Haskoning
Enhancing Society Together

오션테크코리아 2025 바다의 미래를 만드는 신기술
OCEAN TECH KOREA

Development of Ports for Offshore Wind

North Sea insights to unlock Koreas unique national assets to build out offshore wind

Leon Lammers

28 October 2025

Who are we?

We are an **independent** international consulting engineering company leading the way in sustainable development and innovation **since 1881.**

By **combining** engineering, design and consultancy with software and technology, we are delivering more added value to our clients.

6,400+
staff

working from some
60
offices around the world

on projects in
100+
countries

#37 in Engineering News-Record's ***Top 225 International Design Firms***

#2 in Engineering News-Record's ***Top 100 Marine and port facilities***

Enhancing Society Together

Here we can have the ***biggest positive impact*** in delivering benefits for society and the environment in projects for our clients and in our own operations, whilst contributing to related UN Sustainable Development Goals, the SDGs.

Wind Port Services | Value Proposition

2nd in ENR Global Sourcebook Marine and Port Facilities 2020

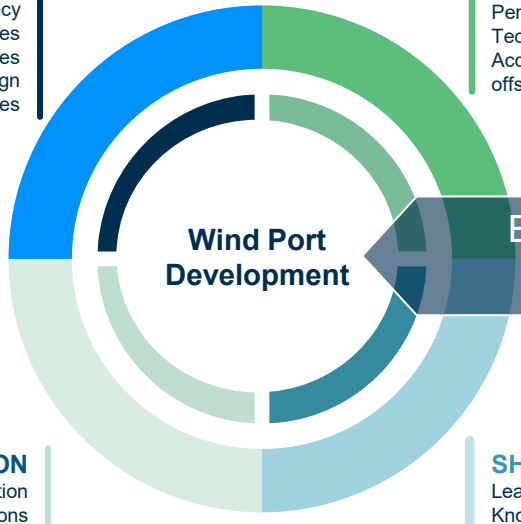
PONDERA a company of Royal HaskoningDHV

PORT DEVELOPMENT

World leader in marine and port facilities consultancy
Wind port strategy, site selection, and feasibility studies
Wind port masterplan including industrialisation studies
Wind port engineering and design
Economics and Commercial advisory services

OFFSHORE WIND

Permitting, E(S)IAs, ecology and regulatory approvals
Technical and strategic offshore wind developer bid support
Acquisition of Pondera has improved our position & services for offshore wind development services



Expert support for the entire offshore wind port lifecycle

TRANSPORT & LOGISTICS SIMULATION

Transport and Installation (T&I) simulation, modelling, and optimisation
Digital twin solutions
Shipping, offshore operations & marine contracting expertise
Detailed offshore wind construction knowledge

Twinn by Royal HaskoningDHV

SHIPYARDS & MANUFACTURING

Leading expertise with FMI (shipyards) and TEC (tunnelling) for FLOW
Knowledge of floater production processes & optimisation
Key expertise of assembly, launching facilities
OEM engagement on floater design and manufacturing

