Supply-chain Requirements for Efficient Assembly and Installation of Larger FOWTs

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Organized by FWE Quest Offshore

HES Company Overview

Heerema Engineering Solutions

Founded in 2019, and based in Delft, the Netherlands.

Around 40 full-time employees across a wide-range of engineering disciplines with 90% having offshore experience

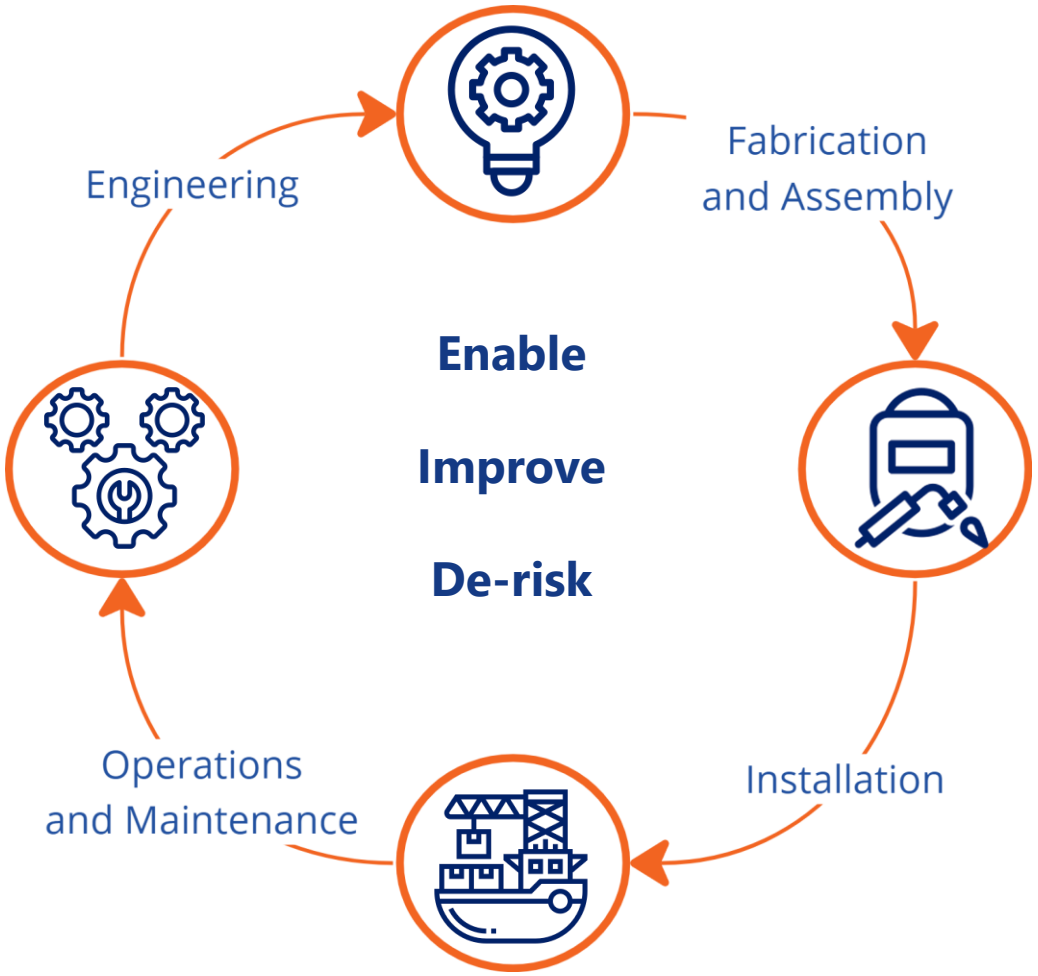
Global Clients

HES serves clients globally in all key offshore renewable markets, including offshore wind developers, transport and installation contractors, and equipment suppliers.

Offshore Renewables

We focus on the construction of offshore wind farms and have directly contributed to over 150 projects.

