RenewableUK scottish renewables

FLOATING OFFSHORE WIND

9 & 10 October 2024 | ABERDEEN

#FloatingWind24

TADEK
Ocean Engineering

Methodology for Benchmarking Floating Offshore Wind Platforms

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COMPANY OVERVIEW

Company Overview

- A dynamic design and engineering consultancy **established in 2010**.
- Based in **Woking, UK** with a team of **20 permanent engineers**.
- ISO9001 Quality Management Certified UKAS BAB.

- O&G to cutting edge renewable energy projects. Leaders in MRE technologies.
- Over **300 projects** (Europe, SE Asia, Japan, US, South America).
- Services offered include:
  - **Project Engineering**
  - **Structural Engineering & Draughting**
  - **Installation Analysis**

- Typical clients include:
  - **Marine Contractors / Vessel Owners**
  - **Owners / Developers of devices / floating systems.**
  - **Insurance / Marine Warranty Firms.**
  - **Manufacturers of umbilical & CPS products.**

BENCHMARKING

Overview - What

WHAT?

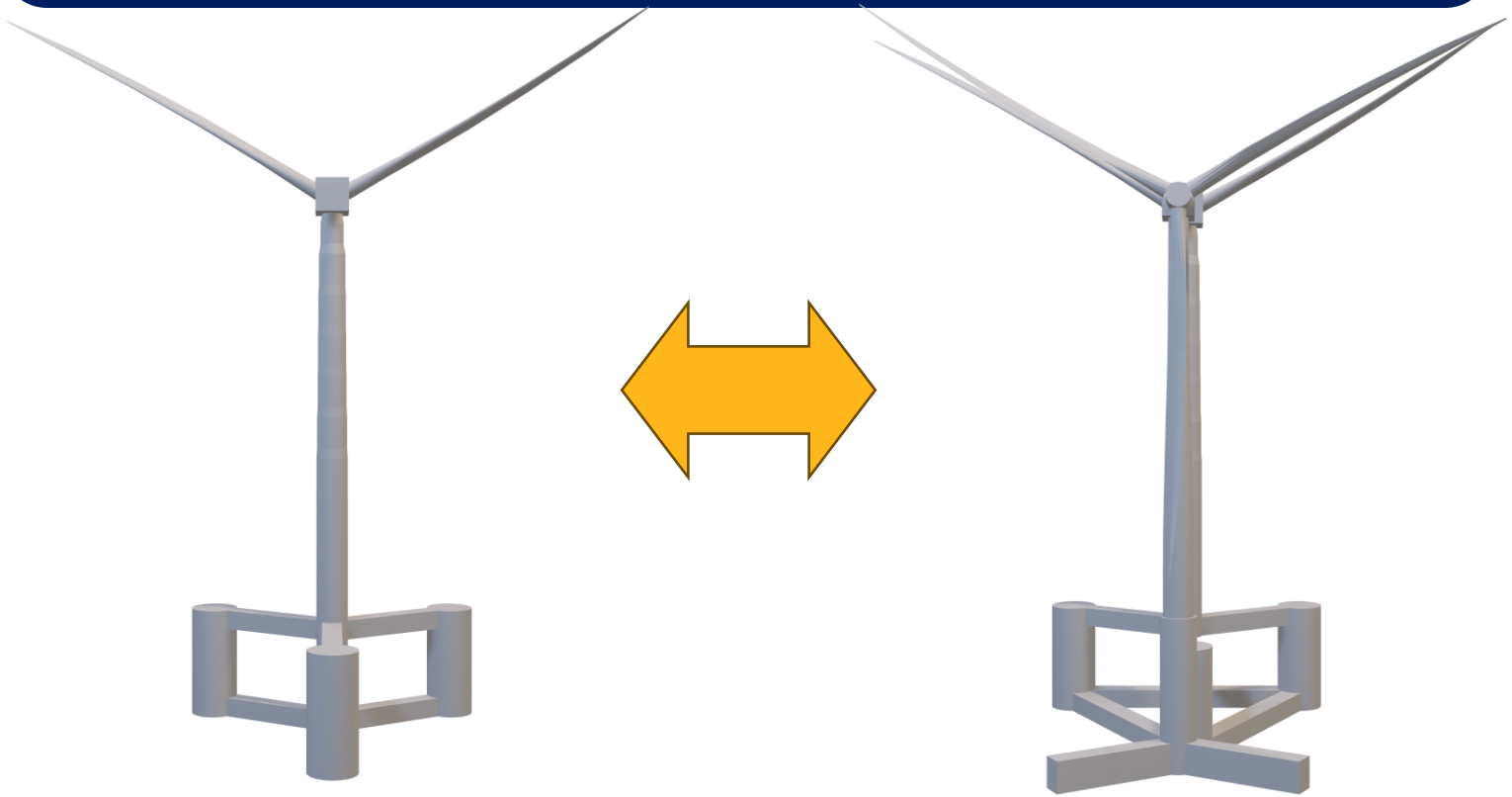
WHY?

HOW

WHEN?

WHO?

"The act of **measuring the quality** of something by **comparing** it with something else of an accepted standard"



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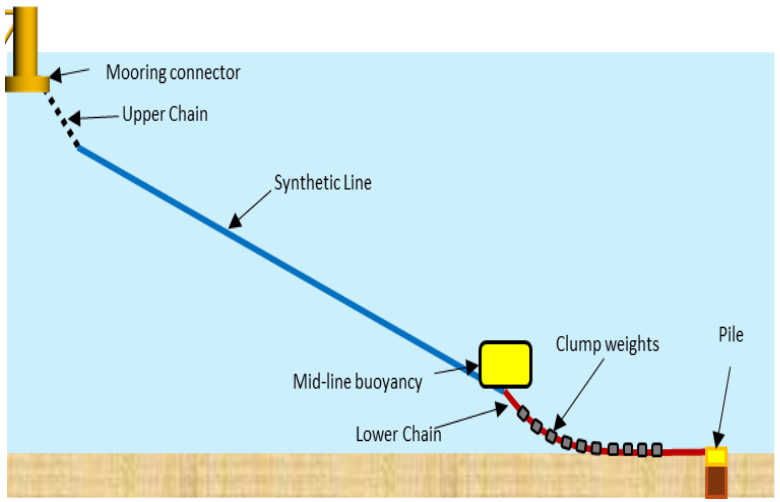
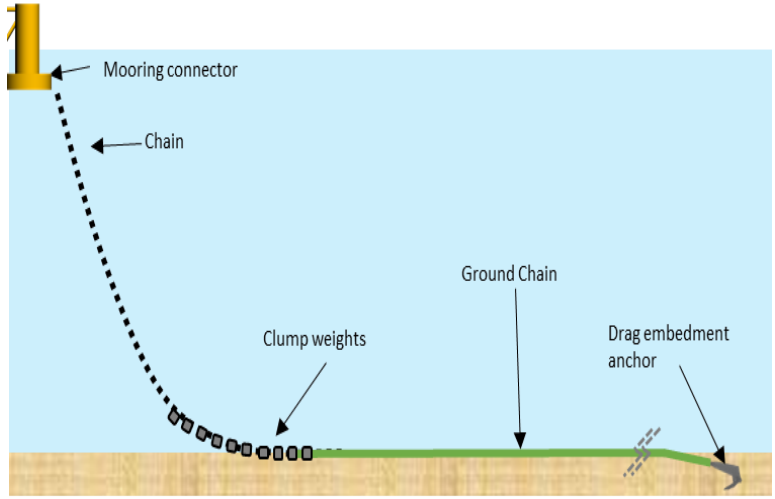
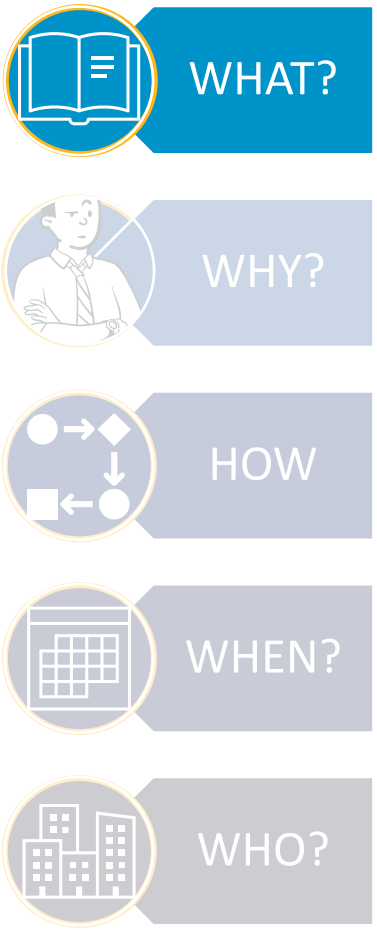


