

Ports of Tomorrow

From logistics gateways to renewable energy hubs and technology centers

Kaspars Liepins

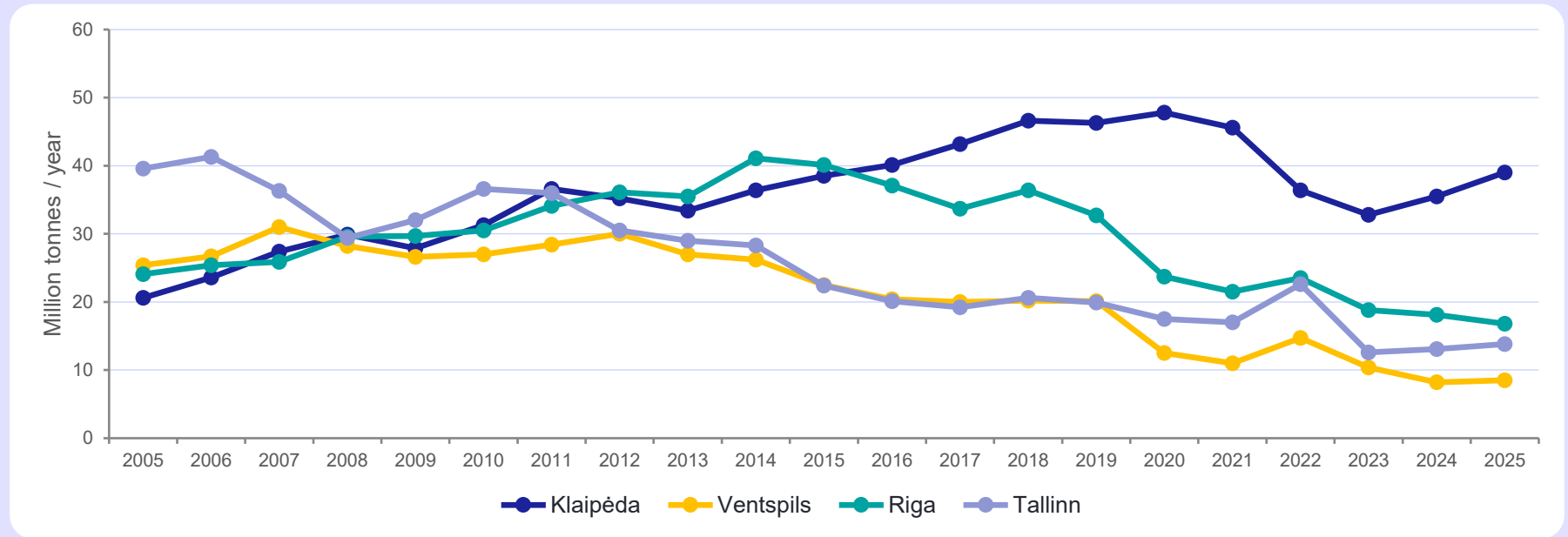
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Where we come from: 20 years of Baltic port cargo

Total cargo turnover, Klaipėda · Ventspils · Riga · Tallinn (million tonnes / year)

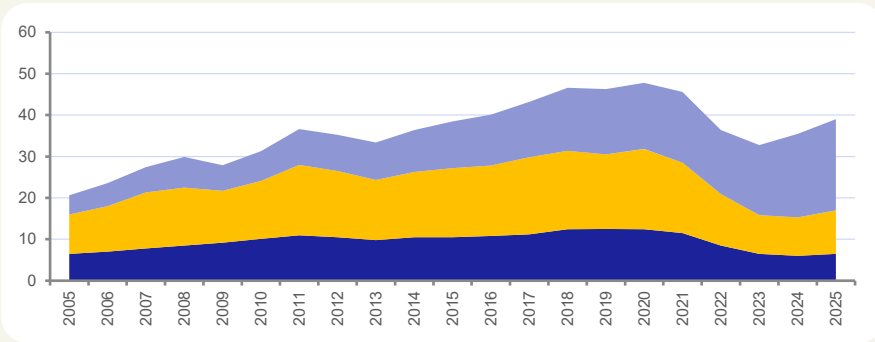


What you see: three ports peaked between 2006 and 2014. One – Klaipėda – kept growing. Three are now well below their peak. The transit-hub era is over.

