CONFERENCE

AIVP Lisbon 2024

November 27, 28 & 29th

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World Conference Cities & Ports by AIVP

Energy Transition and Circular Economy
Introduction

MODERATOR

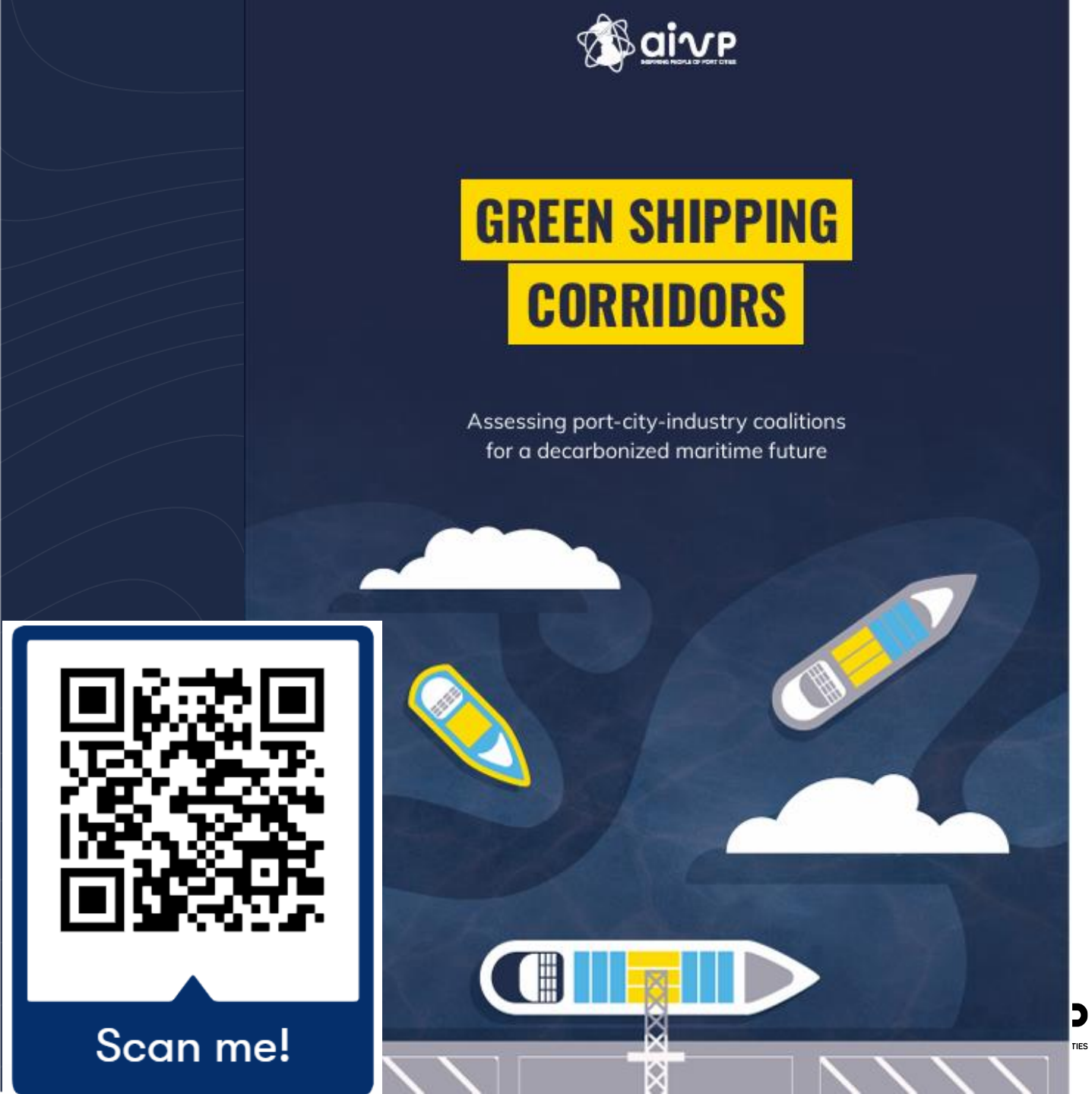
Michele ACCIARO
Associate Professor
Copenhagen Business School

World Conference Cities & Ports by AIVP

Energy Transition and Circular Economy

AIVP Publication

Caya HEIN
Project Leader – Green Transition & Agenda 2030 by AIVP



A new AIVP Publication

- *Publication in collaboration with Port City Futures*

- *Includes interviews with AIVP members involved in Green Shipping Corridors*

- *Includes articles from international organisations such as C40 and Resilience4Ports*

https://www.aivp.org/en/newsroom/aivp-and-port-city-futures-present-the-green-shipping-corridors-white-book/

World Conference Cities & Ports by AIVP

MAGPIE
SMART GREEN PORTS

Energy Transition and Circular Economy Roundtable

MODERATOR

Zenaida MOURÃO
Senior Researcher
INESCTEC

Reyer WILL
MAGPIE Project Manager
Port of Rotterdam

Patrick VAN CAUWENBERGHE
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Port of Antwerp-Bruges

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R&D Engineer
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Environmental Manager
Port of Itaqui

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Reyer WILL
MAGPIE Project Manager
Port of Rotterdam

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MAGPIE
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Port of Rotterdam

sMArt Green Ports as Integrated Efficient multimodal hubs

CONNECTING THE WORLD. BUILDING TOMORROW'S SUSTAINABLE PORT.

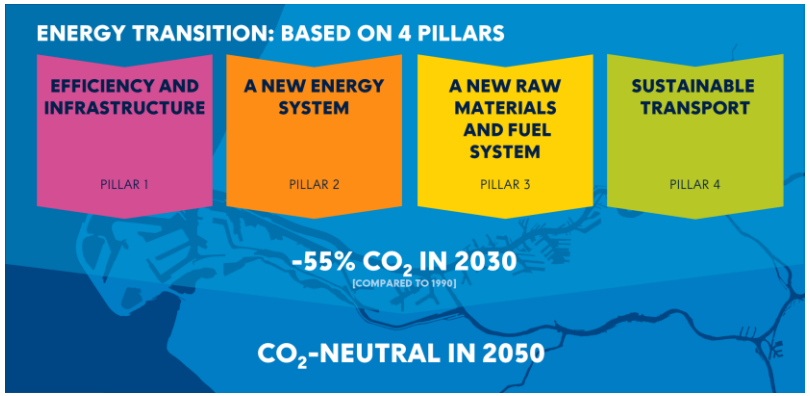
Reyer Will
Manager MAGPIE Project
Program Manager Port of Rotterdam International

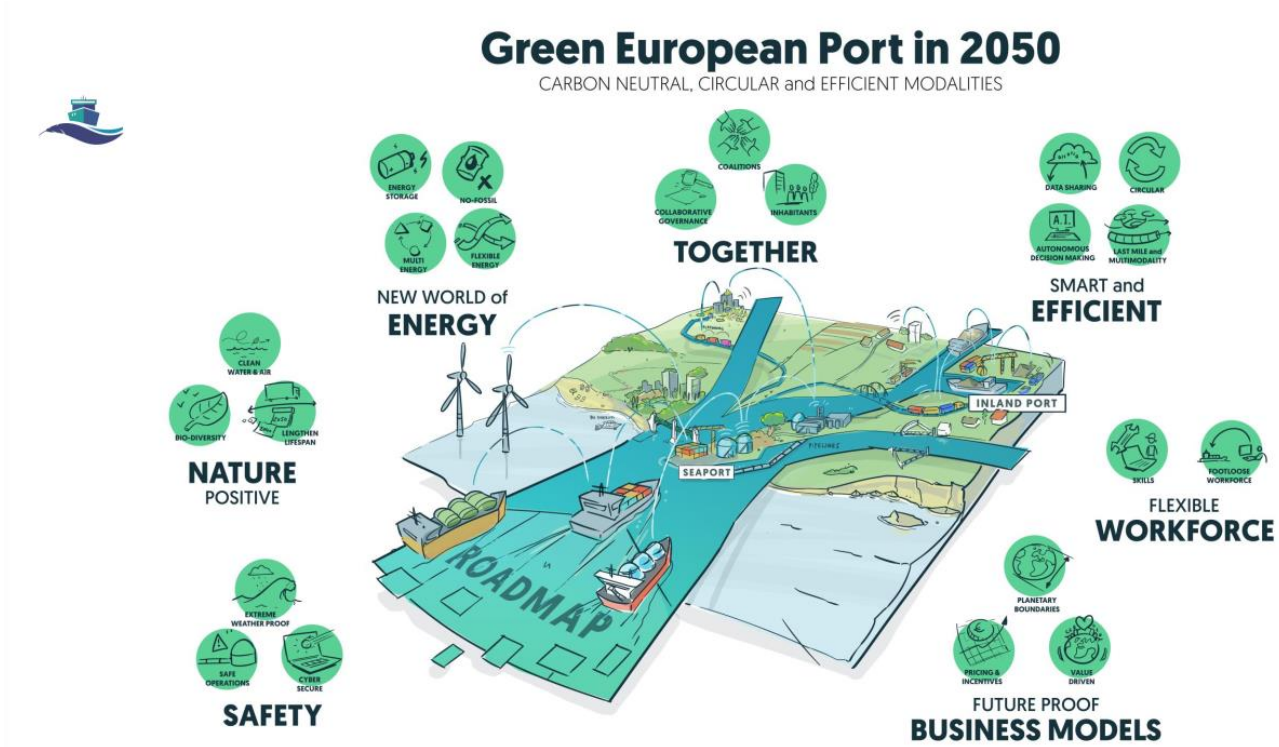
contact@magpie.eu • www.magpie-ports.eu

Funded by the European Union

This project has received funding from the European Union's Horizon 2020 (MFF 2014-2020) research and innovation programme under Grant Agreement 101036594

Green European Port in 2050
Carbon Neutral, Circular and Efficient Modalities





Port of Rotterdam

THINK BIG, START SMALL

SHAPING A MULTI-FUEL FUTURE WITH THE ENTIRE VALUE CHAIN

MAGPIE SMART GREEN PORTS

Port of Rotterdam

Rotterdam aims to meet ~25% EU ambitions 2030 (RePowerEU) and become Europe's Hydrogen Hub

EU hydrogen production

0.6 Mtpa Rotterdam green & low carbon hydrogen production

EU hydrogen import

4.0 Mtpa Rotterdam import green hydrogen & derivatives

Europe is short on energy. Massive import of hydrogen and its derivatives needed

First projects are being built, many more upcoming: FID's taken for main H_2 infrastructure projects

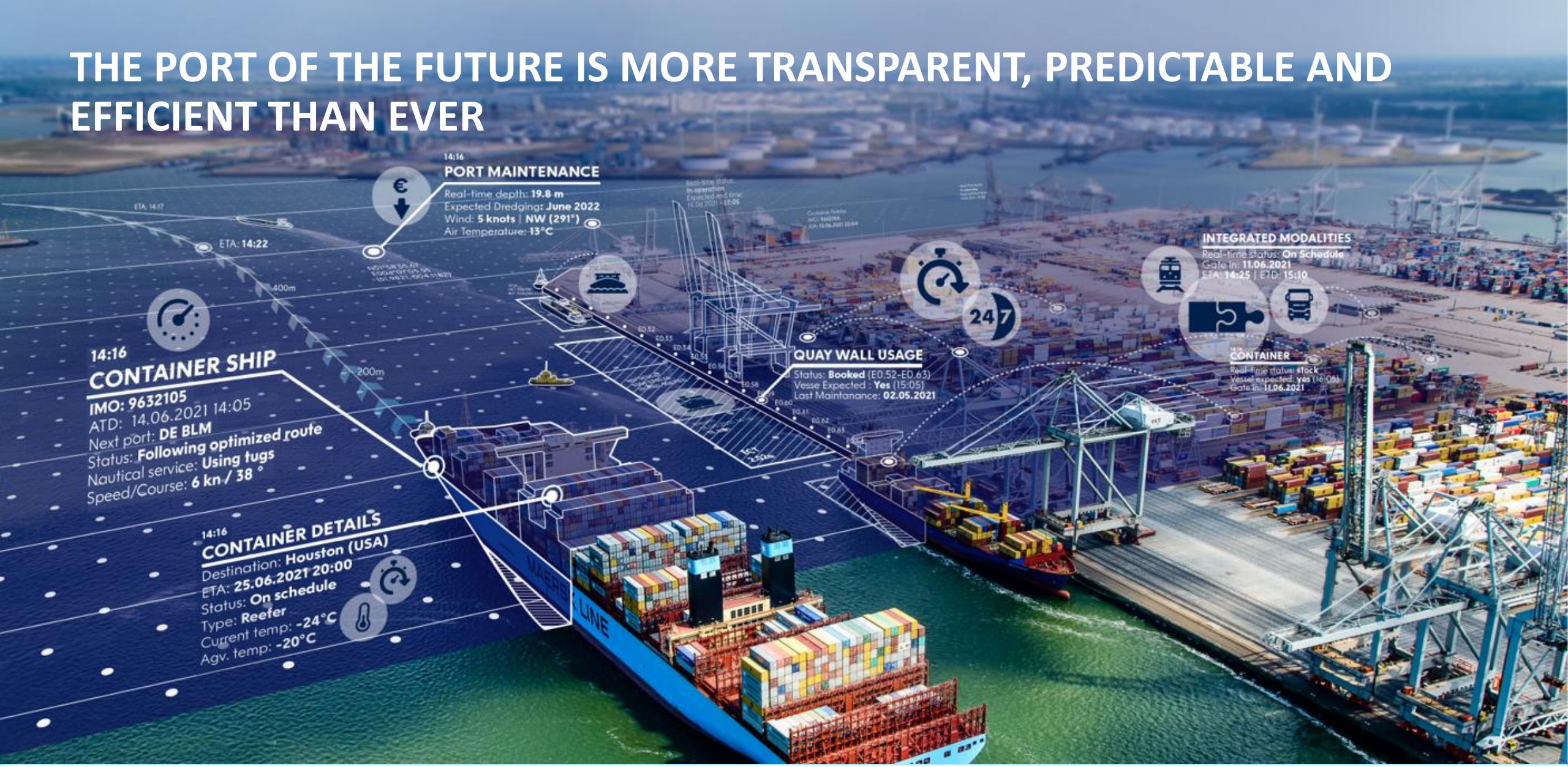
- 1st Electrolyser
- H_2 Pipeline
- 1st Terminal
- CO_2 Pipeline

and Rotterdam is connected to the H_2 demand centers in North West Europe

Pipelines, Waterways & Rail Hydrogen network Netherlands & Delta Rhine Corridor

Port of Rotterdam

THE PORT OF THE FUTURE IS MORE TRANSPARENT, PREDICTABLE AND EFFICIENT THAN EVER



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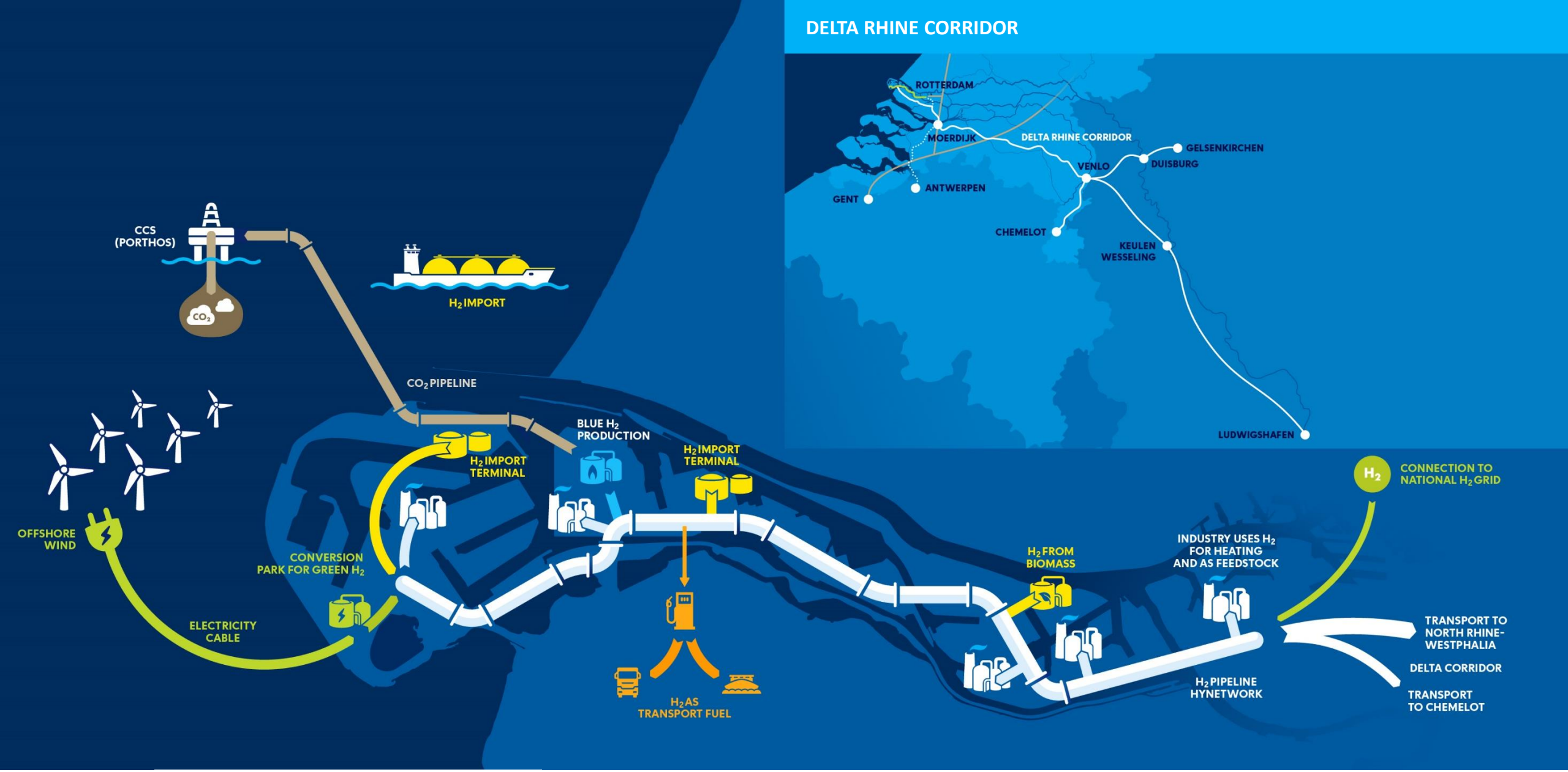
Port of Rotterdam



