

Alternative platform concept specifically designed for stiff-stiff tower

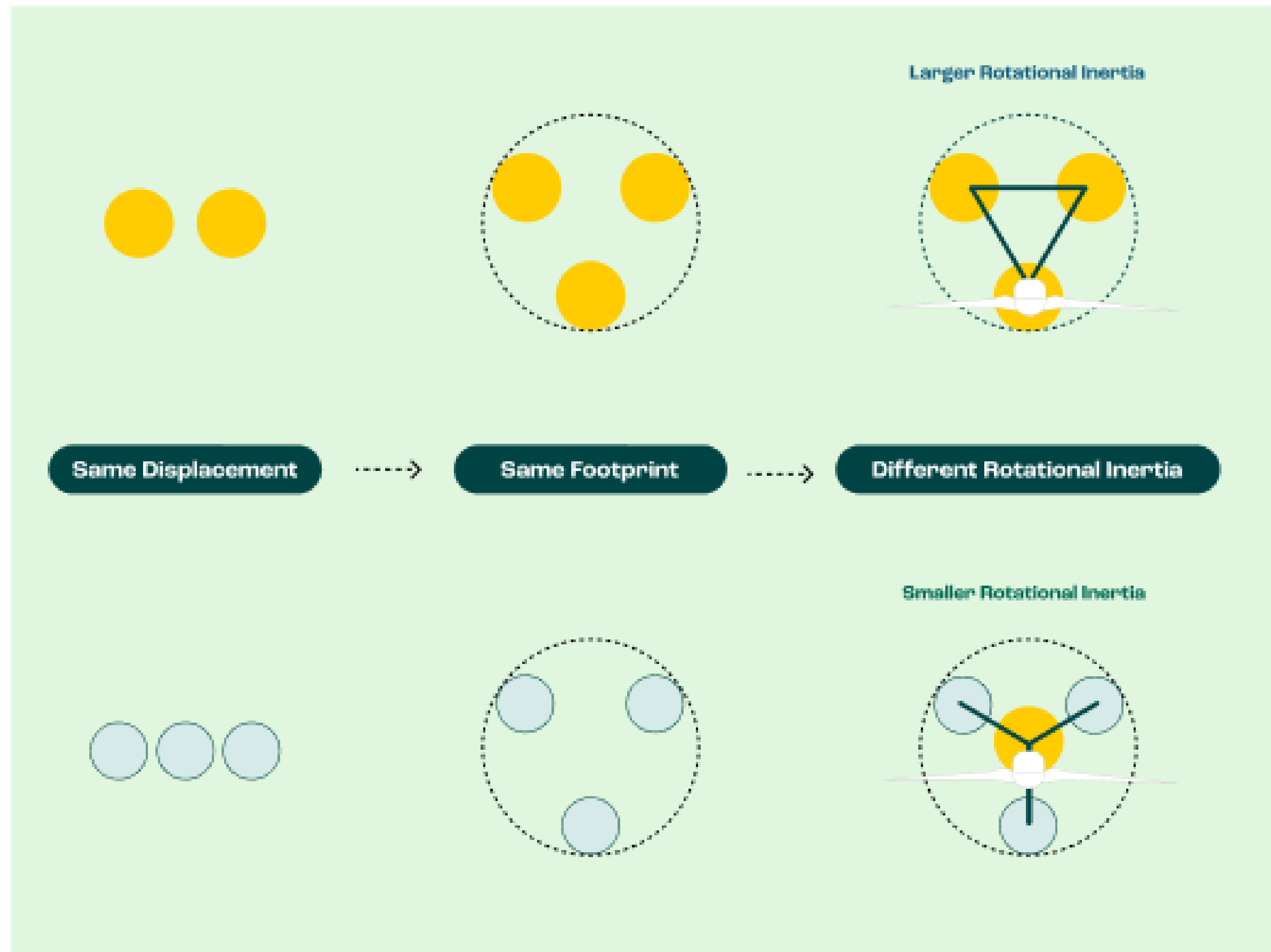
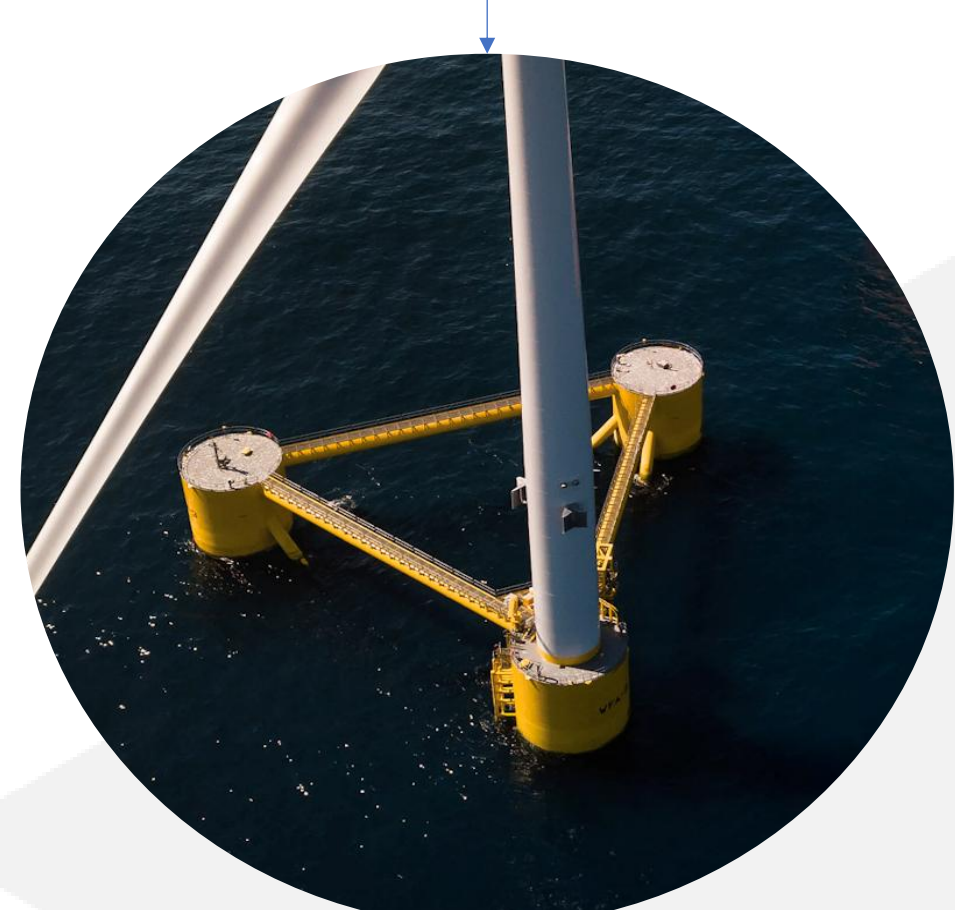