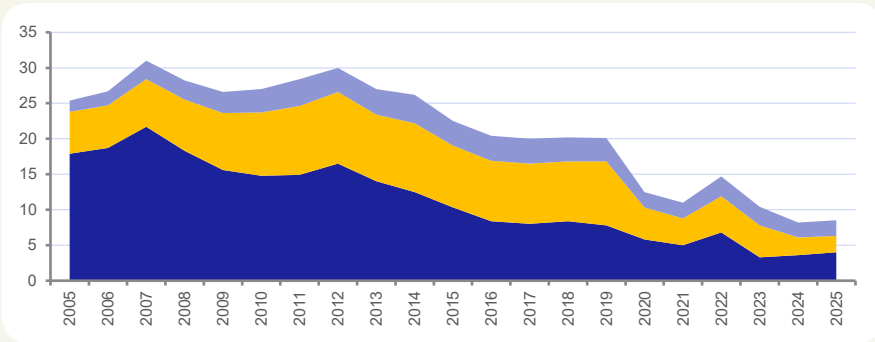
Same trend, different stories: what the cargo mix shows

Stacked cargo composition by port (million tonnes / year). The dark band is fossil transit – oil products & coal.

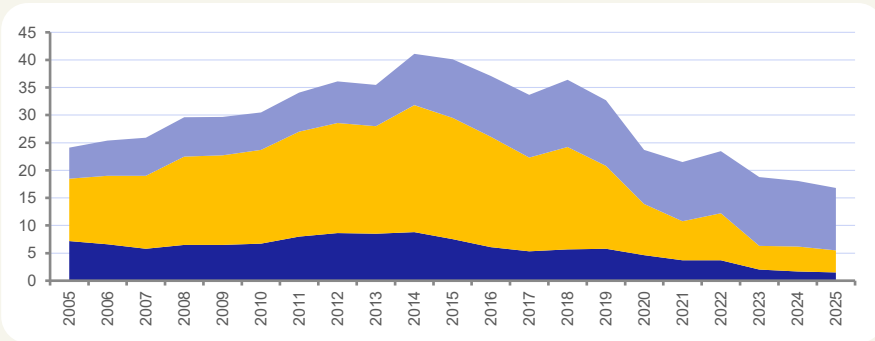
Klaipėda



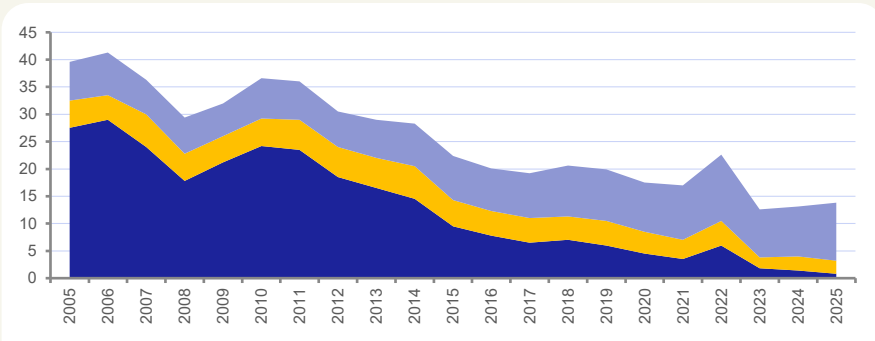
Ventspils



Riga



Tallinn



■ Liquid bulk (oil products) ■ Dry bulk (coal, grain, fertilizers) ■ Ro-Ro / containers / general

Two pressures hit at the same time



PRESSURE 1 · GEOPOLITICAL SHOCK

The transit base collapsed.

- Russian and Belarusian transit volumes – coal, crude, oil products, fertilizers – gone or going
- Sanctions, rail and pipeline reroutes, EU energy independence – all structurally permanent
- The old throughput model cannot be replaced with more of the same



PRESSURE 2 · CLIMATE MANDATE

Decarbonisation is no longer optional.

- EU 'Fit for 55' – –55% GHG by 2030, stringent maritime fuel rules
- IMO net-zero 2050 – shipping must switch fuels, ports must offer them
- Clean Baltic Sea Shipping – 100% OPS availability target by 2030
- EU funding (Innovation Fund, CEF, Interreg) – flowing to those who pivot

The result: the same ports that lost their old business now have to build the new one – on the same quays, with the same people.