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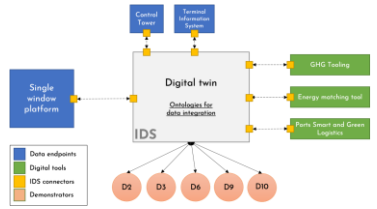
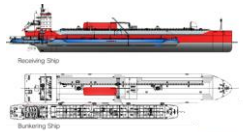
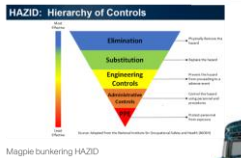
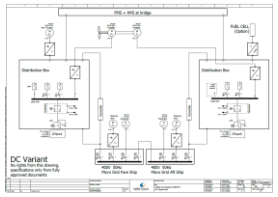
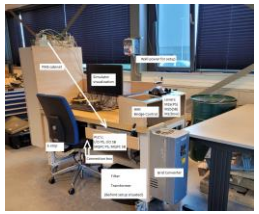
DEMONSTRATORS, TOOLS, ROADMAP, HANDBOOK, MASTERPLAN

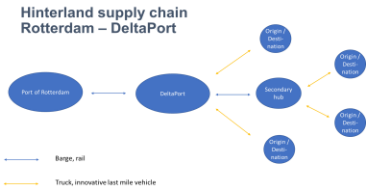












WP 3
- Demo 1: E-Methanol
- Demo 2: Smart Energy Systems
- Demo 3: Grid-Integrated Hybrid Vessel
(Shore Power Peak Shaving)

WP 5
- Demo 4: Ammonia Bunkering
- Demo 5: Off-Shore Charging Buoy
- Demo 6: Autonomous E-Barge
- Demo 7: Green Energy Container (E-Barge)

WP 4
- Tool: Green Energy Matching
- Tool: GHG Tooling
- Tool: Smart Green Logistics

Demonstration projects

WP 1 Project Management, exploitation and coordination

WP 2 Communication, stakeholder engagement and dissemination

WP 3 Energy Requirements and supply chains

WP 4 Digital tools

WP 5 Maritime and inland waterway transport

WP 6 Land transport

WP 7 Non-technological innovations

WP 8 Monitoring and impact evaluation

WP 9 Master Plan for European green ports

WP 10 Cooperation with other actions

WP 6
- Demo 8: Hybrid Shunting Locomotiv
- Demo 9: Green Connected Trucking
- Demo 10: Spreading Roadtraffic

WP 7
- Tool: Tarrif Differensation

WP 9
- Roadmap: Vision 2030,2040,2050
- Handbook: implementation MAGPIE Demonstrators

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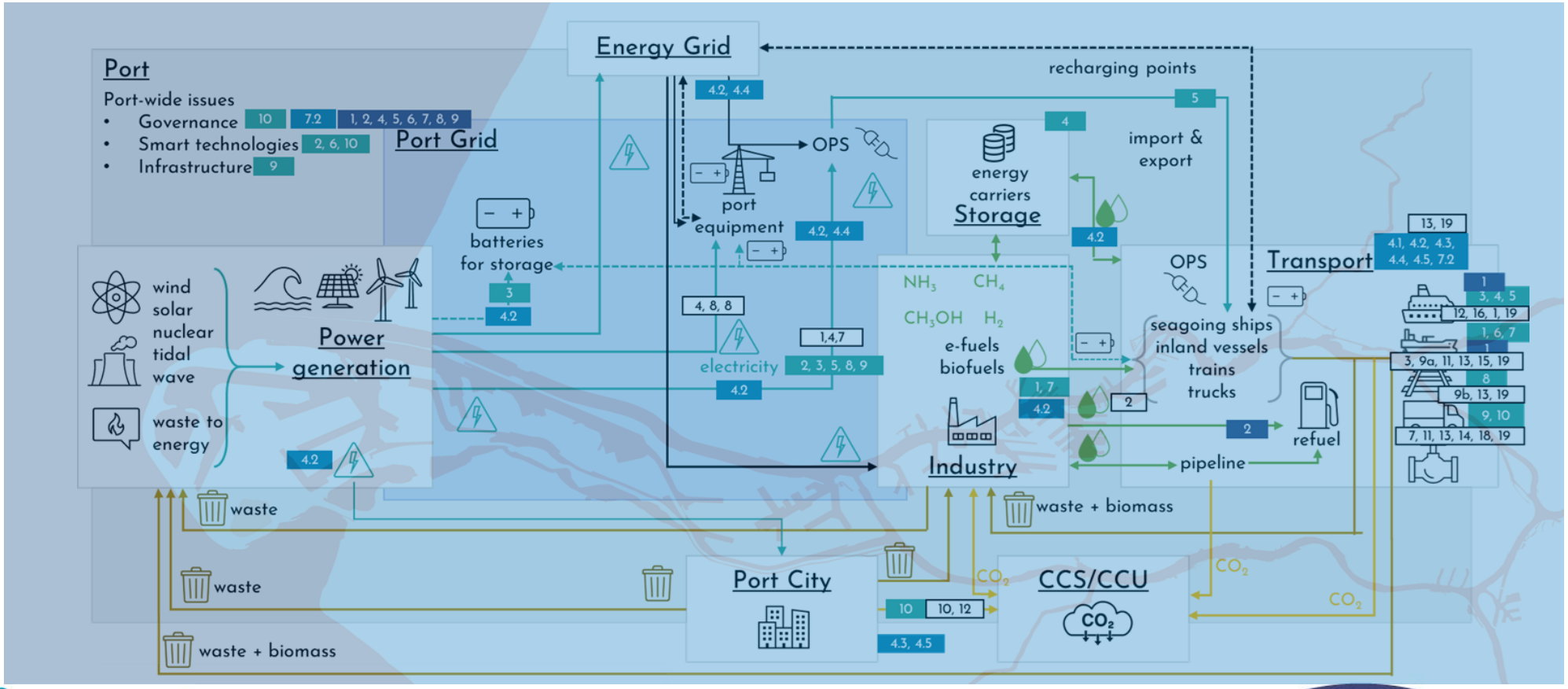
SMART GREEN PORTS

ACCELARATING TRANSITION
VISION, STRATEGY, ROADMAP

Demos
Tools
Solutions
Pioneers



Port of Rotterdam

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Funded by the European Union

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PARTNERS

MAGPIE

SMART GREEN PORTS

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Reyer Will
Manager MAGPIE Project
Program Manager PoRint

HORIZON 2020 GREEN PORT PROJECTS

PIONEERS TULIPS Stargate LGA hOListic Green Airport MAGPIE SMART GREEN PORTS

World Conference Cities & Ports by AIVP

Patrick VAN CAUWENBERGHE
International Trade Networks Manager
Port of Antwerp-Bruges

PIONEERS

Portable Innovation Open Network for
Efficiency and Emissions Reduction Solutions

Port of Antwerp Bruges

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19th World Conference

28/11/2024

Patrick Van Cauwenberghe
Port of Antwerp-Bruges

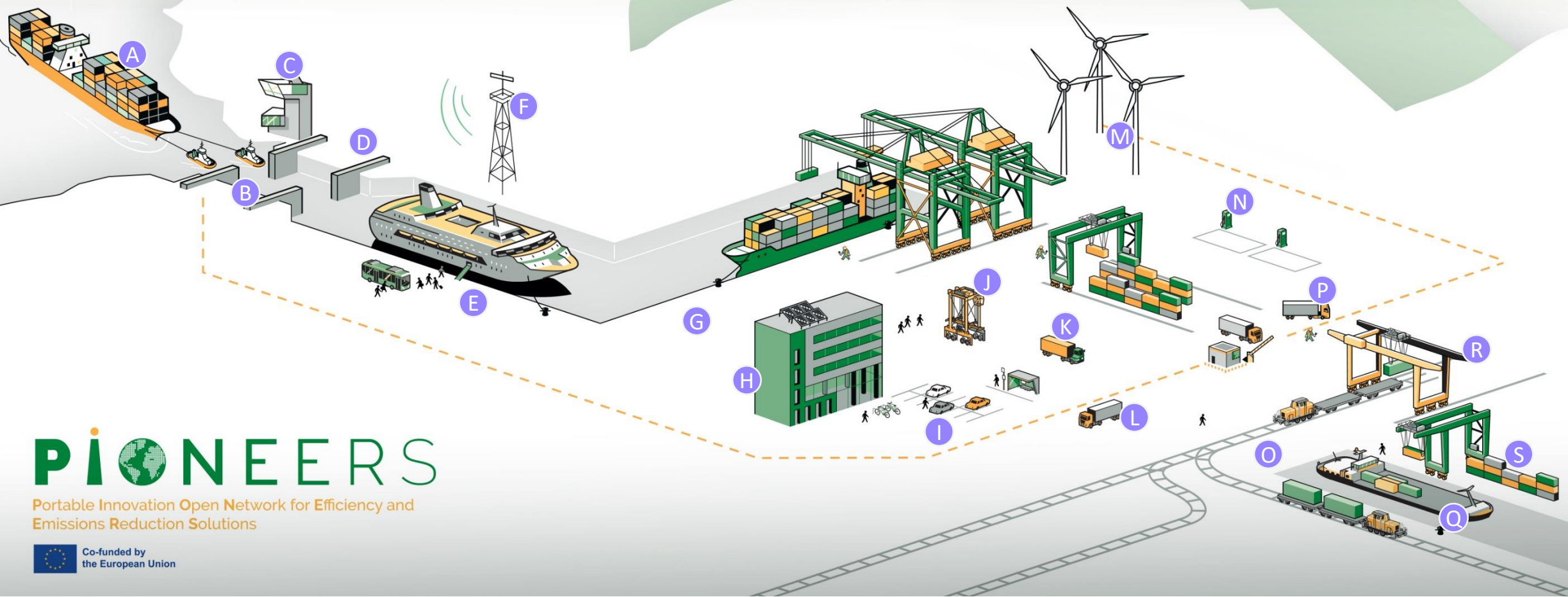
Co-funded by the Horizon 2020 programme
of the European Union

PIONEERS

Portable **I**nnovation **O**pen
Network for **E**fficiency and
Emissions **R**eduction
Solutions

- Reduce GHG emissions in ports while safeguarding their competitiveness
- Green Deal H2020 > Green Ports & Airports call > 25 Mio €
- Collaboration of 47 public & private EU partners
- 4 ports: Antwerp-Bruges, Barcelona, Constanta, Venlo
- 19 demonstrations & 1 Green Port Master Plan
- 2021-2026

Check here all demonstrators' showcases



PIONEERS

Portable Innovation Open Network for Efficiency and Emissions Reduction Solutions

Co-funded by the European Union

PIONEERS 19 demo projects

Implemented in: POAB | POB | POV

Clean Energy Production and Supply	Sustainable Port Design	Modal Shift & Flows Optimisation	Digital Transformation
Green Hydropower Platform for Port Infrastructure **De Meyer**	Local resource recovery for green, circular concrete **VITO**	Multimodal Inland Planner / Connectivity Platform **Mosaic**	Automated container shuttle solutions **AKKA**
Realisation of a hydrogen refuelling infrastructure **Air Liquide**	Hydrogen heating for buildings **PoAB**	Digital Rail Platform **Infrabel**	Automated vessels **Seafar**
Corridor of modular docking stations for energy containers **ZES**	Green Straddle Carriers **PSA**	Modal shift in the commute of port employees **ANT**	Digital Twin **IMEC**
Battery storage & smart mgmt of green energy in terminals **AET**	Electric Green Last Mile **FIER**	Cargo Flow Optimiser **MJC²**	Vessel traffic optimisation **Macomi**
		Cargo Flow Predictor **Mosaic**	Maritime 5G **PoB**
		Mobility as a service Aggregated platform **ACASA**	Container transport forecast **Mosaic**

PIONEERS

PIONEERS transition arena

from demo implementation to strategic green port master planning

Demo implementation & barrier identification

Mapping demo components

Transfer screening meetings (SLR)

Barrier workshops (POAB)

Interviews (UA)

Assessment port-related conditions

Transfer innovative components to fellow ports

Green Port Master Plan

H2020 Green Ports Call

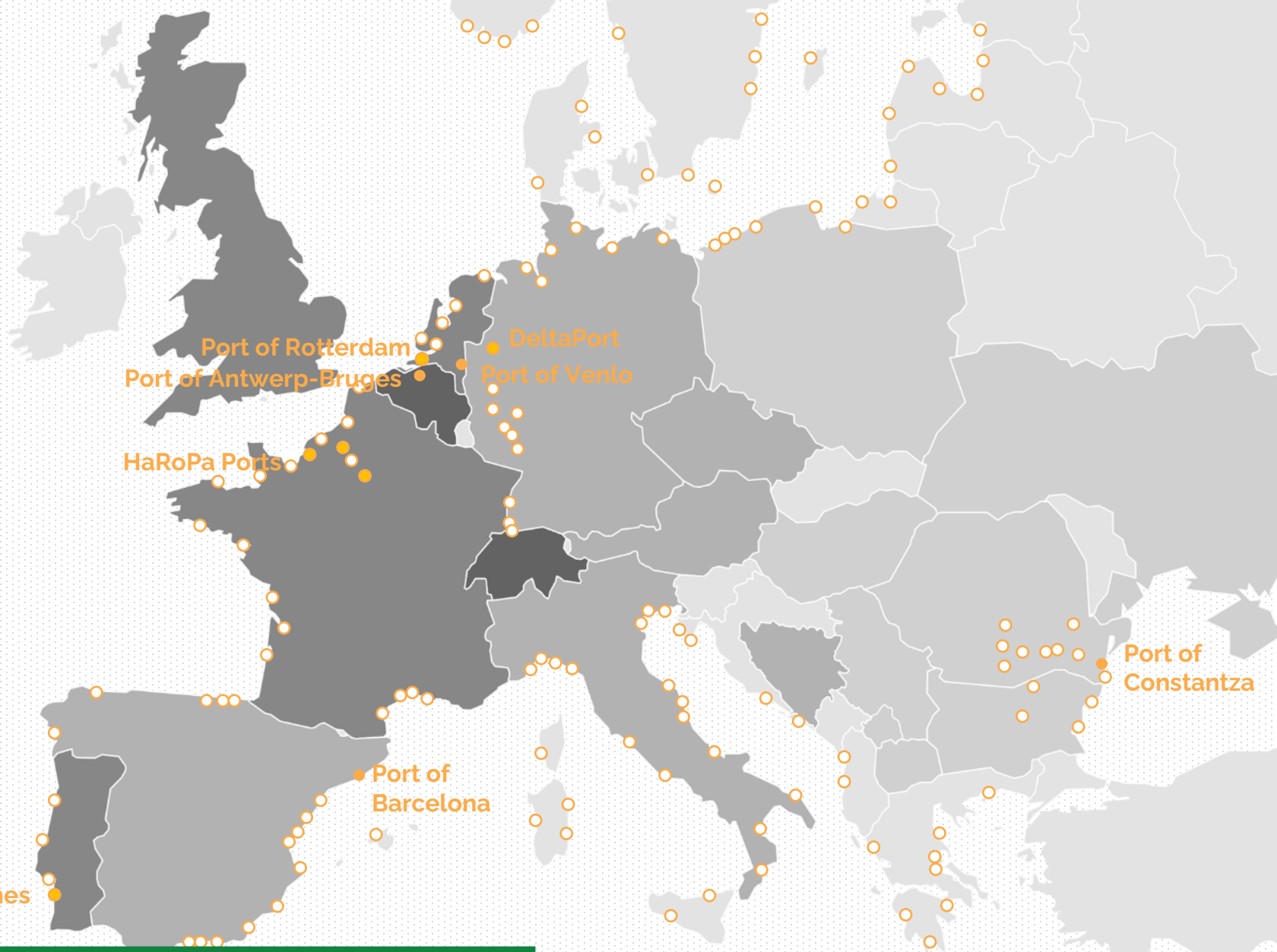
Greening the EU port sector towards climate neutrality

PIONEERS

Portable Innovation Open Network for Efficiency and Emissions Reduction Solutions

MAGPIE

SMART GREEN PORTS



"Green Ports should be the norm"

Magda Kopczynska, Director for Waterborne Transport DG MOVE @ PIONEERS International Conference 2022

PIONEERS' PARTNERS

Methanol bunkering Ane Maersk

4.300 tons of biomethanol, subsequent B100 bunkering

Combining bunkering **simultaneously** with on- and off-loading of cargo **(SIMOPS)**

Port of Antwerp Bruges

Timeline for a Multi Fuel Port

Making PoAB platforms ready

- LNG Ready
- Focus on green fuels
- Kick-off Green corridors

2022

2023

- Risk analysis green fuels
- Bunkermaps available
- Own tugboat running on hydrogen
- First methanol bunkering

- First methanol SIMOPS bunkering
- New regulation
- Audit & licencing process
- Implementation of new terminal procedures
- Own tugboat running on methanol

2024

2025

- Multi Fuel ready
- Implementation of Green Shipping Corridors
- First ammonia bunkering

Mature bunker market

Bruges

Antwerp

Port of Antwerp Bruges

On-shore Power Supply (OPS)

Overview of prospects and milestones

2025/2026

Port of Antwerp-Bruges completes OPS infrastructure works at cruise terminal Zweedse Kaai in Zeebrugge.

