Principle Power WindFloat and Utility Scale Readiness

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Principle Power

Principle Power
Globalizing floating wind

Organized by FWE Quest Offshore

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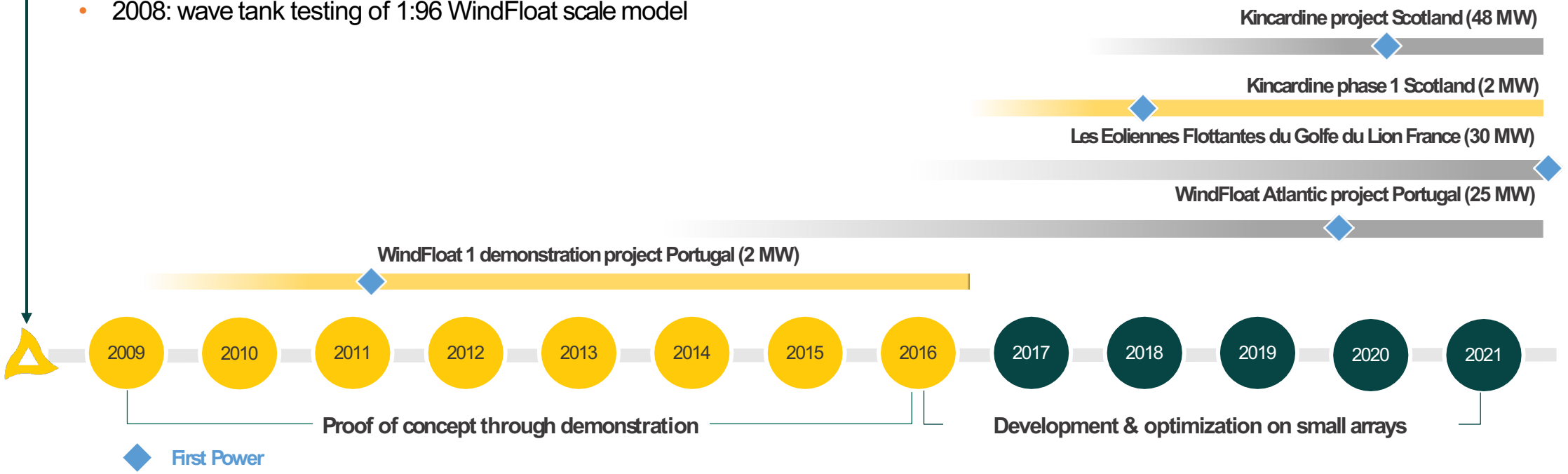
Company history: a step-by-step approach to commercialization

Previous achievements in technology development included

- 2007: Principle Power incorporated
- 2008: wave tank testing of 1:96 WindFloat scale model



The WindFloat ®

A **Wind turbine agnostic**

Designed to host any conventional commercial wind turbine with only software modifications and site-specific tower.

