

Floating Wind Solutions

DELIVERY OF FLOATING STRUCTURES IN LOW INFRASTRUCTURE AREAS

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Organized by



Quest Offshore



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BOSKALIS AT A GLANCE

'WE OFFER AN
UNPARALLELED RANGE
OF ACTIVITIES WITHIN
THE OFFSHORE WIND
FARM LIFE CYCLE'

- Leading global dredging & maritime experts
- With 9,900 employees and 650 vessels
- Active in more than 90 countries across 6 continents
- Offshore wind projects from A to Z
- Floating OW track record : Transport and Installation of the Kincardine OWF.

Kincardine OWF executed by Boskalis (T&I contractor)



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BOSKALIS IN OFFSHORE WIND

'EXTENSIVE SOLUTIONS FOR THE COMPLEX
TRANSPORT AND INSTALLATION OF
FLOATING WIND FARMS'



PREPARATION



- Early contractor involvement
- Permits & FEED assistance
- Concept foundation
- Geophysical & technical survey
- UXO detection & removal
- Towage of floating foundations
- Dry-transport of foundations, substations, towers
- Supply of foundations
- Supply of cables



REALIZATION



- Installation of fixed and floating foundations
- Installation of offshore substations
- Installation of scour protection
- Installation and burial of array and export cables, offshore net connection and landfall & cable pull-in's



MAINTENANCE



- IRM for subsea cable infrastructure

END OF LIFE



- Decommissioning of foundations, substations, cables

VERSATILE AND SPECIALIZED OFFSHORE FLEET OF ASSETS & EQUIPMENT

DELIVERY OF FLOATING STRUCTURES IN LOW INFRASTRUCTURE AREAS

'WE MANAGE COMPLEXITY, MITIGATE RISKS AND SIMPLIFY EXECUTION.'

- Floating wind *now* and in the *future*
- Low infrastructure areas
- Tailormade transport solutions
- Impact transport on the supply chain
- Conclusions



FLOATING WIND *NOW* AND IN THE *FUTURE*

Demo – scale farm	Commercial scale farm (2027 onwards)
<ul style="list-style-type: none">■ 5 floaters	<ul style="list-style-type: none">■ > 50 floaters
<ul style="list-style-type: none">■ ~9.5 MW X 5 = ~50 MW■ ~164m rotor diameter■ ~110m hub height	<ul style="list-style-type: none">■ ~15 MW X 50 = ~750 MW■ ~240m rotor diameter■ ~150m hub height
<ul style="list-style-type: none">■ ~21,000 tons of steel	<ul style="list-style-type: none">■ ~210,000 tons of steel
<ul style="list-style-type: none">■ 8-10-12 m water depth required	<ul style="list-style-type: none">■ 8-10-12 m water depth required