2026

First local funding by Flemish government: selected projects have to be operational as of 2026.

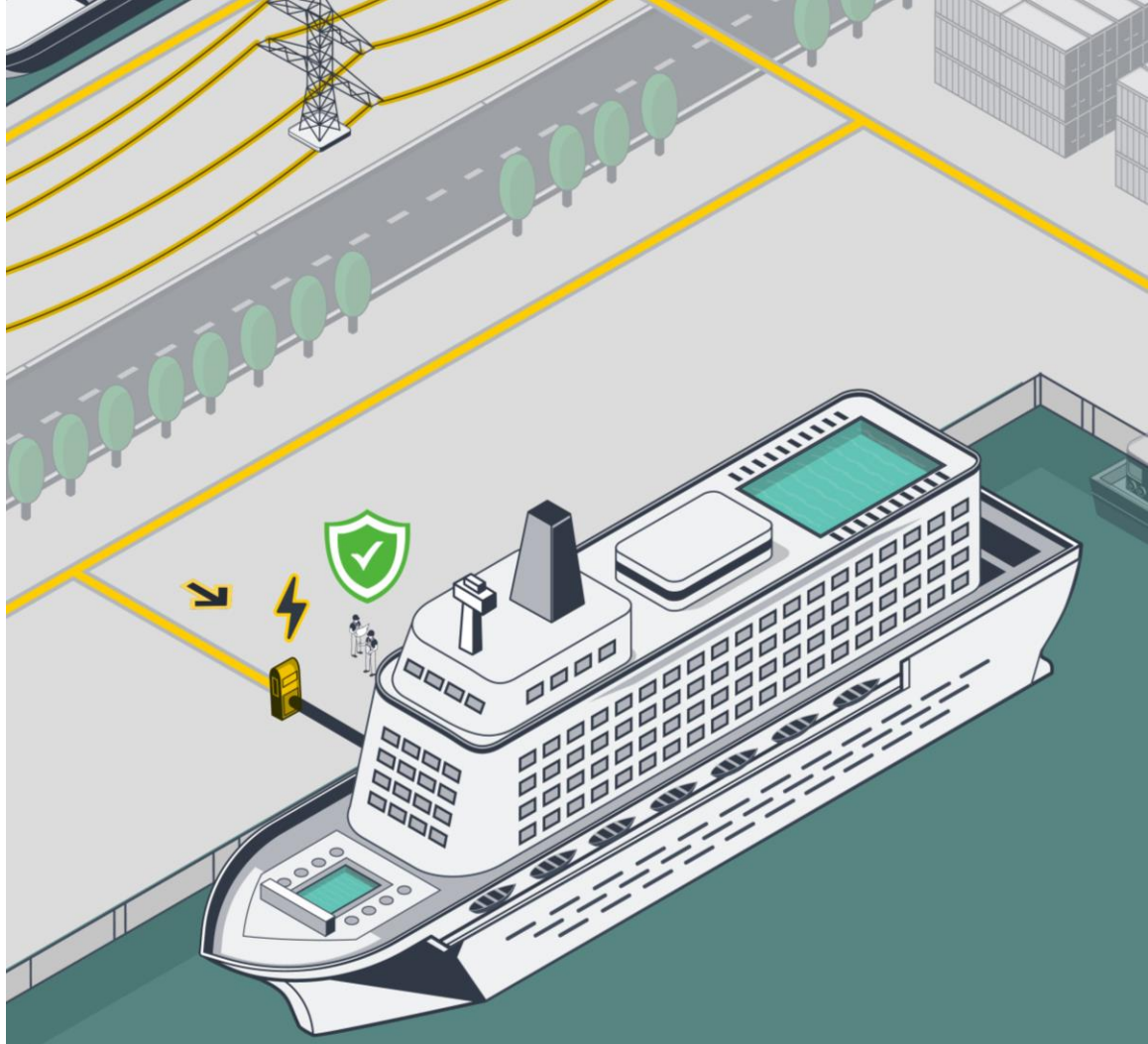
2028

Goal to have shore power available at all high potential terminals.

2030

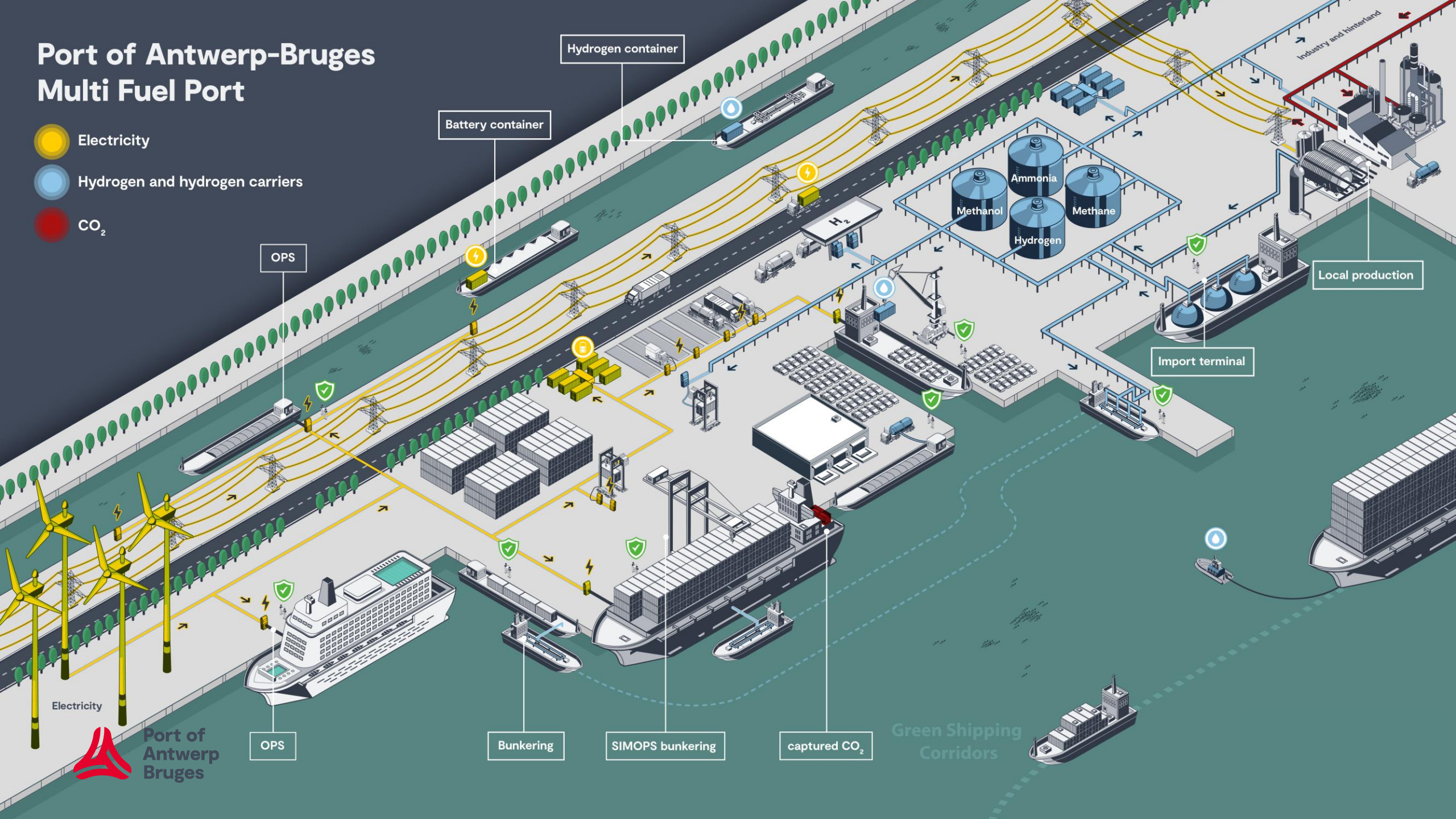
Terminals with vessel traffic under AFIR regulation are obligated to equip OPS. Ships within the Fuel EU Maritime Regulation are obligated to use OPS.

Port of Antwerp Bruges



Reducing emissions

Shore power is an environmentally friendly and noise-free way of mooring ships. Instead of using diesel generators, ships can connect to the electricity grid available at the quay


Port of Antwerp-Bruges
Multi Fuel Port
Electricity
Hydrogen and hydrogen carriers
CO_2
Hydrogen container
Battery container
OPS
Industry and hinterland
Ammonia
Methanol
Methane
Hydrogen
H_2
Local production
Import terminal
Electricity
Port of Antwerp Bruges
OPS
Bunkering
SIMOPS bunkering
captured CO_2
Green Shipping Corridors

PIONEERS

Port of Antwerp Bruges

THANK YOU!

Patrick Van Cauwenberghe
Patrick.VanCauwenberghe@portofantwerpbruges.com

Co-funded by the Horizon 2020 programme of the European Union

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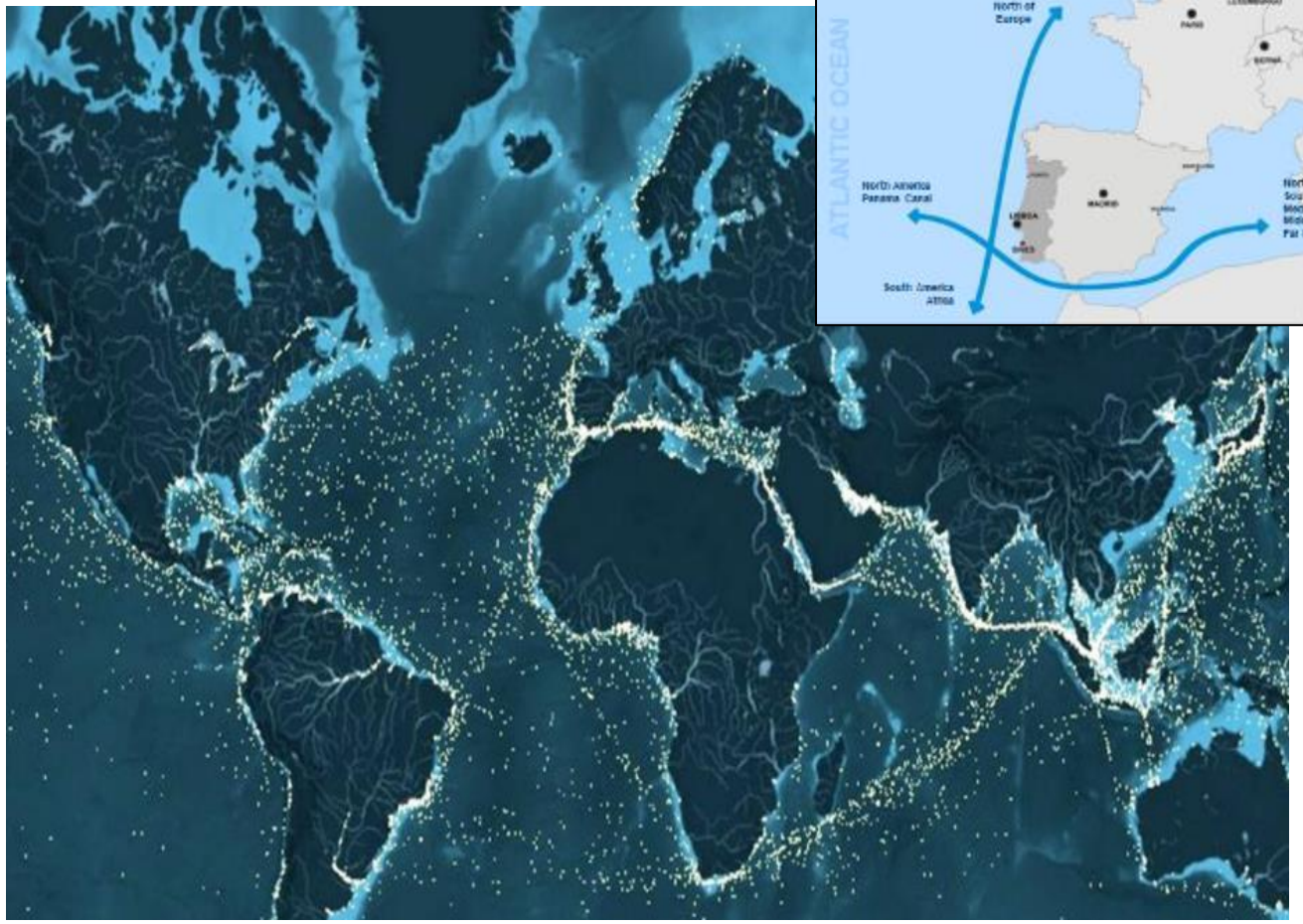
Port of Sines, Energy Transition & MAGPIE

Full Ahead Into Environmental Sustainability

Miguel Vieira de Castro – Port of Sines Authority

Where are we?



APS Administração dos Portos de Sines e do Algarve S.A.

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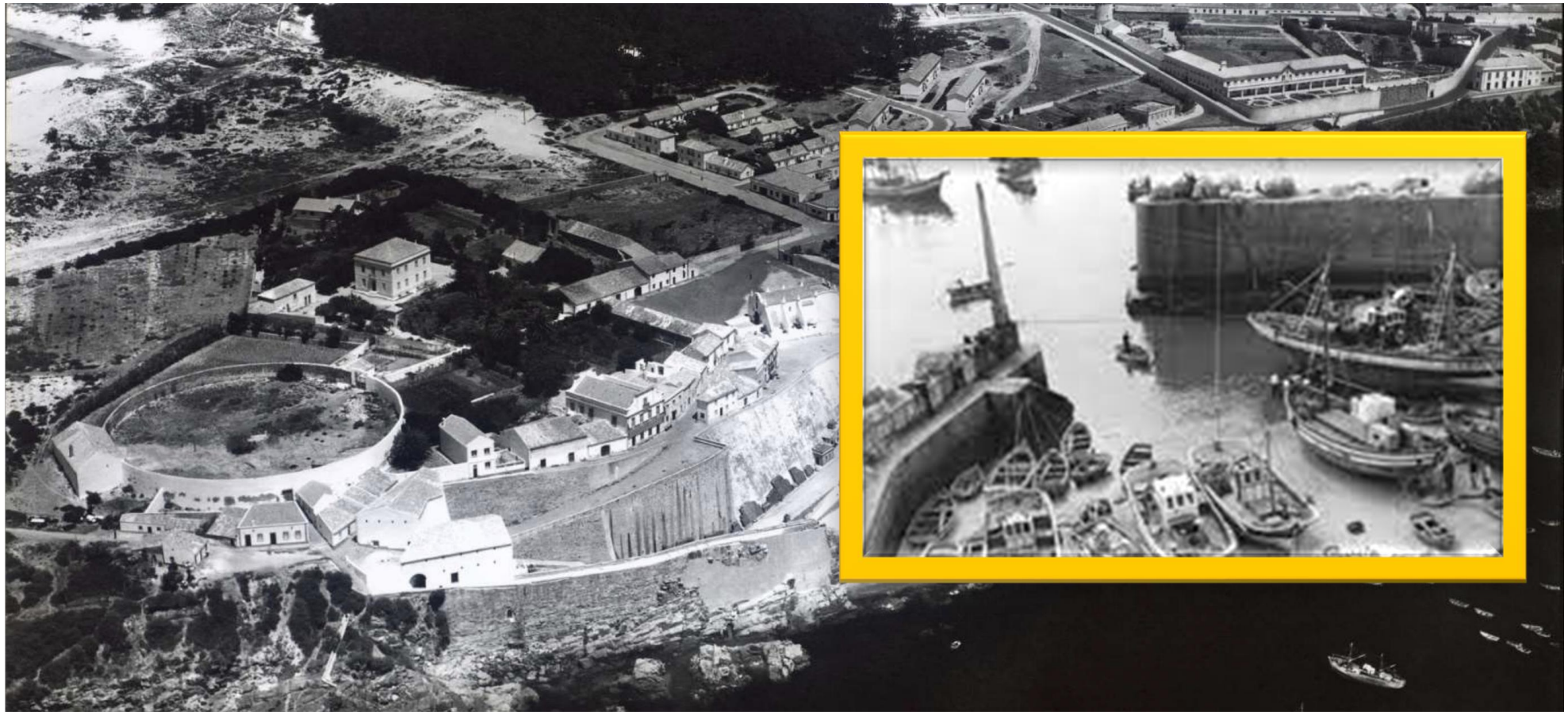
Who are we?



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Who are we?

APS Administração dos Portos de Sines e do Algarve S.A.

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Who are we?

