Dynamic cables for FOW: T&I and T2P

Dynamic Cables Subgroup workshop

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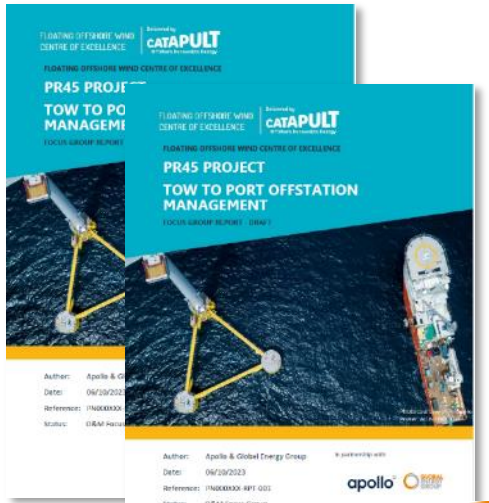
QMF66

Two benchmark reports in preparation

Gigawatt scale T&I for FOW moorings & cables

- Storyboards for marine operations
- Cost and schedule estimates
- Base case and sensitivity configurations
- Equipment preservation post disconnection
- Port requirements and constraints
- Opportunities for future technology

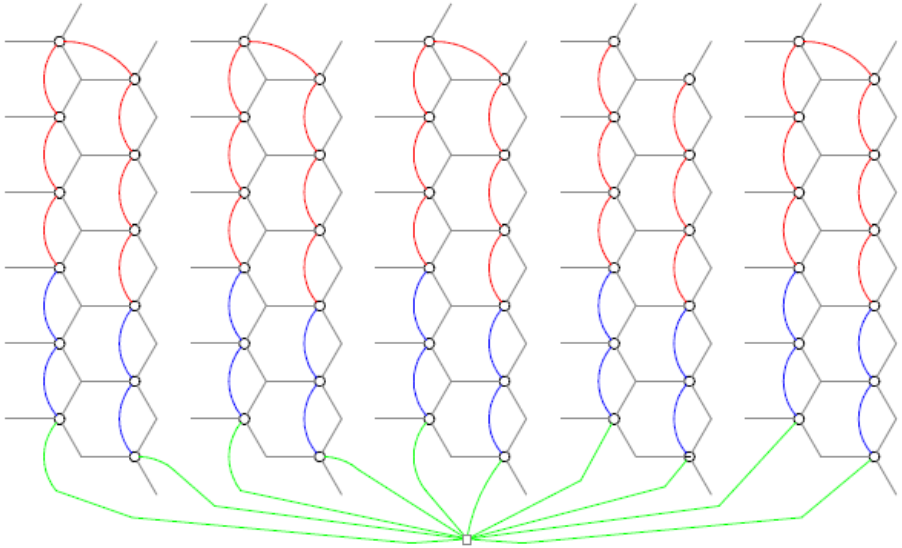
CATAPULT Offshore Renewable Energy



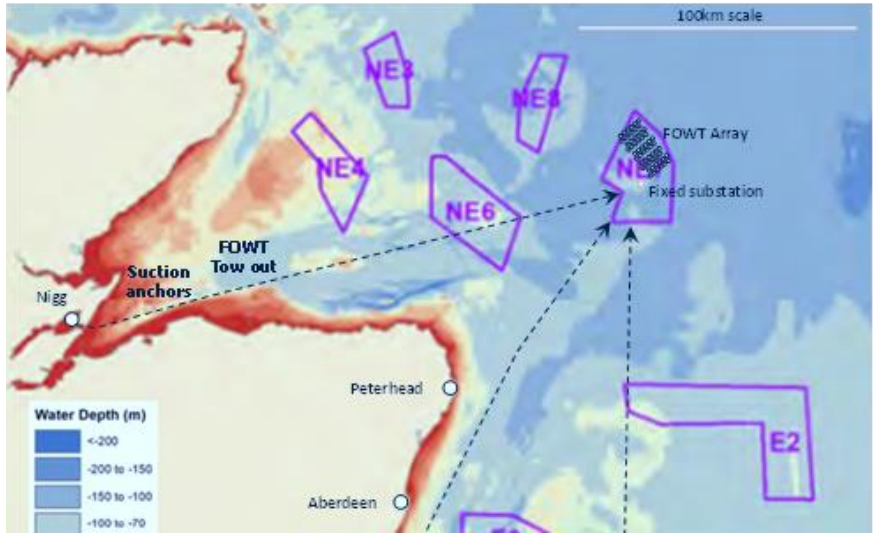
Tow to Port & offsite management

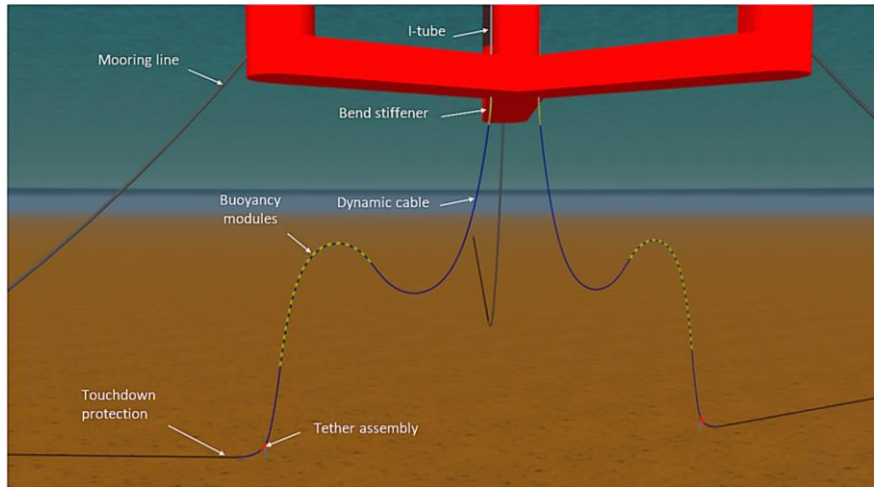
Basis : GW scale FOW

- Methodologies and analysis of current and future mooring & cable combinations
- Selected use case based on MarramWind (~100m water depth, northeast of Fraserburgh)
- 15MW semi-submersible VolturnUS-S
- 60 FOWTs arranged in a clustered array
- Various mooring permutations