B **Damping Plates (Dynamic Stability)**

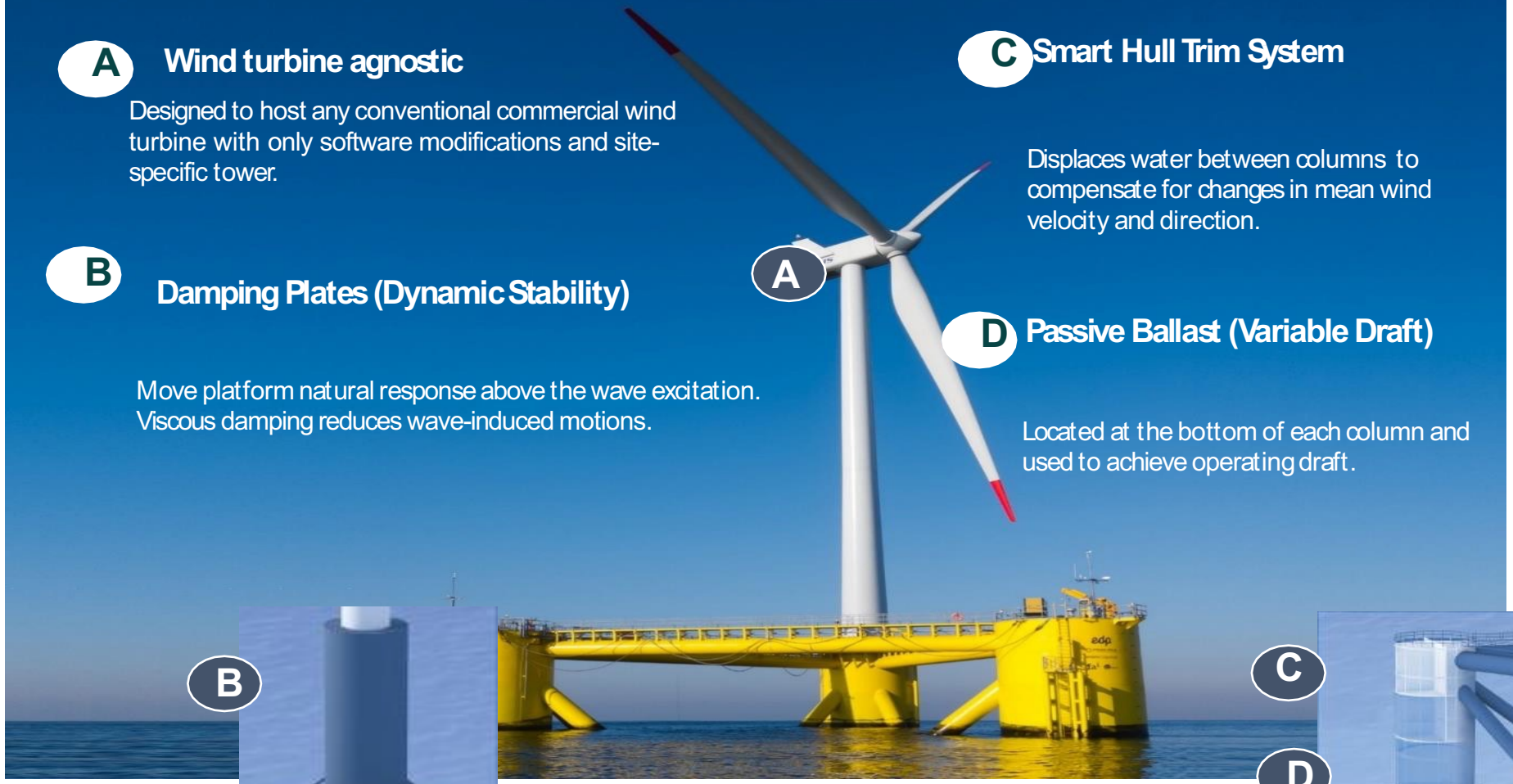
Move platform natural response above the wave excitation. Viscous damping reduces wave-induced motions.

C **Smart Hull Trim System**

Displaces water between columns to compensate for changes in mean wind velocity and direction.

D **Passive Ballast (Variable Draft)**

Located at the bottom of each column and used to achieve operating draft.