NATIONAL LEADER

Sines is responsible for more than **50%** of the cargo handled in Portugal

PORT HANDLING

Per year, we handle more than **43 million tons** of cargo and about **1.7 million TEU**

CONNECTED TO THE WORLD

Sines is in the **Top 100** worldwide for container terminals and in the **Top 15 in the European Union**, with more than **20 regular weekly services**

DEPTH

Bottoms up to -**28m for liquid bulk**, **-18m for dry bulk and general cargo** and **-17m for containers**

INTERMODAL PLATFORM

At the Port of Sines, more than **4,400 trains** operated in 2023

DIGITAL AND SIMPLIFIED

On average, authorizations to start operations are granted **2.5 days before the ship arrives**

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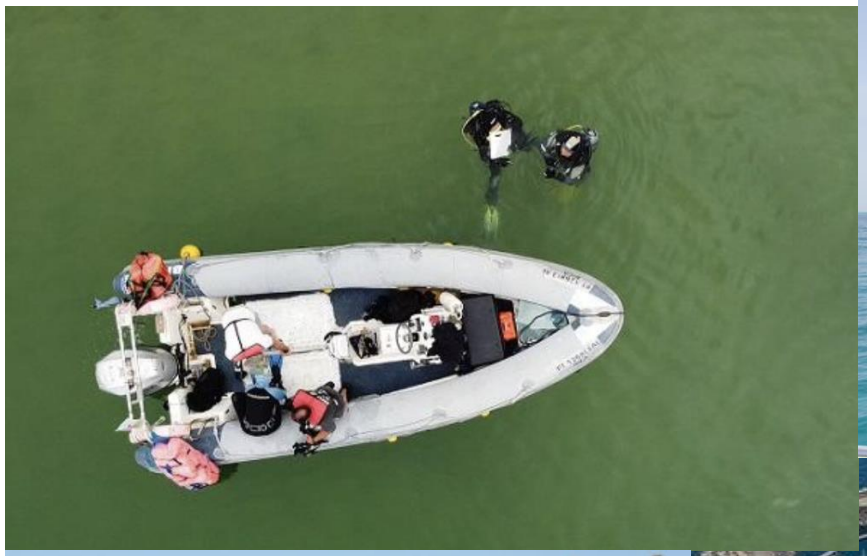
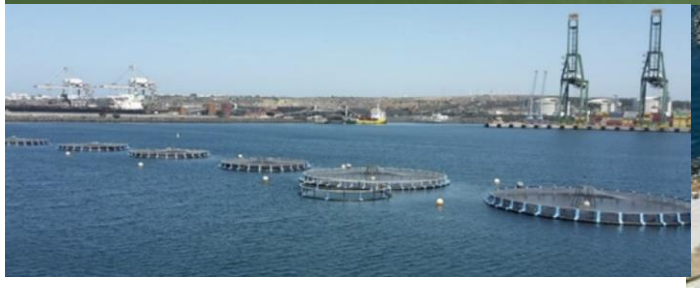
Is sustainability new for us?





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Talking about energy transition

- Everybody is aware of the EU and IMO targets
- The Port of Sines is the sole electrical power provider to our concessionaires, so… We need to look for clean energy solutions
- Planning involves diversifying its origin where we need to integrate various renewable sources, such as photovoltaic, wind, wave and energy storage

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Up to know where are we?

- Renewing the fleet with EV (13)
- 11 EV charging stations
- Investments in the electrical grid - 60/30kV substation + centralized communication system in all grid
- Clean energy production
  - 250 kW (wharehouse)
  - PV Phase 1 & 2 – 1.5 MW + 4.8 MW (to be concluded till December 31st

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And the future?

- 2025
  - PV Phase 3 - 4.0 MW
  - Estimated Consumption 25.000 MWh > 49% of renewable
- Nexus Agenda
  - Energy management system
  - Wave energy converter
  - UAV photovoltaic solution
  - Environmental digital platform
  - Electric support vessels
- 2040
  - Estimated consumption 123 GWh/year - power – 42 MW > 100% renewable

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And the future?

- Wind farm
- Wave energy generation
- 4 OPS up to 10 GWh/year (by 2030 the consumption will be 4x more than today)
- Renewable Energy Community (REC) allows sharing the benefits of port renewable production beyond the physical boundaries of the port
- Alternative fuels…

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And the future?

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Why MAGPIE is so important for us?

- Investment…
- Scalability of proven demos
- Sustainability:
  - Smart energy systems - *Integrated smart energy solutions for strategic support in congestion points and energy system interventions*
  - Shore power peak shaving - *Increase utilisation of a shore power hub facility to reduce costs by shaving the peaks using stored energy*
  - Offshore charging buoy

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Why MAGPIE is so important for us?

- Sustainability (cont.):
  - Green energy matching - *Tool to manage energy carriers with the needs of the port matching green energy supply and demand flexibly.*
  - Green connected Trucking
- But not only:
  - GHG Tooling - *Develop a tool to calculate GHG emissions of transport to reduce emissions and study the effect of strategic decisions*
  - Smart green logistics

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MAGPIE SMART GREEN PORTS

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Thank you

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André Lisboa
R&D Engineer
EDP

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NEW

EDP Innovation

Co-developing & validating novel solutions and business models for energy-related challenges.

Opening new avenues via collaborative R&D projects

Developing and scaling internally incubated projects

Running specific pilot projects with the energy innovation ecosystem

Investing in high potential strategic startups

Exploiting innovative solutions to fulfil market gaps

Technology Maturity

RES Technology

- Emerging Renewables (e.g. offshore renewables)
- Hybridisation of Renewables
- Sustainable and circular strategies for Renewables
- Innovative RES O&M technologies

RES Integration & Flexibility

- Flexibility of Renewable Sources
- Energy Markets & VPPs
- Innovative Storage Technologies
- Green Hydrogen
- Decarbonization Big Hubs (Ports/Airports)

Smart Energy Systems

- Smart grids and microgrids
- Grids services/ grid storage/ V2G/ DR
- Interoperability
- Clean energy systems
- Smart mobility

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Green Energy and Digitalization: Powering Port Competitiveness

André Lisboa, EDP NEW

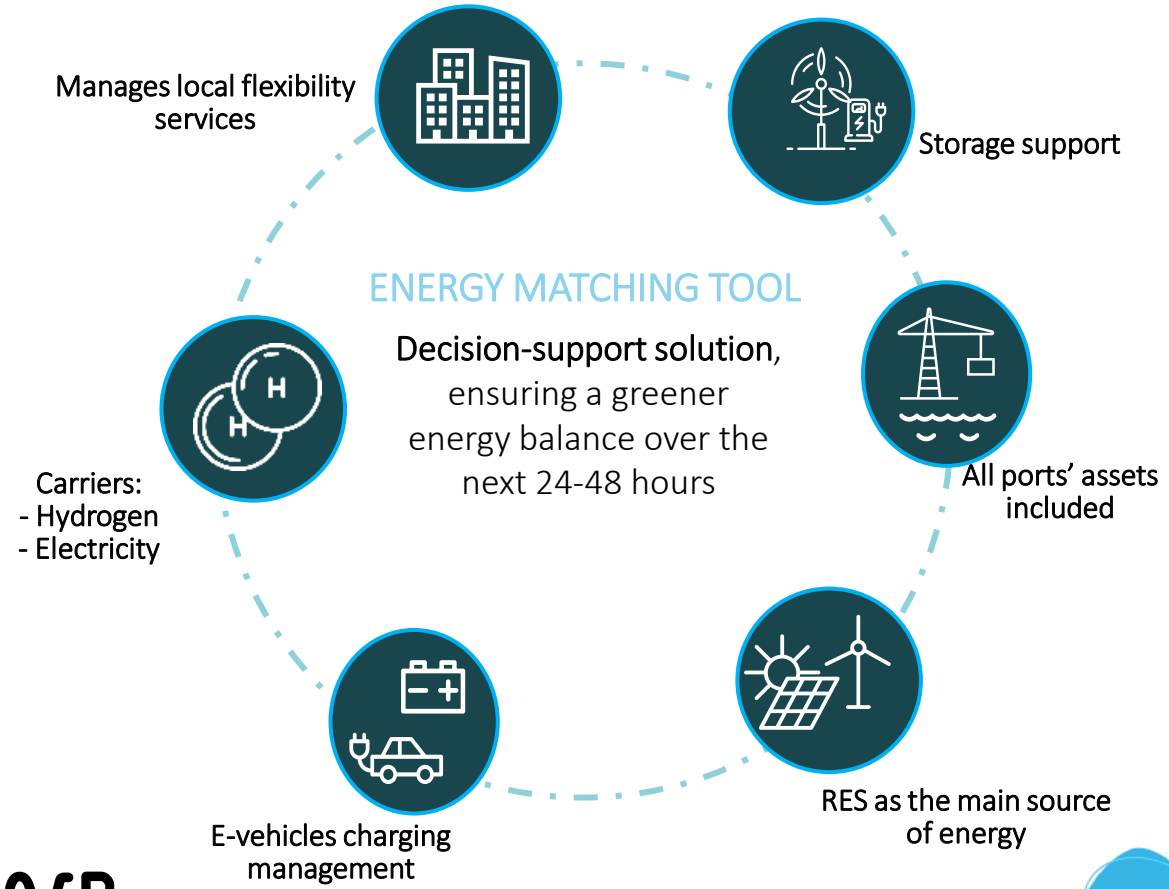
28th November 2024

Digitalization is quick and long-term win to enhance ports operation

MAGPIE (EU Project) Contributions

Focus on green energy carriers and ports of the future:

- ❑ Technological solutions demonstration
- ❑ Digital solutions development
  - ❑ Energy Matching Tool
  - ❑ GHG emissions tool
  - ❑ Logistics Tool
- ❑ Roadmap Guidelines



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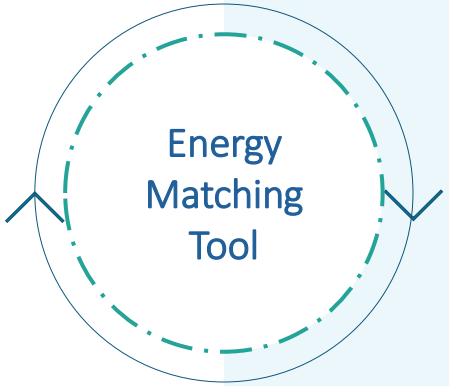
Energy Matching Tool optimal management can untap hidden potential in ports BaU

Key Insights

- Asset management recommendations
- Energy cost savings
- CO2 emissions reduction
- Assessment of activated flexibility
- Scalability to majority of the Ports



Outcome

Enhance port stakeholders' operational efficiency and competitiveness

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EMT in Action: A Case Study of the Port of Sines

Case Study Methodology

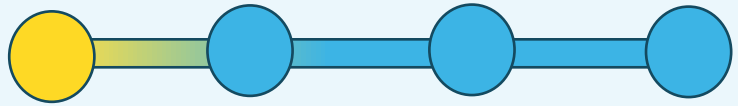
- ❑ Simulate a scaled-down port model
- ❑ Apply various energy paths scenarios
- ❑ Evaluate outcomes and benefits

Key drivers for Port of Sines?

Digitalization and Data Availability

- ❑ APS is the eletrical grid owner
- ❑ APS is the energy retailer to the port stakeholders
- ❑ Centralized platform with logistic data

Status



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Challenges of digitalization for the energy transition in Ports

PROBLEMS

- Data Availability
- Data Interoperability and Integration
- Diverse stakeholders with varying digitalization levels
- Digital Literacy

(and many others)

SOLUTIONS

- Establish and adopt standardized data formats and communication protocols
- Promote stakeholder training and awareness on digital tools and systems
- Implement policies and incentives to accelerate digitalization efforts

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Development of digital tools for the energy transition has structural challenges

INTERNAL REQUIREMENTS

- Digitalization
- Communication of results
- Stakeholders' active role in energy management
- Stakeholders at same priority/participation
- Control decisions are accepted

EXTERNAL REQUIREMENTS

- Adequate market structure incentives
- Regulatory and legislative framework
- Design models to support policy decisions

that need to be addressed by all of us

MANAGE CLOSELY

Port Authorities

Container terminal operators

Hinterland and maritime transport

Industry

Storage service providers

Energy Aggregators

MONITOR

Certification entities

Local government/central

EU regulation

Grid operators (DSO, TSO)

Social/environmental organizations

Media and opinion makers

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Luane LEMOS AGOSTINHO
Environmental Manager
Port of Itaqui

ALIANÇA BRASILEIRA PARA DESCARBONIZAÇÃO DE PORTOS

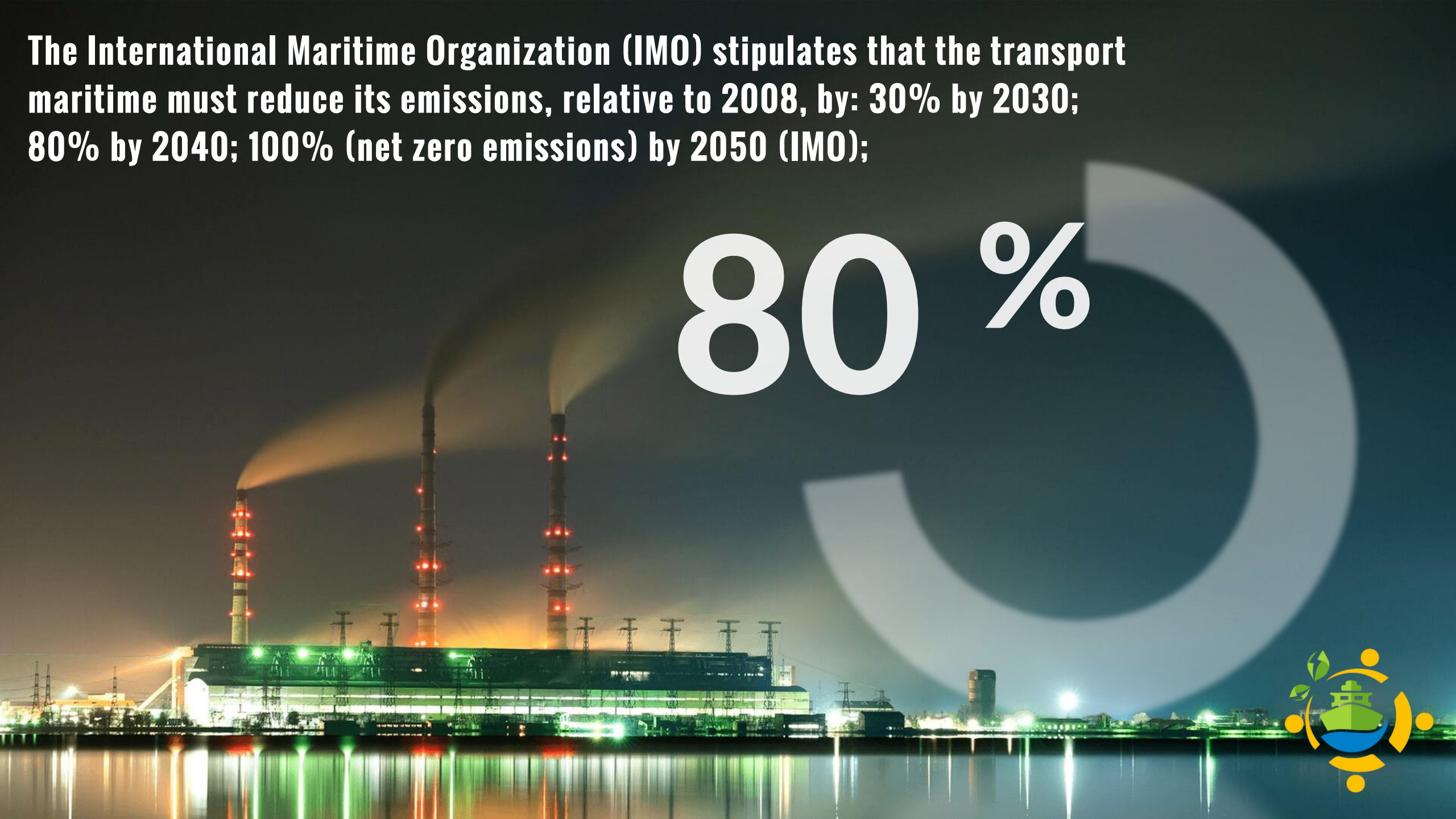
Brazilian Alliance for Port Decarbonization

LUANE LEMOS
ABDP General Coordinator

Maritime Sector Emissions

- In terms of its contribution to global emissions, the shipping sector is responsible for **around 3% of emissions** .
- Emissions from the sector – including international and domestic shipping and fishing – **increased by 9.6% between 2012 and 2018** (IMO, 2020).
- Without any additional action, emissions from the sector are expected to **grow by 50% by 2030 and 250% by 2050** , compared to 2008.
- Maritime transport accounts for approximately 80-90% of the global trade by volume (IMO and UNCTAD);

The International Maritime Organization (IMO) stipulates that the transport maritime must reduce its emissions, relative to 2008, by: 30% by 2030; 80% by 2040; 100% (net zero emissions) by 2050 (IMO);



ALIANÇA BRASILEIRA PARA DESCARBONIZAÇÃO DE PORTOS

Brazilian Alliance for Port Decarbonization

ALIANÇA BRASILEIRA
PARA DESCARBONIZAÇÃO
DE PORTOS

The Brazilian Alliance for Port Decarbonization is a democratic space for the exchange of experiences and information, with the aim of accelerating the decarbonization process of the port and waterway sectors in Brazil

It seeks to promote the collaboration of the most diverse actors, both national and international, encouraging the sharing of knowledge and technologies and the implementation of new strategic actions for the decarbonization of ports and fleets.