Figure: Rotational inertia of different platform concepts

Below 15 MW – some proven soft-stiff designs

RealCoE project was based on a WindFloat T concept based on a conventional field proven WindFloat Tubular platform concept (similar to the ones currently in operation in Wind Float Atlantic Portugal site (3 x 8.4MW Vestas WTG since 2019) and in Scotland Kincardine site (5 x 9.4MW vestas WTG since 2021) that utilizes a soft-stiff tower design. Beyond its operational capabilities supported by an active ballast system, the concept prioritizes modularity and ease of construction, which streamlines the integration of the platform with the WTG and simplifies towing and installation. The platform's design leverages bankable modules in a compact configuration that minimizes both column size and overall footprint.

PPI Examples of soft-stiff systems



WindFloat T

Tubular Design, with unparallel operational track record



WindFloat F

Flat-panel, pontoon-based solution, with established flat panel construction methods

PPI Examples of stiff-stiff systems



WindFloat TC

Tubular, with center column, optimized for 15+ MW "Stiffer" Towers



WindFloat FC

Flat Panel, center column, optimized for 15+ MW "Stiffer" Towers

Impact of the floater layout on the system eigenfrequencies

In first approach, minimizing the rotational inertias of the floating platform will increase the value of the coupled tower eigenfrequency (i.e. the rate at which the tower on top of the floating foundation undergoes one complete cycle of oscillation in the absence of disturbance).

Center column designs are the most suitable platform designs for this purpose, as they can achieve low rotational inertias (slender columns and smaller footprint around the wind turbine) while still meeting the traditional design requirements for a semisubmersible (stability, resonance periods, weight management, etc.). They are therefore suitable to work in the stiff-stiff design space.

Conversely, perimeter column designs tend to use larger columns and a wider span around the wind turbine in order to satisfy draft and stability requirements. Therefore, they are well suited to the soft-stiff design space, as perimeter column designs tend to have larger rotational inertias that limit the coupled tower eigenfrequency.

Above 15 MW – Transitioning to the stiff-stiff design space

As wind turbine generators increase in size, their rated rotational speed decreases, significantly narrowing the range to locate the coupled tower eigenfrequency. Besides, the higher loads experienced by the turbine created a need for thicker and stiffer towers. These trends led the industry to shift towards the "stiff-stiff" design space for wind turbines of 15+ MW. Consequently, most platform designers are moving to central column designs to enable higher coupled tower eigenfrequencies and leave sufficient margin to the blade passing frequency, aka 3P.

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