One asset base – four new businesses

01



Renewable energy hub

Wind, solar, BESS on port land. Anchor offshore wind value chains. The port as Latvia's industrial energy yard.

02



Green manufacturing & PtX

Convert renewables into hydrogen, ammonia, e-methanol, e-SAF. Export the energy as a product.

03



Green corridor & bunkering

Bunker methanol, ammonia, hydrogen. Plug into Baltic green shipping corridors.

04



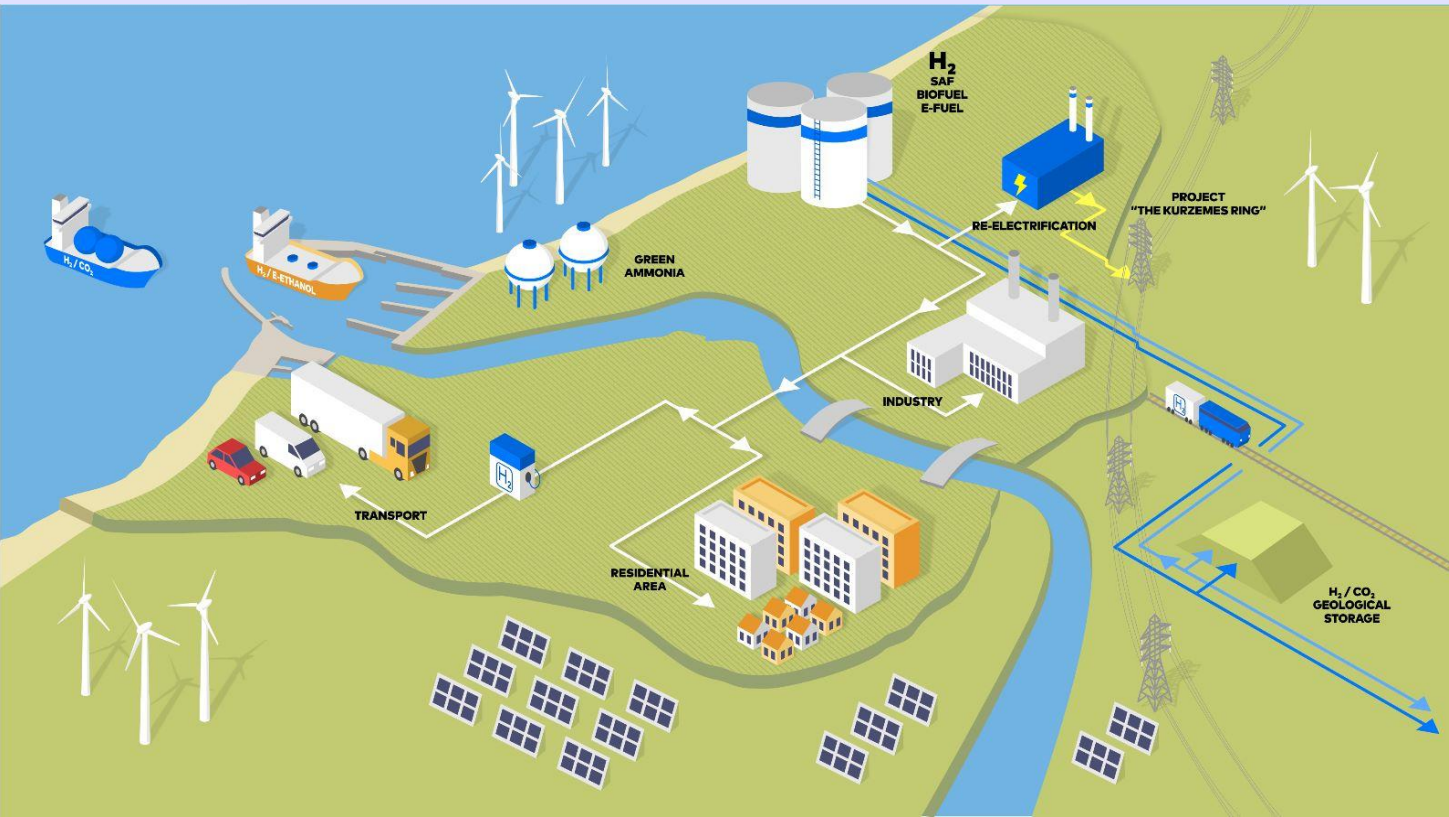
Smart-port technology centre

Digital twins, AI-driven operations, OPS, electrified handling. The platform that runs the other three.