MEMBROS NATOS (31)

Porto do Itaqui
Portos do Paraná
Porto de Santos
Porto do Açu
Pecém
Suape
Portos RS
Vale
portosudeste
Vports
SCPAR Porto de Imbituba
Porto São Sebastião
SCPAR Porto de São Francisco do Sul
Portonave
Porto de Itajaí
Docas do Ceará
Porto de Maceió
Transpetro
Santos Brasil
Wilson, Sons
TESC
Portocel
Odfjell Terminals
cli
Tegram
Portos SC
COPI
Transbrasa
Logística
Cotriguaçu
tcp terminal de contêineres de paranaguá
CMPort

MEMBROS ASSOCIADOS (15)

Rightship
Marsalgado Brasil
Bunker One
zCarbon soluções para descarbonização
Portgreen
MRS Ambiental
SINDOMAR Sindicato dos Operadores Portuários do Maranhão
Sindicanálcool Bioenergia
INPASA
Tractebel Engie
NETZ
Ausenco
PRF
virtugnl
XCMG

APOIO INSTITUCIONAL (10)

Fundación Valenciaport
ATP Associação de Terminais Portuários Privados
ABTP Associação Brasileira dos Terminais Portuários
ABEPH
infra lab Laboratório de Infraestrutura
UnB
CESS
UFMA Universidade Federal do Maranhão
Governo de Santa Catarina Secretaria de Portos, Aeroportos e Ferrovias
Sindiporto Brasil
Ministério de Portos e Aeroportos
Governo Federal Brasil União e Reconstrução

Working Groups

01 POLICIES, REGULATION , FINANCING AND INCENTIVES

02 GENERATION AND USE OF RENEWABLE ENERGY AND ALTERNATIVE FUELS

03 INNOVATION AND TECHNOLOGICAL SOLUTIONS IN THE DECARBONIZATION OF PORTS

04 PATHWAY AND GOOD PRACTICES IN THE DEVELOPMENT AND IMPLEMENTATION OF DECARBONIZATION PLANS

Knowing some data...

GHG emissions

The use of fossil fuels is the biggest cause of GHG emissions in the world

18 %

Clean Energy

Renováveis	8,2 %
Hidrelétrica	6,4 %
Nuclear	4,0 %

Fuels Fossils

8...

73 rd Statistical Review of World Energy 2024 in https://www.energyinst.org/statistical-review

Renewable Energy in the World

Proportion of renewable energy used in electricity production

Country	Proportion [%]
Norway	**98.5**
Brazil	**89.2**
N. Zealand	**86.6**
Colombia	**75.1**
Canada	**68.8**
Sweden	**68.5**
Portugal	**61.0**
Chile	**54.6**
Germany	**44.4**
United Kingdom	**43.3**

Source: Enerdata Dec. 2022

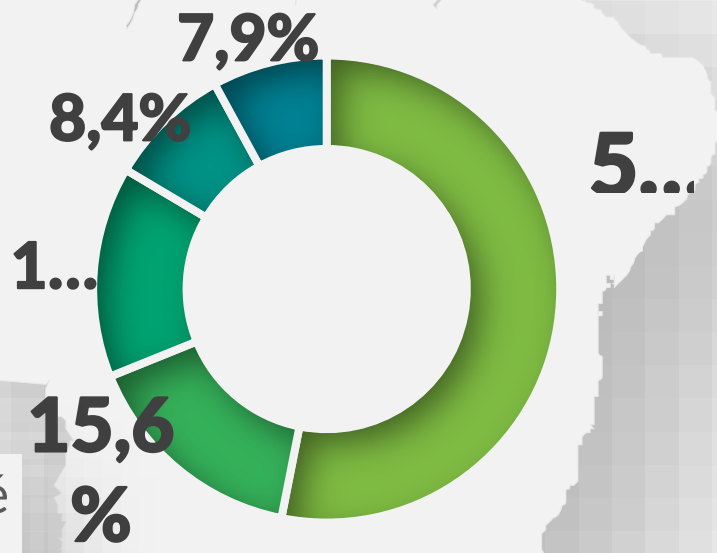
Electric Energy in Brazil

2023 scenario according to ANEEL

205.7 GW
Total installed capacity

3rd
Hydroelectric Generation

8th
Wind power generation



7.8 GW
Expansion 2024 - set

219
New plants
Wind and solar

+30 %
Wind Energy

https://app.powerbi.com/view?r=eyJrIjoiNGE3NjVmYjAtNDFkZC00MDY4LTliNTItMTVkZTU4NWYzYzFmIiwidCI6IjQwZDZmOWI4LWVjYTctNDZhMi05MmQ0LWVhNGU5YzAxNzBlMSIsImMiOjR9

Electric Energy in Brazil

Important Facts

Wind Energy

Wind energy is **rapidly rising** in Brazil, with over 18 GW in 2020, making it the **8th largest producer in the world.**

Solar Energy

Solar energy **is on the rise** in Brazil, with **great potential** , especially in the Northeast and Central-West.

Biomass

Brazil **is a leader in biomass energy** , using sugarcane bagasse, corn and biogas from agricultural waste and animal waste.

RESEARCH | **Sampling results**

From a universe of 56 members, we obtained 27 responses, generating a universe of 48% of interviewees

26%

PUBLIC PORTS

15%

PRIVATE PORTS

8%

LEASED TERMINALS

11%

PORT OPERATORS

40%

OTHERS

RESEARCH | **Sampling results**

The questions involved analyzing the level of maturity in the decarbonization process. From the answers obtained, it is clear that most of the interviewees have measures to reduce emissions, but lack adequate planning.

Maturity level

45 % Have you adopted any decarbonization measures?

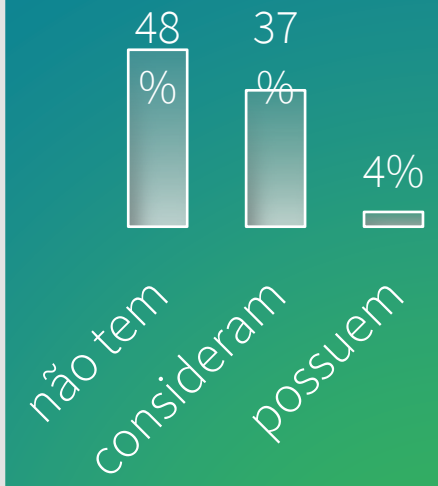
GHG INVENTORY

33 % Has inventory for over 3 years

DECARBON GOALS

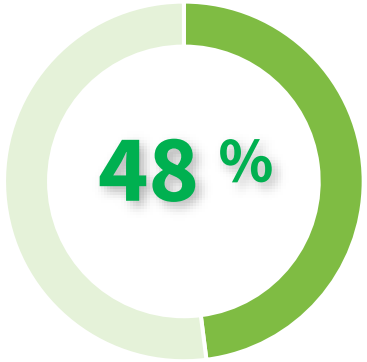
40 % Did not set clear emissions reduction targets

FINANCING



48 % They did not carry out any type of financing for decarbonization

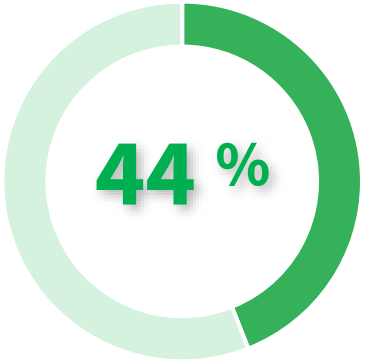
RESEARCH | **Sampling results**



ALTERNATIVE ENERGY

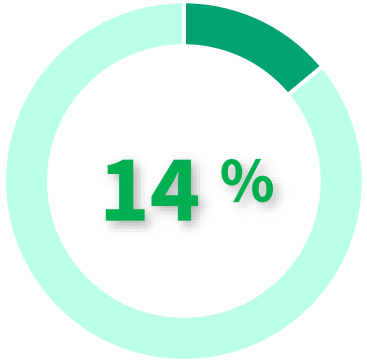
48% have already implemented alternative energy (solar or wind)

18% is in the process of implementation



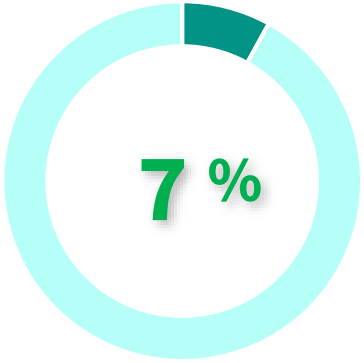
LAND FLEET

44% already have an alternative for replacing fuel for their land fleet (light and heavy vehicles)



VESSELS

Only 14% are studying or have already started alternatives for fuel for vessels

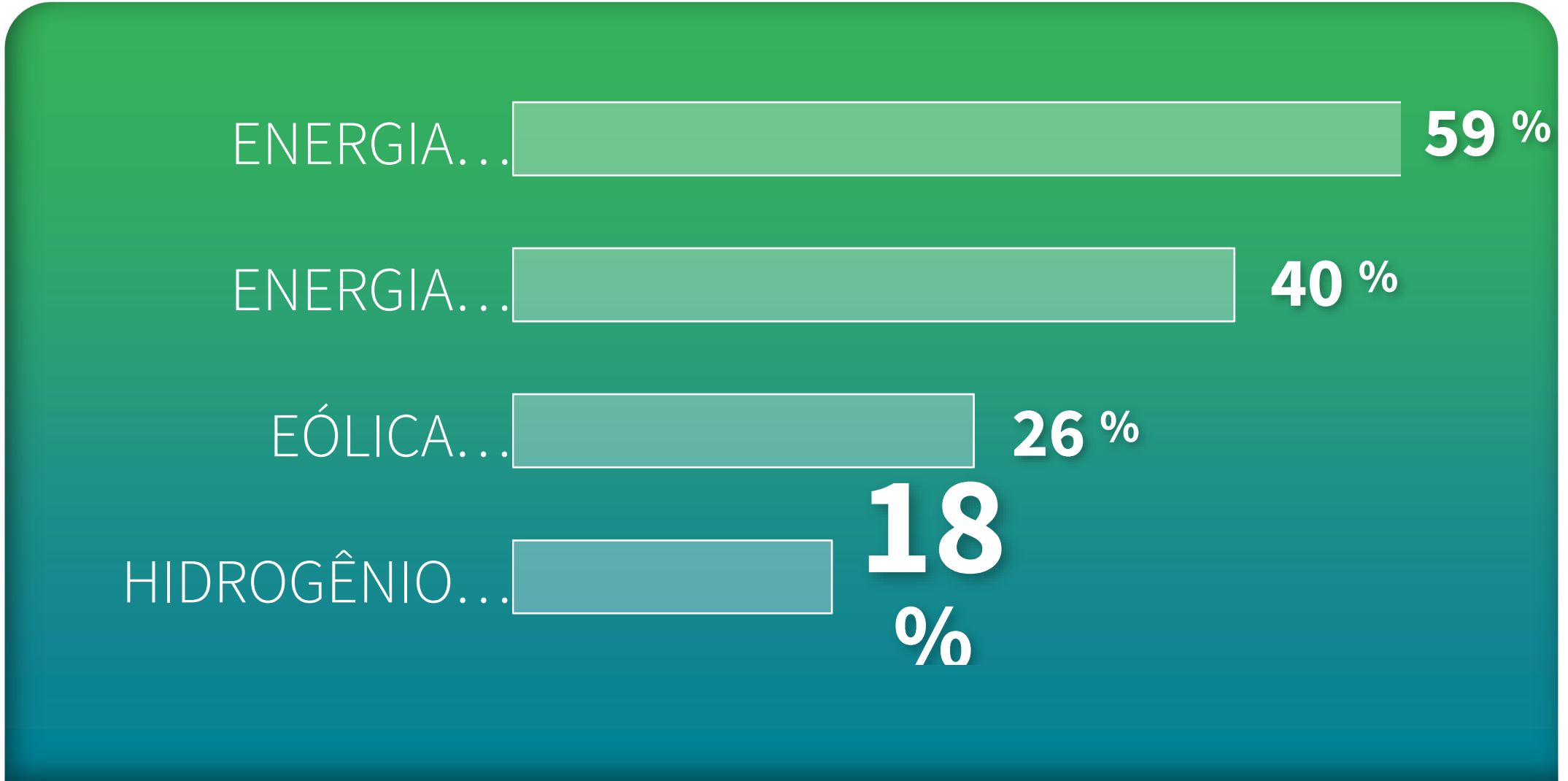


OPS

Only 7% reported considering installing OPS

RESEARCH | **Sampling results**

Types of energy considered for future acquisition



For ABDP, decarbonization is the challenge of transforming our ports into engines of innovation, new business and sustainability for a carbon-neutral future.

ALIANÇA BRASILEIRA
PARA DESCARBONIZAÇÃO
DE PORTOS

OBRIGADA

LUANE LEMOS
Coordenadora Geral da ABDP
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@luanelemos @descarbonizacao.portos

World Conference Cities & Ports by AIVP

Energy Transition and Circular Economy
Discussion and Q&A

MODERATOR

Zenaida MOURÃO
Senior Researcher
INESCTEC

Reyer WILL
MAGPIE Project Manager
Port of Rotterdam

Patrick VAN CAUWENBERGHE
International Trade Networks Manager
Port of Antwerp-Bruges

Miguel CASTRO
Senior Marine Pilot
Port of Sines

André Lisboa
R&D Engineer
EDP

Luane LEMOS AGOSTINHO
Environmental Manager
Port of Itaqui

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Coffee Break

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MAGPIE
SMART GREEN PORTS

Energy Transition and Circular Economy Solution Hub

MODERATOR

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Groupe Legendre

Aurélien CROQ
Chief Executive Officer
Solarinblue

Guilain Pedezert
Head of International Business Development
Wattway

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World Conference
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Quentin HENRY
Directeur Dikwe Project
Groupe Legendre

World Conference Cities & Ports by AIVP

WAVE OP

Waves can be an opportunity for ports and coastal cities

WAVE OP by Legendre & GEPS Techno

Group Legendre, a major player in **construction,** real estate, and energy.

GEPS Techno is an SME specialized in the development of **wave energy** technologies.

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INSPIRING PEOPLE OF PORT CITIES

CONCEPT

The energy generated by the waves hitting the port breakwater is immense. Instead of wasting it, we harnessed it in a dual function breakwater

Protection

Wave Energy

aivp
INSPIRING PEOPLE OF PORT CITIES

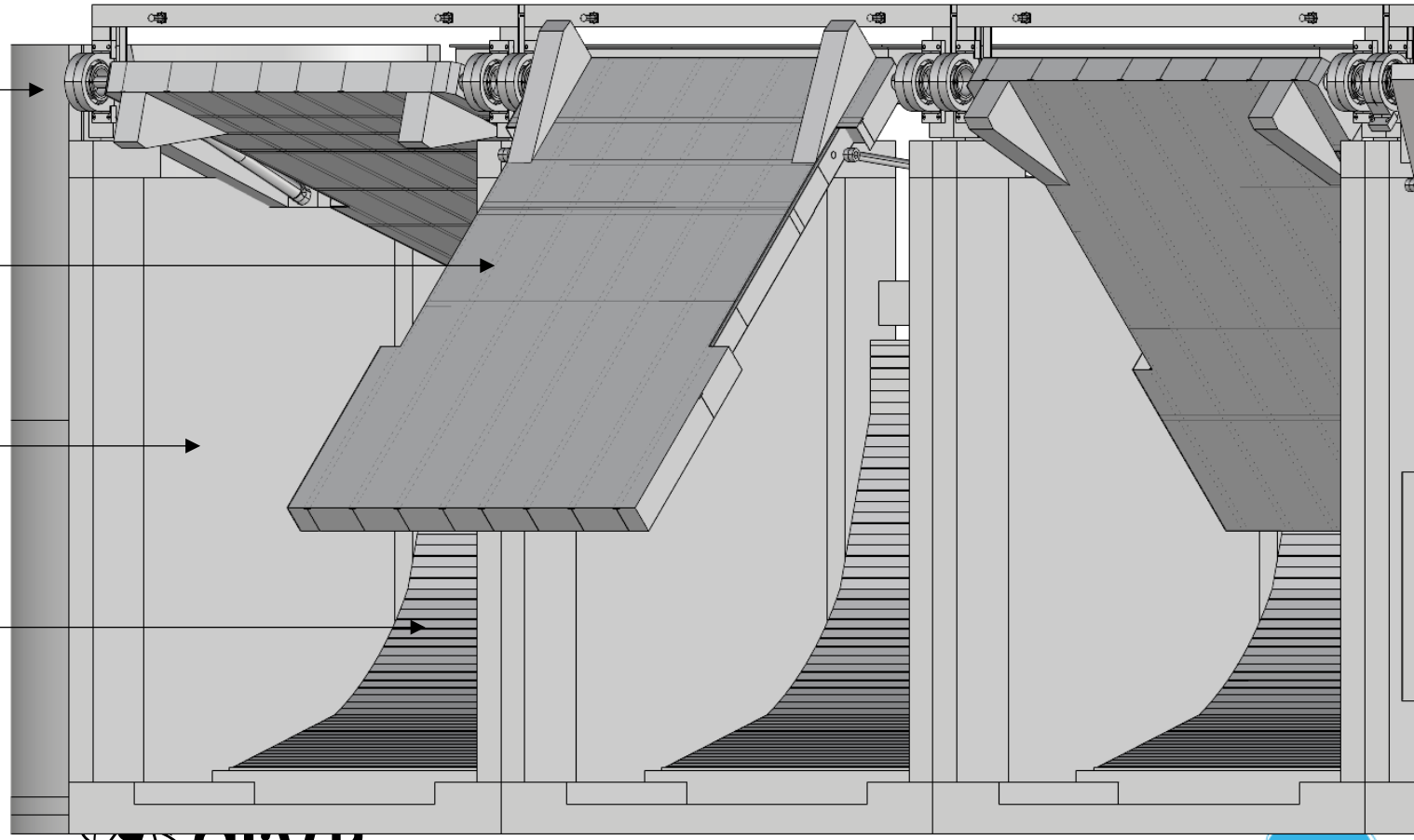
FLAP technologie

POWER TAKE OFF (PTO)