Semi-Taut



Catenary

Overview - What



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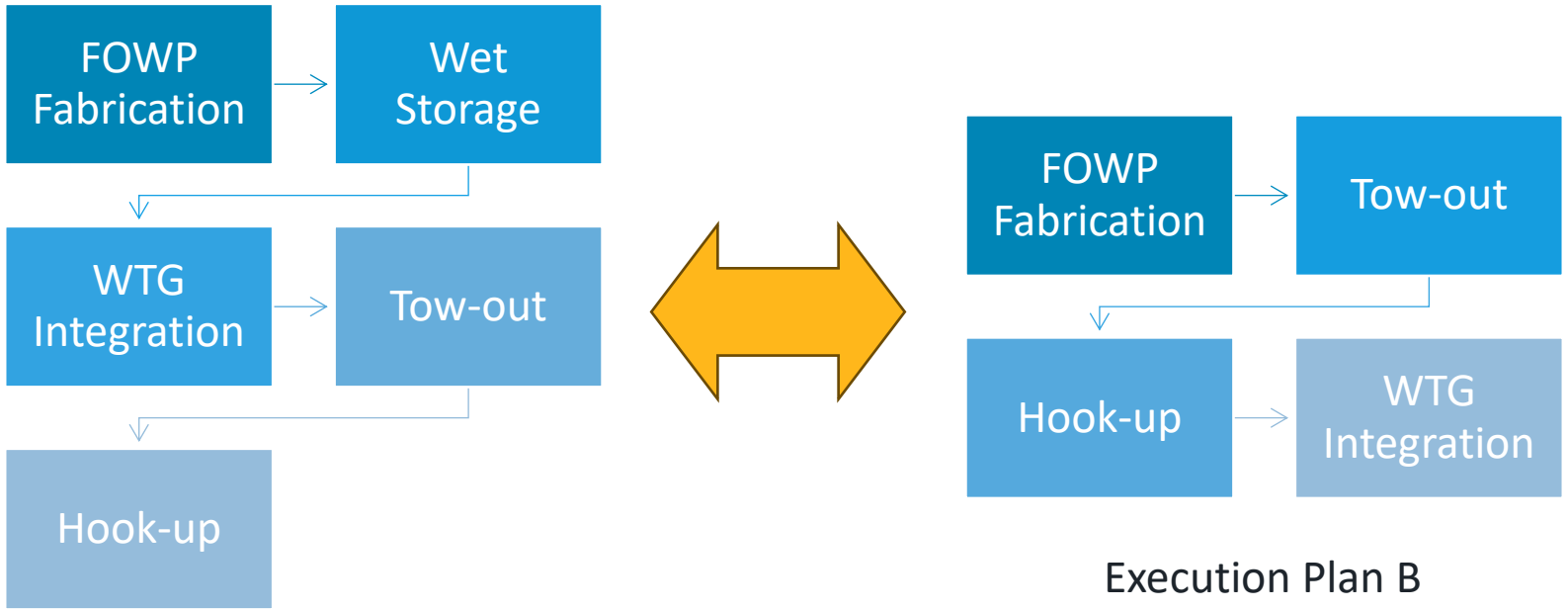
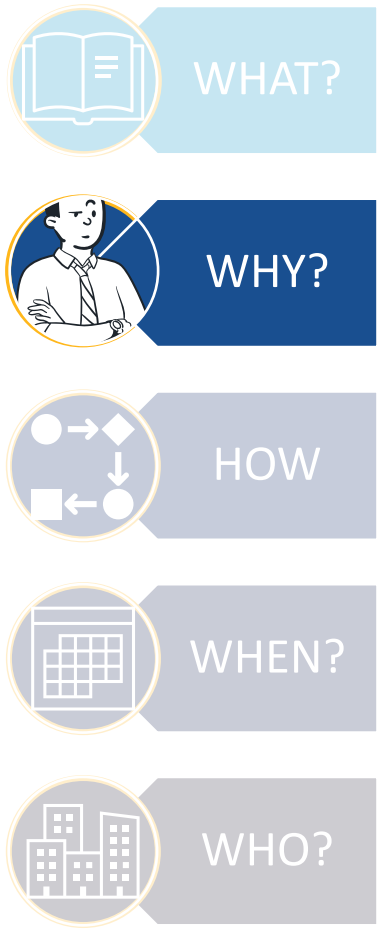
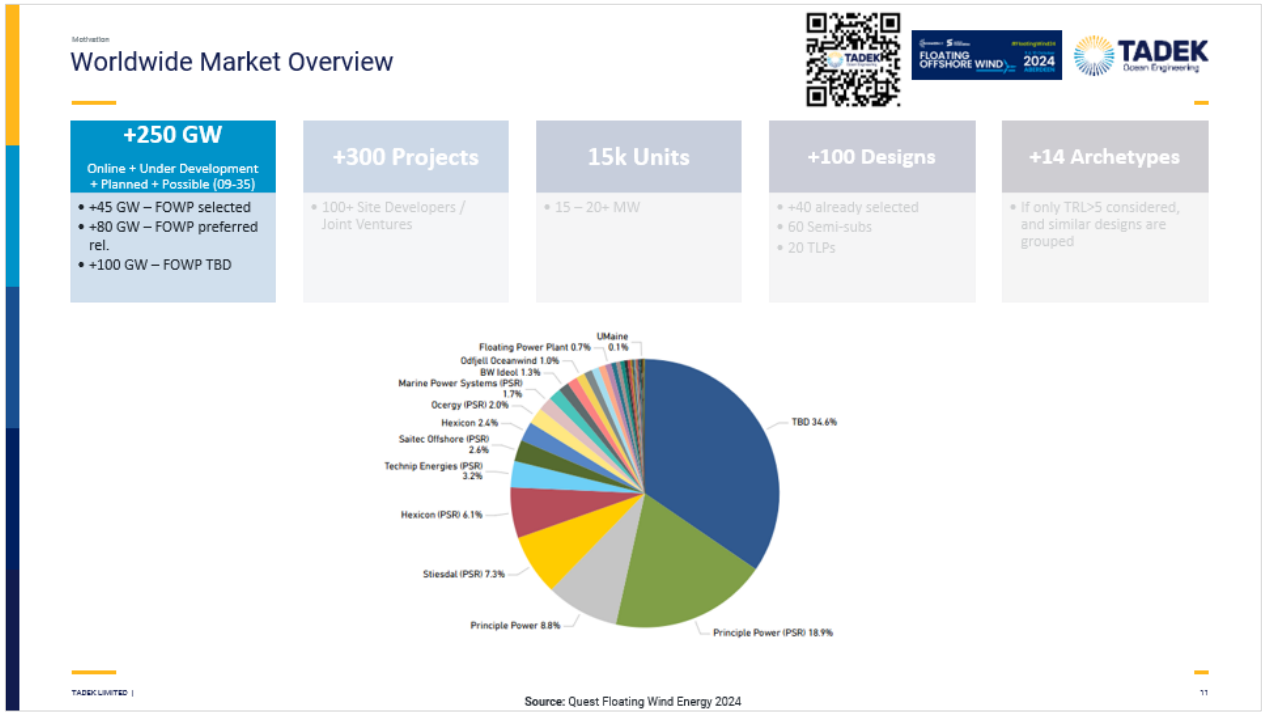


Execution Plan A

Execution Plan B

Overview - Why





Worldwide Market Overview

+250 GW

Online + Under Development + Planned + Possible (09-35)