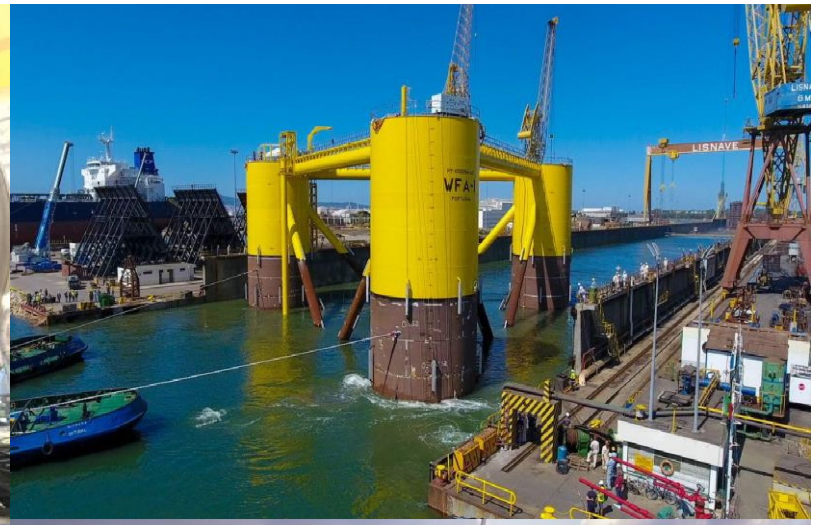
Operational WindFloat Projects

WindFloat Atlantic, Portugal

- Kincardine, Scotland, UK

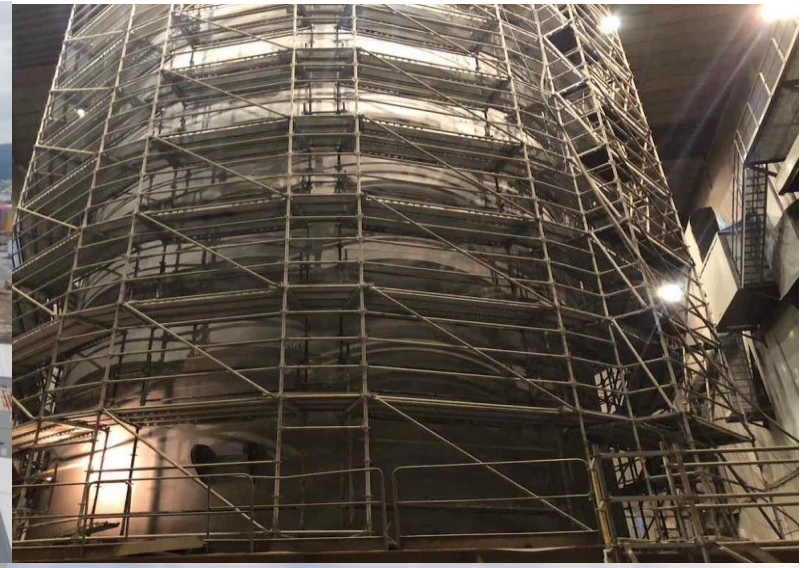
Operational WindFloat Projects: WindFloat Atlantic

- 3 Vestas WTG with 8.33 MW of Turbine Rated Power
- Water depth 95 m and 20 km offshore
- Designed for North Atlantic extreme weather conditions
- Classification Society ABS
- Layout footprint suitable for dry dock
- WTG assembly at Ferrol port
- Commissioned and Start-up in 2020
- First year production: 75 GWh



Operational WindFloat Projects: Kincardine

- 5 Vestas WTG with 9.5 MW of Turbine Rated Power
- Water depth 70 m and 15 km offshore
- Classification Society ABS
- Uniquely fast-tracked project
- WTG assembly at Rotterdam port
- Successful installation, commission and start-up in 2021



Applying Lessons from past projects into New Designs

Existing projects provide indispensable lessons for the industrialization process

Design Method & Project Execution Plan

- Early interface between floating foundation designer and WTG is critical

  Improves the integration between multifaced and complex systems (Foundation and WTG), removes conservativeness and increases availability and annual energy production

- Early engagement from the supply chain to inform project constraints and installation philosophy

  Improve project schedule, meet local content constraints, cost reduction, holistic overview of project challenges

- Use of empirical data from real world operations to validate and calibrate numerical models

  Increase design confidence, optimize methods, and challenge safety factors with Class societies challenging complex coupled dynamic factors