Floating Offshore Wind



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Solving Challenges

Matching the onshore and offshore paces

Realistic Strategy

We create realistic planning for accurate estimations

Installation and Maintenance

Enabling solutions to debottleneck

Reduce Costs

By using a pragmatic innovation approach, we can reduce costs

Floating wind route towards commercialization

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2017
30MW
Hywind Scotland

2019
25.5MW
WindFloat Atlantic

2020
48MW
Kincardine

2023
88MW
Hywind Tampen

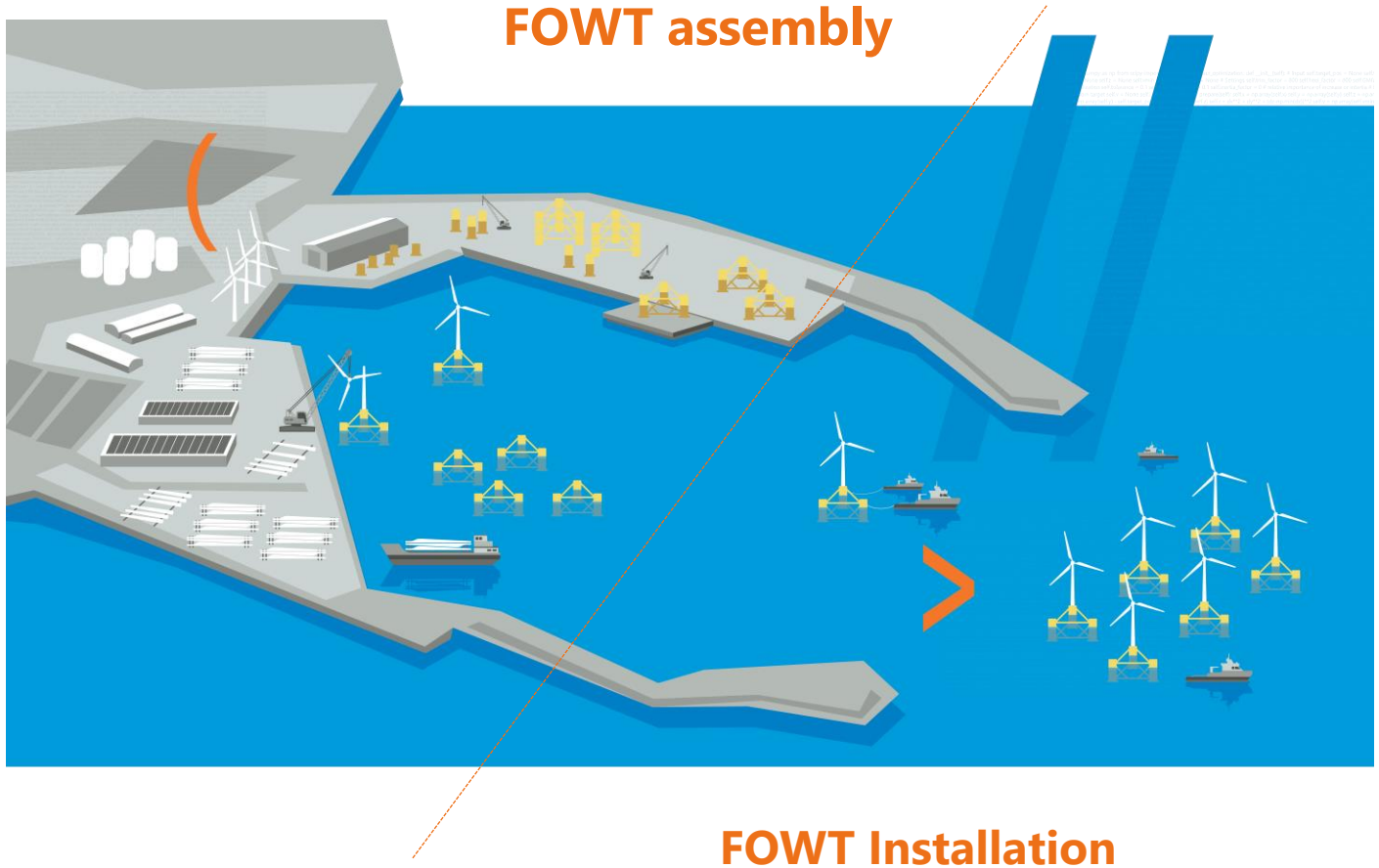
2023
25.2MW
Provence Grand Large

SCALABILITY

Larger turbines

Bigger projects

The logistical puzzle

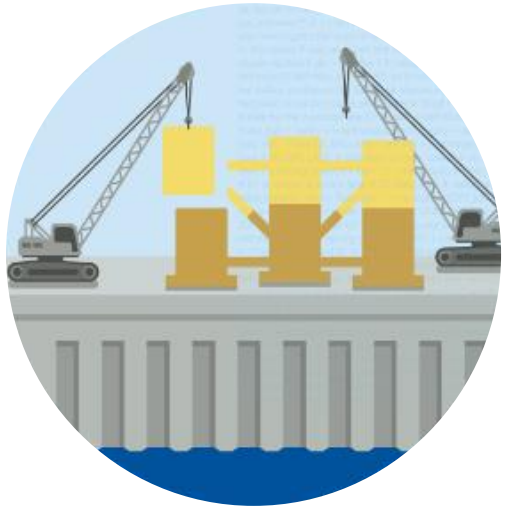


