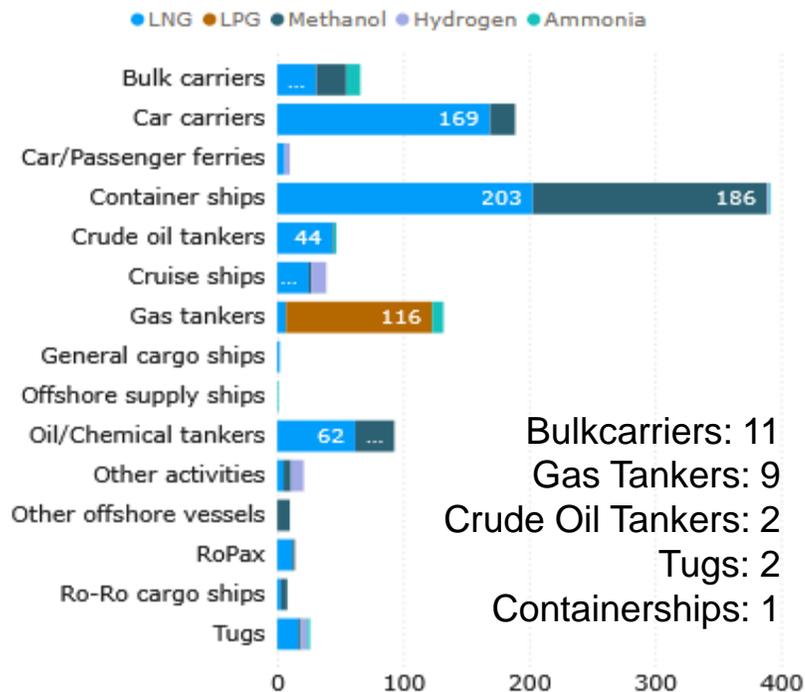
- limited clean energy production capacity (8x solar and 2x wind since 2008). Unbalance in offer/demand
- Price (\$1,000 USD green / tonne vs \$200 grey)

# THE FLEET

## New contracts in the last 12 months

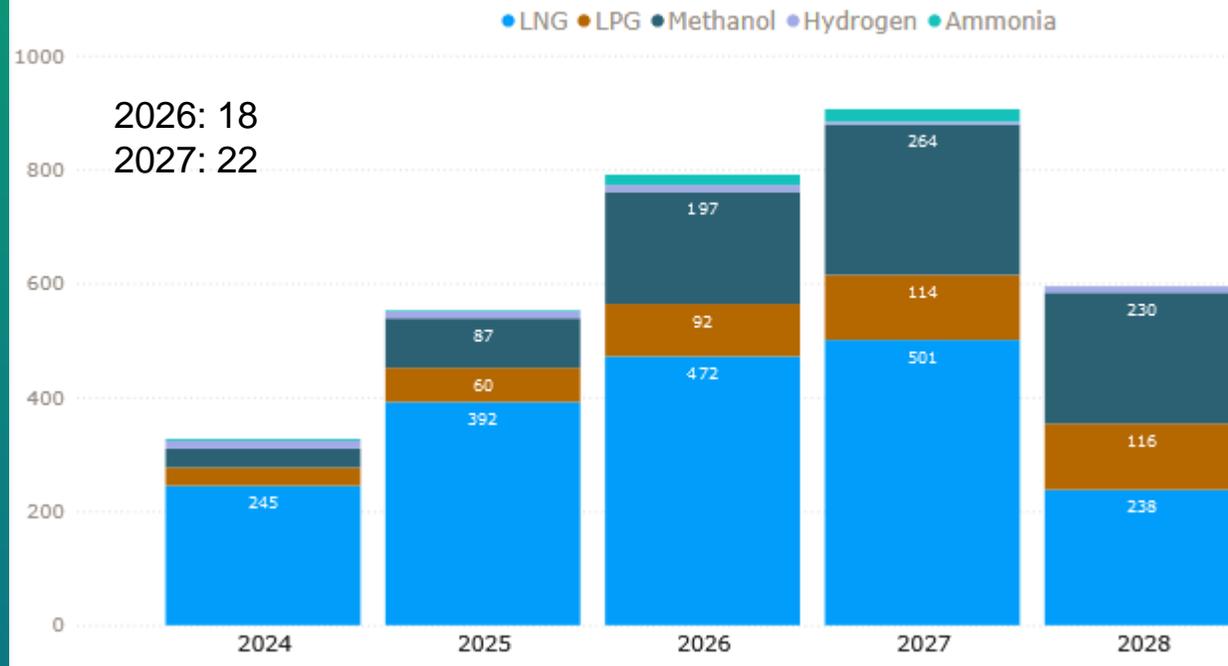


## Alternative fuel uptake by ship type



Bulkcarriers: 11  
 Gas Tankers: 9  
 Crude Oil Tankers: 2  
 Tugs: 2  
 Containerships: 1

## Growth of alternative fuel uptake by number of ships



Source: Alternative Fuels Insight (DNV) efficiency  $\approx$  50%

### Maritime Engines:

WARTSILA	4-stroke	End of 2023	1.7-3.4 MW
MAN	2-stroke	End of 2024	5 – 85 MW
WinGDF	2-stroke/4-stroke	End of 2024	5 – 31 MW

SOFC (NH<sub>3</sub> → Power) efficiency  $\approx$  60%

ShipFC	2 MW AiP from DNV
Amogy	1 MW

Summer 2024



## General features

- Total Budget: 4,117,197.5 EUR
- Duration: 2019-2024



### Reach Stacker in MSCTV

2 years / 5000 h de operation

### 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

# HIDRO REACH STAKER MSCTV



# 4X4 HIDRO TERMINAL TRACTOR GRIMALDI



# Final summary

Ports act as hubs. Engagement required since they are the gate to the maritime transport

Ammonia infrastructure already developed with a limited production capacity for the upcoming demand

Clean Energy is required for the green ammonia

Energy Prices still high. 2% global emissions of CO<sub>2</sub>

Vessel's space limited . Ammonia has the highest energy density of the non CO<sub>2</sub> emitters

Engines dual fuels while fuel cell can use ammonia only and no need of pilot fuel, however limited power

Thank you 😊

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