Maximising The Floating Opportunity For Ports

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AqualisBraemar LOC Group

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Organized by FWE Quest Offshore

FWS

The Marriott Marquis, Houston 1-3 March 2022

The Opportunity

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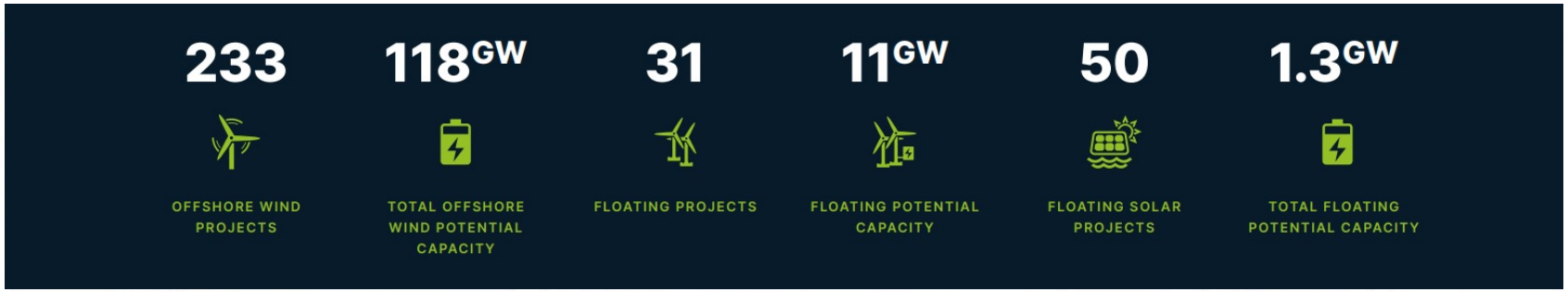
AqualisBraemar LOC Group

ABL Group is a leading **global independent energy and marine consultant** working in energy and oceans to de-risk and drive the transition across the **renewables**, **maritime** and **oil and gas** sectors, offering our customers the deepest pool of world-class expertise across marine, engineering and adjusting disciplines from more than 300 locations worldwide.



- Above figures from **end of Q1 2021**
- In **2021** in total we worked on **99 new offshore wind farms**, representing **69GW** of capacity
- The lead technical consultant in offshore fixed & floating wind

OWC….The Offshore Wind Consultants.

OWC
AqualisBraemar LOC Group

OWC (Offshore Wind Consultants)
Project development services, owner's engineering and technical due diligence to the offshore renewables industry.

LONGITUDE
AqualisBraemar LOC Group

Longitude Engineering
Independent engineering, design and analysis services for the marine, renewables, oil and gas, defence and offshore infrastructure industries.

OSD-IMT
Part of Longitude

OSD-IMT
Specialist ship design house; new build design and offshore support

INNOSEA
AqualisBraemar LOC Group

INNOSEA
Engineering advisory, verification, research and development, concept development and consultancy for marine renewable energy.

EAST POINT GEO
AqualisBraemar LOC Group

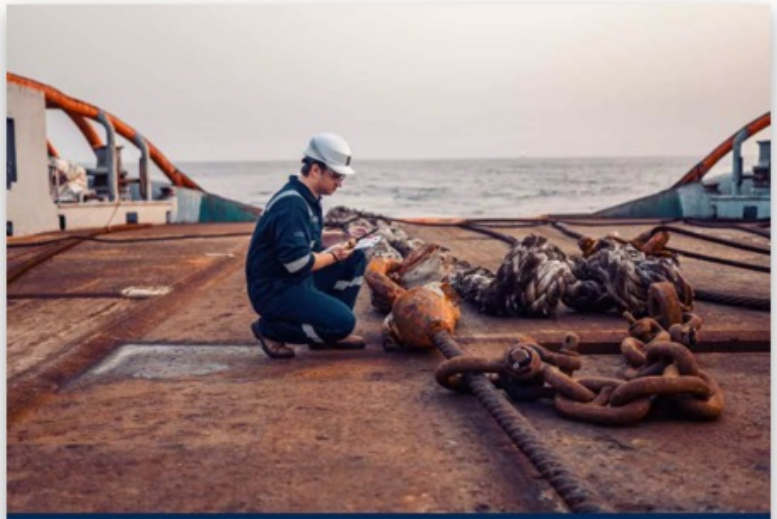
East Point Geo
Expert Geoconsulting organization supporting all sectors; providing efficient client-focused deliverables including data assurance, ground models and quantitative risk assessment.