Independent but connected

and with a high impact on the supply chain

- **Requirement for industrialization**
- **Lack of suitable ports**
- **Lifting equipment to be developed**
- **Asset scarcity market**

Floater assembly



Increased assembly time

- Industrialized processes
- Additional assembly lines

Depth and strength

- Deeper quaysides – 25-30m
- Bearing capacities – 30T/m2

Increased footprint

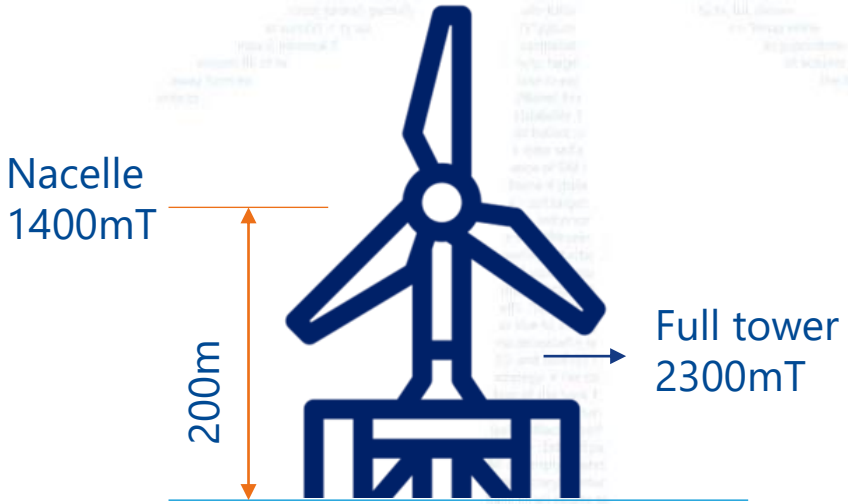
- Increased storage space 12 to 40 ha

Turbine assembly

More demanding cranes and longer integration times

Impact on WTG integration cycle time

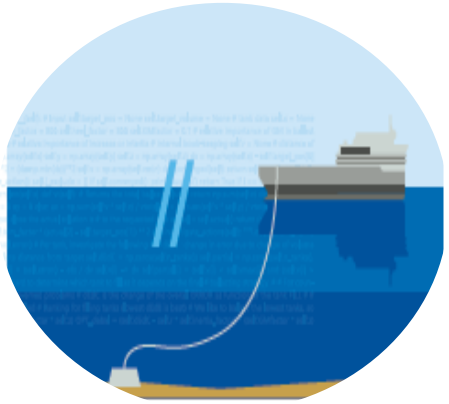
- Additional tower section lifts
- Extended commissioning durations