- +45 GW – FOWP selected
- +80 GW – FOWP preferred rel.
- +100 GW – FOWP TBD

+300 Projects

- 100+ Site Developers / Joint Ventures

15k Units

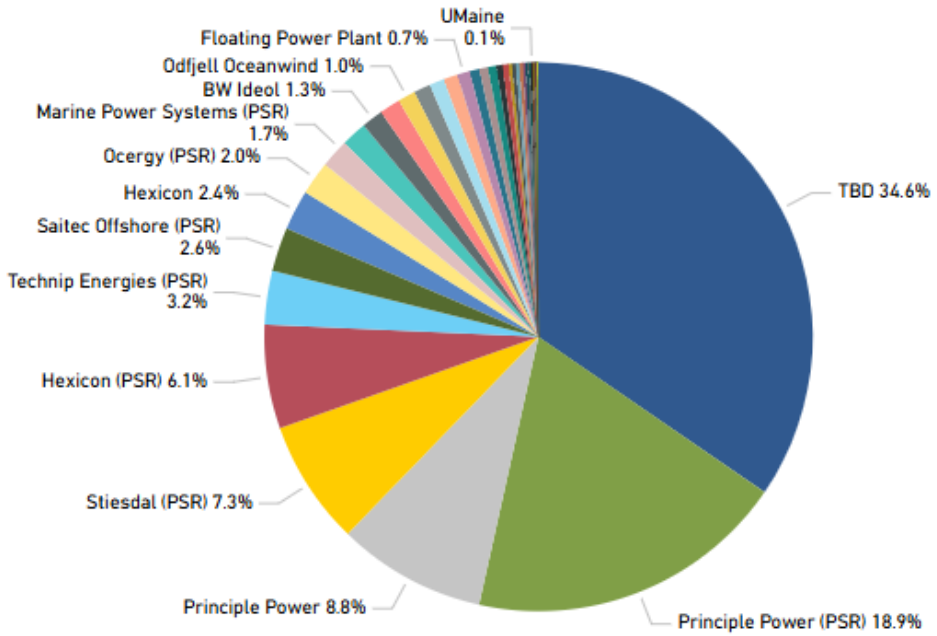
- 15 – 20+ MW

+100 Designs

- +40 already selected
- 60 Semi-subs
- 20 TLPs

+14 Archetypes

- If only TRL>5 considered, and similar designs are grouped



Source: Quest Floating Wind Energy 2024

Worldwide Market Overview

TADEK Ocean Engineering

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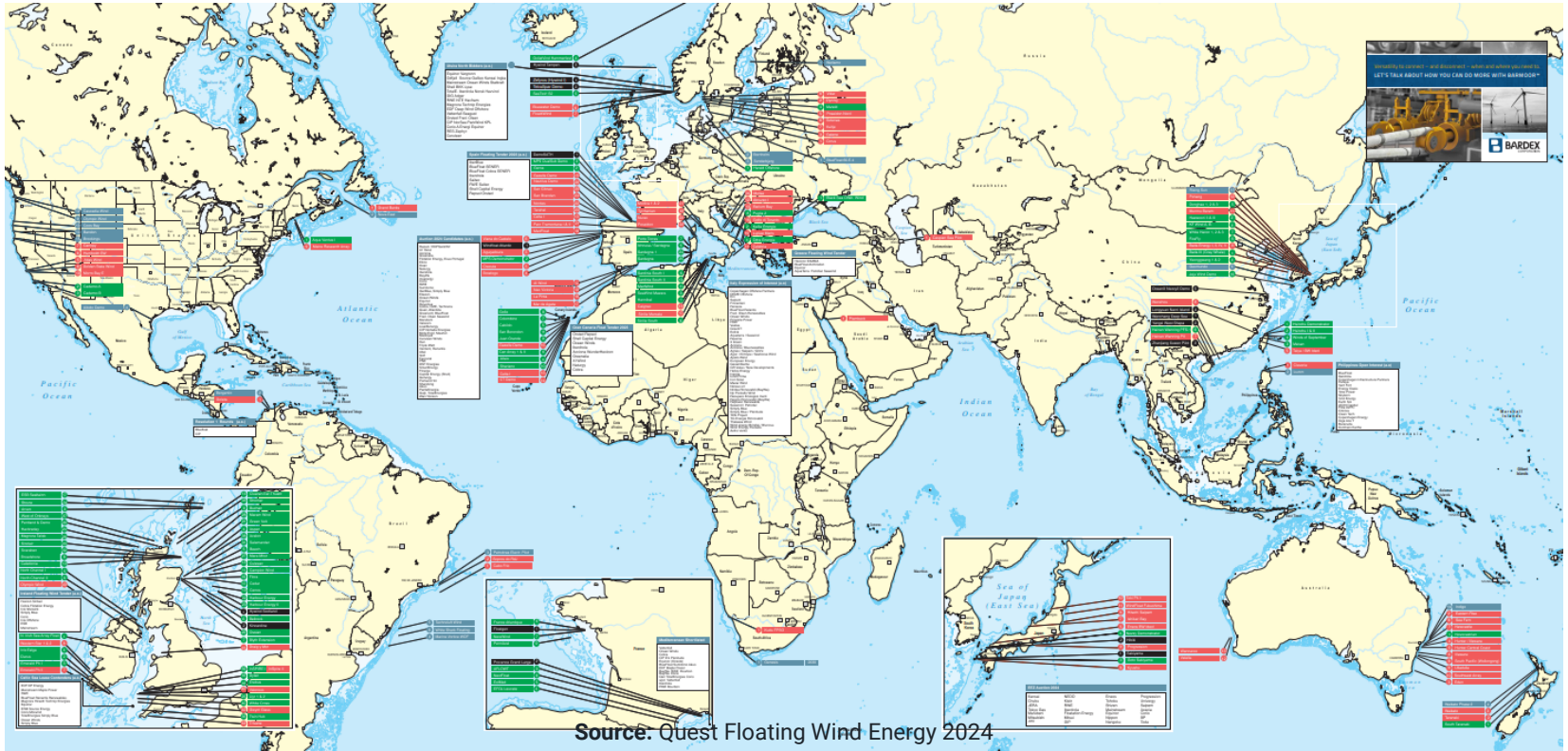

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Worldwide Market Overview

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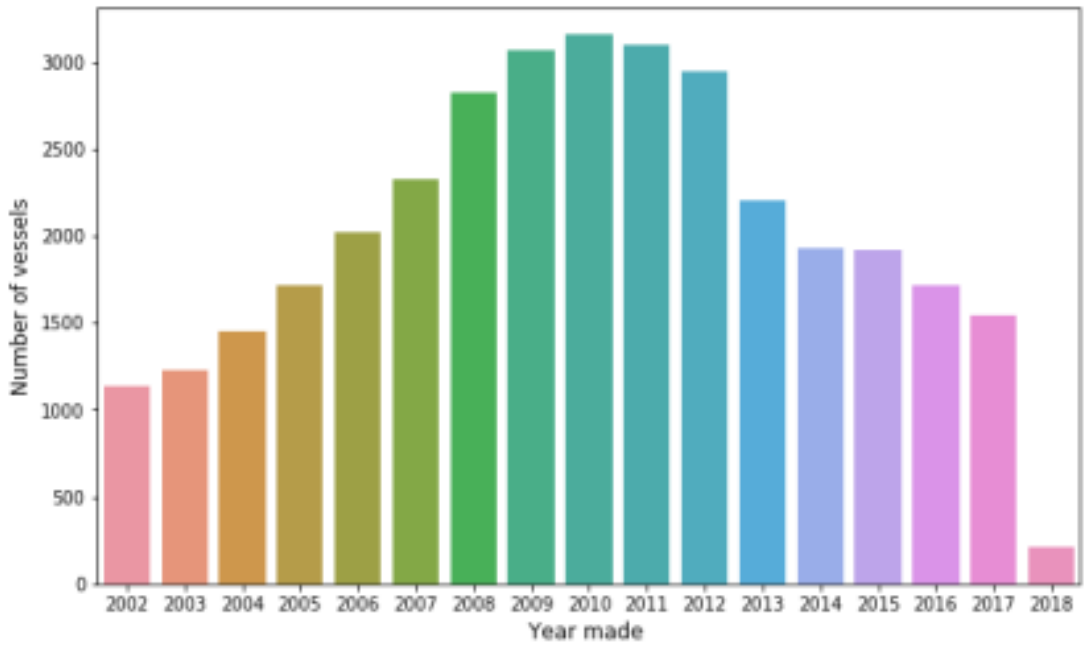

Source: S M Mizanur Rahman, Predicting Global Ship Demolition Using Machine Learning Approach, 2021