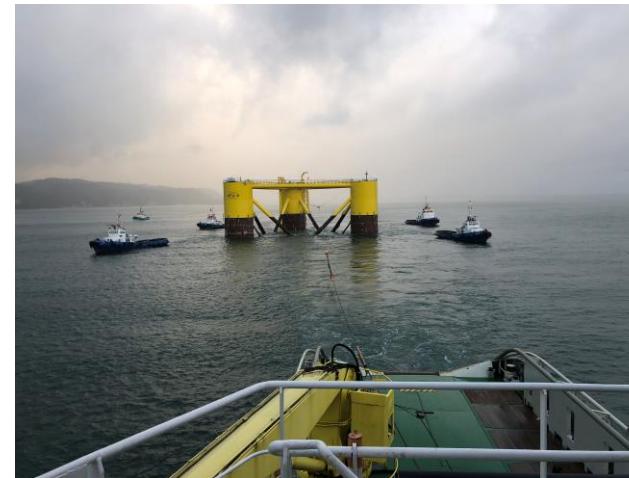
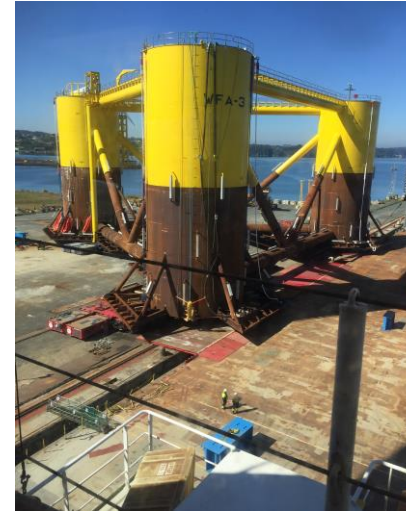
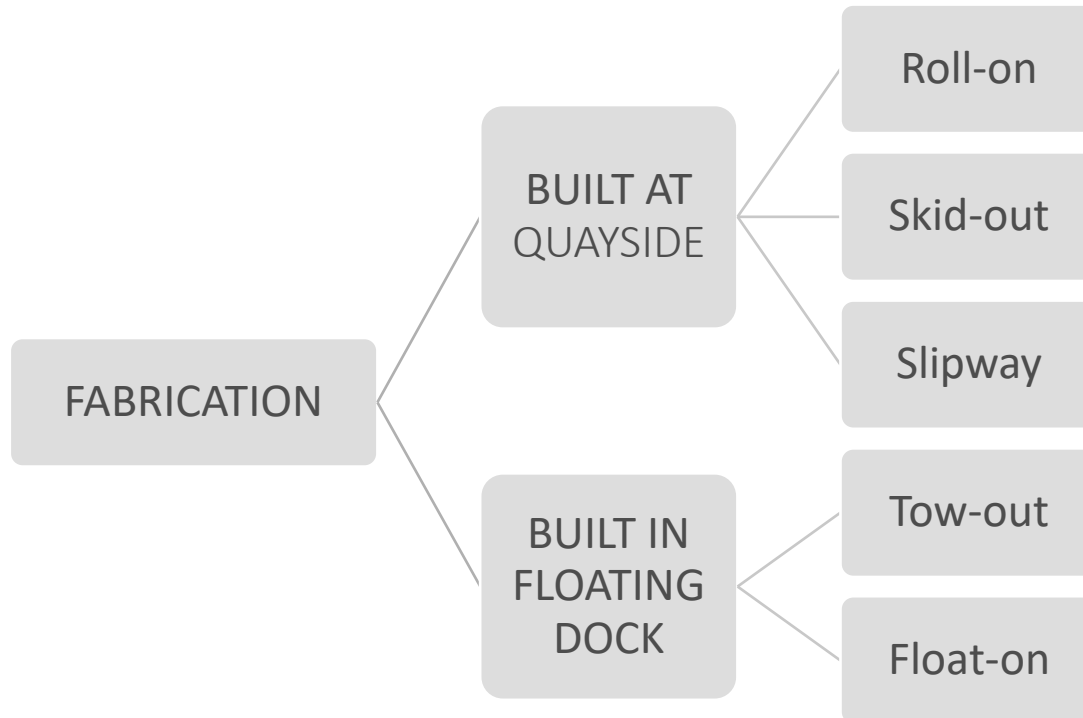


‘TOGETHER WE DE-RISK, OPTIMISE LIFETIME AND MAXIMISE ENERGY PRODUCTION’

LOW INFRASTRUCTURE AREAS

'WE MANAGE COMPLEXITY, MITIGATE RISKS AND SIMPLIFY EXECUTION.'

- *Infrastructure required at fabrication location:*
 - ✓ Significant quayside space or floating dock
 - ✓ Focuses on serial production and serial delivery
 - ✓ Smooth transition from yard to transport vessel