First Marine International

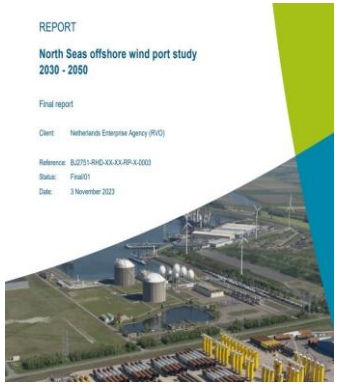
Contents of the presentation

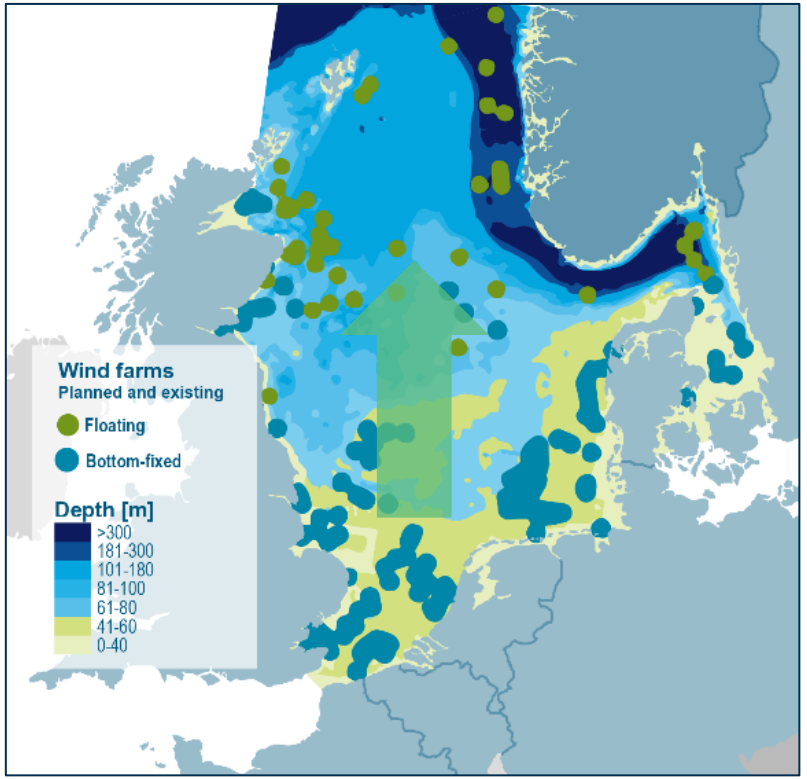
The North Sea Context: Large ambitions

- **Europe:** 80 GW by 2030 and 400+ GW by 2050 in Europe.
- Countries surrounding the **North Sea Basin** aim to deploy around **15.000 wind turbines** before 2050
- Port capacity is an important bottleneck.

European Commission

Netherlands Enterprise Agency





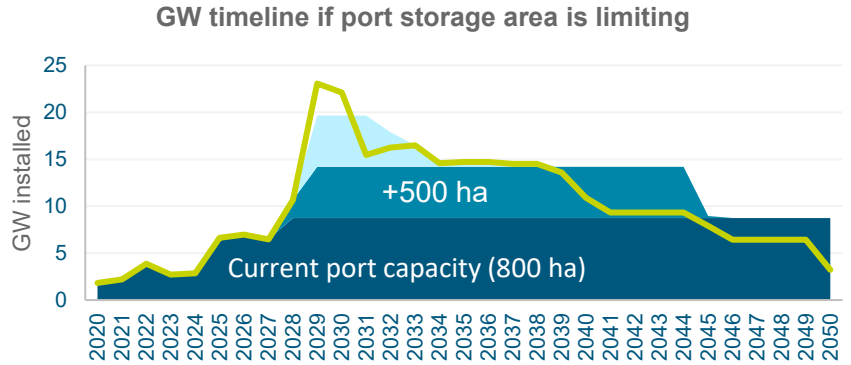
There is insufficient port capacity to service the North Sea offshore wind targets

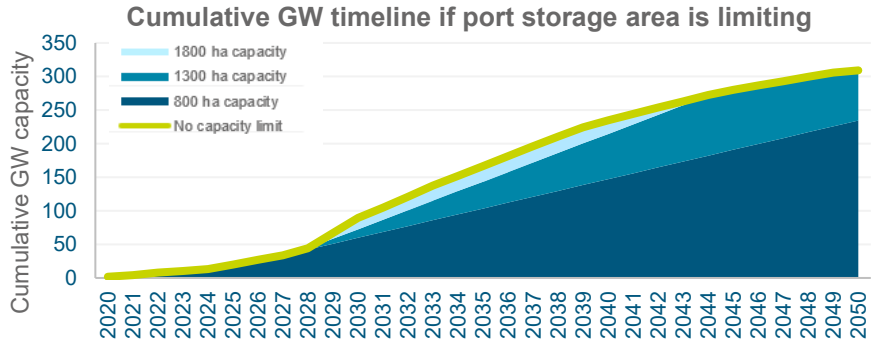
North Sea OW port supply-demand outlook

Based on the country ambitions we can conclude that:

- There will be port undersupply from 2027 onwards due to the expected deployment peak
- **Currently available port capacity** (~800ha)
  The 2030 deployment target is delayed 3-4 years
  2040 target is delayed 10 years, 2050 targets will not be met
- **Expanded port capacity** (~1,300ha)
  The 2030 and 2040 deployment targets will be delayed with 2-3 years, the 2050 ambitions can be met.
- **Full supply** (~ 1,800 ha)

  Strategy that focusses on serving the peak.
  Results in overcapacity.





Port investments are held back by uncertainty and a non-viable business case, with alternative use being more attractive

Key challenges holding back offshore wind supply chain and port investments

Demand uncertainty

High level OW **targets are providing insufficient certainty throughout the value chain** for port investments and funding to materialise

Non-viable Business cases

Large long-term investments with limited returns, create **unattractive business cases for OW port** development projects

Technical development risks

Uncertain future technical requirements create **risk of either overinvesting or becoming unsuitable** for future wind farms

Competition for space

Ports have **limited space and a large demand** coming from other (future) uses with more certainty, returns and clear requirements

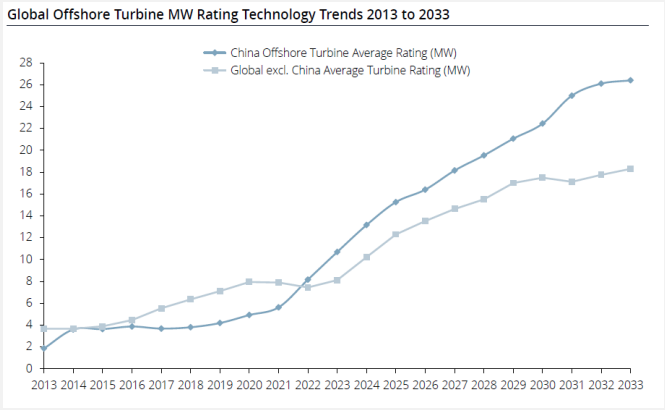
Incentive mismatch

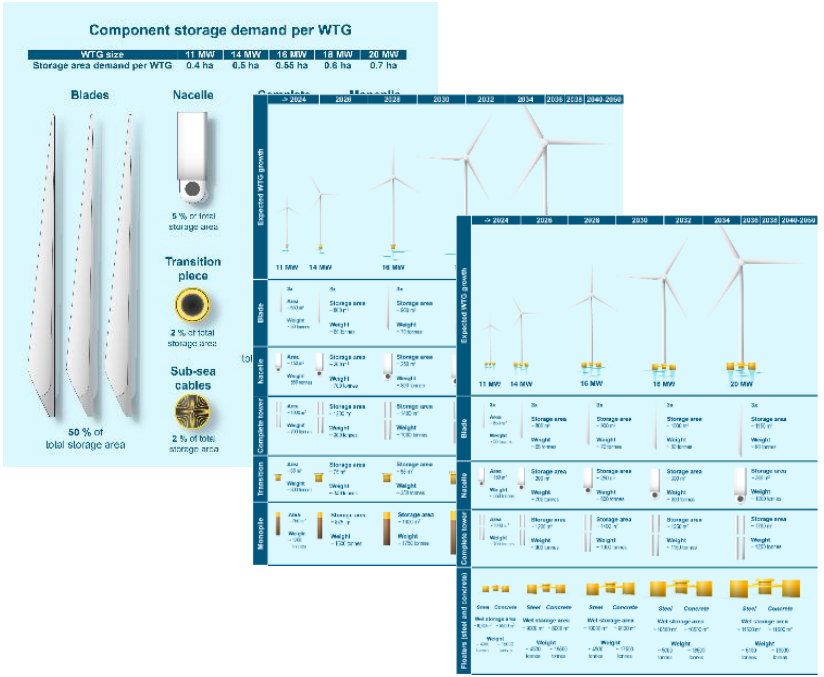
Market actors all contribute to solve issues but have different perspectives and interests. **Ports do not directly suffer the consequences of inaction in offshore wind**