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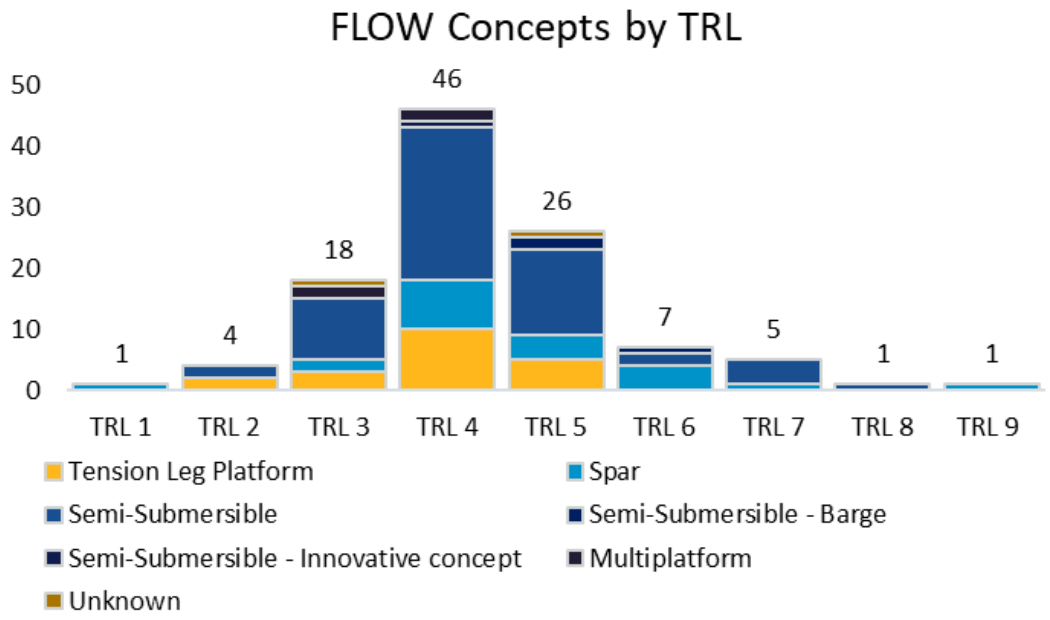

Source: Collated Data Multiple Sources, 2022

Worldwide Market Overview

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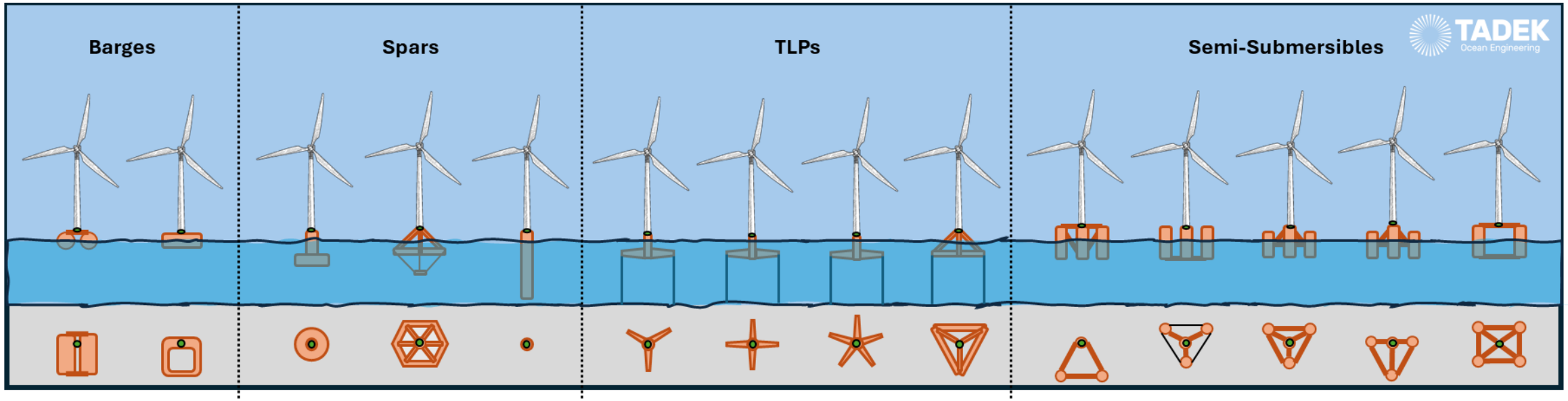
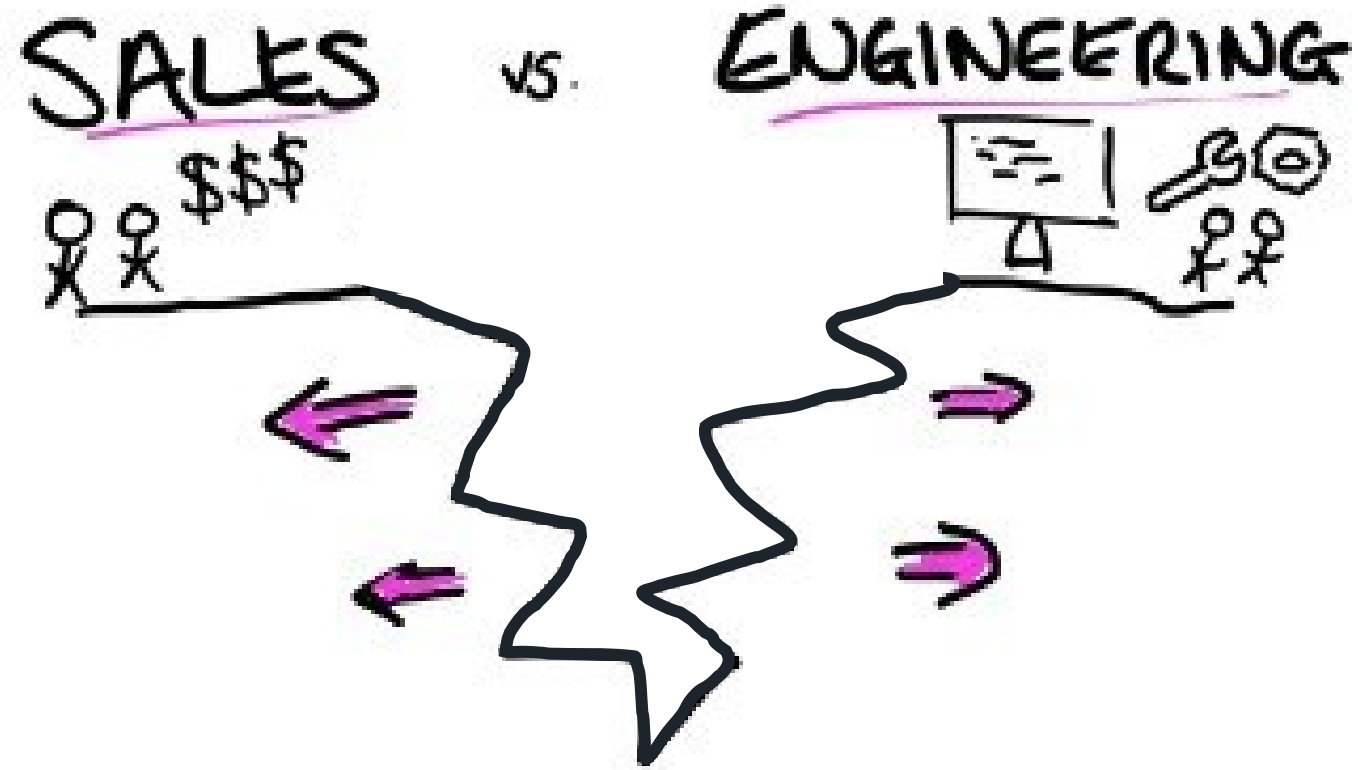
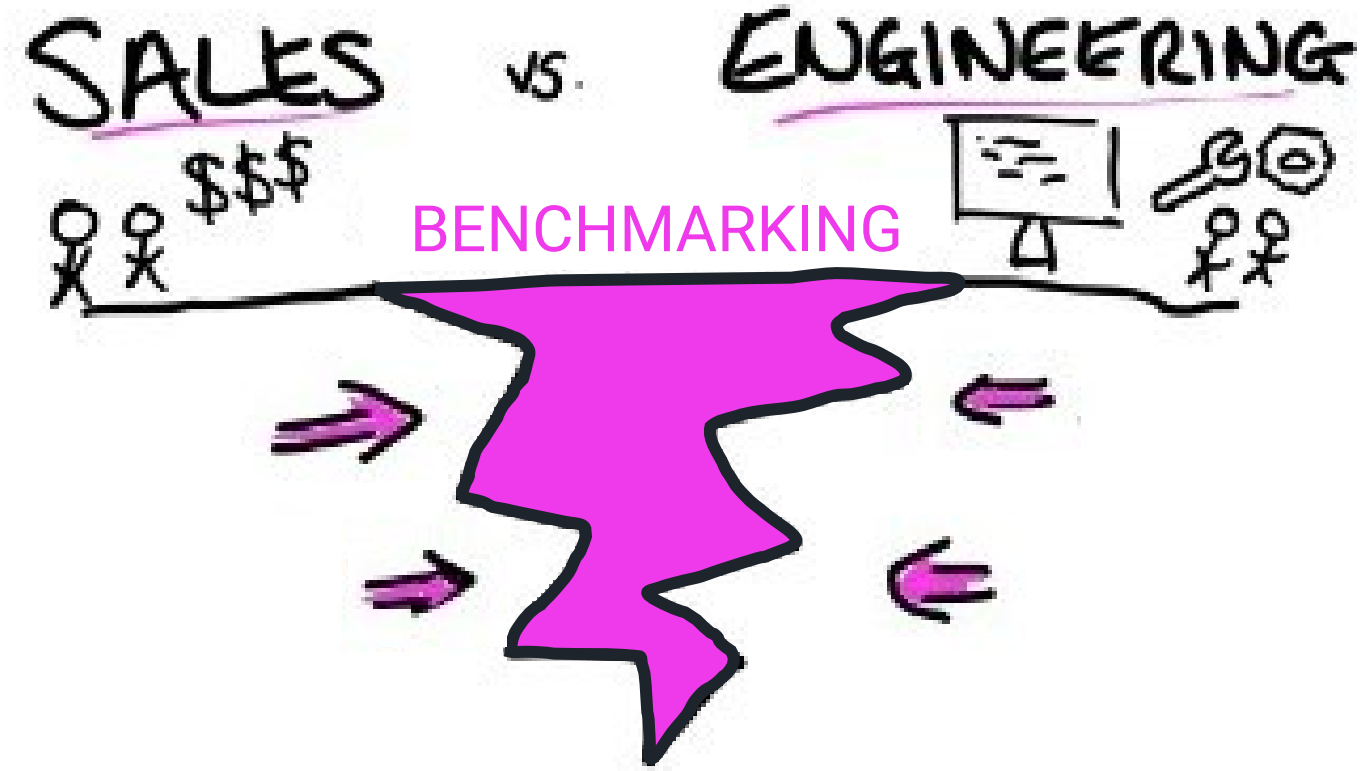