OSCILLATING FLAP

CAISSON STRUCTURE

REFLECTIVE SHAPE



INSPIRING PEOPLE OF PORT CITIES

PROTOTYPE

12-month sea trial campaign from May 2022 to May 2023

>25% average energy efficiency on one year data collected (from waves to electrons)

0 noise impact measured during environmental assessment

TRL6 - PROTOTYPE

OpenC Foundation – IFREMER – Brest (29)

© video IFREMER

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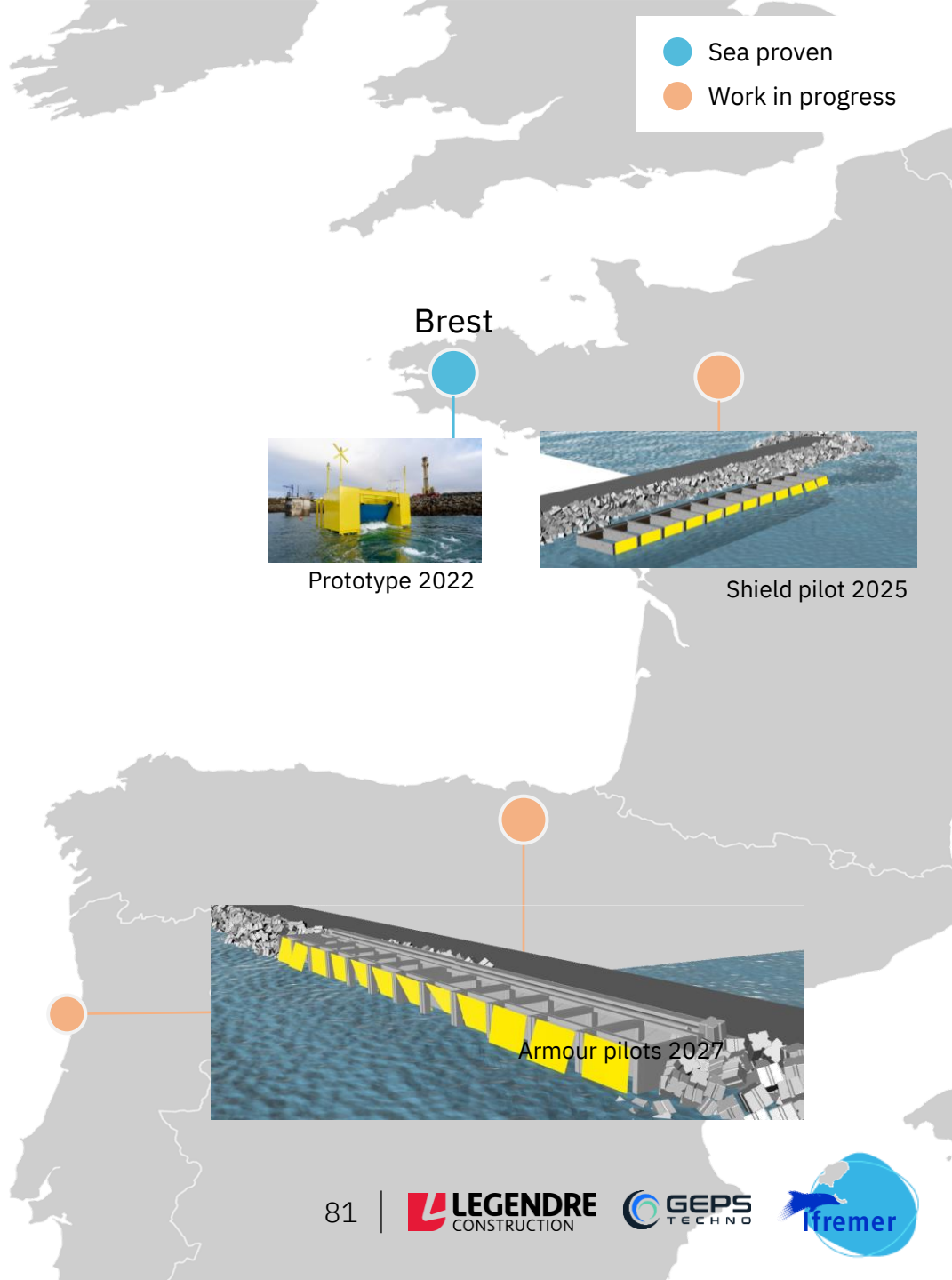
PILOTS

First wave energy breakwaters

France Pilot

Spain

Portugal



Wave op in Portugal

Longueur de digue

25 Km

Ressource disponible

17 kW/ml

Capacité installée

508 MW

Production estimée

1, 1 TWh

Consommation de

238 000 personnes

45 sites exploitables

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INSPIRING PEOPLE OF PORT CITIES

Thank you for your attention

WAVE OP

Waves can be an opportunity for ports and coastal cities

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World Conference Cities & Ports by AIVP

Aurélien CROQ
Chief Executive Officer
Solarinblue

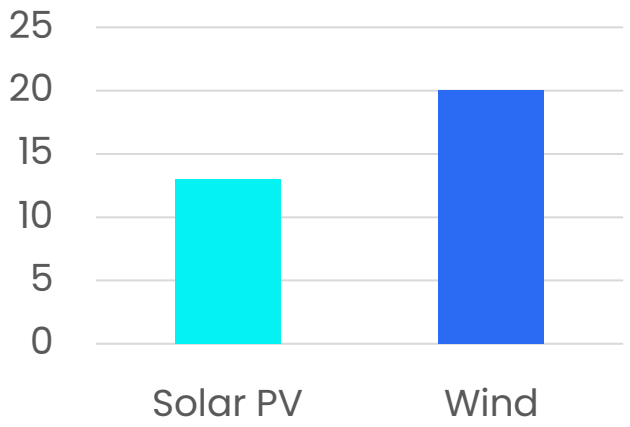
The future of solar is at sea!

November 2024

Solar PV: the scaling paradox

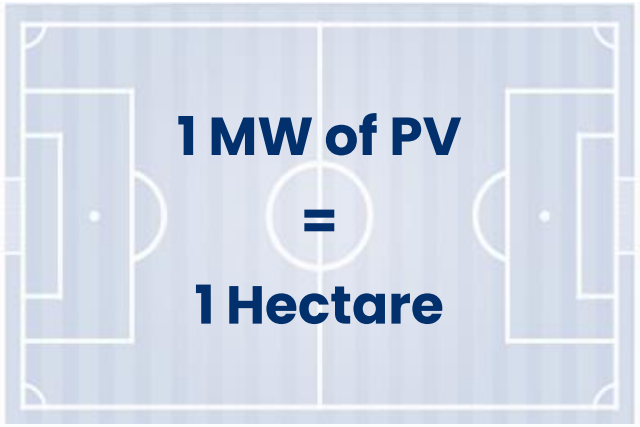
The rationale for offshore solar PV

Solar PV is the cheapest renewable energy to implement at scale.



Costs of electricity generation (best-in-class, €/MWh)

But solar PV at scale creates land-use competition.



So today, new PV additions are not at scale.

60+ % of new PV capacities are rooftops in Europe

Real cost > 100 €/MWh

Sources: Solar Power Europe Dec. 2023, French Ministry of Energy, July 2024

SolarinBlue

Offshore solar: more area for coastal cities

The rationale for offshore solar PV

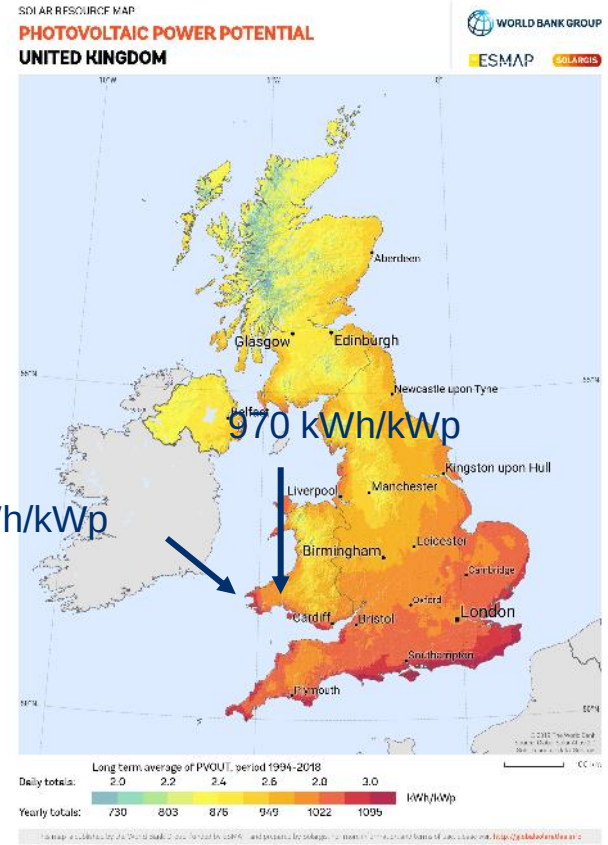
- ✓ No land-use competition
- ✓ Settle only 3km from shore
- ✓ Reach 60% of the world's population
- ✓ +5 to 15% electricity production vs. onshore

- ✓ 100 MW to 1 GW farms, at scale
- ✓ LCOE at 50€/MWh by 2030

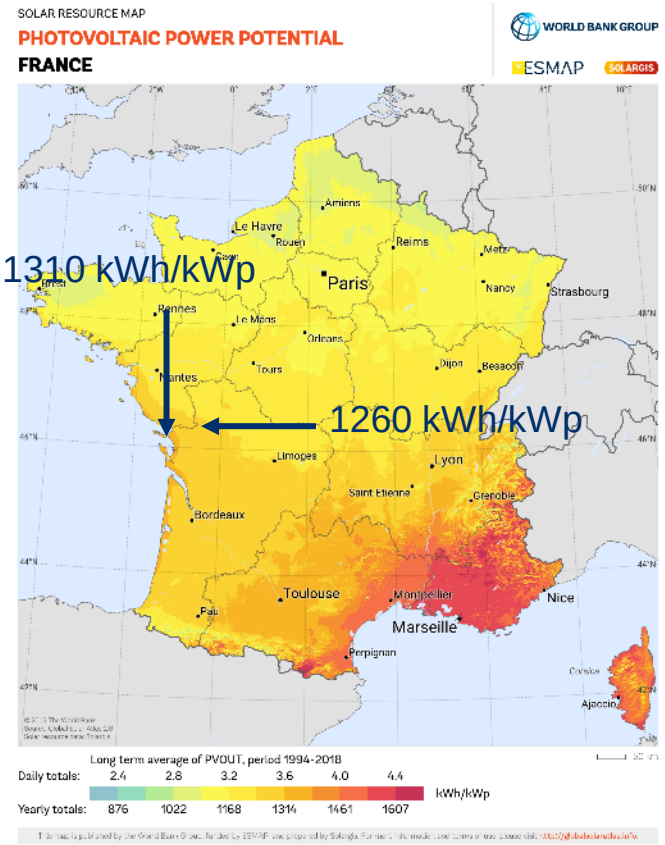
SolarinBlue

Irradiance, your new friend with benefits

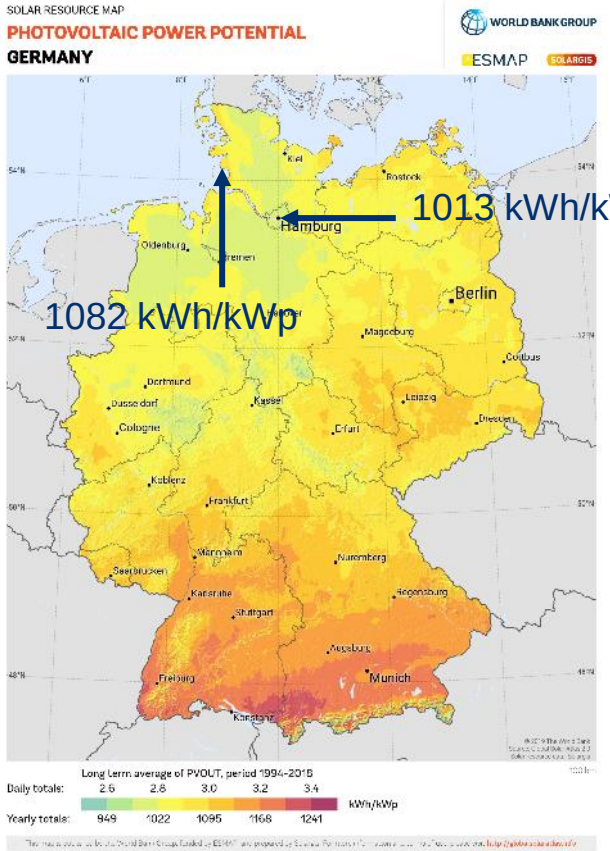
The rationale for offshore solar PV



St Davids : +13% vs Brecon



La Rochelle : +4% vs Niort



Büsum: +7% vs Hamburg

SolarinBlue

SolarinBlue's patented technology

The Technology

- ✓ Ready for typhoon-class conditions
  - ✓ Waves over 14 m
  - ✓ Winds over 200 km/h
- ✓ 30 yrs lifetime & corrosion resistance
- ✓ Eco-friendly

- 2 patents SolarinBlue®
- High airgap for solar panels protection
- Easy construction & assembly

Sun'Sète, Mediterranean Sea – December 2023

SolarinBlue

Proven. In real, harsh, marine conditions

The Demonstrator

Sun'Sète – 1st Mediterranean offshore solar farm:

- ✓ **In the domain of the Port of Sète**
- ✓ 12 months operations (live since Dec. 2023)
- ✓ Record for wave resistance: **8,7 meters**
- ✓ PV production: **6% more than onshore**

Mega Sète – Our first Mega Watt

- Extended to 1 MW by end 2025
- Financial support from the industry by TotalEnergies, Engie & Technip Energies

Sun'Sète, Mediterranean Sea, 2 km offshore – March 2024

SolarinBlue

Proven. In real, harsh, marine conditions

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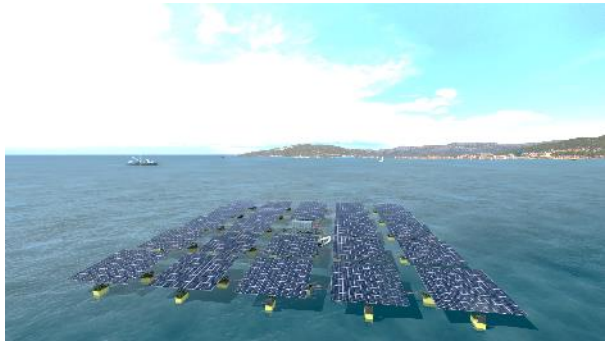
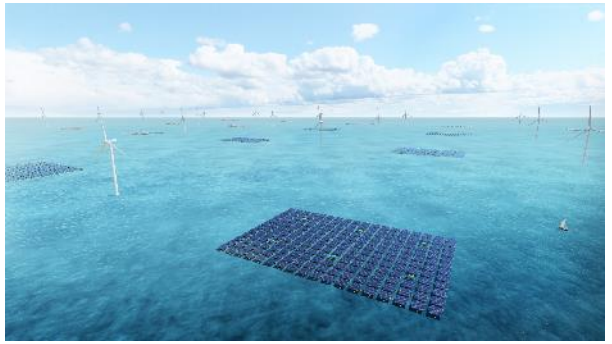
Mega Sète, Mediterranean Sea, 2km offshore – End 2025