Technology is scaling fast: Turbine sizes grow to 20 MW in base scenario and to potentially 30+ MW in XXL scenario up to 2040

Trends & Developments

- **Base case**: Western turbine sizes could develop to around 20 MW around 2035. After 2035 we assume a consolidation
- **High scenario**: Chinese suppliers could cause larger platforms to be used. Larger platforms announced very regularly.





Solutions that can remove uncertainties: Clarity, policy and public funding support is required

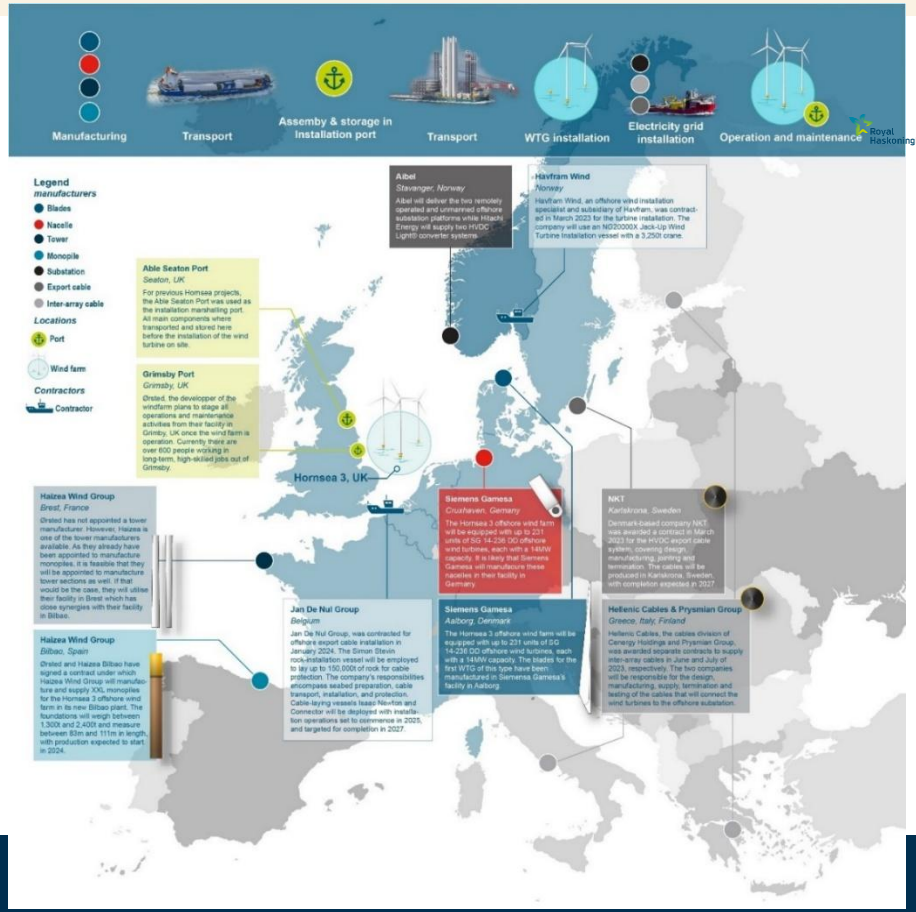
- **Proactive port policy is lacking**
  - No/limited national port policy or support funds for port development
  - Ports are privatised or independent and are assumed to progress their own investments plans
  - Developing ports to reach energy transition targets is of high societal interest
- **Possible solutions for business case development**
  - National or EU port funding (TEN-T, CEF, FLOWMIS)
  - Dedicated / ringfenced offshore wind (port) funds
  - CBA methodology can show societal value to get public funding
  - Strengthen OW port revenue model and multi-purpose use business models
  - Joint investment in port infrastructure (value chain partner)