21MW reference

FOWT installation

Increased pressure on existing assets



A bollard pull of 200-300t is required

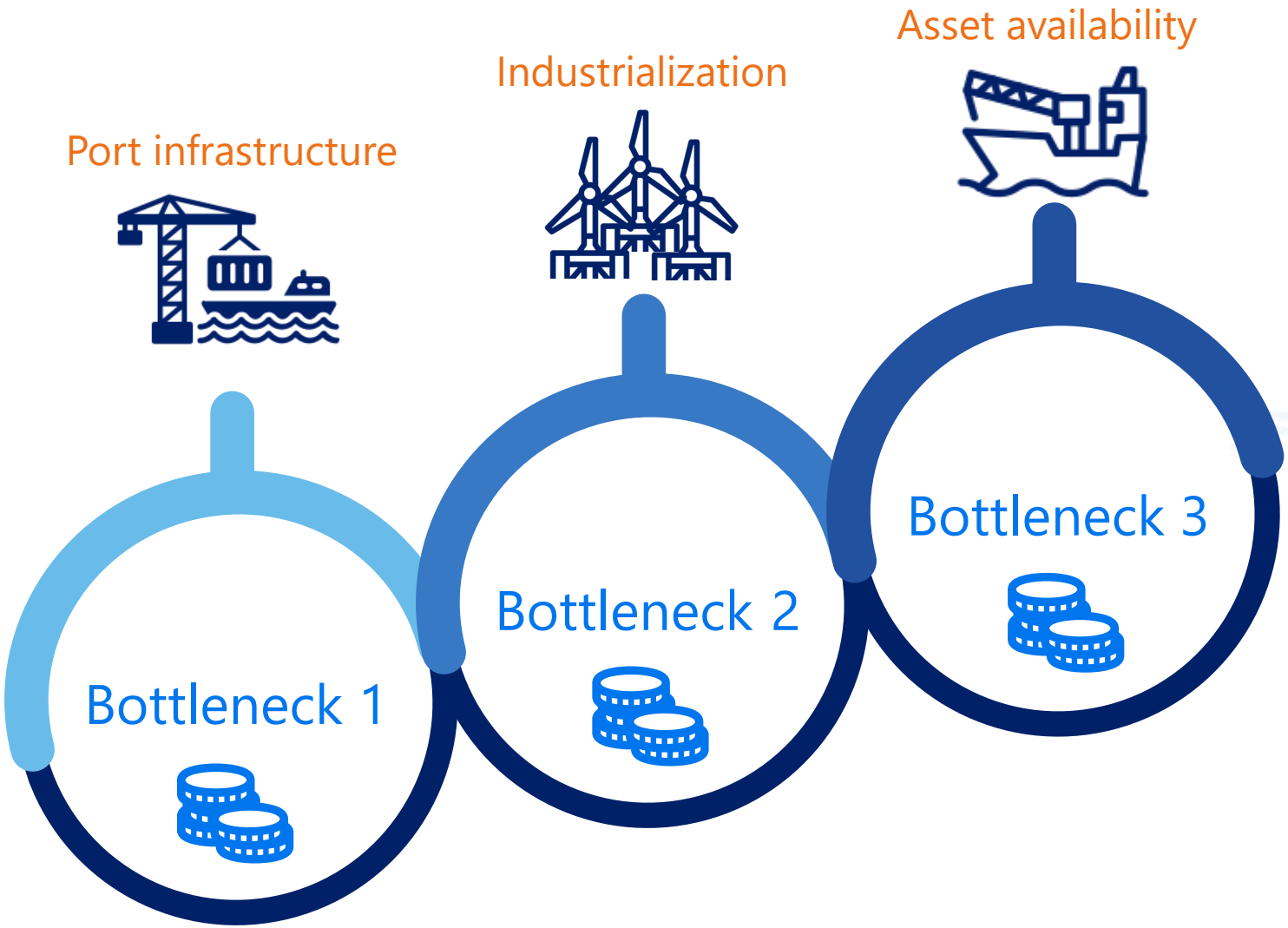
Asset availability worldwide:

- 200t BP : 136 vessels
- 300t BP : 15 vessels

Large deck space requirements

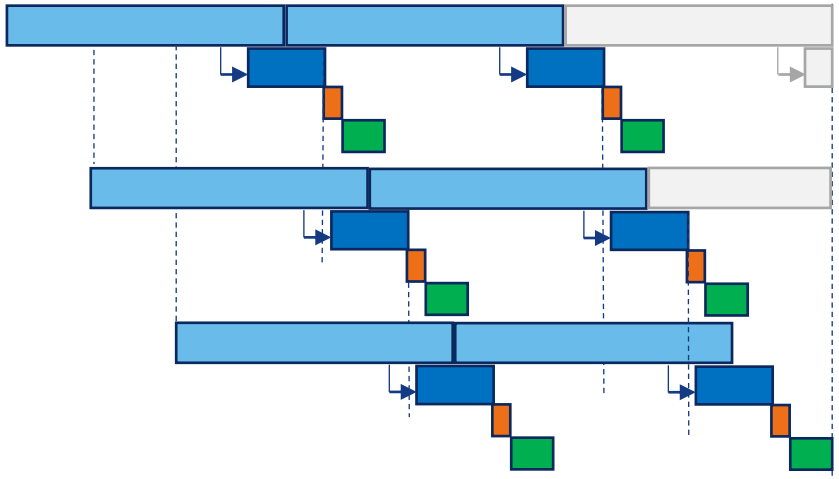
Anchor proof loading ~1000t

Will we be ready to meet the targets?



How to account for a supply chain that is not ready?

Early planning for supply chain uncertainty



Representative activity durations

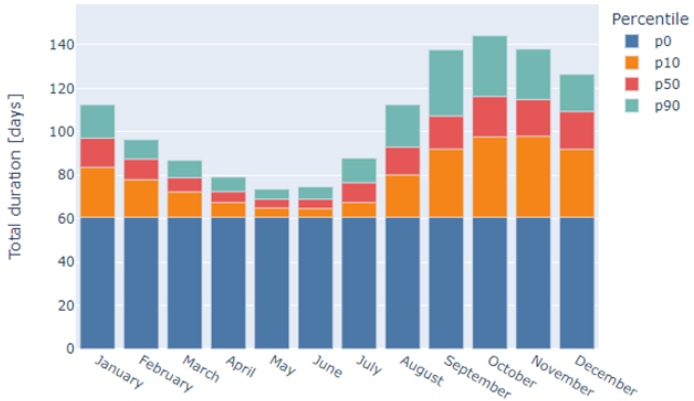
Floater assembly		~ 3 weeks
WTG integration		~ 1 week
FOWT tow-out		~ 1-3 days
FOWT hook-up		~ 5 days

Repetitive multi dependency parallel activities

→ Discrete parallel event simulation

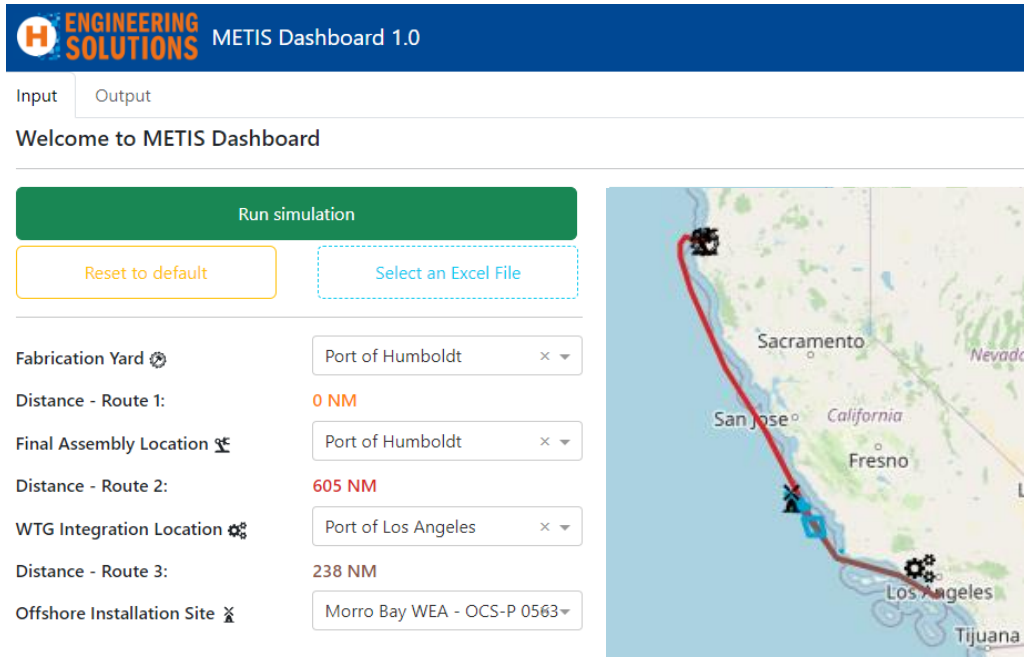
Simulating supply chain deficiencies from early stage, to mitigate risks