SolarinBlue

SolarinBlue & Coastal Cities: 3 markets

Economics & markets



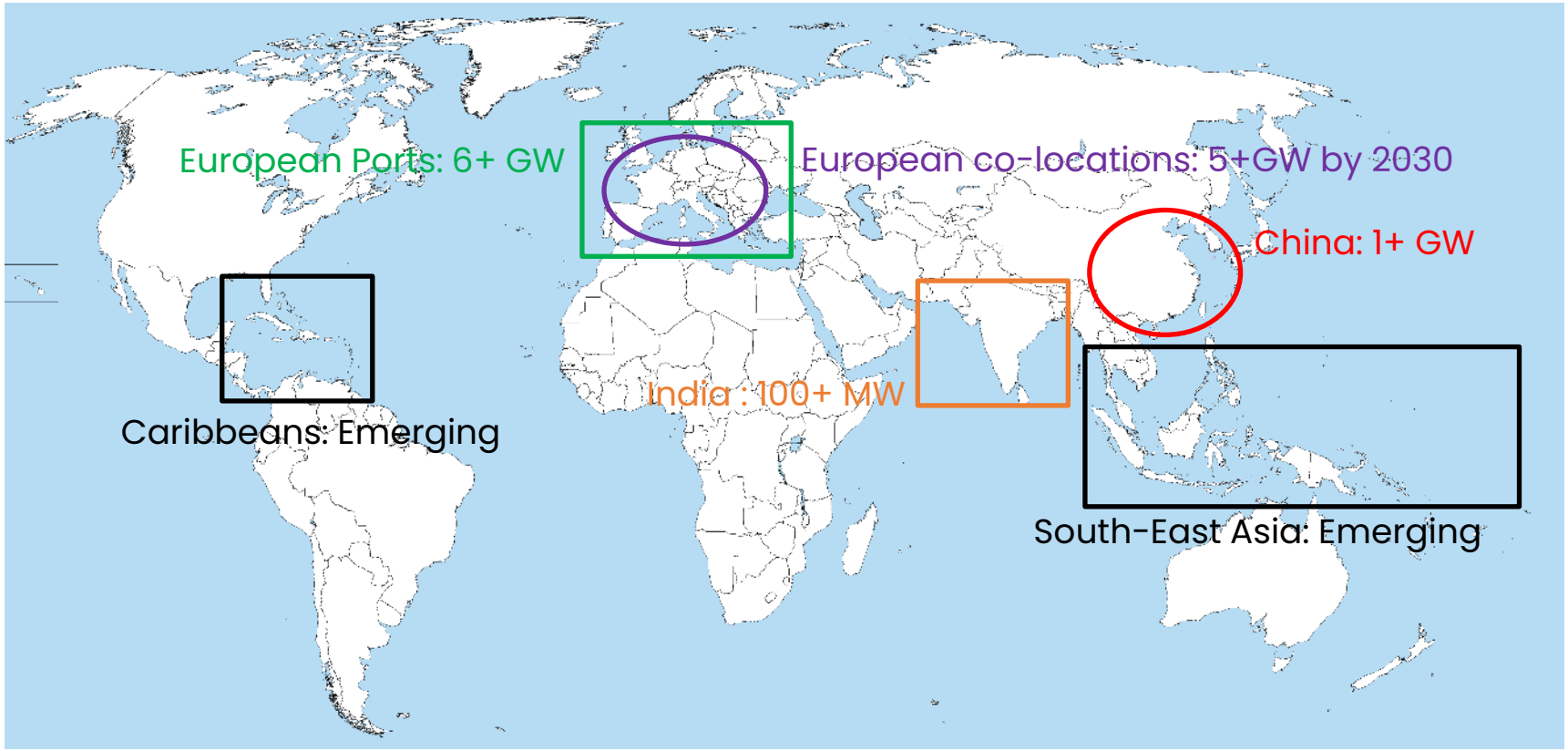


	Ports & Industries	Islands	Offshore Wind & Solar Co-location
Typical project size	1 MW to 50MW Self-consumption **Inside the Port's domain**	5 MW to 100 MW Local grid connection **At the island's Port**	50 MW to 1 GW Shared grid connection **Built in a coastal city**
Market size	6+ GW in 200+ projects in Europe	10+ GW projects in Med. Sea, Ind. Oc., Caribbeans & DOM-TOMs	5+ GW by 2030 200+ GW potential

SolarinBlue

Market is live, starting today

Economics & markets



SolarinBlue

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Guilain Pedezert
Head of International Business Development
Wattway

WATTWAY SOLAR PAVEMENT: PIONEERING SOLAR ROADS

PRESENTATION

Guilain PEDEZERT

Head of International Business

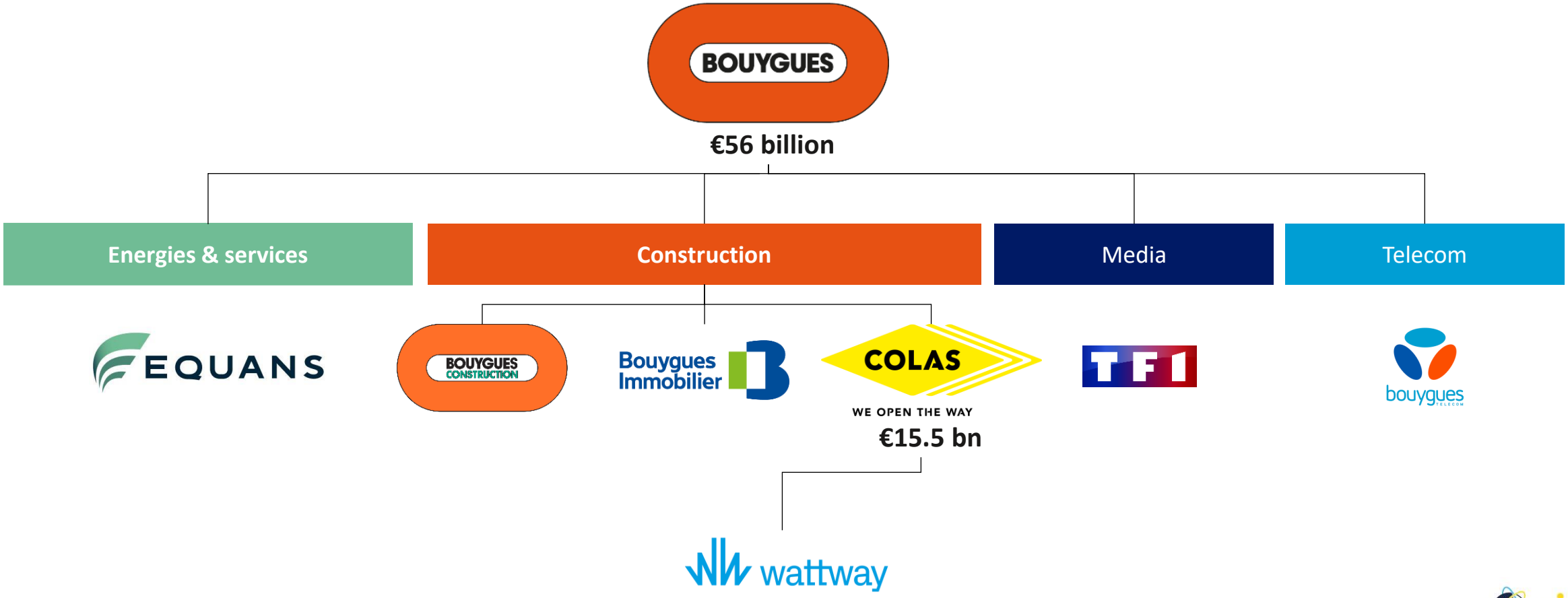
Development- Wattway

Wattway’s team France and International

COLAS GROUP

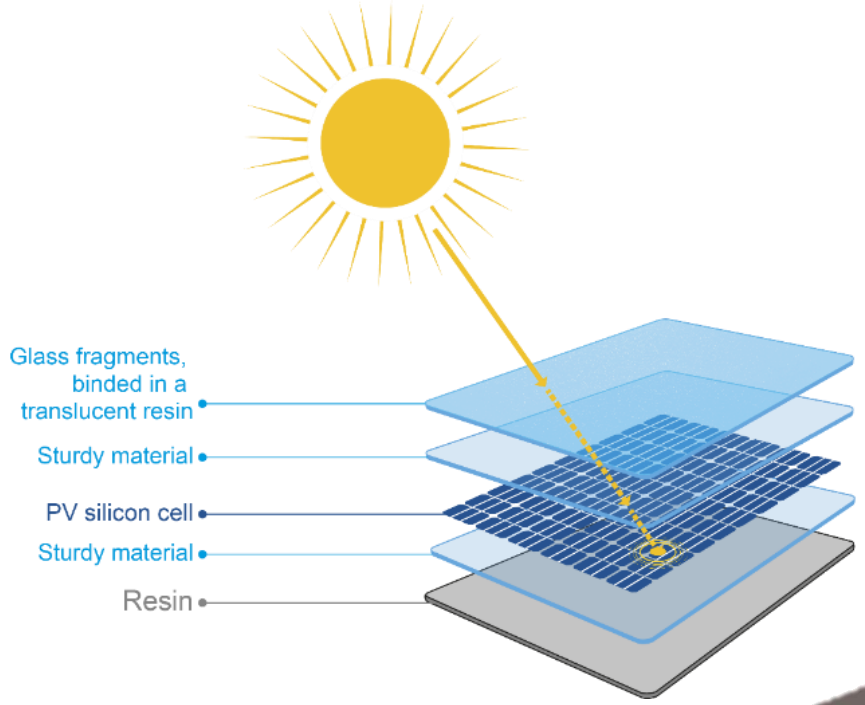
WATTWAY INNOVATION DEVELOPED BY COLAS

Colas, world leader in transport infrastructure, and a subsidiary of the diversified industrial group Bouygues, **unveiled Wattway in 2015.**



WATTWAY TECHNOLOGY - HOW IT WORKS

Giving a second function to your road infrastructure by turning solar energy into electricity



WATTWAY PLUS SOLUTION - markets

Wattway Plus, an additional solution for your local self-sufficiency projects

Cycle paths

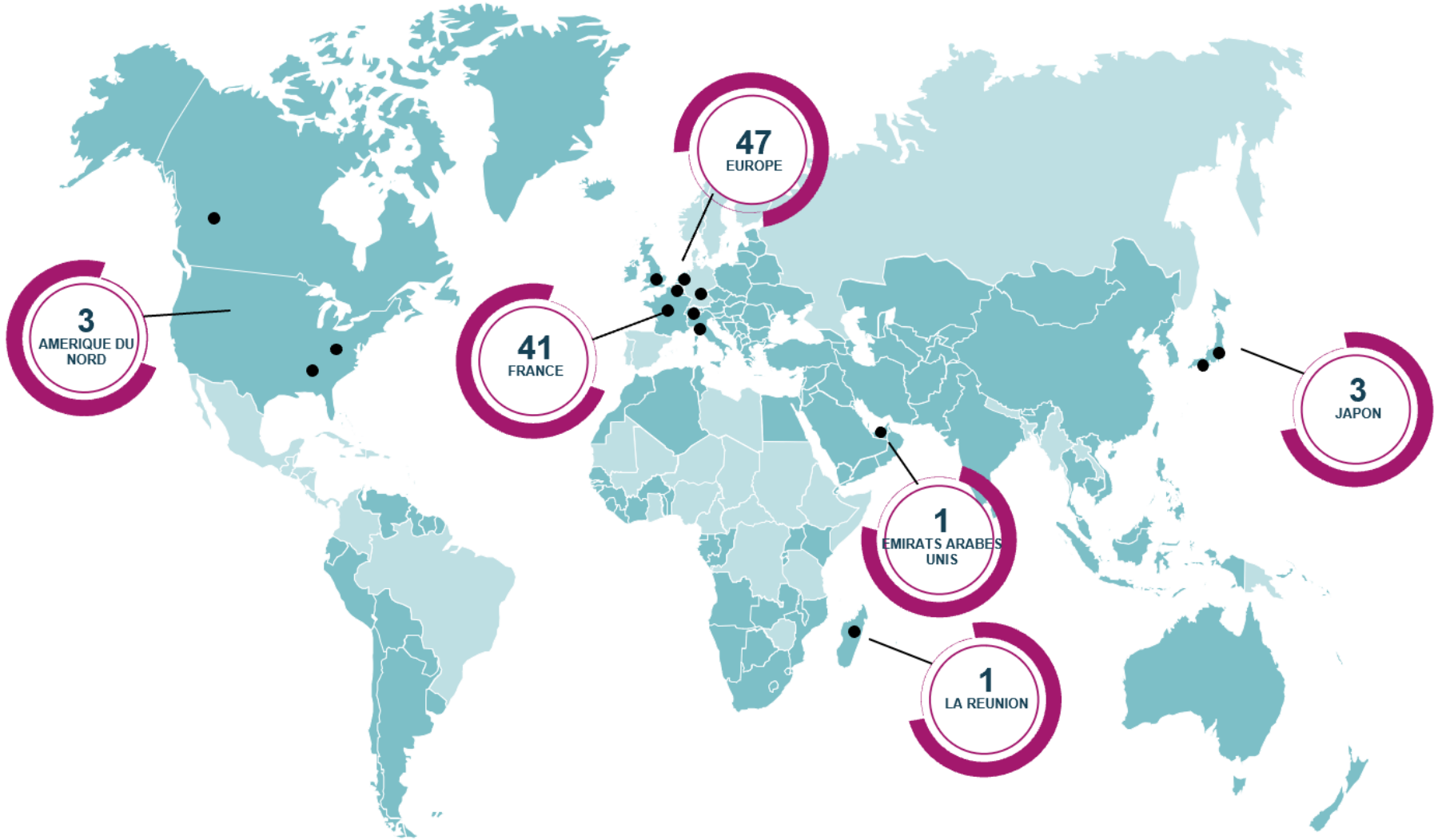
Airport

Seaport

Car park

Parvis/Pier

WATTWAY TECHNOLOGY – SITES DEPLOYED



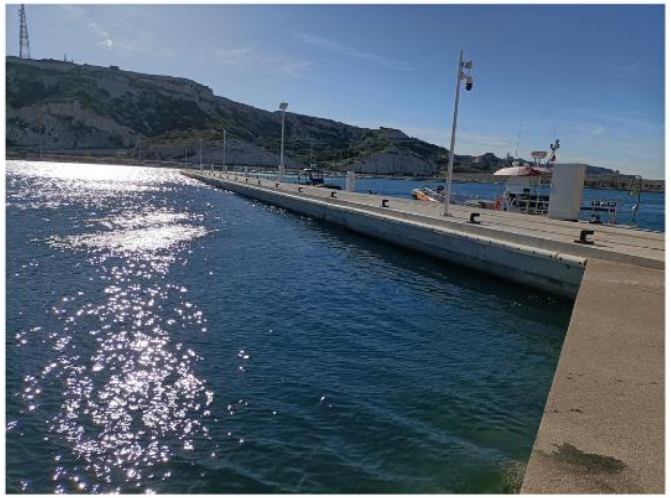
NETHERLANDS - PHOTOVOLTAIC POWER PLANTS ON CYCLE PATHS
280 kWp - 160 MWh/year