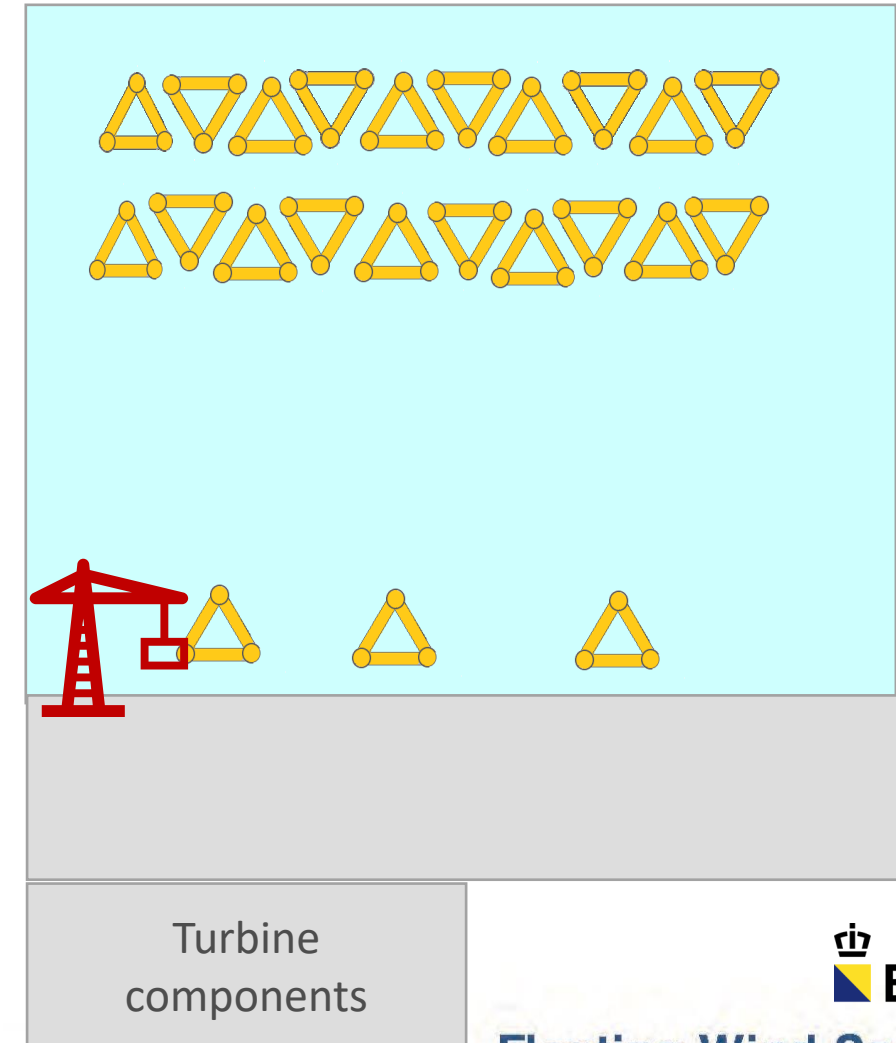
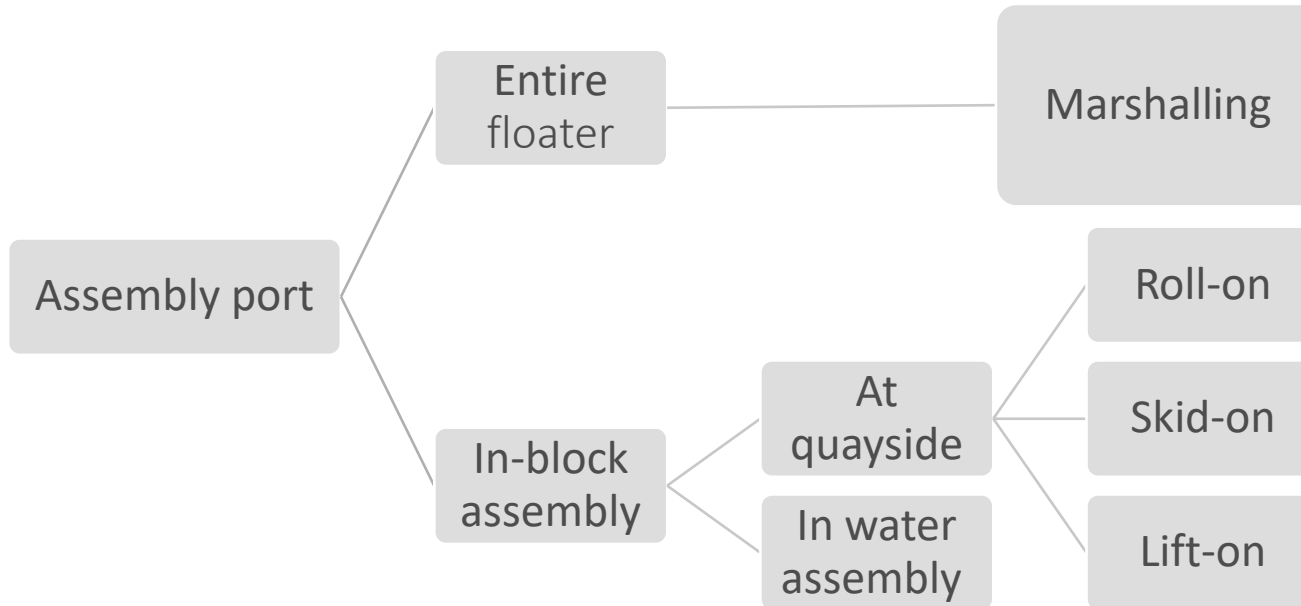
 **Boskalis**