Challenge



Proposed Solution



Overview - Why

WHAT?

WHY?

HOW

WHEN?

WHO?

Scale

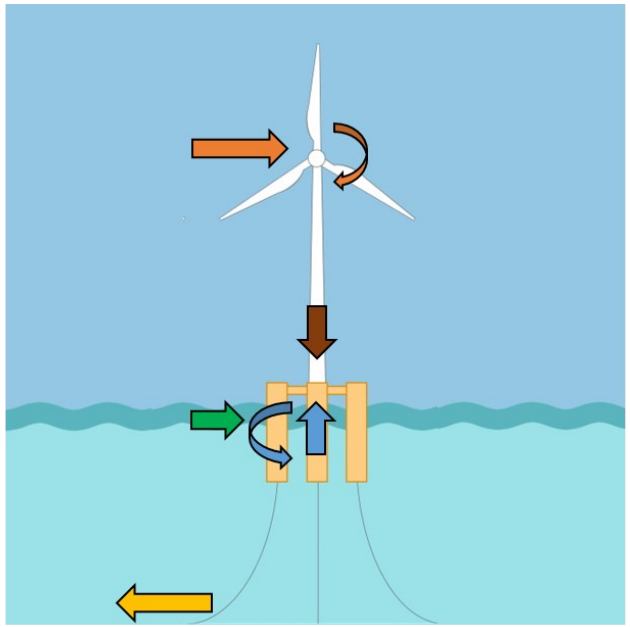
- Large number of projects
- Each project is unique (external factors)
- Different approaches
- Different supply chains

