Decarbonization pathways for maritime & H2 import - export corridor

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Blueweek June 2022 - Rotterdam

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PRESENT CONTEXT: A WISH TO ACCELERATE EU SECURITY OF ENERGY SUPPLY

"One is the diversification of supply away from Russia and towards reliable suppliers. This is mainly LNG and pipeline gas. Both have the advantage that the infrastructure is over time hydrogen-compatible.

The second main element is to repower the European Union. Repower means massive investment in renewables, like solar, wind and hydrogen."

Press release 7 March 2022 BRUSSELS

"Diversifying gas supplies, via higher Liquefied Natural Gas (LNG) and pipeline imports from non-Russian suppliers, and larger volumes of biomethane and renewable hydrogen production and imports"

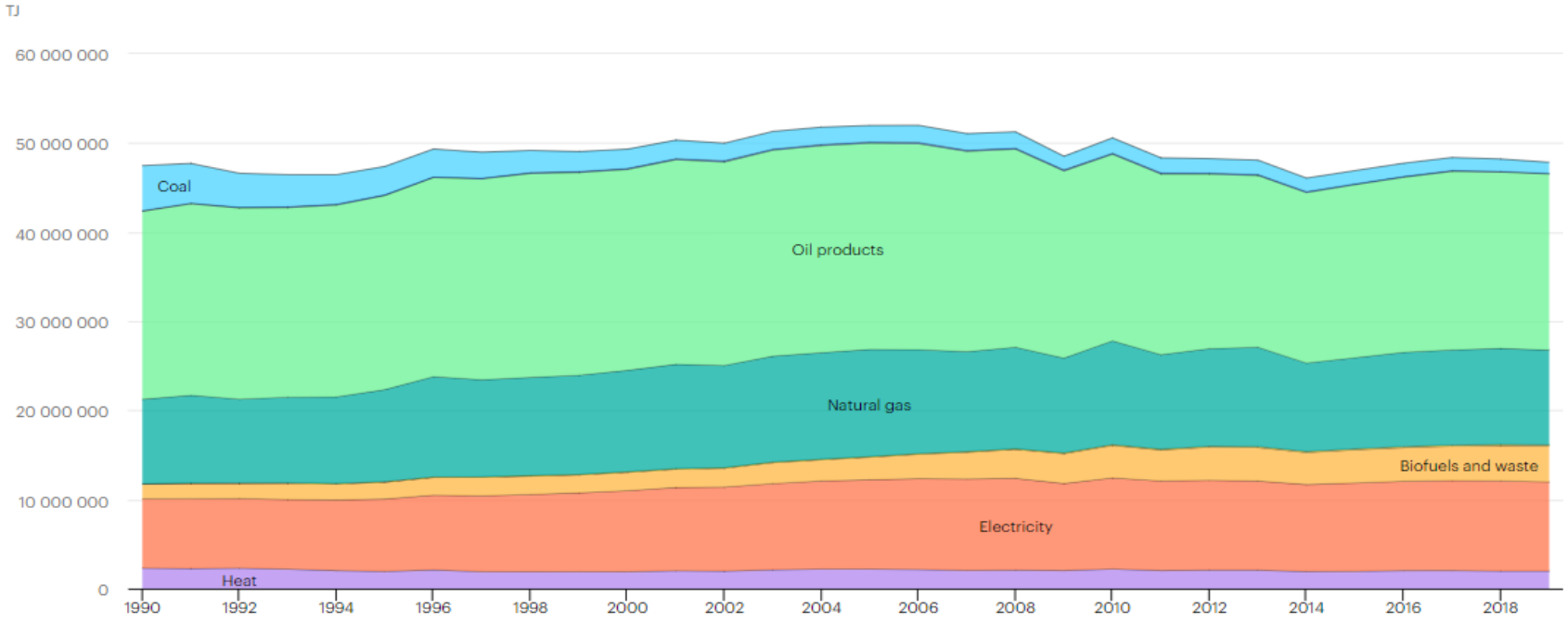
Press release 8 March 2022 Strasbourg

EU ENERGY SOVEREIGNTY…WHAT ELSE?