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LOW INFRASTRUCTURE AREAS

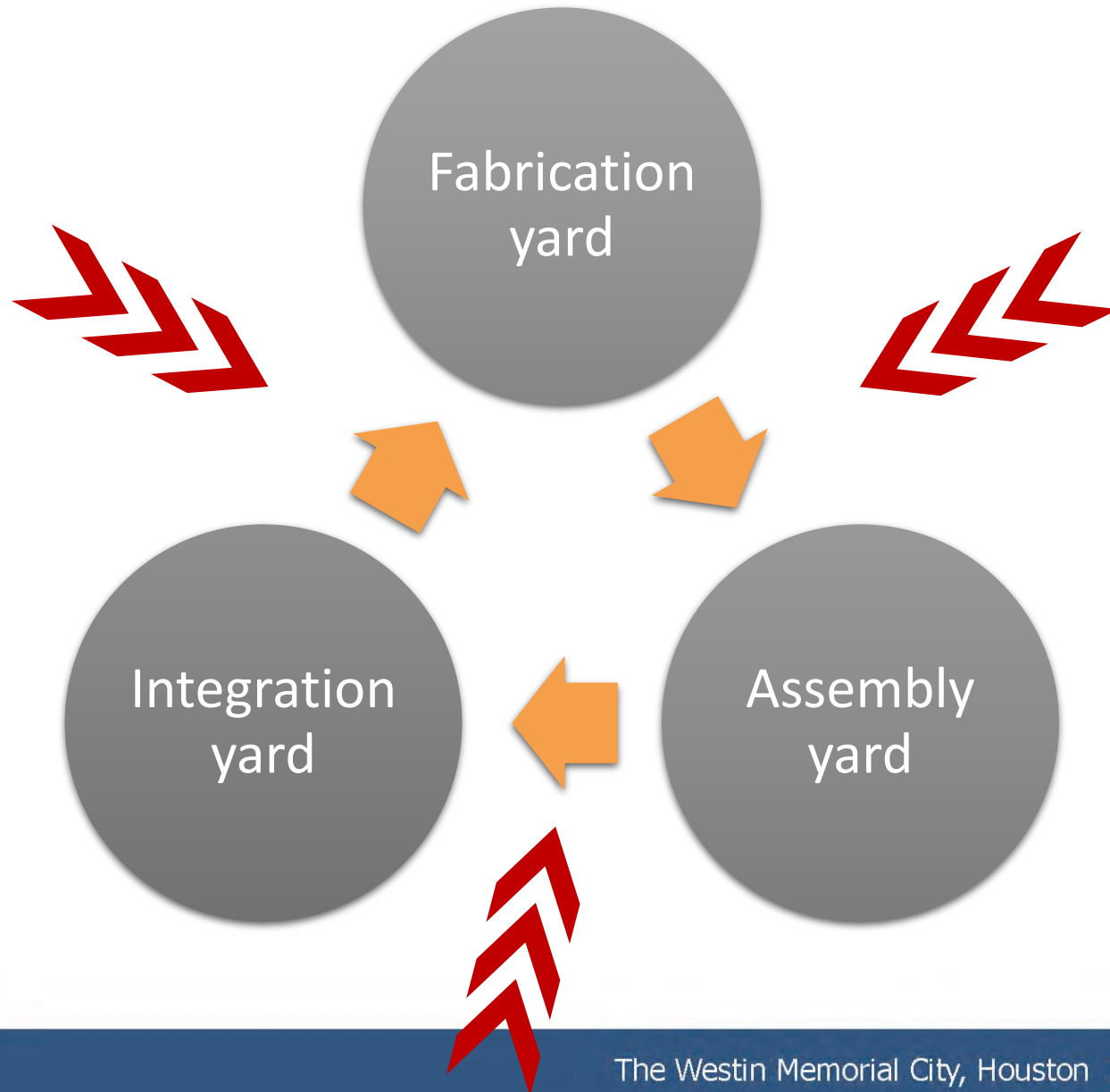
'WE MANAGE COMPLEXITY, MITIGATE RISKS AND SIMPLIFY EXECUTION.'