plus

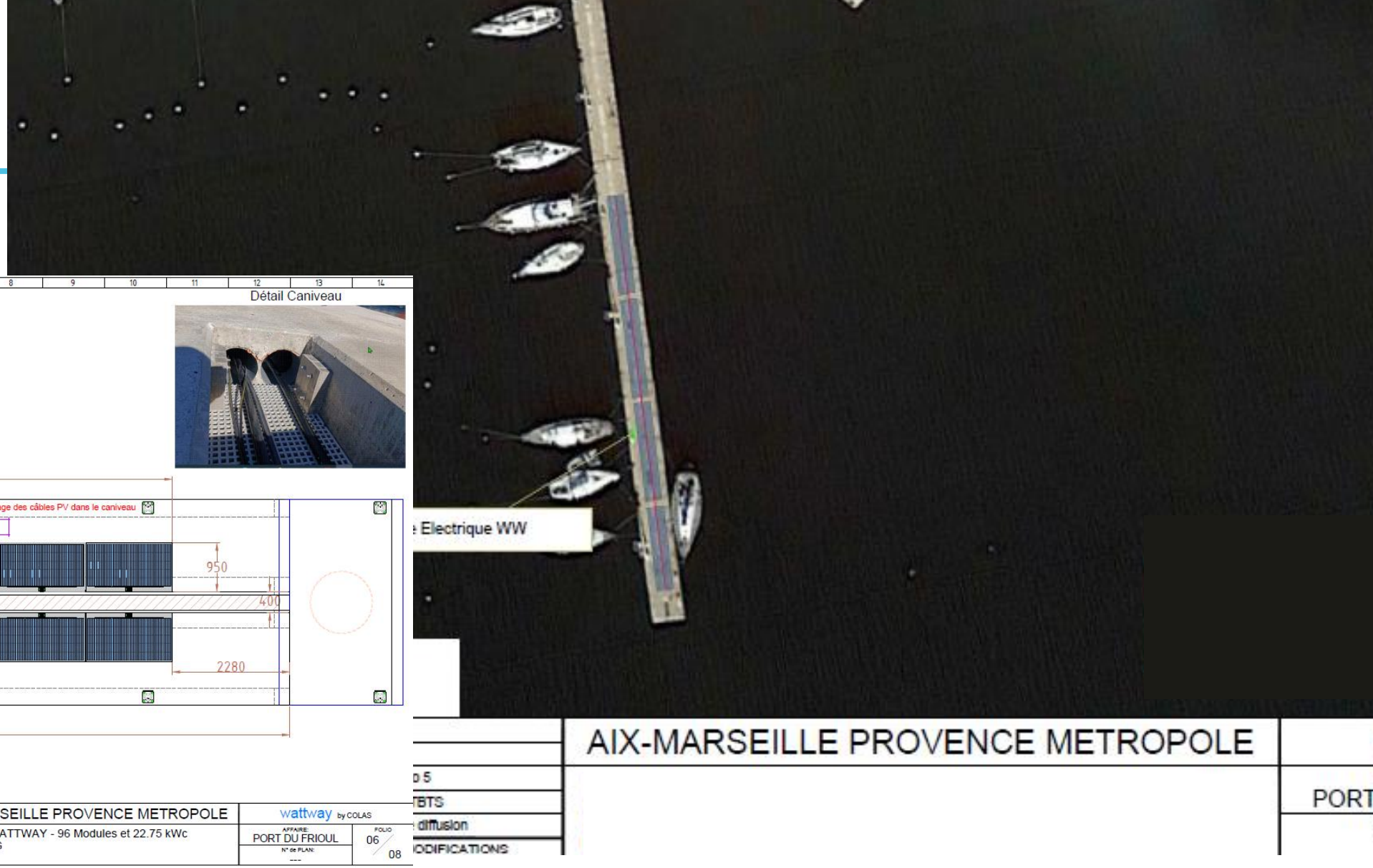
OUR SOLUTIONS FOR SEAPORTS

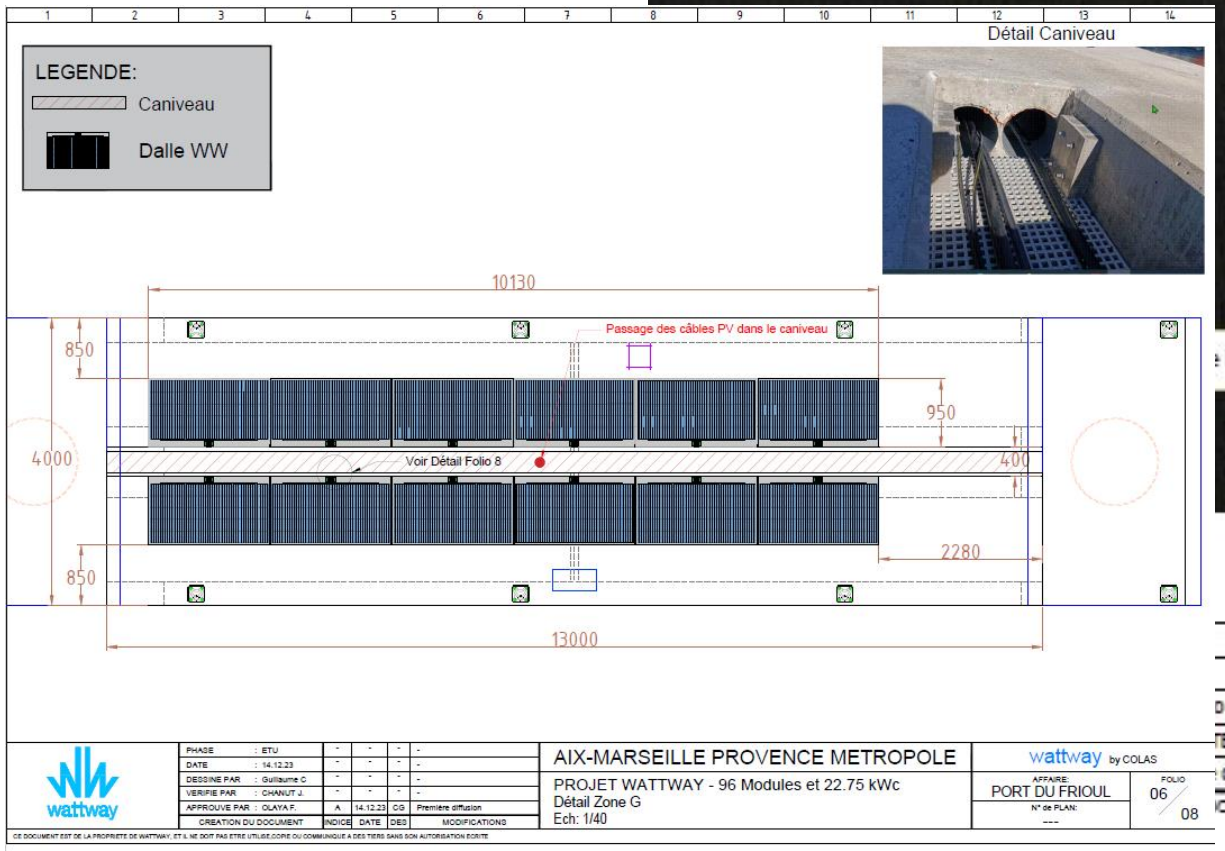
FRIOUL PROJECT

FRIOUL PROJECT

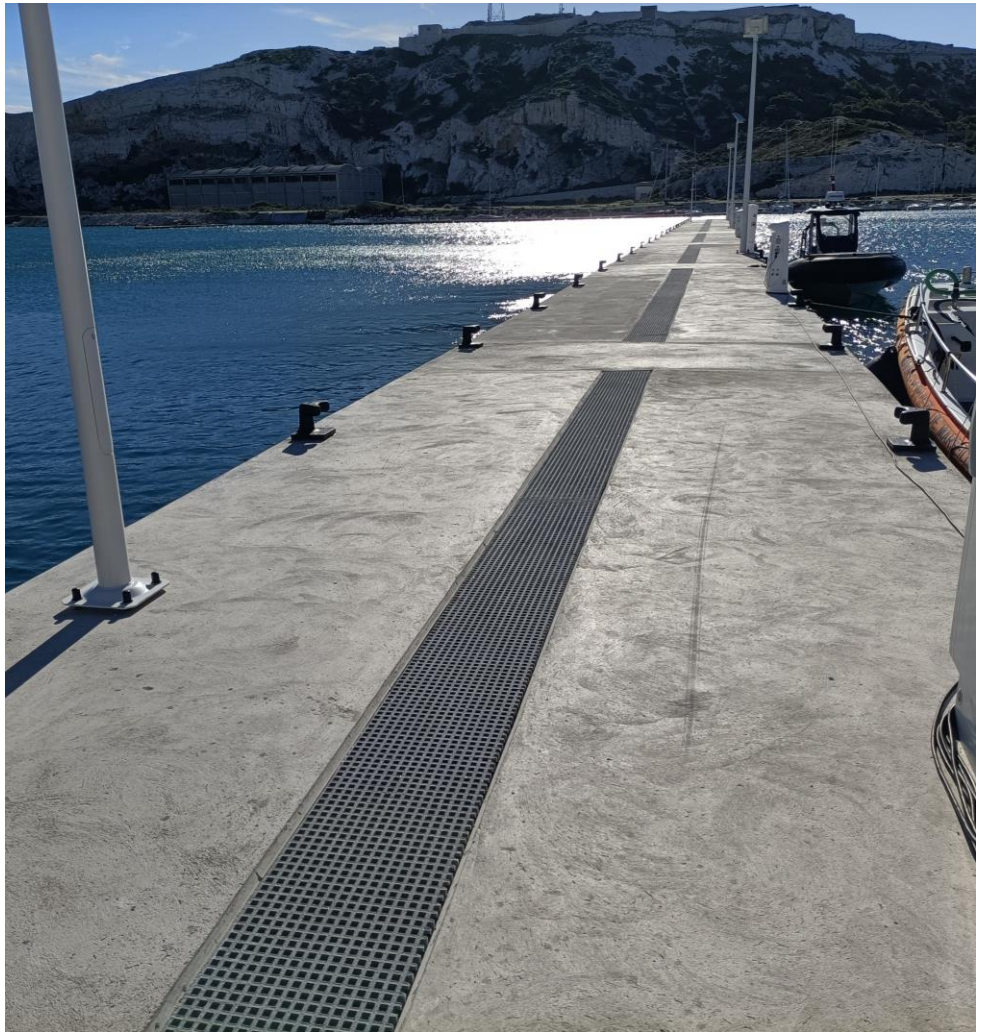


FRIOUL PROJECT: DETAILS





PORT OF MARSEILLE/ SEAPORT SEGMENT



PROJECT:

- Substrate: maritime quay
- Completion: 2024
- Final customer: Métropole Aix Marseille
- Levers: transition & landscape integration

PV POWER PLANT & RENEWABLE ENERGY:

- Use: Self-consumption
- Estimated service life: 20 years

THANK YOU

guilain.pedezert@colas.com

World Conference Cities & Ports by AIVP

MAGPIE
SMART GREEN PORTS

Energy Transition and Circular Economy
Discussion and Q&A

MODERATOR

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Associate Professor
Copenhagen Business School

Quentin HENRY
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Solarinblue

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Wattway

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World Conference Cities & Ports by AIVP

Energy Transition and Circular Economy Keynote

MODERATOR

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Associate Professor
Copenhagen Business School

Arianne COLSON
Knowledge Manager, Ports & Shipping
C40 Cities Climate Leadership Group

Successful port-city collaboration: a catalyst for a just energy transition

Ariane Colson
Knowledge Manager, Ports & Shipping
C40 Cities

C40 CITIES

C40 unites the world's leading mayors to deliver the **urgent action needed right now to confront the climate crisis**

98

Member cities

750+

Million citizens

60

technical assistance areas

C40 CITIES

Ports & Shipping Programme

- 2019: launch by **former Mayor of Los Angeles**, Eric Garcetti
- Aim: unite cities and ports to accelerate **shipping decarbonisation** and deliver benefits like improved air quality and green jobs creation

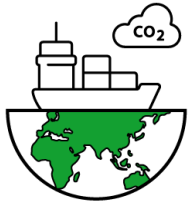
Green Ports Forum connects **19 cities, 22 ports, and industry stakeholders** in peer-to-peer collaboration

C40 CITIES

The urgency of action

>80%

of global trade is delivered by ships



17%

of global CO2 emissions by 2050 - what shipping could reach without action,

80%

of the world's GDP is generated by cities

75%

of the world's energy is consumed by cities

C40 CITIES

Cities and ports: catalysts of the energy transition

Green Ports Forum are **leading the way**:

Hydrogen and ammonia fuels and new worker upskilling.

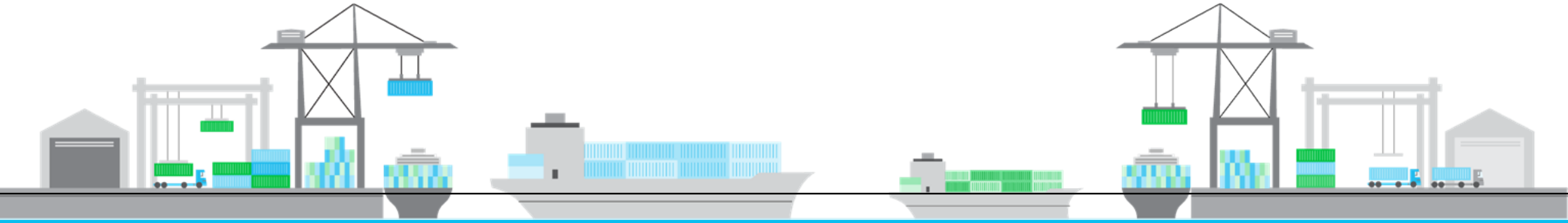
Offshore wind-powered energy hub creating up to 90,000 jobs.

Exploring hydrogen to decarbonise industries, reduce pollution, and improve energy security.

C40 CITIES

Cities and ports driving change together

- **Cities and ports are drivers of multi-stakeholder collaboration**
- **Seattle**: Shore power infrastructure reduces emissions and supports local jobs.
- **Rotterdam**: 90% emissions reduction target by 2030 through workforce innovation.



Leveraging just transition

- Helps to secure **social licence for climate action, rally stakeholders**, and **accelerate urgent action**
  - E.g., inclusive stakeholder engagement in Los Angeles

- Leaving no-one behind: **sharing best practices** between cities and ports globally

C40 CITIES

Need for adequate finance and equity

- ➔ Cities need **adequate funding and delegated powers** to unlock transformative progress.

- ➔ National leaders must support **multilevel partnerships**.

"Adaptation and mitigation actions that prioritise equity, social justice, climate justice, rights-based approaches, and inclusivity, lead to more sustainable outcomes, reduce trade-offs, support transformative change and advance climate resilient development."

IPCC AR6 report

C40 CITIES

Ports & Shipping newsletter sign-up:

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World Conference Cities & Ports by AIVP

MAGPIE
SMART GREEN PORTS

MODERATOR

Maurice JANSEN
Senior Researcher
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Energy Transition and Circular Economy

Social acceptance & Spatial Impact Workshop

aivp

MAGPIE
SMART GREEN PORTS

MAGPIE WP8
Social Acceptance & Spatial Impact

Funded by
the European Union

This project has received funding from the European Union's Horizon 2020 (MFF 2014-2020) research and innovation programme under Grant Agreement 101036594

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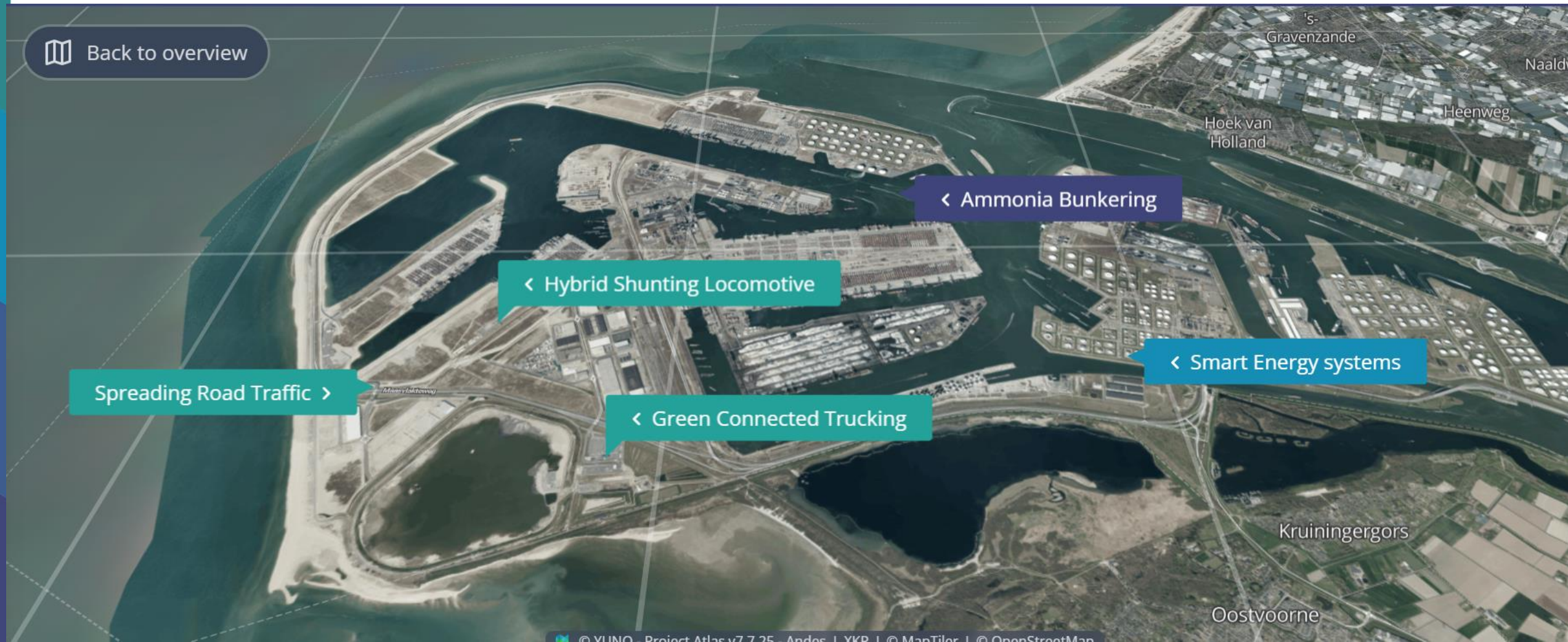
Magpie project overview



Demonstrator projects

Demo	
2	**Smart Energy System**
3	Shore Power Peak Shaving
4	**Ammonia Bunkering**
5	**Off-shore charging buoy**
6	Autonomous e-barge and transhipment
7	Green Energy Container (e-barge)
8	**Hybrid shunting locomotive**
9	**Green Connected Trucking**
10	**Spreading Road Traffic**

Social Acceptance
- actively oppose
- negative aware
- passive
- positive aware
- active support

- Spatial impact
  - within the port
  - in the port city
  - in the region
  - in the ecosystem
  - on national scale

Conceptual framework

Social Acceptance

- Awareness that technology exists
- Making a sensible judgement of the positive and negative aspects

Passive?

- What space can be affected by the demo?
- Physical (land), aerial (air), aquatic (water) and cyber

Active?

Spatial Impact

MACRO
High level and impact-driven (climate change, zero emission)

MICRO
Contextualizing the port in relation to its surroundings and communities (proximity, porosity)

- In line with MAGPIE goals
- Who could be against greening the port?
- What happens in my backyard?
- More contradictions! License to operate under pressure

Workshop plan

- Introduction (5 min)
  - Explain the background and instruction to workshop.
- Phase 1 (15 min)
  - Identify issues related to **social acceptance** of the chosen scenario (15 minutes).
  - Voting
- Phase 2 (15 min)
  - Identification of **spatial impact** identified of the chosen scenario
- Reflection round (10 min)
  - On social acceptance and spatial impact

Workshop plan

Introduction	Round 1: Social acceptance	Round 2: Spatial impact	Debriefing SA & SI combined
• Explain setup	• Issue identification • Engagement with the energy transition solution	• Type of impact • Spatial dimension	• SA: accept • SI: scale • Overall impact relationship port-city
5 min.	15 min.	15 min.	10 min.

In order to be able to use the elements in the discussion for the benefit of the MAGPIE project, we will ask you to voice record the discussions, take notes and pictures, and send them to Caya Hein and Maurice Jansen after the session

World Conference Cities & Ports by AIVP

MAGPIE
SMART GREEN PORTS

Group facilitators:

- *Maurice JANSEN*
- *Michele ACCIARO*
- *Zenaida MOURAO*
- *Beatrice MORETTI*
- *Paula VALE DE PAULA*
- *Caya HEIN*
- *Laureen GOLETTO*

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World Conference Cities & Ports by AIVP

19:30 - 23:00	Networking Official evening

CONFERENCE

World Conference Cities & Ports by AIVP

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Champalimaud Foundation

LISBON CRUISE PORT

GLOBAL PORTS HOLDING

Co-organiser:

Porto de Lisboa

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