Platforms

- Complex systems
- Various Interactions
- Sales vs Engineering arguments

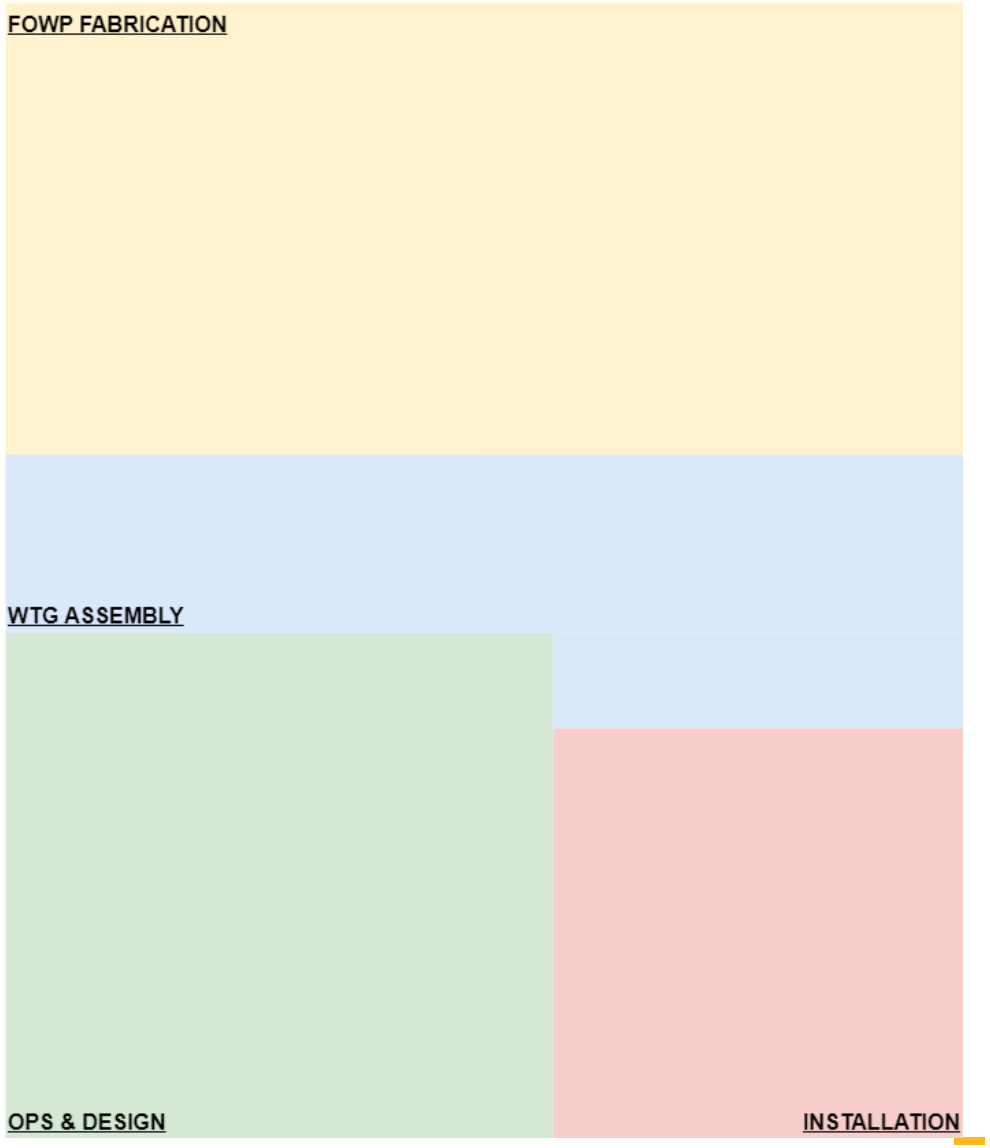
Operations

- Distance to ports
- Harsh environments
- Pressure to deliver worldwide



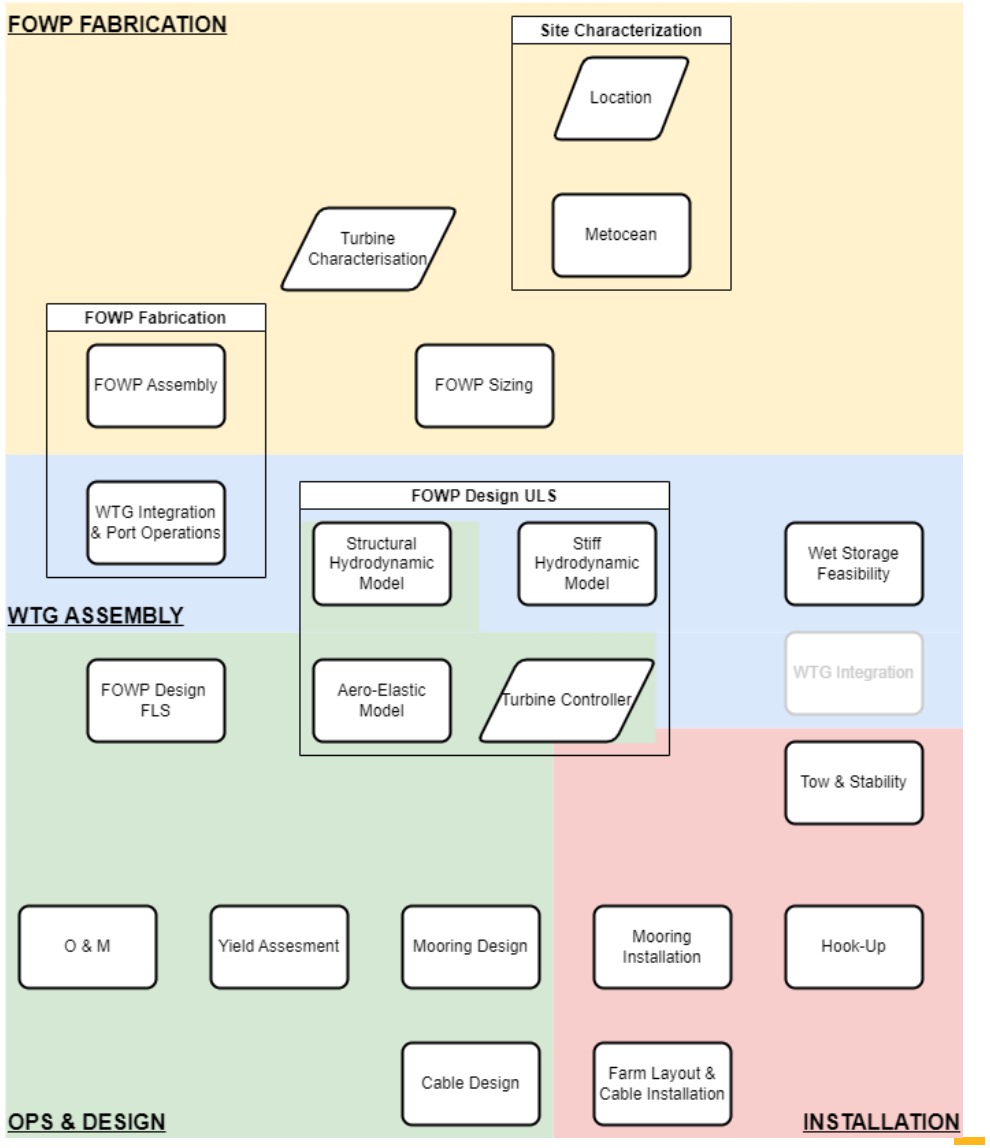
Overview - How

1. **Split overarching comparison into 4 key areas**
   - FOWP Fabrication
   - WTG Assembly
   - Ops & Design
   - Installation



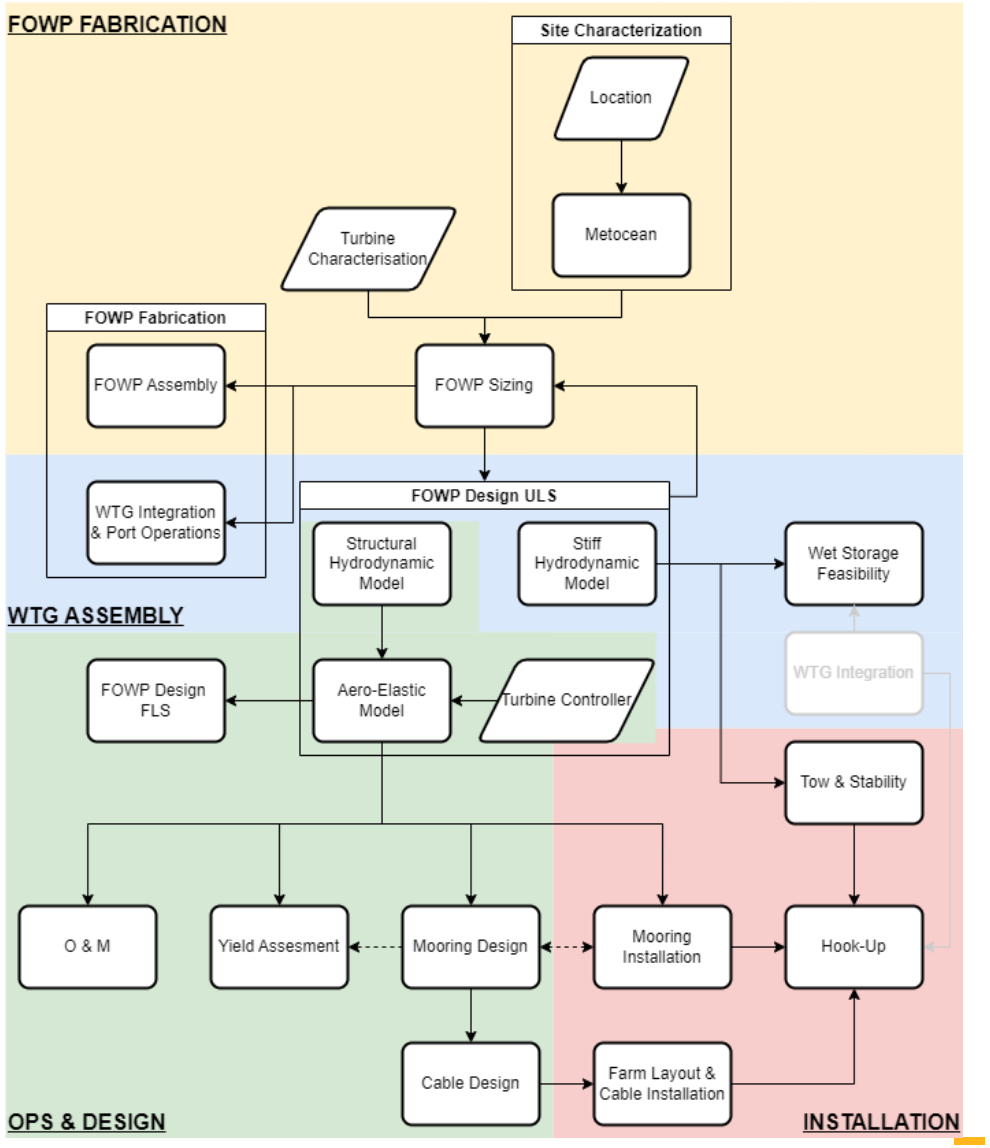
Overview - How

1. Split overarching comparison into 4 key areas
2. **These are further split into manageable standalone workscopes**
   - FOWP Sizing
   - Wet Storage
   - Tow & Stability
   - Mooring Design
   - Farm Layout & Cable Instalation
   - Yield Assessment



Overview - How

1. Split overarching comparison into 4 key areas
2. These are further split into manageable standalone workscopes
3. **Identify couplings/dependencies between different systems**



Overview - How

CASE STUDY: Tow-Out (SS vs TLP)