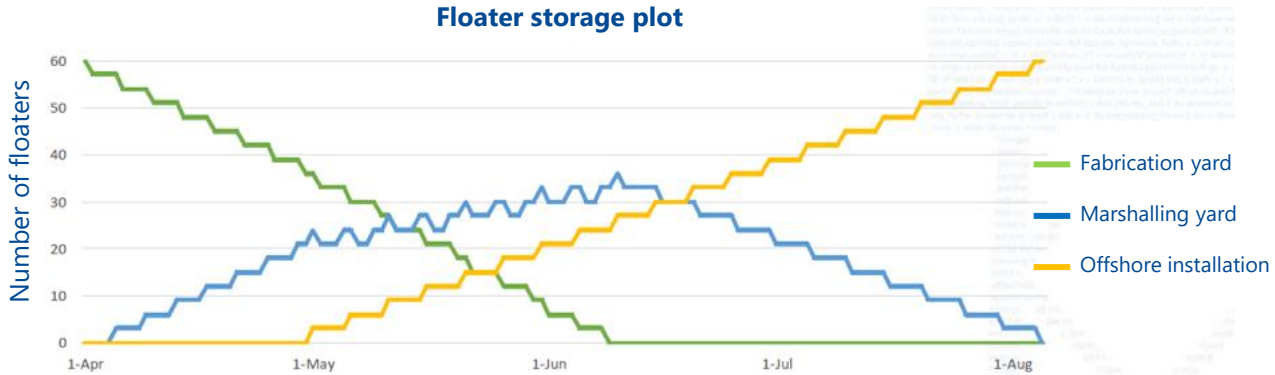
- Fabrication delay
- Limited storage space
- Insufficient quayside depth
- Limited asset capacity
- Weather

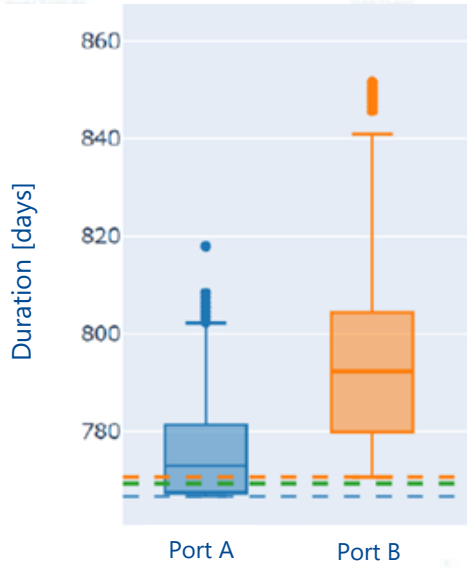


Case study – Limited storage space

The balance between space and towing distance







Floating Wind Solutions

Main takeaways

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Supply Chain

Supply chain requirements pose a challenge for commercialization.

Early Planning

Is key to enable, improve and de-risk projects, considering:

- Impact of different floater types and WTG sizes, and number of FOWTs.
- Multi scenario evaluation for different levels of port development, industrialization and asset availability.

Simulation Tools

Discrete parallel simulations are the recommended tool to understand impact of different scenarios in total project duration and costs.

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How can we support your project?

Contact

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We **enable**, **improve**, and **de-risk** projects