# Overview of Floating Offshore Wind Port Requirements

**Northwest Seaport Alliance** 

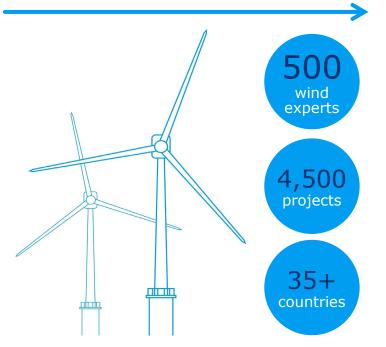
Tacoma, Washington May 24, 2023



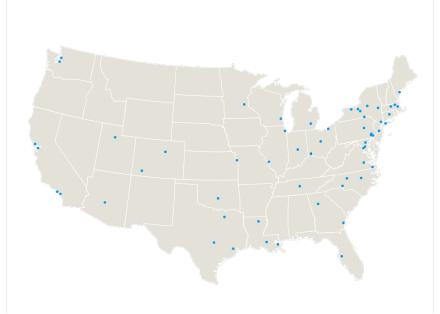


## Ramboll – World-leading Offshore Wind Consultant with Nationwide U.S. Presence

World-leading offshore wind consultant with more than 30 years experience and a powerful global work force



60 locations across United States, with 2,000+ local experts working on innovative solutions and projects



30 local plus more than 500 global colleagues offering a comprehensive range of offshore wind services covering the entire value chain



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## Ramboll's offshore wind services cover the full project lifecycle

#### **Asset Management**

- O&M Strategy
- · Lifecycle Planning & Support
- Structural Integrity Mgmt

#### **Strategic Advisory**

- Strategic Advisory
- Technical, environmental & commercial due diligence
- Bid Support
- Go-to-market strategies, private & public sector
- Supply-chain assessment

#### Civil & Structural Design

- WTG foundation design (fixed bottom and floating)
- Substation foundation & topside design
- Port design

Engineering

### Transport & Installation

- Development of T&I concepts & equipment selection
- Development of construction schedules
- · Weather Downtime analysis

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#### **Project Development Services**

- · Site identification & feasibility studies
- Layout & micrositing
- Technical concept development & selection
- Cost estimation, LCOE analysis
- · Procurement & contracting
- Package & and Project Management
- · Risk & Interface Management
- OFW-to-X

#### Wind & Site

- Planning & management of campaigns
- Wind measurements
- Wind resource assessments
- Energy yield assessments
- Metocean studies
- Geophysical & geological assessment and interpretation
- Digital ground modeling

#### **Electrical Design**

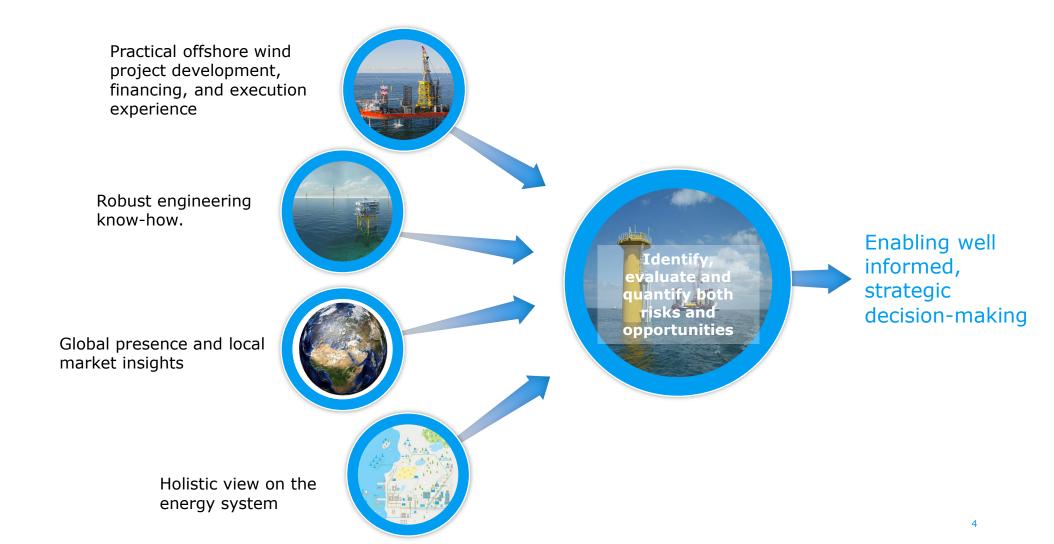
- System studies
- Grid connection concept
- LV, MV and HV grid design
- Substation design

#### **Environmental Services**

- Environmental & Social Impact Assessments
- Constraint assessments
- Visualization
- Cultural heritage studies

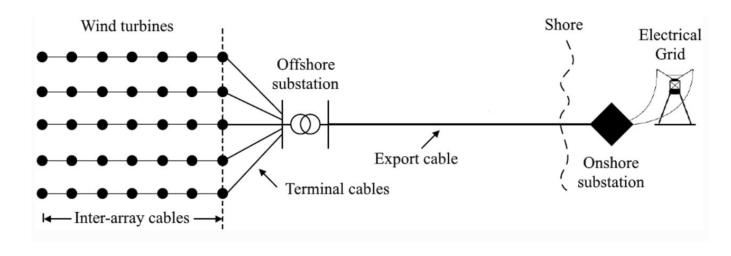
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# Ramboll provides holistic solutions to clients to enable thorough decision making