AqualisBraemar LOC Group

Service Portfolio

CONSULTING & ENGINEERING

- Technical due diligence
- Owner's engineering & construction monitoring
- Geotechnical & geophysical
- HSEQ & risk
- Marine operations
- Marine design, upgrade & conversion
- Site investigations
- Clean shipping
- Engineering & design
- Jack-up & wind far installation vessels
- Advance analysis & simulation
- Digital services
- Cable engineering
- Marine consulting
- Client Reps & secondments



LOSS PREVENTION

Marine surveys, inspections & audits

- Vessel and marine assurance
- Rig inspections and assurance
- Industrial standard audit
- Vessel condition survey
- Pre-purchase survey

Marine warranty survey

- Renewables
- Oil & gas
- Operations
- Project cargo
- Rig moving
- Decommissioning

LOSS MANAGEMENT

Marine casualty support & management

- Salvage & wreck removal
- Hull & machinery (H&M) claims
- P&I claims

Loss adjusting & claims management

Expert witness & litigation

- Energy expert witness & litigation
- Marine expert witness & litigations
- Marine casualty investigations

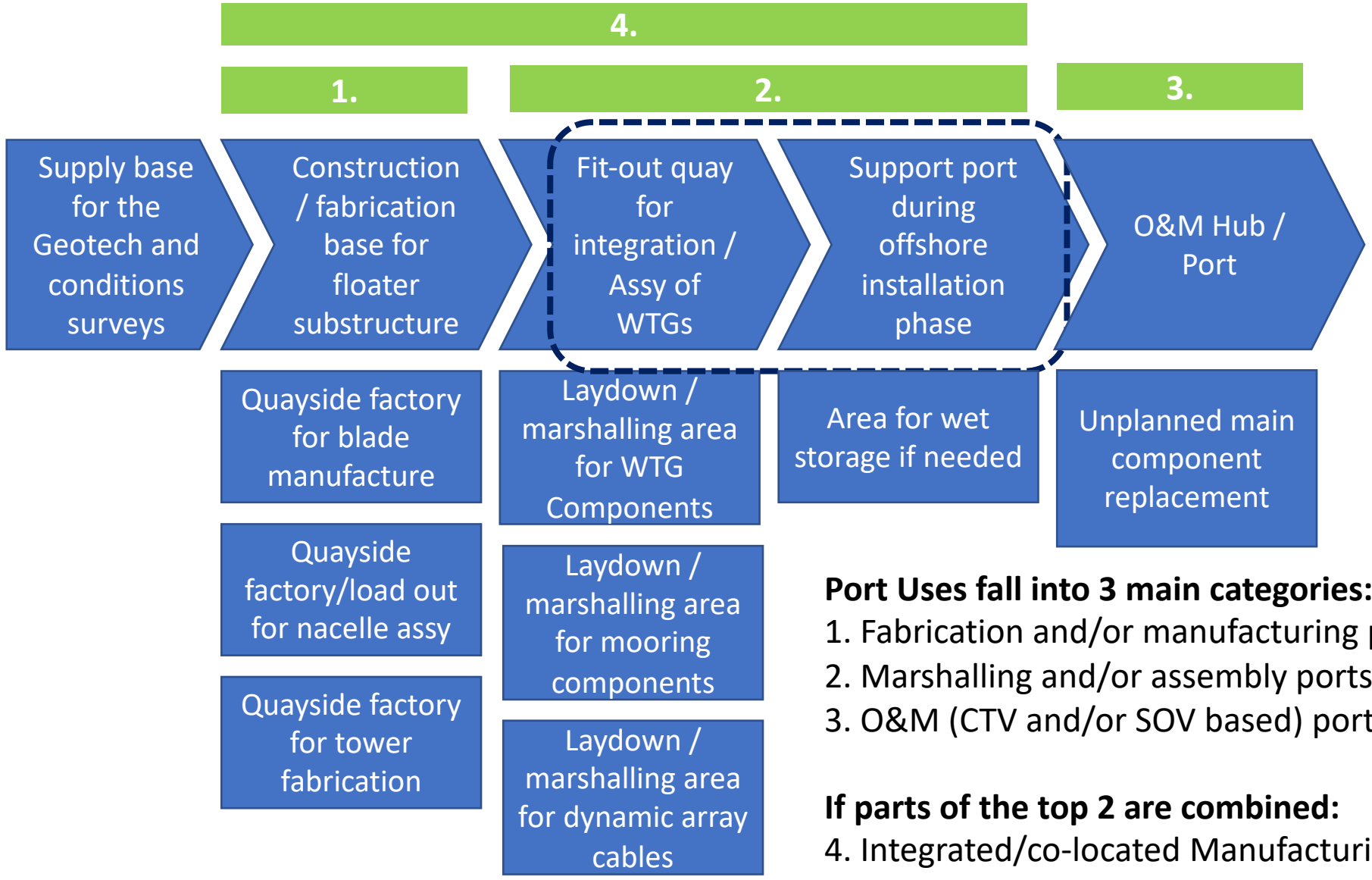
The Anatomy Of A Floating Wind Port

The Scottish Perspective

- 15GW of leases out of 25GW awarded in Jan 2022
- First floating projects 'possible' 1st generation 2029-2031
- No hub or 'super-ports'
- Adequate O&M capacity / capability
- Limited capacity for manufacturing / fabrication and marshalling / assy
  - No existing facilities with 20-25m water depth quays
- All Ports are free market – so requires co-ordination

(Not me or 100% representative)

Port Needs For A Floating Wind Project



Port Uses fall into 3 main categories:

1. Fabrication and/or manufacturing ports
2. Marshalling and/or assembly ports
3. O&M (CTV and/or SOV based) ports

If parts of the top 2 are combined:

4. Integrated/co-located Manufacturing Port/Hub

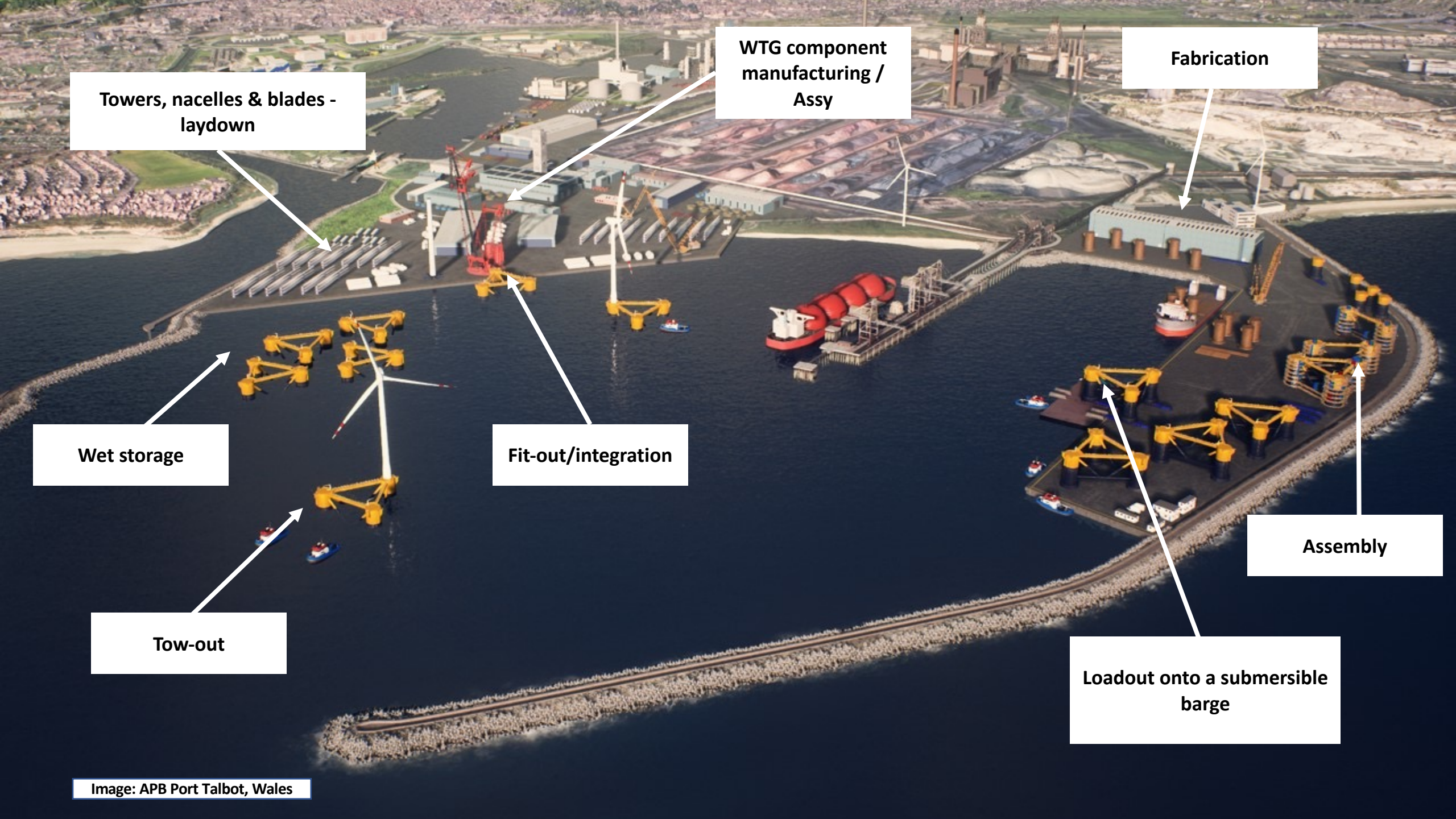


Image: APB Port Talbot, Wales

Example Port Demands/Requirements

- For a 300MW project
- 6 units in port process at any one time
- Steel
  - Skilled labor – eg welders
- Concrete
  - Brings high local content opportunities
    - Aggregates & cement
    - Rebar, form work
    - Pre-tensioning
  - Semi-skilled labor

	Semi-sub	Barge	Spar
Tower manufacture	25hec	25hec	25hec
Nacelle manufacture	25hec	15hec	15hec
Blade manufacture	25hec	32hec	32hec
Channel width	140m	110m	90m
Quay length	120m	60m	80m
Water depth	12-14m	10-12m	90m
Dynamic cable storage	25hec	25hec	25hec
Export cable storage	25hec	25hec	25hec
Suction piles	15hec	15hec	15hec
Drag anchors	10hec	10hec	10hec
Chains only	12hec	12hec	12hec
Clump weights	9hec	9hec	9hec
Shipyard	6hec	4hec	5hec
Area fit out	6hec	6hec	6hec
Fit out quay	10-20 t/m2	10-20 t/m2	10-20 t/m2