NOT ONLY THROUGH ELECTRONS…BUT ALSO MOLECULES

Energy topic	Indicator	Country or region
Energy consumption	**Total final consumption (TFC) by source**	**European Union - 28**

Total final consumption (TFC) by source, European Union - 28 1990-2019



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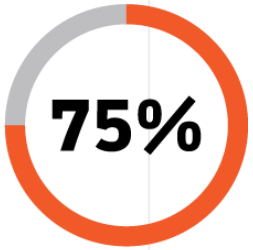
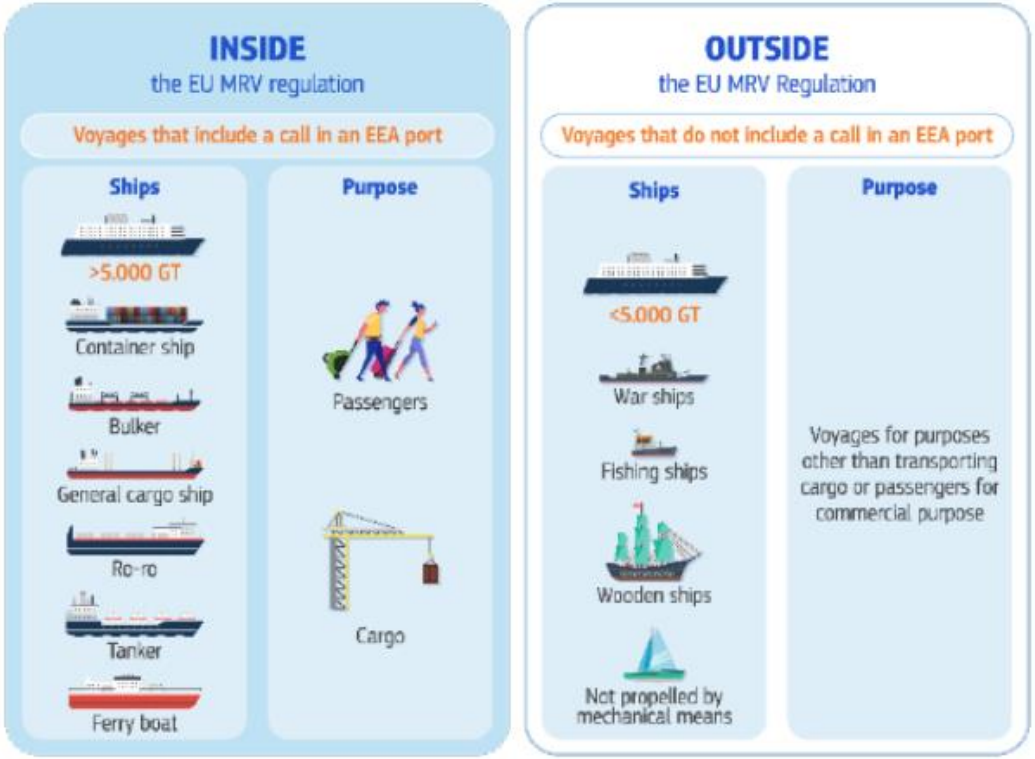
Coal · Crude oil · Oil products · Natural gas · Wind, solar, etc. · Biofuels and waste · Electricity · Heat



¾ is Oil & Gas
requiring
- reuse of existing infrastructure
- High energy massification

¼ is electricity
requiring
- massive deployement of renewable
- electrification of processes