Objective	Solutions
Reduce demand uncertainty through increased tender pipeline visibility, collaboration and coordination	✓ Translate ambitions into a shared project pipeline ✓ Collaborate and produce a multi-year strategy ✓ Setting up the dialogue ✓ Programmatic procurement ✓ Optimise sizing and timing of tenders ✓ Early-stage port selection ✓ Early-stage tendering and extension of time towards execution
Improve business case viability by mobilising investments and strengthening port revenues	✓ Broaden the definition and purpose of TEN-T ✓ Special offshore wind facility under Connecting Europe Facility (CEF) fund ✓ Channel EU Recovery funds and Net Zero Industry Act support to offshore wind supply chain development ✓ European Investment Bank (EIB) focus on offshore wind port development ✓ Use of Cost Benefit Analysis methodology ✓ Value chain collaboration on infrastructure investments ✓ Strengthen port revenues ✓ And Develop more attractive revenue models ✓ Build a business case based on multi-purpose revenue ✓ Stimulation of terminal operator models ✓ Revenue support
Reduce technical development risks	✓ Technology and requirements collaboration for port planning ✓ Locking technology or standardisation to confirm port requirements ✓ Support new logistics concepts to reduce port requirements ✓ Develop and stimulate a multi-port strategy
Improve spatial use and planning	✓ Futureproof spatial planning ✓ From competition of space to cooperation ✓ Accelerate permitting procedures ✓ Easing legal and administrative procedures ✓ Set Renewable Acceleration Areas for ports
Create urgency, incentives and collaboration	✓ Government recognition of the sense of urgency and value ✓ Incentivise ports to act ✓ Coordination on securing port capacity needs to be improved ✓ Involvement of European and national governments to drive offshore wind port capacity

Offshore wind supply chains are complex, floating wind adds to that

Wide array of players in the supply chain

- Hornsea 3 wind farm UK is installed from the Able Seaton Port.
- Prysmian group and Hellenic Cables to deliver cables.
- The XXL monopiles for the project will be built by Haizea from their facility in Bilbao, Spain.
- Aibel, Stavanger will supply the two sub stations.
- Jan de Nul is contracted for installation of the NKT Export cable.
- The Siemens Gamesa Turbines are built in Cuxhaven and installation is contracted to Havfram Wind..