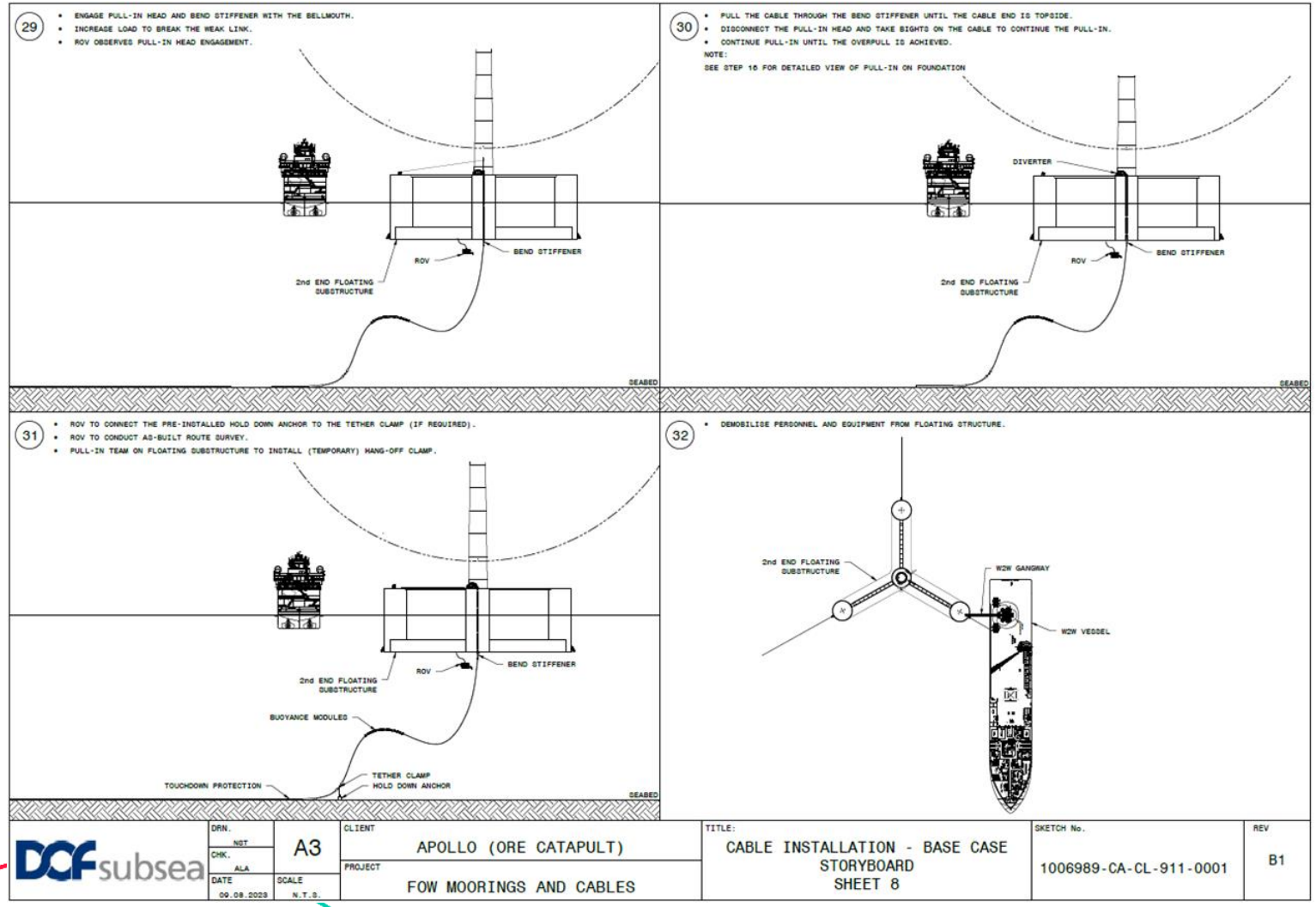


60 turbine 900MW array





T&I Study



- Detailed storyboards prepared by DOF using their recent experience from Hywind Tampen
- Cables and moorings transportation and installation cases
- Generated cost and schedule estimates, exploring base case and sensitivity options
- Emerging technology reviewed