Objective

- Establish and compare required assets for tow-out and operability

Inputs

- Platform Geometry and Weights
- Wind Turbine Geometry
- Downflooding Points

Outputs

- Minimum bollard pull required (and example assets)
- Operability
- Tow Speed

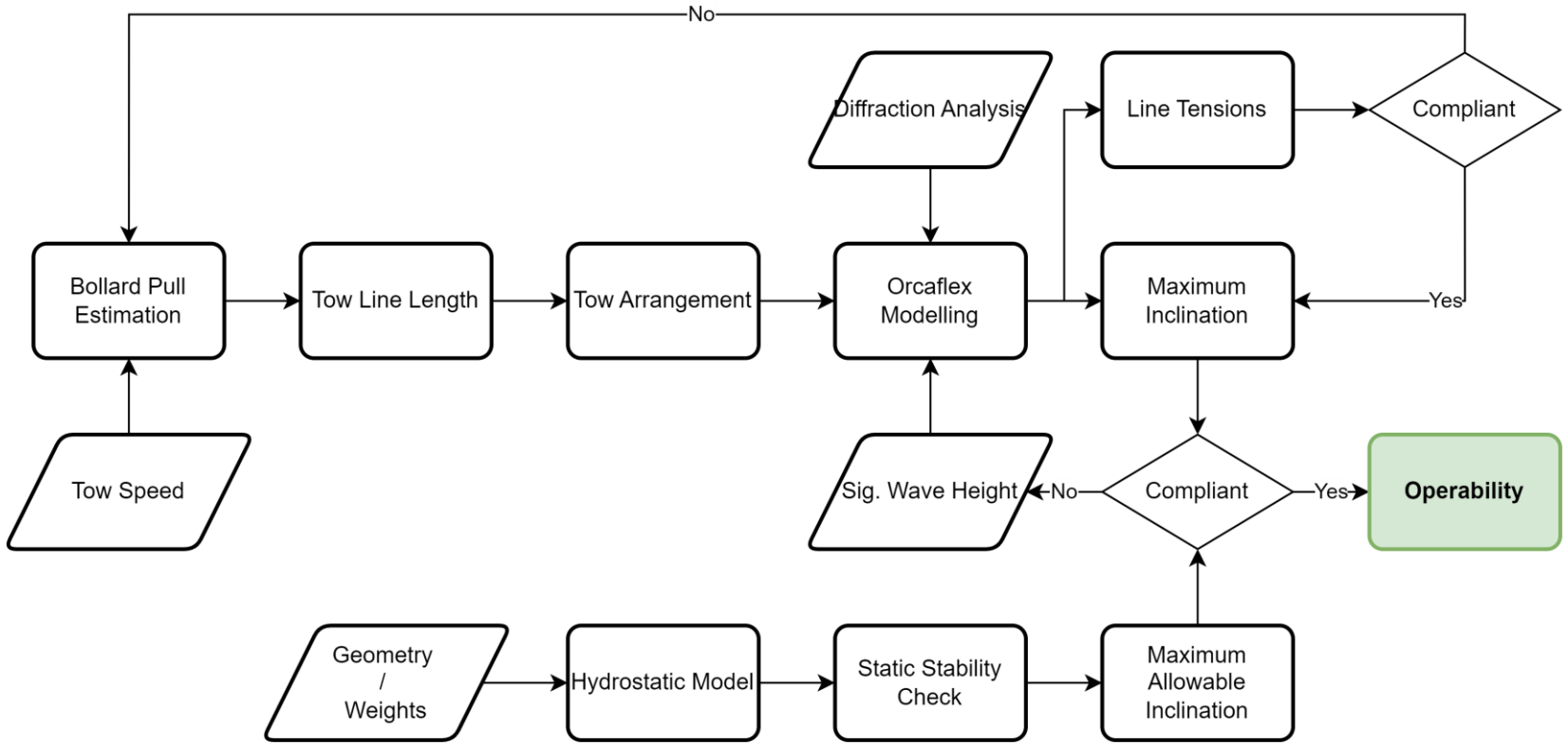
Assumptions

- Tow Line Arrangement / Properties

Overview - How

1. Split overarching comparison into 4 key areas
2. These are further split into manageable standalone workscopes
3. Identify couplings/dependencies between different systems
4. Define inputs and assumptions for each work scope
5. **Define clear methodologies to develop each work scope**

CASE STUDY: Tow-Out (SS vs TLP)



Overview - How

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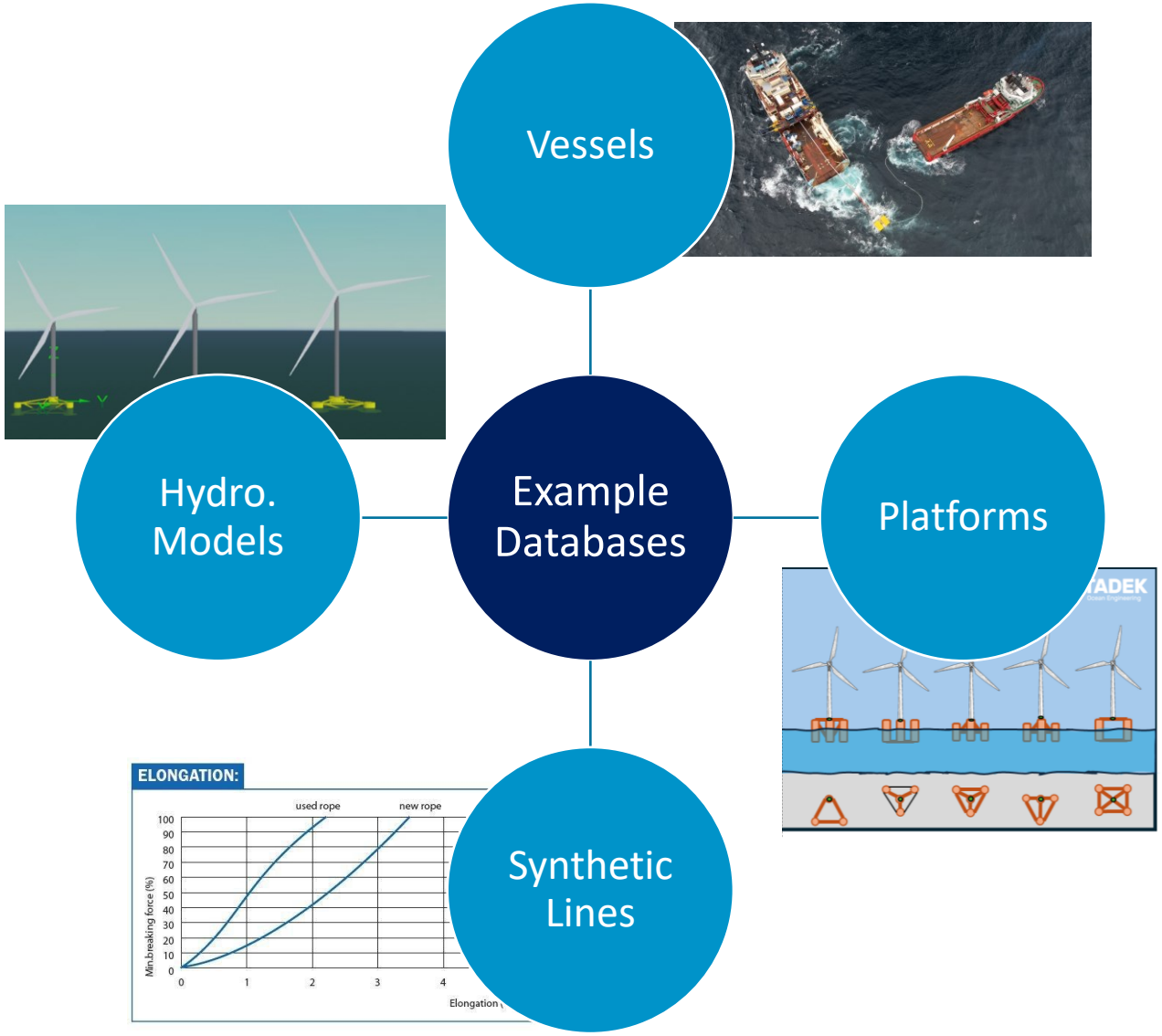
6. **Develop databases for potential missing data**



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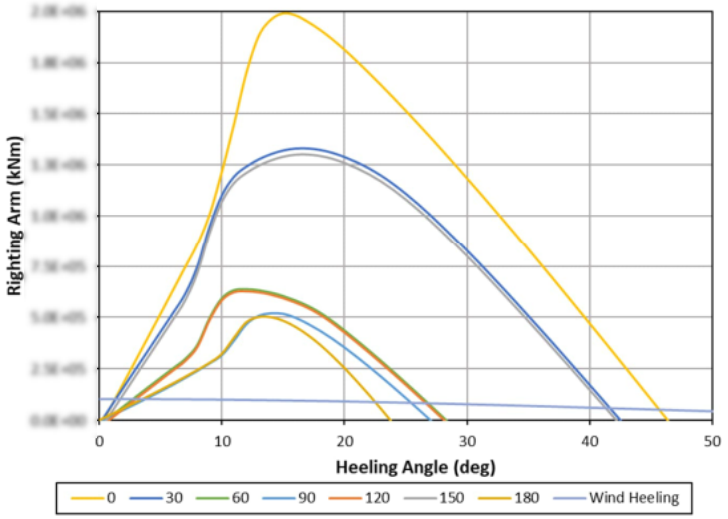
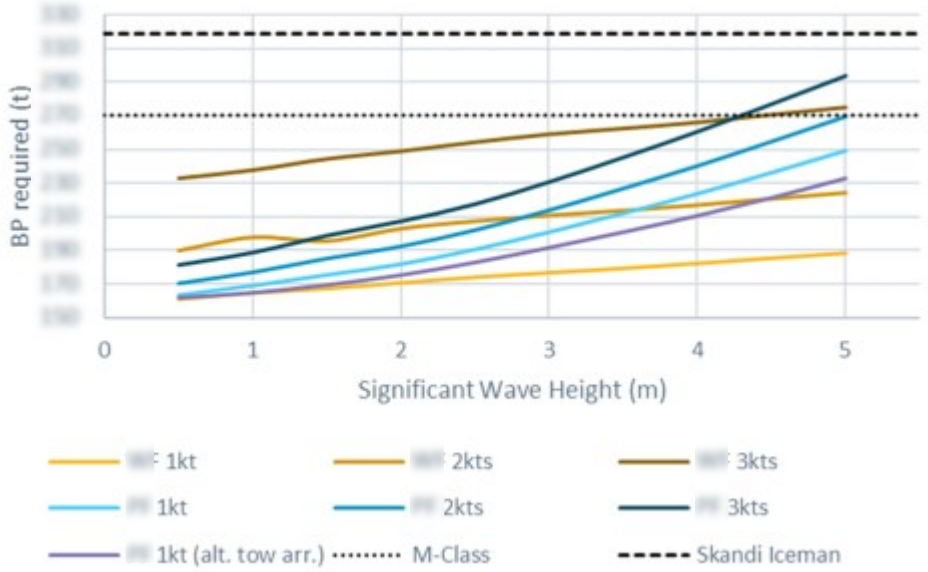
7. **Present results clearly (individual WS** and holistic)