THE RULES OF THE GAME IN THE YEARS TO COME:
ETS, FUELEU, RED 2 – INCENTIVES TO BRING THE SHIPPING GREENER



EU-Emission Trading System (ETS)	Renewable Energy Directive (RED)	FuelEU Maritime *EC Proposal*	Energy Taxation Directive (ETD) *EC Proposal*
"**Shipping company**", meaning the shipowner or any other organisation or person, such as the manager or the bareboat charterer, that has assumed the responsibility for the operation of the ship from the shipowner. (future art. 3.v)	**Fuel Supplier** in transport sector. Art. 2-(38) 'fuel supplier' means an entity supplying fuel to the market that is responsible for passing fuel through an excise duty point or, in the case of electricity or where no excise is due or where duly justified, any other relevant entity designated by a Member State	"Company", meaning the **shipowner** or **any other organization or person having the responsibility for the operation of the ship from the shipowner**, such as the manager or the bareboat charterer (art. 3.k, sending to art. 3.d of the Maritime CO2 MRV regulation – 2015/757)	**Bunker procurers**

Maritime targets on the limits on greenhouse gas intensity of the energy used on-board compared to 2020

What does the initial IMO GHG strategy say?

The initial GHG strategy envisages, in particular, a reduction in carbon intensity of international shipping (to reduce CO2 emissions per transport work, as an average across international shipping, by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008); and that total annual GHG emissions from international shipping should be reduced by at least 50% by 2050 compared to 2008.

THE IMPACT IN TERMS OF VALUE CHAIN:

HOW TO LEVERAGE ON EXISTING INFRASTRUCTURE AND DENSIFY ENERGY CONTENT?

…FROM…

Situation Today
Fossil oil

- × Overseas sourcing
- × Stranded assets
- × CO_2 emissions
- × Complex industrial chain

ENERGY SOURCING → **INFRASTRUCTURE** → **ENERGY CARRIER** → **CO2 CYCLE**

Remote exploration & production → Overseas and inland transport and storage → Refinary process and energy carrier conditioning → Shipping propulsion → CO_2

…TO…

- ✓ Local economy
- ✓ Industrial symplicity
- ✓ Short cycles
- ✓ Infra leverage
- ✓ CO_2 avoidance & valorization

ENERGY SOURCING → **INFRASTRUCTURE** → **ENERGY CARRIER** → **CO2 CYCLE**

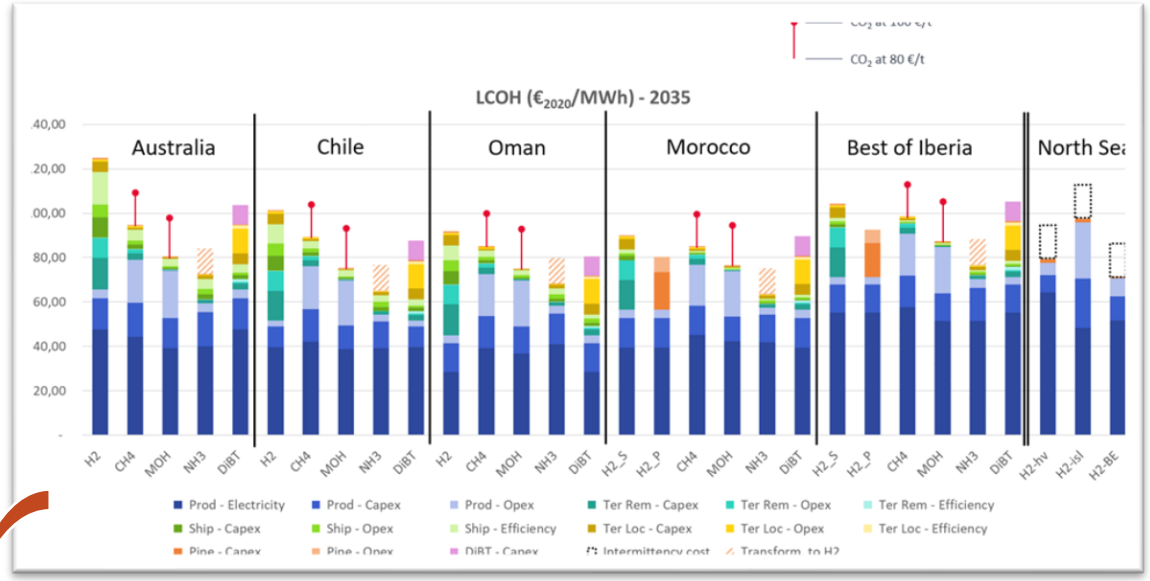
Local Renewable Hydrogen prod. → Hydrogen transport and storage → Energy carrier synthesis → Shipping propulsion → CO_2 (If any)