Source: AP Crowle / PR Theis, IMechE 2022 / OWC

Challenges

Different Floaters = Different Needs/Requirements

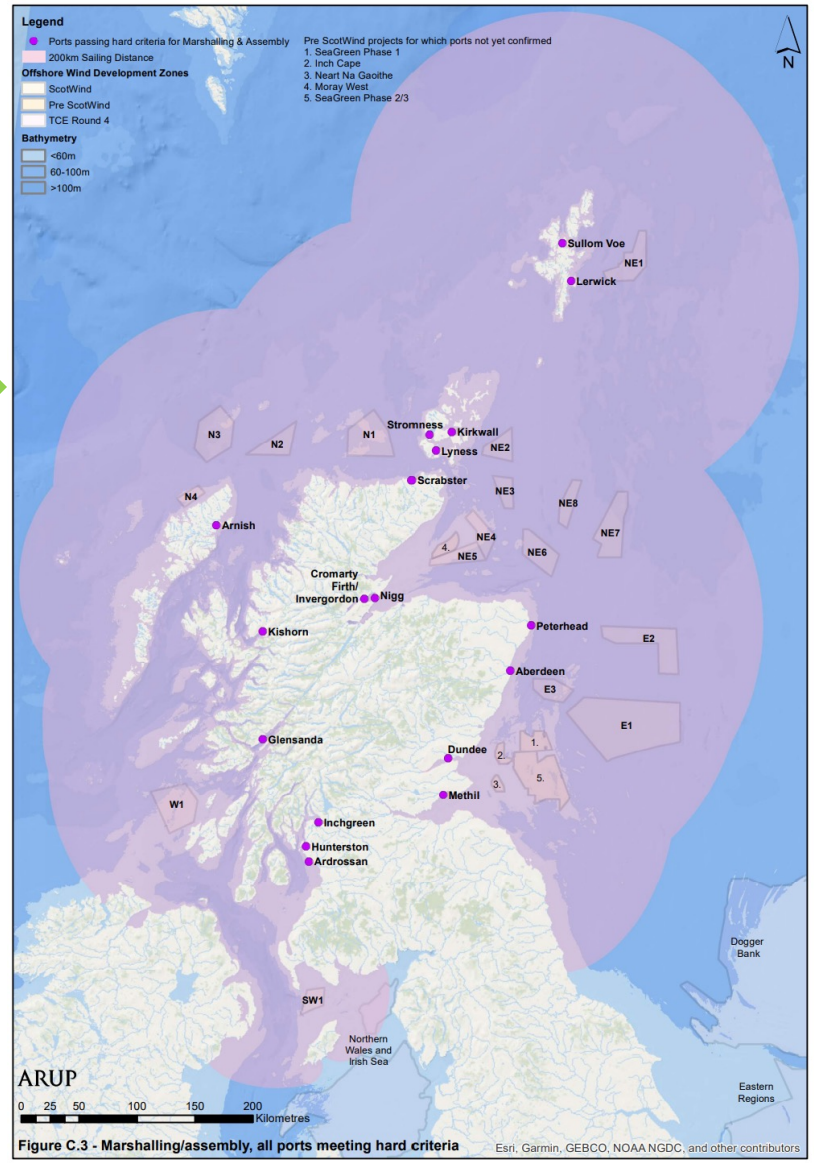
Semi-sub	Barge	Spar	TLP

• Draught 10-12m (steel)
• Draught 12-15m (concrete)
• WTG on corner/side to optimise onshore crane capacity
• Drydock float out may need temp buoyancy
• 2,500-5,000 tonnes
	• Draught 6-8m (steel)
	• Draught 10-12m (concrete)
	• Suitable for shallow draft ports
	• Assy of structure performed onshore
	• 2,000-4,000 tonnes
		• Draught 70-80m (steel)
		• Draught 80-90m (concrete)
		• Complex assy & T&I – needs a Fjord!
		• Large SSCV needed to instal WTG in sheltered deep water location
		• 2,500-5,000 tonnes, pre-ballasted
			• Draught 10-12m (steel)
			• Negative to low stability making assy complex, some options:
			  • Temp buoyancy
			  • Build offshore using crane vessel with active heave compensation

- Currently projects decide floater early, then look at port infrastructure
- …

Location, Location, Location

- Distance sensitivity from the project (s)
- Distance is a variable risk factor for offshore wind projects - delays
- Marshalling/assy ports with 108nm zones
- O&M sensitivities
  - CTV (41nm)
  - SOV (81nm)
- Floating brings more uncertainty than fixed
  - Low cost (tug or anchor hander) vessels could reduce costs and so distance sensitivity
  - Weather risk – floater +WTG before they get to their perm station



Source: 'Ports for offshore wind', CES. Sept 2020

Logistics

- Lack of heavy lift cranes
  - Lifting radius can be >55m for 14MW WTG
  - Nacelle weights c 1,000t
  - Hub heights <170m expected
- Quayside loads
  - Storage & transport of WTG components - 5 t/m2
  - Storage of large floater components, towers & nacelles - 10 t/m^2
  - Tower build prior to integration – 20 t/m^2
  - Heavy crane integration berth - 15-25 t/m^2

V164-9.5MW WTG being installed on a WindFloat

Getting Fit For Purpose

The Scotland Experience – 'The Market'