The pivot is not about replacing transit with one new thing – it is about layering four new revenue streams onto existing infrastructure.

POWER-TO-X

Green energy cluster in the **port of Ventspils**: wind farm service, solar energy production, H₂, e-methanol, green ammonia, biofuel, etc.



Asset one – the wind is already there

Wind, solar, biomass and biogas around Ventspils. Renewable supply that feeds everything downstream.

86

MW

installed onshore wind

370

MW

onshore planned

1,552

MW

in EIA process

2,000

MW

ELWIND offshore (LV-EE)

AND THE COMPLEMENTS



Solar capacity

Large port land parcels – solar-ready, grid-adjacent.



BESS already live

Utilitas Wind 10 MW / 20 MWh – Latvia's first, since 2024.

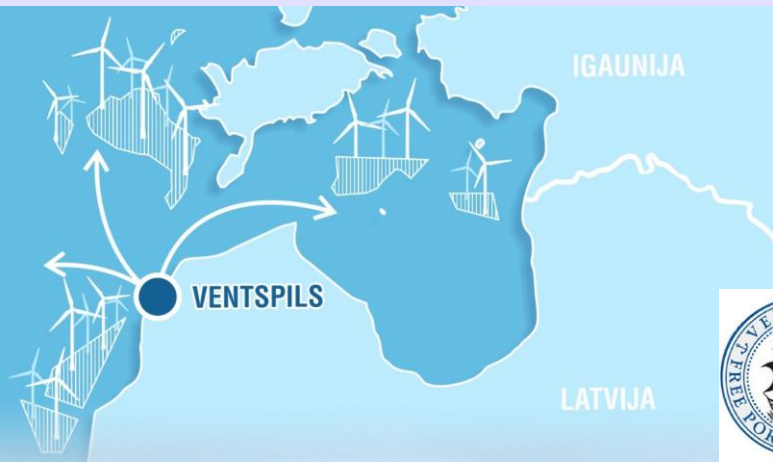


E-fuels & bio-fuels

Domestic feedstock for the chosen ammonia production pathway.