DOF Vessel specifications

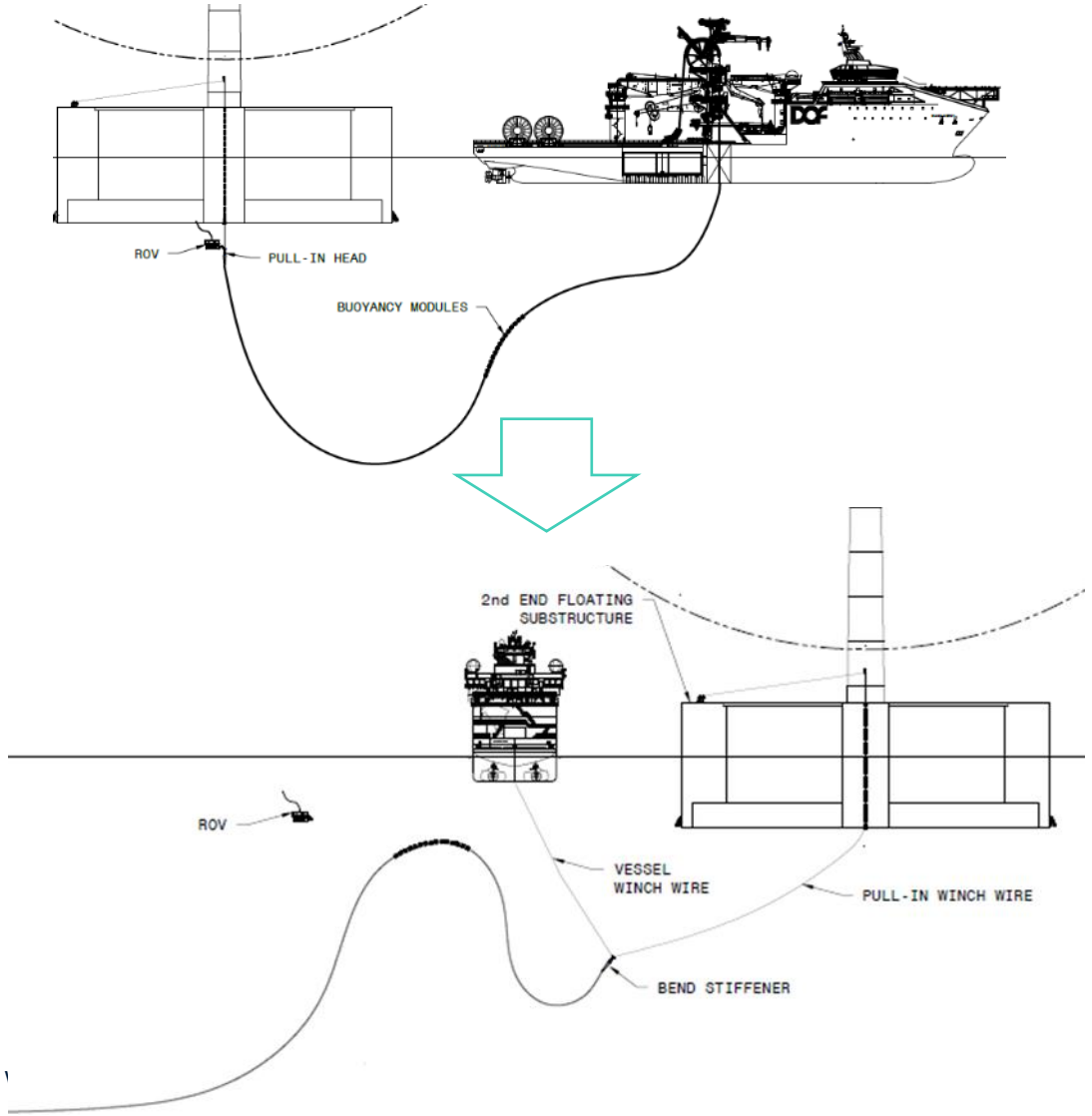
Item	Anchor Handler A	Anchor Handler B	Construction Vessel	Station Keeping Vessels (SKVs)
Case study vessel	Skandi Skansen	Skandi Iceman or Skandi Vega	Skandi Acergy	Vessels similar to the Skandi Emerald
Main Role	Mooring pre-lay	Mooring tow and hook-up	Suction anchor installation	Open water tow and hook-up positioning
Principal dimensions	107m LOA x 24m beam	94m LOA x 24m beam	157m LOA x 27m beam	75m LOA x 17m beam
Bollard Pull	350 Tonnes	320 Tonnes	N/A	200 Tonnes
Chain Locker capacity	2 x 1100 m of 175mm or 6 x 840m of 132 mm	2 x 1100 m of 175mm or 6 x 840m of 132 mm	N/A	N/A
Deck space	1100 m^2	780 m^2	2100 m^2	525 m^2
Relevant Equipment	2 x Work Class ROV 250 Tonne crane 260 Tonne A-Frame	1 x Work Class ROV 260 Tonne A-Frame	ROV survey spread 400 Tonne crane	N/A
Day Rate (2027 price)	£150k/day	£115k/day	£192k/day	£71k/day

Base case (current technology)

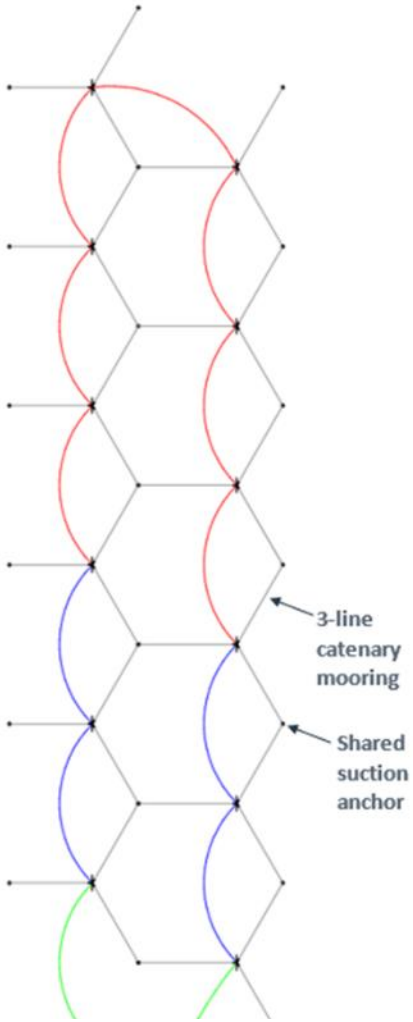
Assumptions:

- 2 FOWTs delivered per week
- No waiting on weather
- 3 leg 175mm moorings with shared anchors

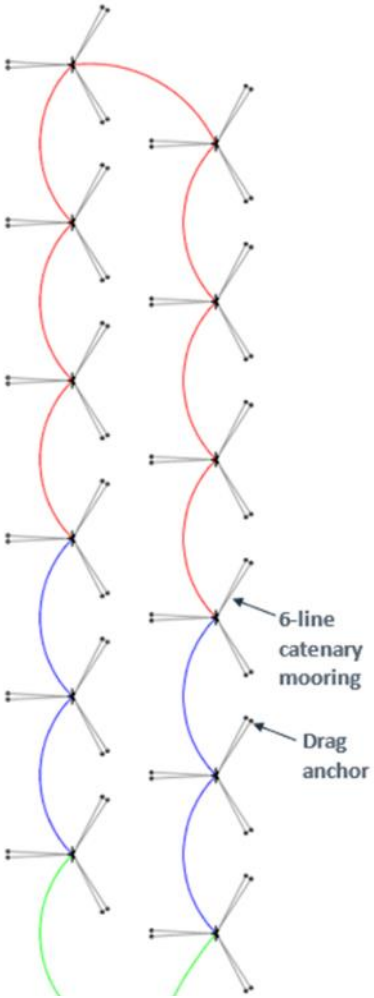
- 2 year integrated schedule (best case)
- 50-hour end-to-end cable installation without wet store
- Total base installation costs of £241M (£101M for the cables)
- Mooring installation a major constraint