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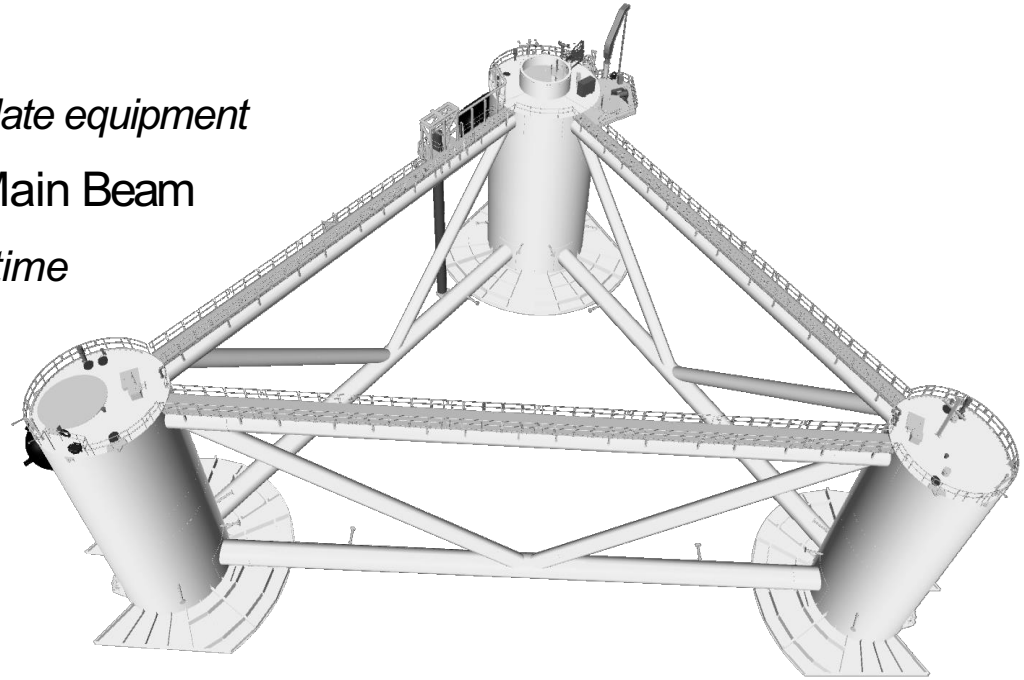
Existing projects provide indispensable lessons for the industrialization process

Design

- Optimized Column Structural & Marine Systems Configuration
  Minimize Steel Weight and fabrication complexity: standardize and consolidate equipment
- Minimized & Simple Truss Connections: V-brace connects to Upper Main Beam
  Simplify detailing and increased modularization to minimize final assembly time
- Damping plates refinement
  Simplify detailing and Enhanced Performance
- Access philosophy, boat landing and laydown area optimization
  Improve offshore accessibility and simplify fabrication complexity



Applying Lessons from past projects into New Designs

Existing projects provide indispensable lessons for the industrialization process

WTG integration / Offshore Installation / Commissioning

- WTG Integration Process: Reduction in integration time through KOWL

  New WTG integration methods optimized the project time schedule

- Platform hook-up

  Experience built through multiple hook up operations lead to significant reduction of operation time and weather limitations

- Platform pre-commissioning and commissioning

  Improve planning of pre-commissioning activities at the fabrication yard and commissioning in the turbine integration port for better quality, reduction of commissioning activities offshore and anticipating turbine production start up

Conclusions

- The WindFloat®is already proven technology and has demonstrated that is cost-effective and utility-scale
- Industrialization of the WindFloat®is a reality and Principle Power is well positioned for utility-scale deployments.
- Principle Power has successfully deployed pre-commercial projects globally => ~75MW of expected floating wind capacity (installed by 2021) with key learnings integrating into future designs at scale
- Utility-scale project success is reliant on leveraging the experience gained on pre-commercial projects in combination with informed global supply chain engagement
- Industrialized solutions are project specific solutions aimed at reducing project LCoE through factoring in detailed project execution plan constraints at the earliest design stages