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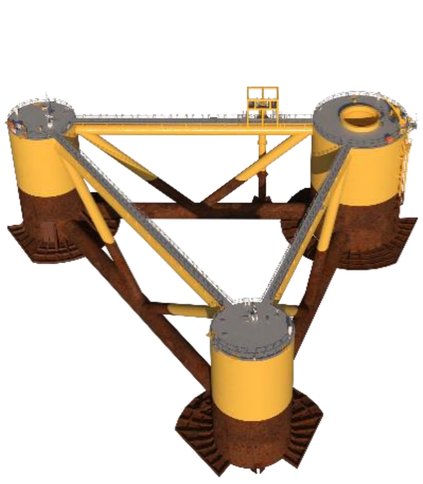
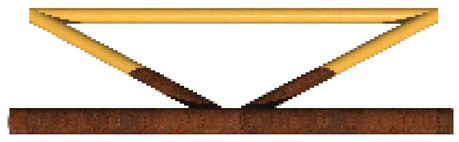
Developing the Next Generation 12+ MW Offshore Wind Turbine for Clean and Competitive Electricity

Supply-Chain Adaptable Designs to Accelerate Floating Wind and Reduce LCoE



WindFloat T



Tubular Truss Assembly
(1) Baseline Hull

Boxed UMBs and Pontoons
(2) Alternative Hull

Description: Baseline and Alternative Hull Designs

Benefits of Boxed Pontoons

The boxed hull subcomponents are made up of flat panels with internal stiffening reinforcements.
While the connections between the boxed UMBs/pontoons and the perimeter cylinder columns are more complex than the tubular connections, due to an increased number of internal reinforcements, these flat panel elements have a high potential for automation and to increase the subcomponent fabrication productivity and consequently, cost and schedule.

Beyond 15+MW Wind Turbines

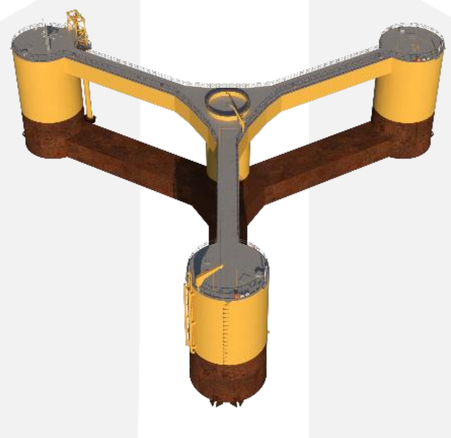
With the increasing wind turbine size and tower design philosophy changing to "stiff-stiff", Principle Power designed two center-column designs, i.e., hulls with the WTG in the central column, offering the most optimal balance between platform cost and system performance.
These center-column designs, whether tubular or flat panel, enable substancial reductions in weight with clear economies of scale on a weight-per-MW basis. These reductions translate into lower platform and mooring system CAPEX which in turn contribute to a lower project's Levelized Cost of Energy (LCoE).

In Work Package 1 – "Development of 12+MW Wind Energy Converters (WECs) including substructures and manufacturing concepts", the project partners designed bottom-fixed and floating foundations based on GE Haliade-X 15+MW wind turbine. Principle Power designed two concepts for floating offshore wind foundations, also referred to as hulls:

- (1) Baseline Hull – WindFloat T, with tubular truss assembly – a proven concept with eight platforms already operating in Europe.
- (2) Alternative Hull – WindFloat T, with boxed Upper Main Beams (UMBs) and pontoons, which provide additional buoyancy enabling WTG integration in shallow ports.

Increased Supply Chain Flexibility

The cylindrical columns build on established tower and monopile fabrication expertise, while the use of flat-panel fabrication methods - widely adopted in shipbuilding and the oil and gas industry - expands supply chain options. Together with the modular hull design, this approach enables decentralized, parallel fabrication across multiple facilities using their preferred fabrication methods. In addition, the geometry of these subcomponents allows for higher transportation and storage density, improving logistics efficiency and streamlining port operations.



WindFloat TC

WindFloat FC

Description: Center-column hull designs

Source
1. "Deliverable 1.4 Assessment Report on Manufacturing", Version 1.0 (2024) (Confidential)

ReaLCoE's vision is to unleash the full potential of offshore wind energy
€35/MWh LCoE Goal, +12MW WEC Capacity, ~32 mio € Total Budget, 42 month project duration

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Further information about the ReaLCoE Programme can be found on our website: ReaLCoE.eu