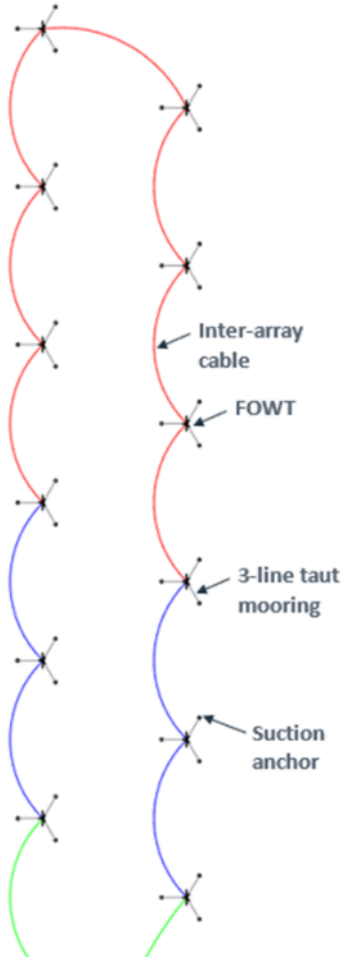
Sensitivity cases – mooring focused



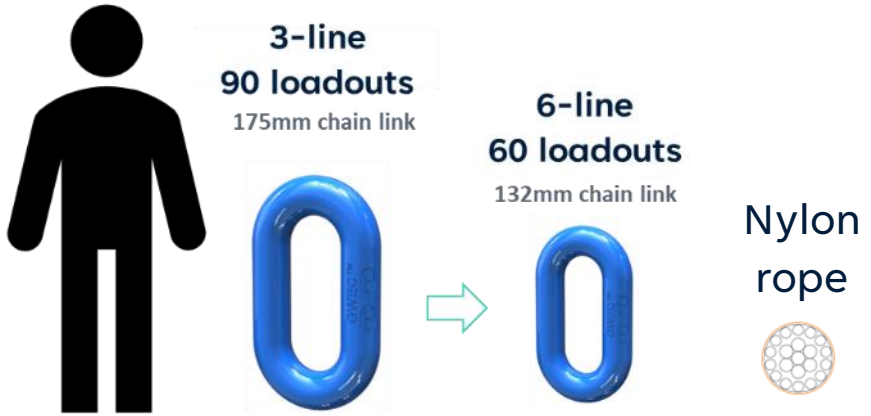
3 line shared suction piles



6 line drag anchors



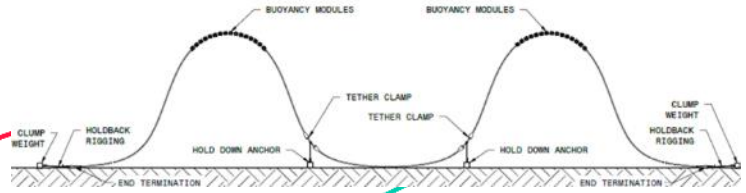
3 line taut leg anchoring



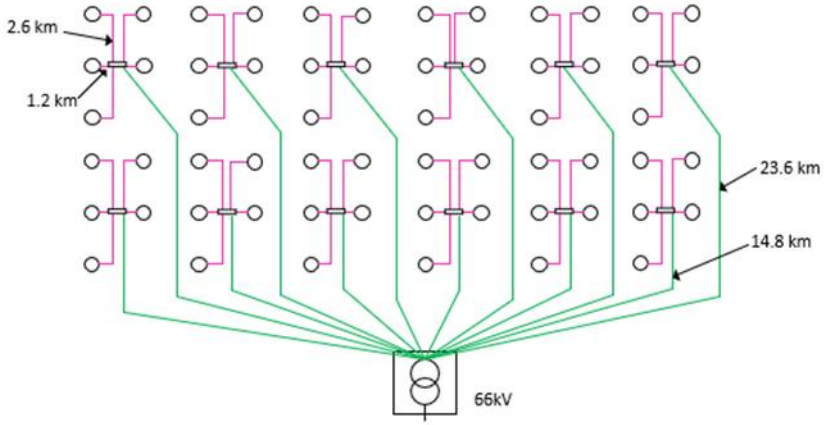
- Few vessels capable of handling 175mm largest chain systems
- 500t pretensioning of drag anchors needs 2 vessels– sampling approach?
- Nylon rope offers advantages within taut systems

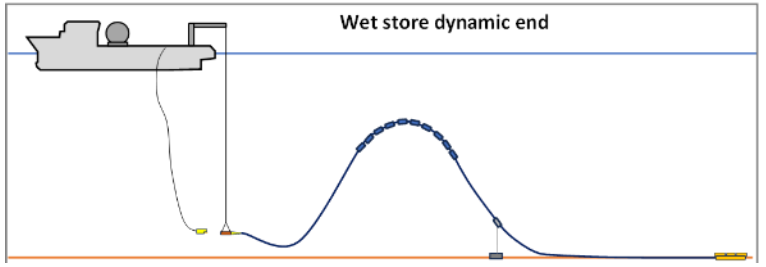
Emerging tech – cable focused

Pre-lay & wet store (halves pull-in time)

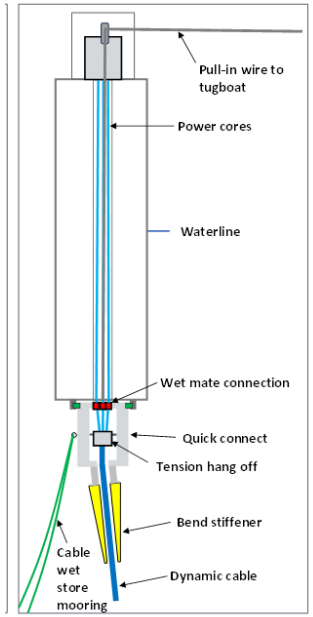


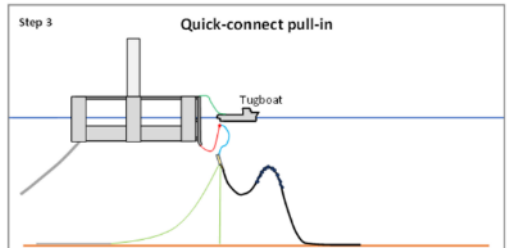
Subsea hubs (longer set-up, half the hook-up time)





Quick connect systems (longer set-up, accelerated pull-ins)





Balanced view

2 season baseline schedule for 900MW array

Shared anchors

Suction piles

Taut leg moorings

Pre-laid cables

Subsea hubs

Quick connection systems

Production schedules

Vessel availability

Waiting on weather

Off-station management of cables

Tow to port remains the base case solution for major component replacement.

Consultation exercise with 21 stakeholders across the industry:

- ~30 port visits per year from 2035
- ~£8 million per operation
- Bottlenecks in port and fleet availability
- Robust, proven wet store solutions needed
- Subsea hub with cable QCS expected to be competitive with HLV alternative

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