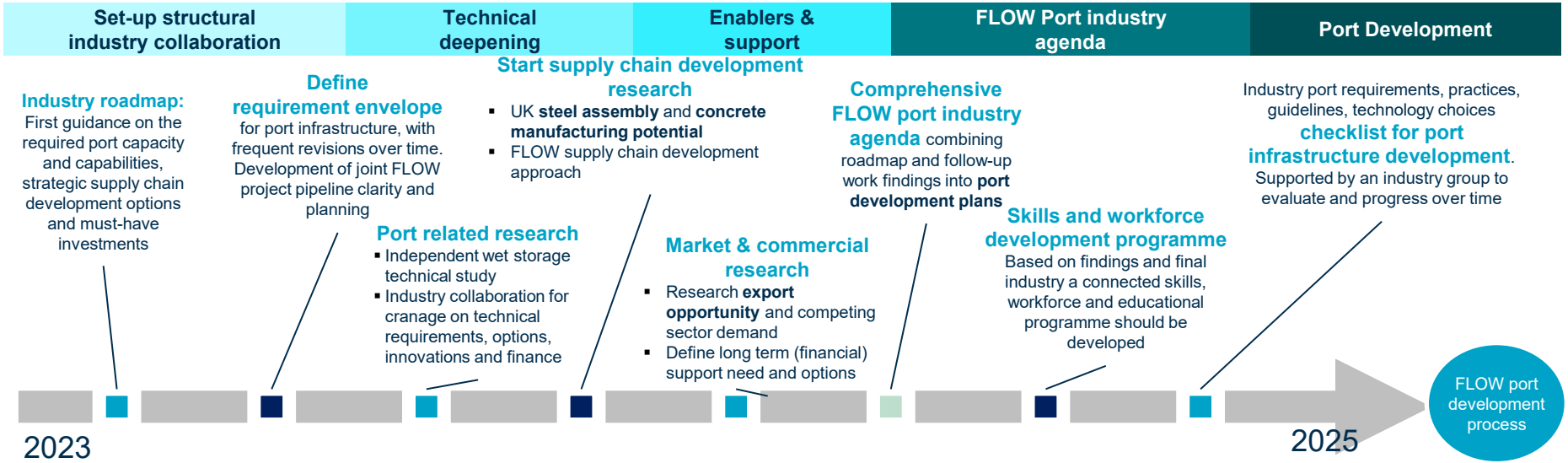


Case: RenewableUK Floating Offshore Wind Industrialisation Roadmap

The case for a national coordinated effort

This report set out a first **comprehensive view on the initial FLOW port requirements**, infrastructure and industry gaps, and suggests potential interventions, approaches and follow-up work that is required. Based on the outcomes of this report we have established suggestions for follow-up work in 2023.

These actions give further guidance on **joint industry key focus areas**, the remaining knowledge gaps that needs to be filled, and the sequence of actions to stimulate FLOW port infrastructure developments in the right direction at the right time.



Lessons learned for the supply chain, from a manufacturing, ports and vessels perspective

- Combine renewable development with industrial development
- Securing a workforce can be challenging
- Large steel floaters / structures are expected to be built outside Europe, with potential for assembly activities in European ports.

*Regional manufacturing to focus on **specialised production / assembly.** Manufacturing will become a global market.*

- Port infrastructure is available, but becomes a limited resource
- Especially around 2030 and when fixed and floating compete
- Current port model is not working
- Efficiency and cooperation, not only invest in capacity

***Ports need to collaborate, modify and expand** to deal with growing demand. At least 15MW in the upcoming years, but future-proof >20MW*

- Vessels are built but shortage of purpose-build vessels expected
- More global spread and regionalisation of vessels
- Integration of production and installation activities (cables)
- Potential for innovative installation solutions that need less ports.

Many new vessels needed to service industry. Design and building of specialized vessels and equipment offers opportunities

Korean Offshore Wind ambitions

Ambitious Targets, Near-Term Headwinds

- **National ambition:** 40.7 GW of wind energy by 2038.
- **Offshore wind target: 7.2 GW** of new offshore wind by 2030 and **22 GW** offshore wind in 2040
- **2026 Policy Shift:** Market will move to **government-led site development**, reducing developer risk.