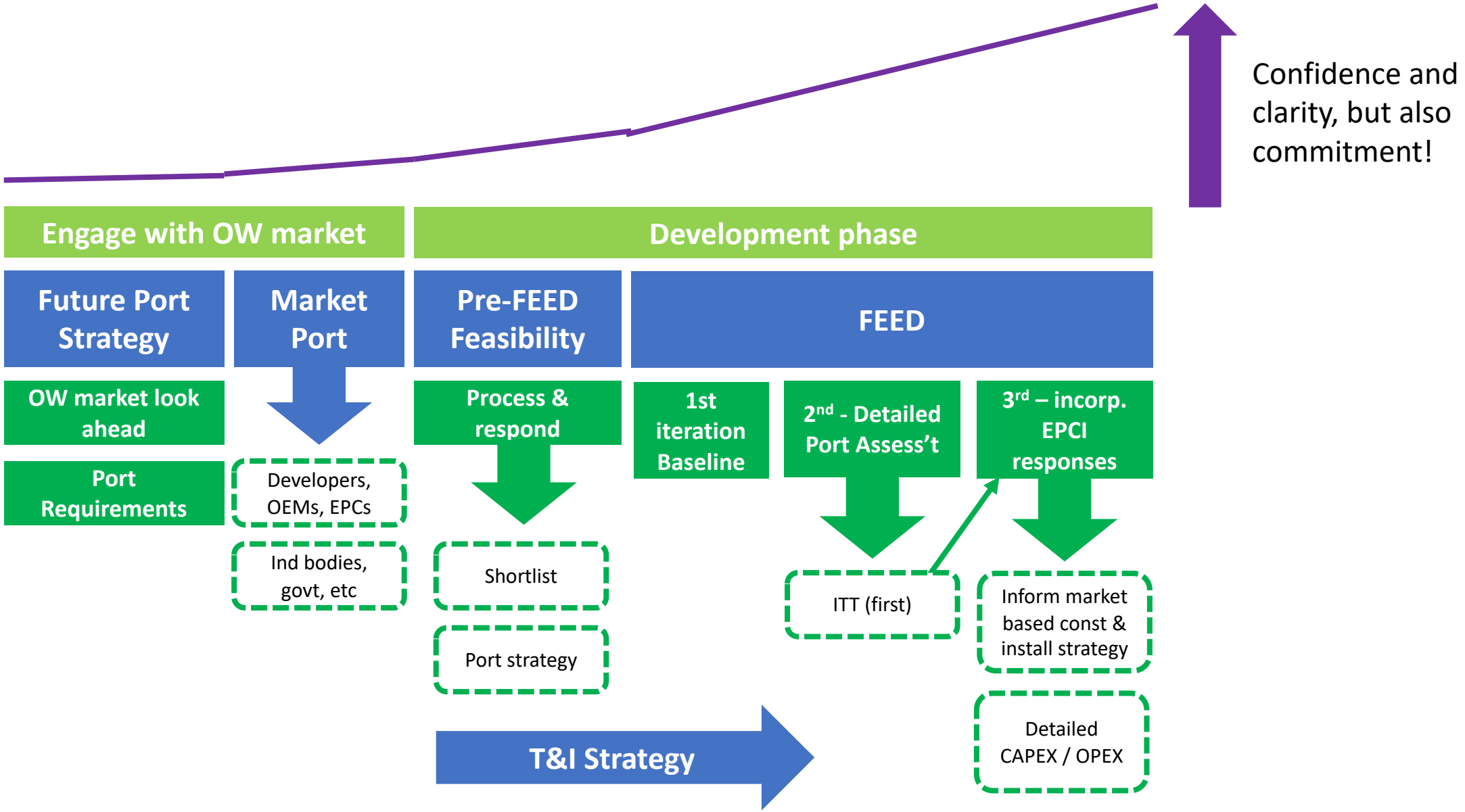
- Port expansion/upgrade decisions based on business confidence in future demand
  - Risks continual under-supply in suitable port capacity due to the lead-time between demand forecast, financing and build
- Lack of readiness:
  - Restricting optimum methodologies used by developers / OEMs / EPCs = increasing costs and risks
  - Impact commerciality of market (worse), the competitiveness of the port (best)
- Ports not collaborating will make big land grabs
- Risks incl., co-situating O&M operations within ports where 'large' offshore wind port functions could otherwise be supported could be less than optimal, so ports need to decide it's offering carefully

The Scotland Port Solution

- Increase large port capacity suitable for marshalling / assy activities
  - Increase longer-term market confidence
  - Encourage pooling of funds from multiple projects to support port enhancements, possibly clustering, regional govt. support / co-ordination and larger annual builds
  - A major 'hub' would be most cost-effective depending on project development proximity
- Strategic port planning
  - Timescales inadequate for 'business-as-usual' market iteration approach
  - Public and private partnership
  - Regular publication of demand projections with uncertainties and risks
  - Cross-industry involvement in the generation of a standardised guidance on infrastructure requirements for offshore wind for the ports industry, warning…floating brings more uncertainty than fixed
- The ideal port has a large industrial hinterland bringing skilled workforces and <Tier 2 supply chain companies
  - Co-ordination with other industrial / commercial bodies / local govt