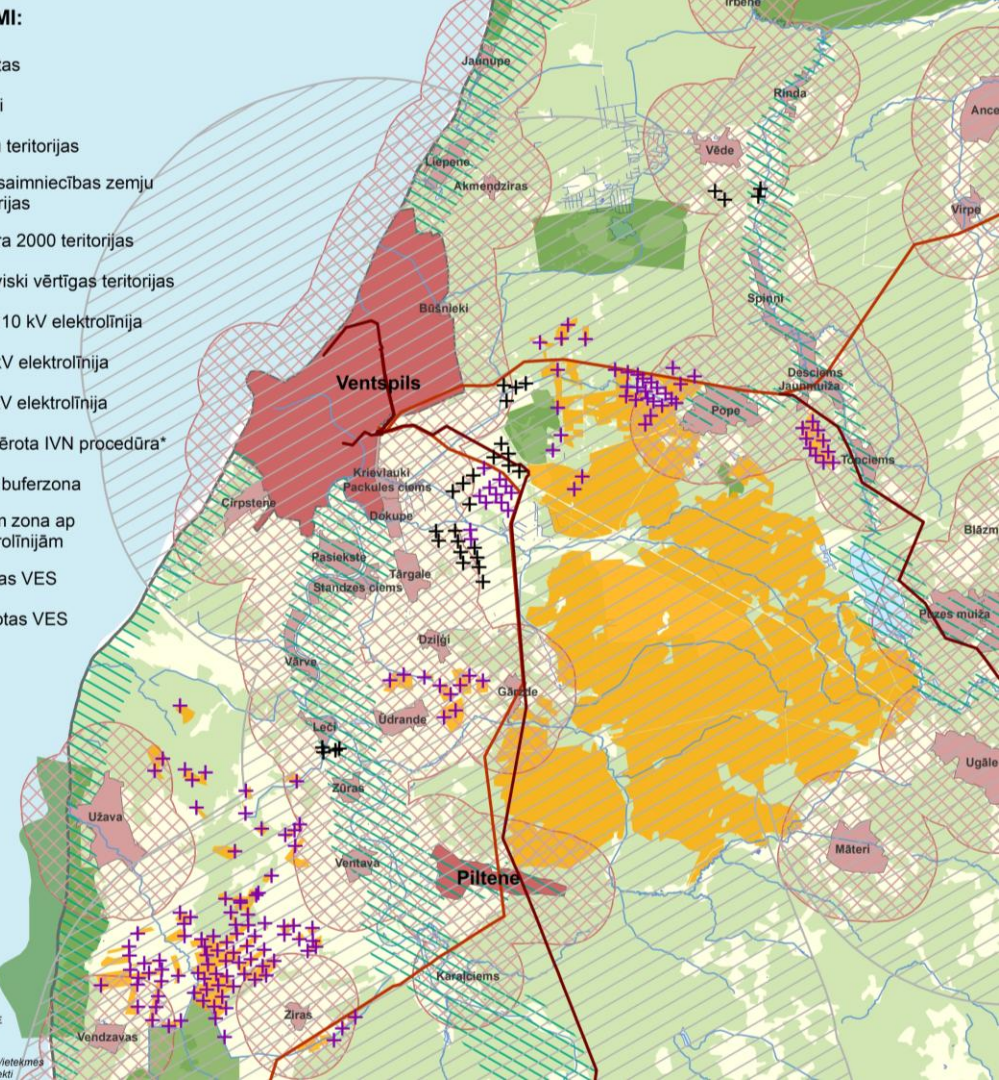
WIND ENERGY PROJECTS NEAR VENTSPILS

- +** Installed on-shore: **86 MW**
- +** Planned on-shore: **370 MW**
- +** Allocated for EIA: **1 552 MW**
- +** Off-shore: **2 000 MW**



APZĪMĒJUMI:

- Pilsētas
- Ciemi
- Mežu teritorijas
- Lauksaimniecības zemju teritorijas
- Natura 2000 teritorijas
- Ainaviski vērtīgas teritorijas
- 330/110 kV elektrolinija
- 330 kV elektrolinija
- 110 kV elektrolinija
- Piemērota IVN procedūra*
- 2 km buferzona
- 10 km zona ap elektrolinijām
- Esošas VES
- Plānotas VES



GREEN AMMONIA PRODUCTION PROJECT IN VENTSPILS

52 ha

land leased for the development of green ammonia plant.

Planned capacity:

67 000 t

of Hydrogen per year

567 000 t

of Ammonia per year

> 1.3 bEUR

Anticipated investment

Project status:

- EIA started
- On-going feasibility study.
- MoU for sale of green ammonia signed in 2024 with German trading house.

VENTSPILS GAIN

Green
Ammonia Innovation



PURPLEGREEN

BATTERY ENERGY STORAGE SYSTEMS

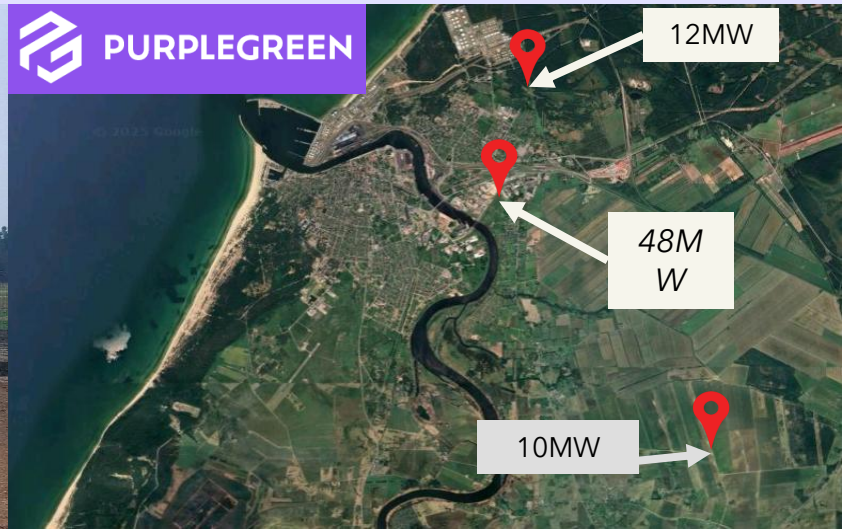
Utilitas Wind

- Latvia's 1st and largest BESS - located in Ventspils region
- In operation since: **2024**
- Total capacity: **10 MW**
- Storage capacity: **20 MWh**
- Total investment: **>7 mEUR**