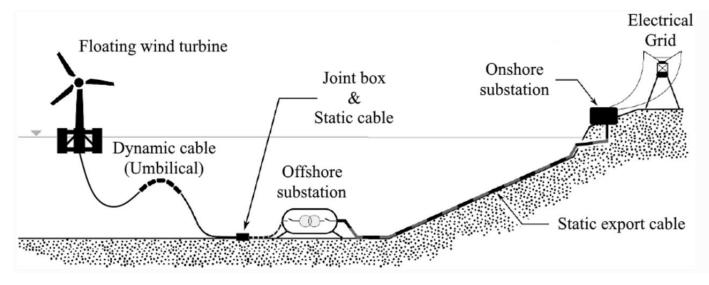


#### Overview of an Offshore Wind Project

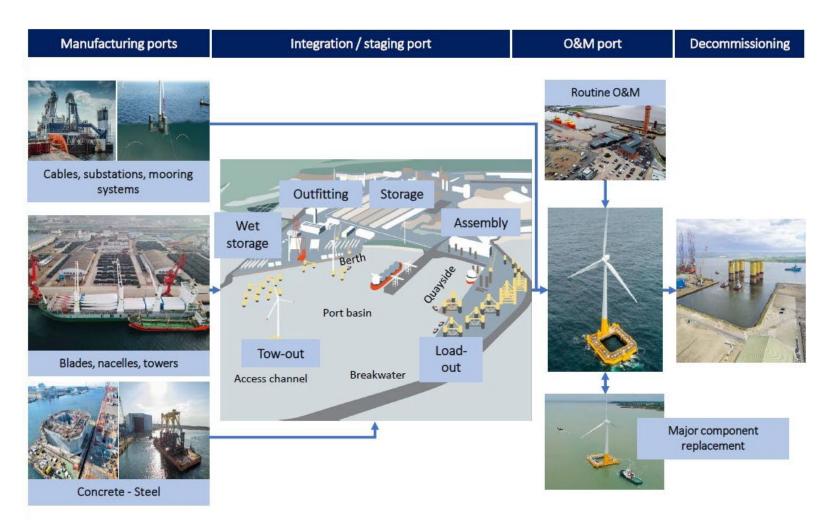
Topview



Sideview



#### Floating Offshore Wind Ports – General Requirements



Facility requirements for installation of floating offshore wind projects are somewhat different from requirements when installing fixed-bottom offshore wind projects.

Ports can offer facilities for the whole supply and installation chain, or parts of the chain.

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#### Heavy Lift Equipment

#### Launching of Floaters & Turbine Integration

- Future crane capacity requirements for floating offshore wind uses may exceed 1,000 tons
- Special heavy-lift equipment ("Ring Cranes") are needed



Source: Mammoet



Source: Mammoet

#### Ring cranes are used either:

- (a) when exceptionally large single lifts are essential, or
- (b) when the ability to repeatedly perform such lifts would accelerate a construction project sufficiently to make the use of such a specialized crane cost-effective.

#### Ring cranes combine:

- Lifting capacity (up to 5,000 tons)
- Long reach (jib lengths up to 160 m give a lifting radius of 50-70m for a 1,000 ton lift)

#### Typical ring crane lifts:

- Petrochemical plant modules
- Nuclear reactor vessels
- Bridge components
- Offshore O&G and wind equipment

## Floating Offshore Wind Ports Heavy Lift Equipment

Launching of Floaters & Turbine Integration

As an alternative, two heavy crawler cranes by tandem lift could be used instead of a single ring crane.

Two crawler cranes could be a more flexible and costefficient solution.

An example on right is Vestas' onshore installation of a V-236-15.0 MW prototype unit.



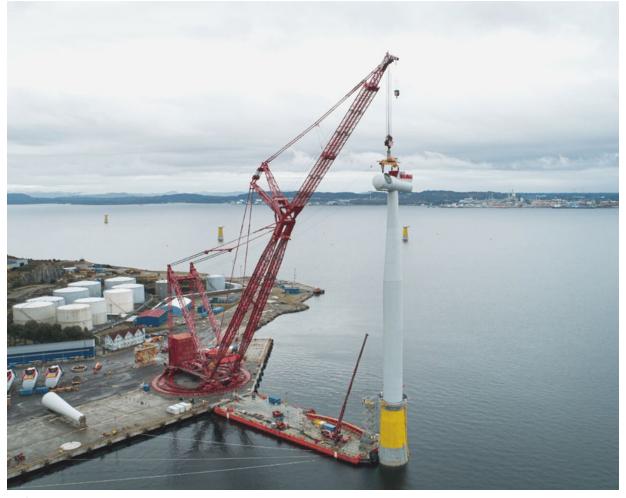
Source: Vestas

Example – WindFloat Atlantic (Principle Power)



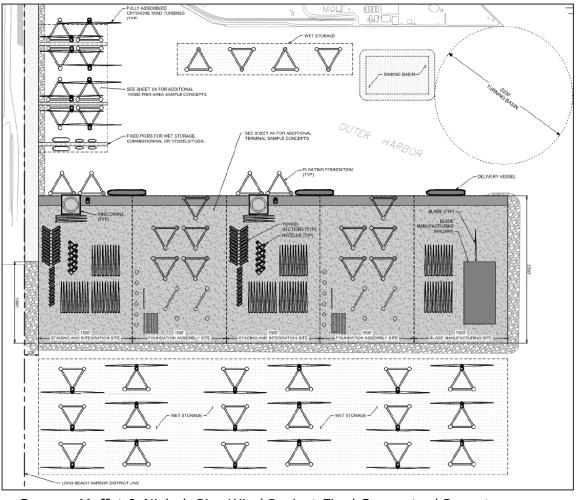
Source: NREL

Example – Hywind Tampen (Equinor)



Source: Mammoet

Example - Pier Wind (Long Beach, California)



Source: Moffat & Nichol, Pier Wind Project Final Conceptual Report

## Let's connect!

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# Bright ideas. Sustainable change.

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