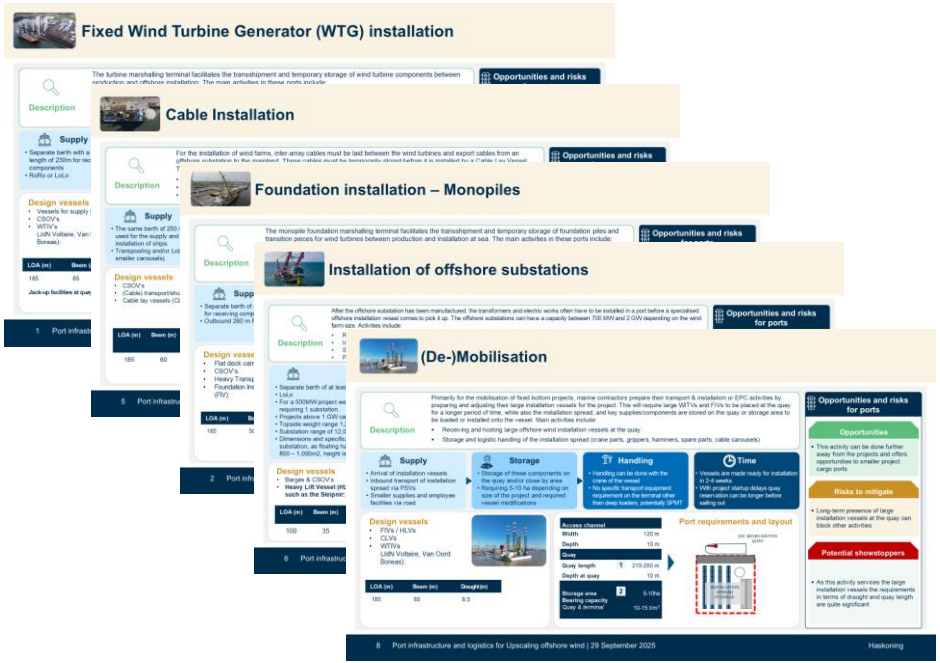
Key Challenges & Market Drivers

- **Auction Slowdown:** Q2 2025 auction awarding only 689 MW (missing its 1.5-2 GW target).
- **Floating Wind Uncertainty:** Costs remain high, concerns over low auction ceiling prices (same as fixed-bottom).
- **Local Supply Chain Focus:** Recent auction results show a clear strategic shift to prioritize **public-led projects** and **domestically produced turbines**.

Transforming to the Unique South Korean Setting

- Korea has **strong industries in shipbuilding, steel, and cabling,** it can transform this to a fully developed offshore wind supply chain.
- There is a need for **dedicated offshore wind ports development** and investments in floating offshore wind technology to improve the supply chain of offshore wind.
- How to grow **the revenue streams** for South Korean ports to support the required investments?
- Combination with other ocean technology developments can prove beneficial.

Transforming to the Unique South Korean Setting



What functions in which Korean ports?

- Marshalling and storage of turbines
- Integration and commissioning
- Assembly of steel floaters
- Manufacturing of concrete floaters
- Wet storage
- Cables, substations, anchoring, mooring lines
- O&M
- Other markets to secure revenue?

Different ports have different functions!

Main take aways

Think in decades not years
Port infrastructure is a long-term strategic asset. The quays and assembly yards built today will serve projects deploying in the **2030s and beyond**.

Collaboration Over Competition
A coordinated national / regional strategy is essential.
It beats a fragmented, competitive approach.

Learn, Leapfrog, and Lead
South Korea has a unique opportunity to learn from the North Sea journey and **"leapfrog"** directly to state-of-the-art port strategy.

With a clear vision and coordinated national investment, South Koreas ports can:

✅ Unlock a **multi-billion Euro** domestic industry.

✅ Secure the nation's **long-term energy independence**.

✅ Debottleneck the offshore wind industry

Reach out for any questions!

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Wind Port Services | Our portfolio

Business Consultancy	Port Planning	Port Design & Engineering	Logistics & Digital	Manufacturing & assembly
• Market Studies & technology developments • **Commercial strategy** & Due Diligence • **Supply-Demand** • **Competitor analysis & Tariff benchmarking** • **Revenue & financial Modelling** • Business case & investment structuring • Economic cost-benefits	• Feasibility & suitability • Port Master Planning & layouts • **Roles & Requirements** • **Capacity Assessment** • **Transport forecasting** • 3D Visualisations • Wet Storage and Requirements • Consenting services	• Technical Requirements and project definition • FEED Design • **Preliminary design,** • **Detailed design** • Construction Support • **Cost Assessments** • **Consenting services** • Project management	• Supply Chain Studies • **Transport & Installation Logistics** • **Transport Simulations** • Terminal optimisation • Port digitisation • Offshore wind development logistics optimisation • Digital twin • **Alternative Offshore Wind Infrastructure & Energy islands**	• Market studies & feasibility studies • Concept design • **Assessment of capacity and benchmarking** • **Functional design and operations** • **Launching facilities** • Foundation design • **Production process optimisation**