- *Infrastructure required at assembly, integration yard:*
 - ✓ Entire floater – turbine integration
 - ✓ Partial blocks - assembly



TAILORMADE TRANSPORT SOLUTIONS

'WE MANAGE COMPLEXITY, MITIGATE RISKS AND SIMPLIFY EXECUTION.'

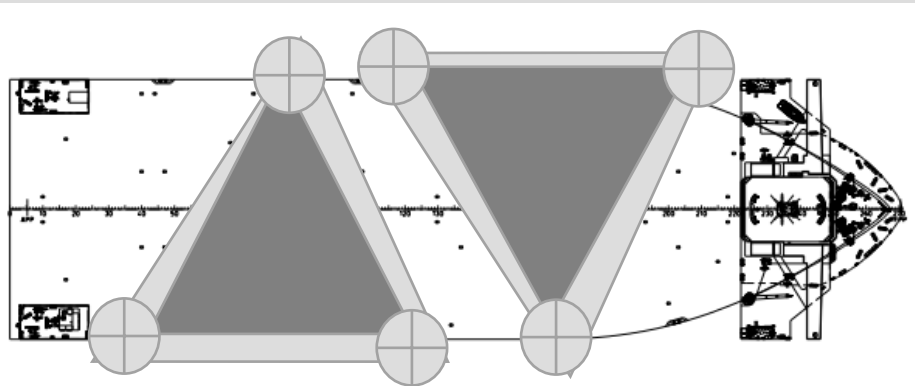


Any delay caused in this process has a knock-on effect on the following process
FLUID TRANSPORT IS CRUCIAL AND WILL MAKE A DIFFERENCE

TAILORMADE TRANSPORT SOLUTIONS

'WE MANAGE COMPLEXITY, MITIGATE RISKS AND SIMPLIFY EXECUTION.'

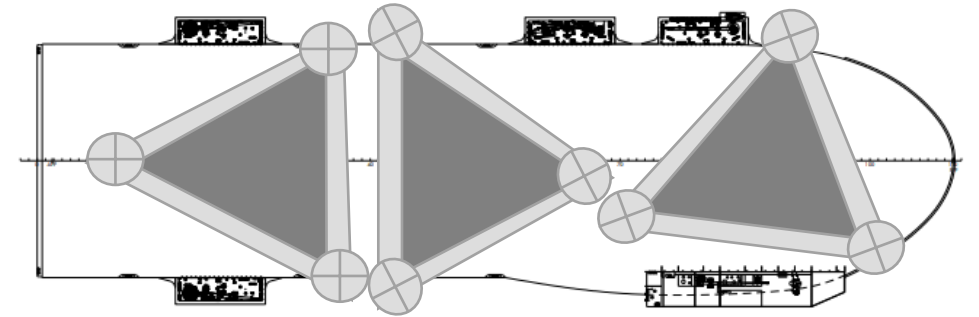
- Account for transport scope in design phase / FEED stage
- Optimize design for floater and block assembly
- Consider to include transport of turbine element