If You Are A Port…

Engaging During Development



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Conclusion

- Have a clear port strategy, but one that is incorporates the wider port infrastructure available
  - Look at your current state
  - Carefully understand the needs / requirements and timescales
  - Develop your strategy to maximise your port and area
  - Do you need to work in clusters?
- Understand the floating technologies and the project pipelines
- Engage with developers, help them in their development process
- Obtain the necessary confidence to make port expansion / modification decisions

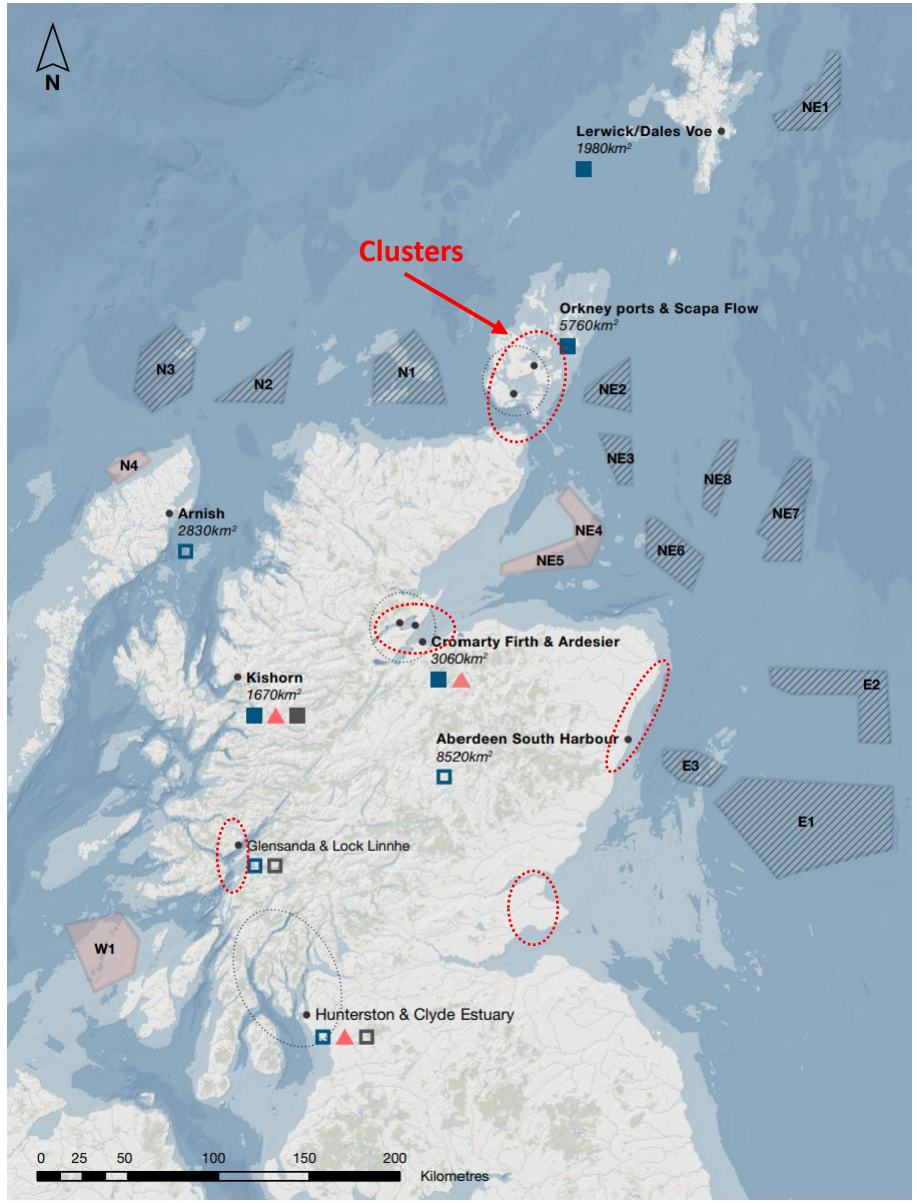

Figure D.1: Floating offshore wind assembly - locations with high potential

Thank You

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