PurpleGreen Wind

- Contract signed: **2025**
- Planned capacity: **12 MW**
- Storage capacity: **24 MWh**



VENTSPILS TERMINALS CAPABLE OF SERVICING GREEN FUELS & OTHER DEVELOPMENTS

- Liquid product tankage: 1.6 mln.m³
- Ammonia handling terminal
- Capacity: ~ 1.5 mt/a
- Storage (2 tanks): 54 kt
- Ongoing feasibility studies:
- Terminal for CO₂ export and pipeline transportation to the Port
- Green methanol production in the port for up to 300 kt/a







PORT DEVELOPMENT PROJECT

Witteveen + Bos

The future development plans of Ventspils port include the construction of a new terminal for assembling and production of offshore wind turbines



NORTHERN PORT DEVELOPMENT PROJECT WITH BERTH NO. 35

- Terminal area:
40-50 ha
- Bearing capacity:
10 - 50 t/m²
- Draft - 15.5 m
- Quayside length:
600 m
- Hinterland
manufacturing area
~100ha



New role – from molecule to bunkering business

Production without a corridor is just chemistry. **H2Deri@BSP** turns it into a fuel business across seven Baltic states.

H2Deri@BSP · Interreg Baltic Sea Region

The Baltic green-fuel framework.

15

partners

7

BSR states

€2.86M

budget

36

months

Ventspils Freeport · Lead role: WP1 / 1.2

- GIS-based renewable potential assessment (solar, wind, hybrid)
- PtX pathway evaluation: H₂, NH₃, e-methanol, e-SAF, r-SNG
- Spatial & technical constraints – grid, pipelines, quays, storage
- Investment cases with AEP, LCOE, LCOx outputs



Demand analysis

H₂-derivative demand at ports & BSR shipping.



Bunkering guidelines

Infrastructure standards, techno-econ models.



Bunker vessel concept

Green methanol ship design + truck-to-ship.



Regulatory framework

Safety manuals + public-communication.

H2Deri@BSP PROJECT

The screenshots illustrate the software's workflow:

- Dashboard:** Shows a 'Welcome back, kaspars' message and options for 'Investment Analysis', 'GIS Map', 'User Management', and 'System Settings'.
- Project Selection:** A screen titled 'What type of project would you like to analyze?' offers three options: 'Solar Farm', 'Wind Farm', and 'Hybrid (Solar + Wind)', plus a 'Power-to-X (PtX) Facility' option.
- GIS Map:** Displays a map with several parcels highlighted, including 'PARCEL-54', 'PARCEL-13191', and 'PARCEL-12074'.
- Site Investment Analysis Report:** A detailed report for 'Power-to-X (PtX)' showing an 'Net Present Value' of 250 € (Millions of euro), an 'Internal Rate of Return' of 18.6%, and a 'Payback Period' of 6.1 years. It also lists 'CO₂ Buy Price' at €01 and 'Full Scale Price' at €40/MWh.
- Financial Analysis:** A section titled 'Capital Expenditure (CAPEX)' showing a total of 107.9 M€ (92.1% of the total investment).

1

GIS Layers

2

Spatial selection

3

RES / PtX scenarios

4

Investment cases

Hard truths – four real barriers

Naming them honestly is the first step to solving them.



Capital intensity

Multi-million € per OPS berth. ~€800M-€1B per green ammonia plant. Without de-risking instruments, the case stalls.



Standardization gap

OPS voltage, frequency, plugs differ across the global fleet. H₂ derivatives bunkering protocols still being written.



Chicken-and-egg

Ports won't invest without vessel demand. Shipowners won't retrofit without port availability. Both wait – unless someone moves first.



Grid headroom

Concurrent loads from OPS + electrified equipment + electrolysers will hit local 110/330 kV networks hard.

The takeaway

The port that once moved East-West is now building North-South.

From *transit* → *generation* → *manufacturing* → *bunkering*.



Mandate to invest

National OPS mandate + green-bunkering support fund.



Grid before fuel

Grid impact studies for port clusters – now, not later.



Pilot, then scale

One berth, one corridor, one offtake – then replicate.

What if the next power plant you build... is actually a port?



Thank you! Questions?

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