ENERGY CARRIER → **CO2 CYCLE**

Global Renewable Hydrogen prod. → Hydrogen transport and storage → Energy carrier synthesis → Energy transport by ship → Energy restitution

MARITIME INDUSTRY HAS ALSO A ROLE TO PLAY TO BRING ENERGY AROUND THE GLOBE… WITH NO CLEAR ENERGY CARRIER WINNER

Energy carriers in the same order of magnitude of cost, allowing for diversification, but also no massification



Source: Hydrogen Import Coalition

- By 2035, cost of production in a bandwidth between 50 and 80 €/MWh
- Cost of delivery oversea is in the range of 80 to 120 €/MWh

Displacing fossil energy carriers require to match characteristics: energy density & reuse infrastructure

Energy Carrier	# vessels (100 kt oil ~113 x 10³ m³)	Toxicity	Flammability	Efficienc
Oil	1			
L. Hydrogen (20 K)	5			
Di Benzil Toluen (ambient T)	6			
Methanol	3			
LNG	2			
Ammonia (Liquid, -33C)	3			

Dimensions (Good-Bad-Worse)

Toxicity: Man **Flammability** **Efficiency**

Fish

Source: ENGIE hydrogen carrier study 2017

ENGIE targets for long-term development of Hydrogen

	Build green H2 production capacities	Develop a midstream portfolio and H2 backbone		Provide H2 solutions for green mobility
2025:	0.6	170	0.3	50
2030:	4 GW	700 km	1 TWh	>100
	Green H_2 capacity	Transmission pipeline	Storage	Refueling stations