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Requirements	Units	Platform A	Platform B
Overall operability	m	>5	>5
Time under tow	h	6	5
Cost		-	-
Motions Operability	m	>5	>5
Maximum Allowable Inclination	deg	11.5	16
Maximum Inclination[1] at Hs 1.0	deg	1.0	3.4
Maximum Inclination at Hs 2.5	deg	2.3	4.0
Maximum Inclination at Hs 4.0	deg	6.4	4.6
Bollard Pull Operability	m	>5	>5
Bollard Pull [1kt, Hs2.5m] (FWD/BWD) *	t	183/190	174

Conclusion – platform A take 25% longer to install than platform B = £££ difference in installation cost

Overview - How

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	FOWP Fabrication		WTG	Ops & Design				Installation	
FOWP	Steel Weight	Assembly	Wet Storage	Yield	O & M	Mooring Cost	Cable Design	Mooring Installation	Tow & Stability
TLP-A	+	○	−	+/−	+	−	+	−	○
SS-A	−	○	+	○	−	+/−	−	+	○
SS-B	−	+	+	−	−	+/−	−	+	○
SS-B (W. St.)	−	+	+/−	−	−	+	−	+	+

Overview – When / Who

WHAT?

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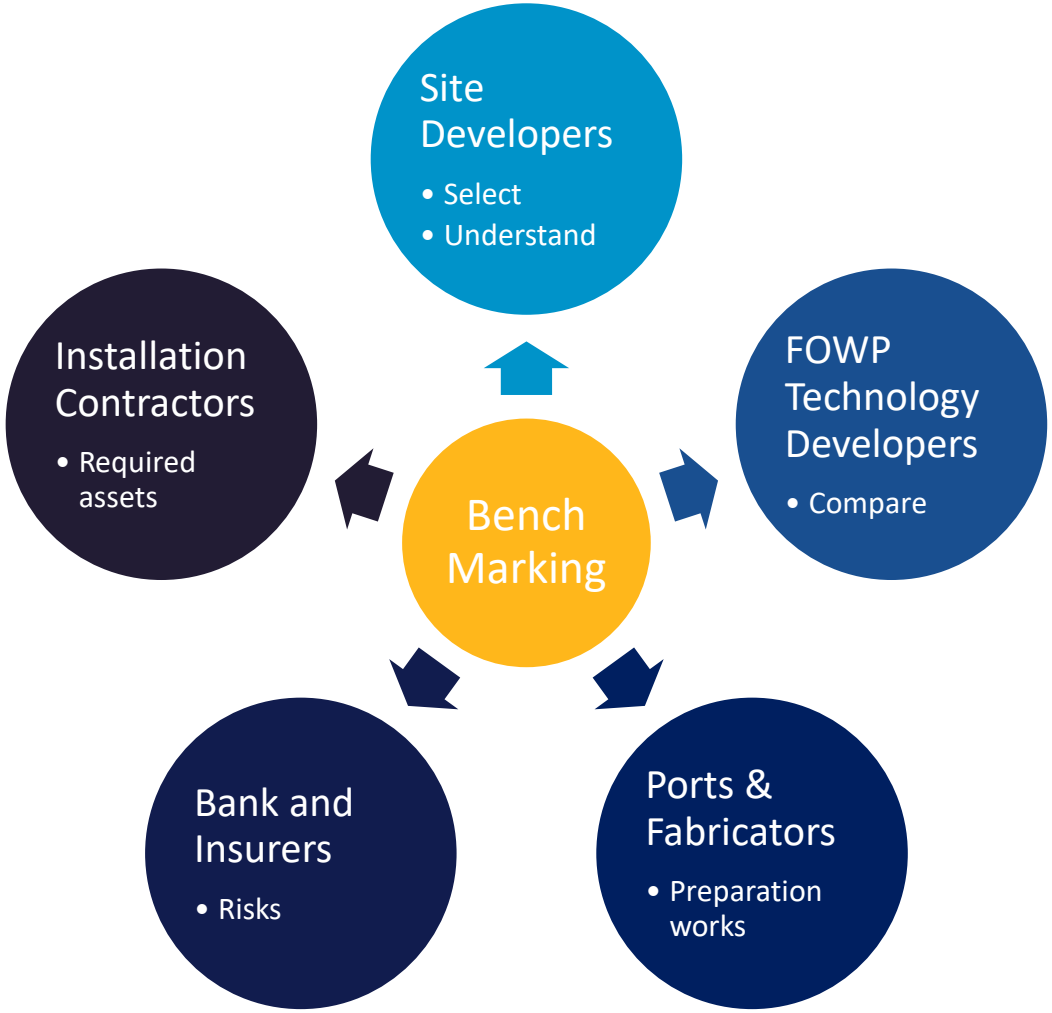

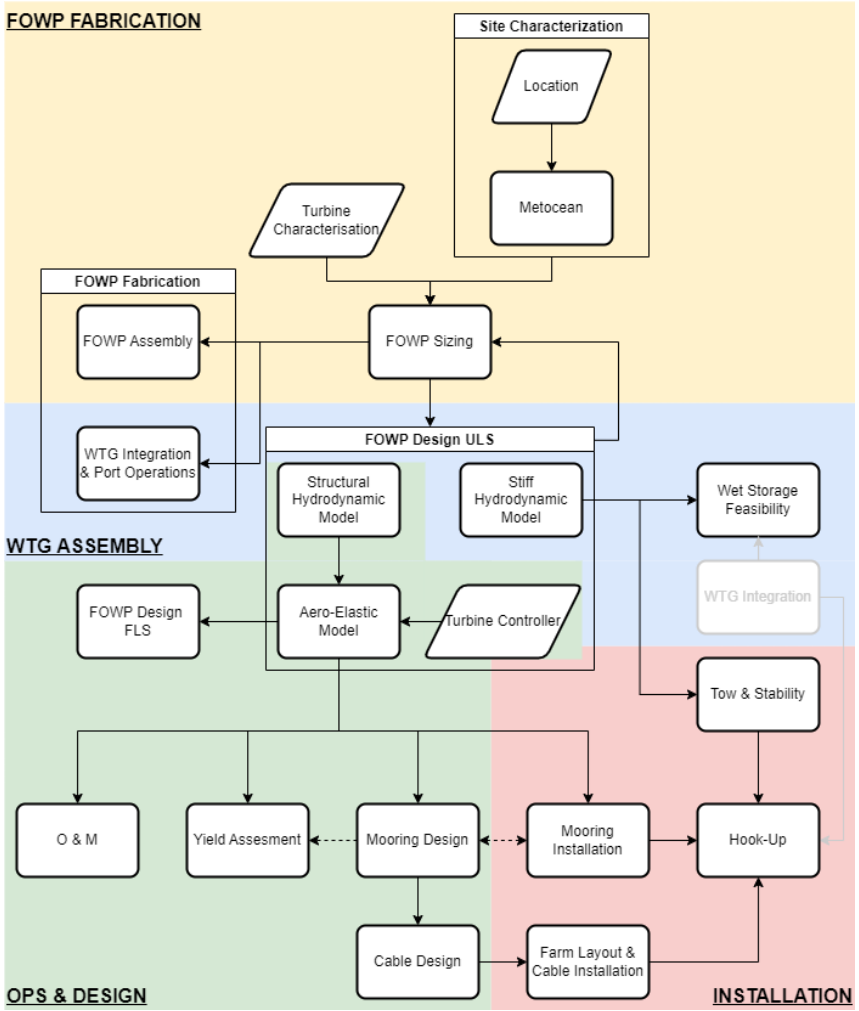

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