2 floaters ~8.000t – WHITE MARLIN - TYPE



91,000t P70 FPSO



3 floaters ~12.000t – BOKA VANGUARD - TYPE

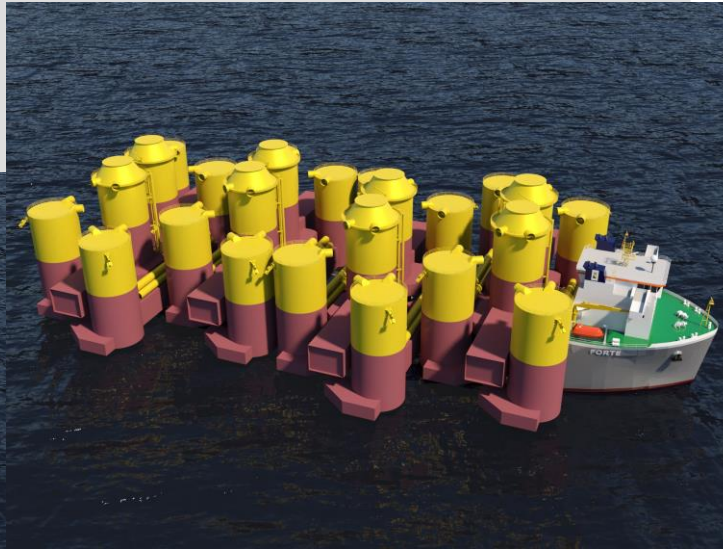
TAILORMADE TRANSPORT SOLUTIONS

'WE MANAGE COMPLEXITY, MITIGATE RISKS AND SIMPLIFY EXECUTION.'

- Transportation comparison of different designs on a standard size transport vessel
- 4 floaters instead of 2 per transport reduces transport cost in half



6 @ 10 MW (transport packs) for T-floater together with tower, nacelle and turbines



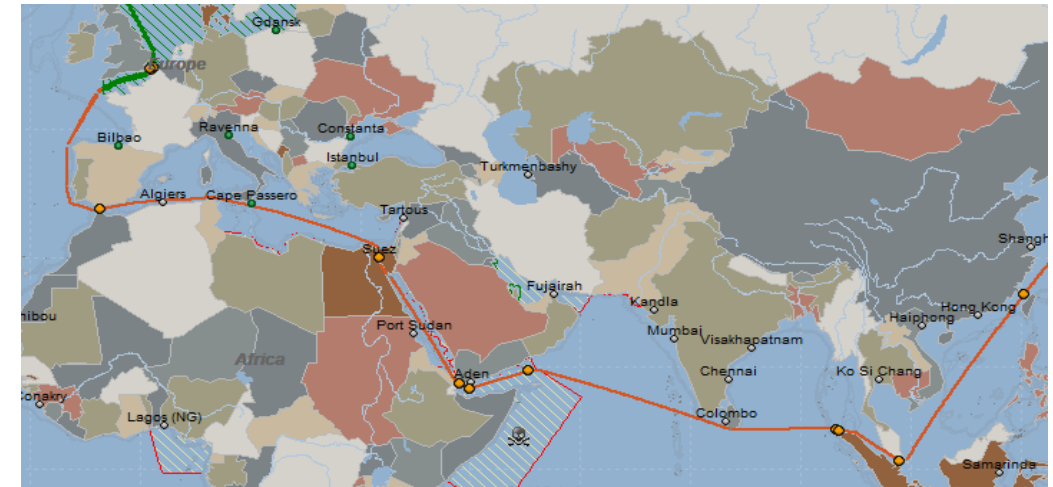
8 @ 15 MW (transport packs) for T-floater



4 @ 15MW complete T-floate hulls

TRANSPORTATION IMPACT ON THE SUPPLY CHAIN

- The biggest fabrication yards are located in
 - *1st Asia / 2nd UAE / 3rd EU*
 - Average Transport durations at 12 knots
 - Asia to Europe – 88 days roundtrip including loading and unloading (via Suez) => 4 round trips a year
 - Asia to US West Coast – 47 days roundtrip including loading and unloading => 7 round trips a year
 - Europe to US West Coast – 60 days roundtrip including loading and unloading (via Panama) => 6 round trips a year



'EXTENSIVE SOLUTIONS FOR THE COMPLEX
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CONCLUSIONS

- Scaling up infrastructure requires commitment of the government, authorities, developers and supply chain
- Transport will continue to play an important role in the coming years for the delivery of floating wind foundations
- Consider transport in floater design
- Optimize transport to ensure minimum impact on supply chain



‘TOGETHER WE DE-RISK, OPTIMISE LIFETIME AND MAXIMISE ENERGY PRODUCTION’



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THANK YOU

*‘TOGETHER WE CREATE
NEW HORIZONS IN
FLOATING WIND’*



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