ENGIE is partner of the Global Maritime Forum

GLOBAL MARITIME FORUM

ENERGY TRANSITION

Getting to Zero Coalition

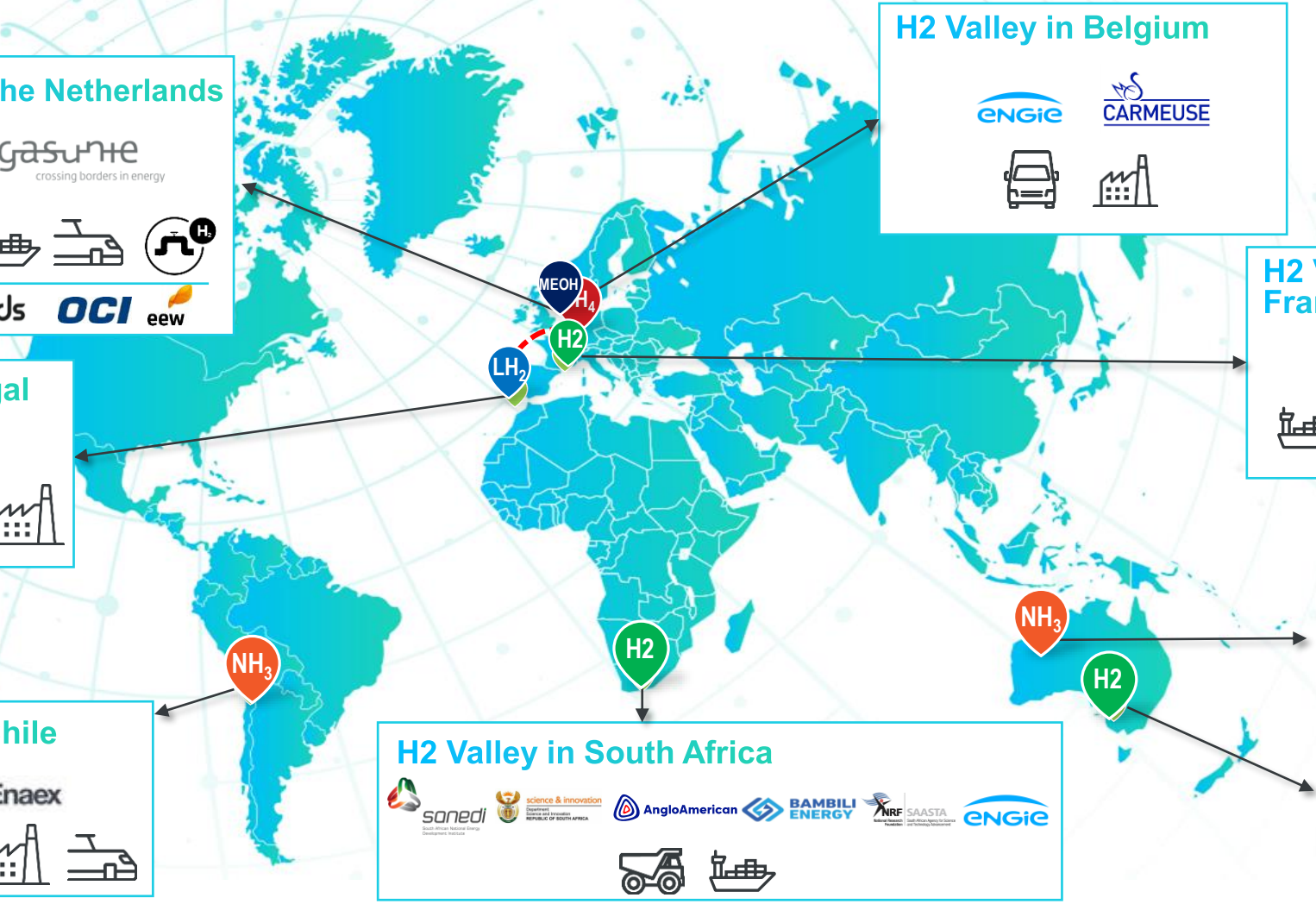
Accelerating maritime shipping's decarbonization with the development and deployment of commercially viable deep sea zero emission vessels by 2030.

ENGIE and CMA CGM join forces to decarbonise shipping

Developing Hydrogen Valleys Worldwide

Prioritising location in ports to provide energy solution to shipping sector …with the ambition to connect valleys together in the longer term…

- NH_3 e-ammonia [NH_3]
- MEOH e-methanol [MEOH]
- CH_4 e-methane [CH_4]
- LH_2 Liquid hydrogen [LH_2]
- H2 Gaseous hydrogen [H_2]



H2 Valley in the Netherlands

ENGIE, gasunie (crossing borders in energy), hynetherlands, OCI, eew

H2 Valley in Belgium

ENGIE, CARMEUSE

H2 Valley in Portugal

ENGIE

H2 Valley in the South of France

ENGIE, TotalEnergies

H2 Valleys in Australia

ENGIE, YARA

ENGIE, Australian Gas Networks

H2 Valley in Chile

ENGIE, Enaex

H2 Valley in South Africa

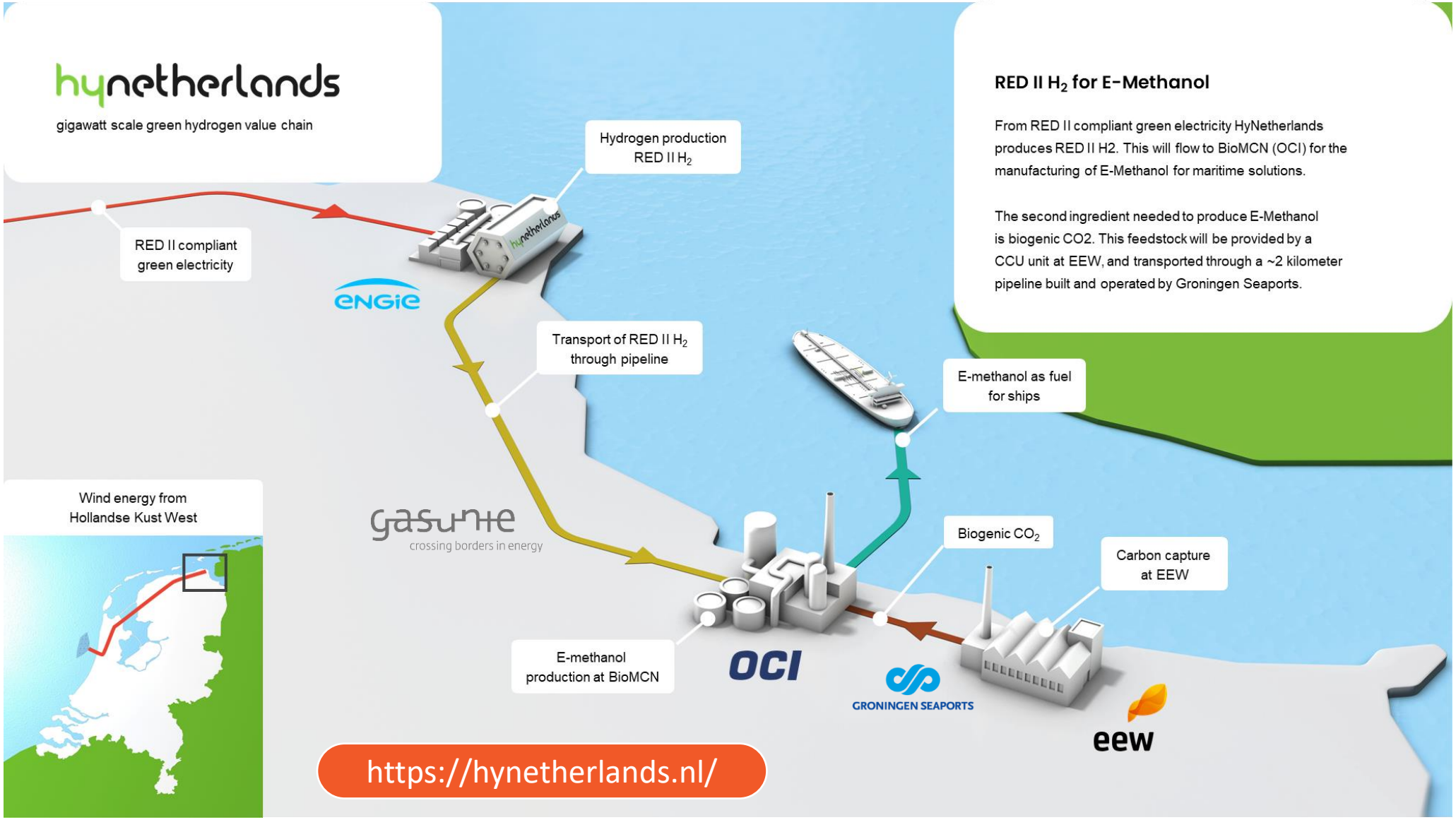
sanedi, science & innovation, AngloAmerican, BAMBILI ENERGY, NRF, SAASTA, ENGIE

ENGIE

ENGIE is partner of the Global Maritime Forum

- HyNetherlands project Phase1 targets the production of 14 ktpa renewable hydrogen and 53 ktpa e-methanol based on biogenic CO_2
- Objective is start construction August 2023 and operation End 2025
- Envisioned capacity of the entire hydrogen plant is 1,85 GW

HYNETHERLANDS PROJECT: WHAT ARE WE TALKING ABOUT?



https://hynetherlands.nl/

TIME TO LOOK UP
AND ACT NOW!
ENGIE