NASA Floater

The next generation of floating offshore wind.

The NASA Floater is a University of Maine-led, project within the ARPA-E ATLANTIS program which is developing an ultra-lightweight, corrosion-resistant, concrete floating offshore wind turbine (FOWT), equipped with NASA motion mitigation systems originally developed to reduce vibrations in rockets. By applying this NASA-developed technology in conjunction with Control Co-Design-based optimization methodologies the NASA Floater seeks to counteract typical design-driving FOWT motions, leading to lighter platforms, increased turbine performance, and a lower Levelized Cost of Energy (LCOE).

INNOVATION

- Large-scale 15MW wind turbine genrator (WTG)
- NASA-developed motion mitigation technology
- Concrete hull built using undustrialized production methods
- Significant cost saving by enabling smaller and easier-to-construct floating foundations.

TECHNOLOGY

Program Objectives

- LCOE of 5.4c/kW-hr
- Initial FEED design and cost-estimate
- 1:70 scale model test - check design performance and numerical models
- Successful third-party design review by the American Bureau of Shipping (ABS)
- Reach TRL 4

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COLLABORATION

A team of world-class offshore wind industry experts

Design

Model development, component design, system optimization, controls development and model testing:

- **University of Maine** - project management, technology development, founation design lead, model testing
- **NREL** - 15MW reference WTG and control development
- **NASA** - Motion reduction technology
- **Atkins** - Mechanical system design

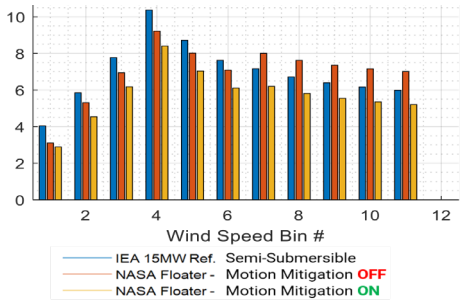
Technical

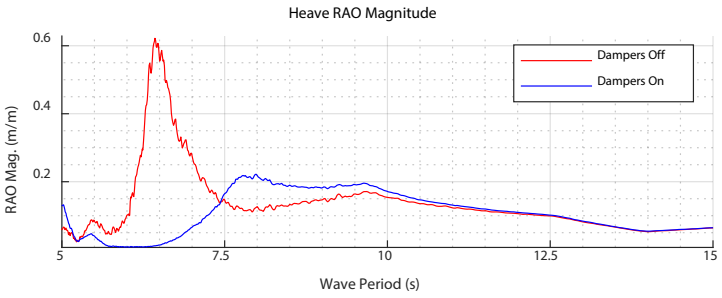
Review of various project outcomes:

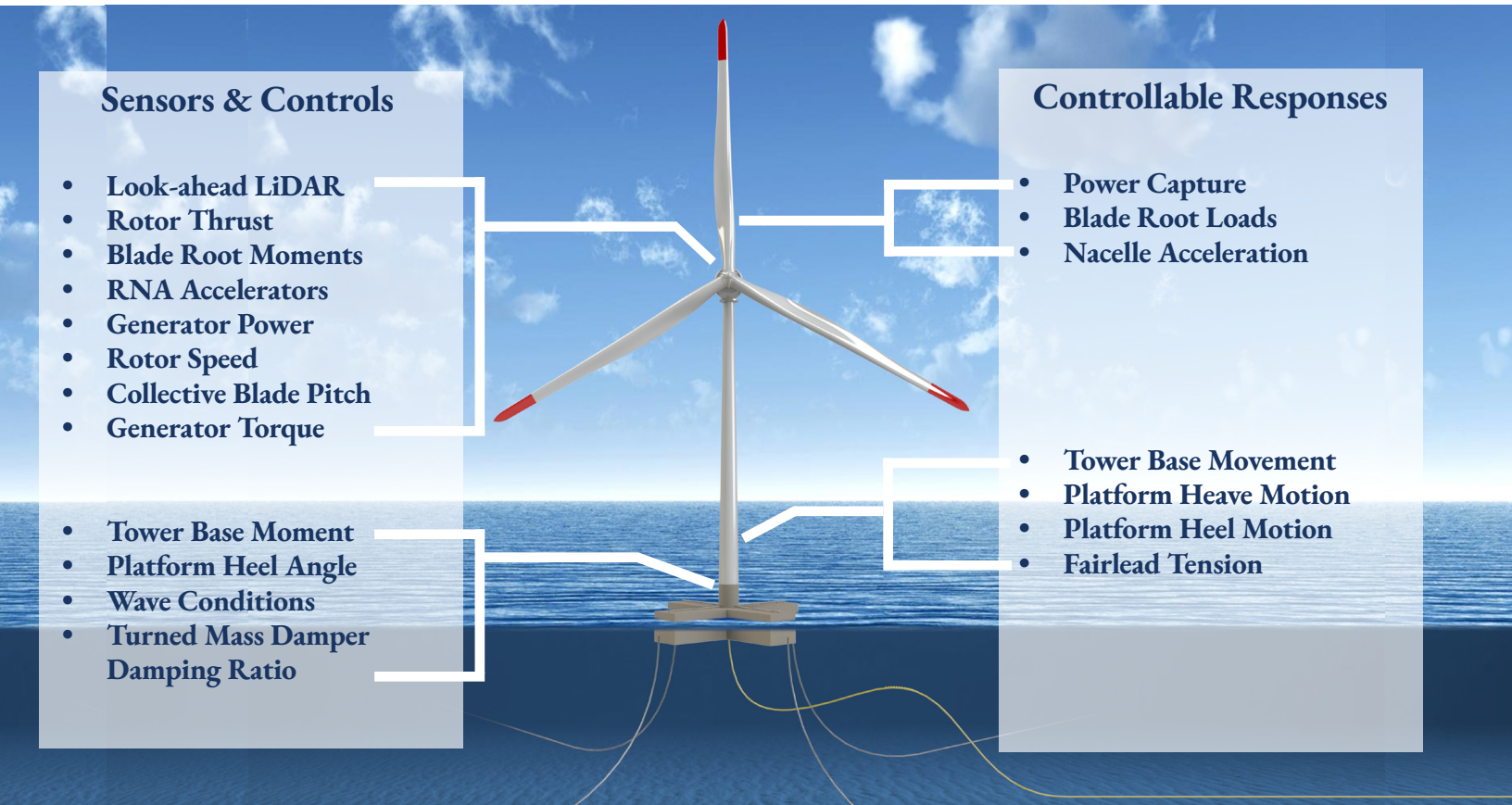
- **ABS** - Third-party design review and approval
- **NREL** - Independant LCOE analysis of final design

Increased System Performance Using Motion Mitigation Technology

The NASA Floater has been designed to minimize LCOE through shrinking the platform size by taking advantage of the platform rigid body motion mitigation capabilities of the NASA damping technology. This results in a smaller platform capable of producing equivalent performance metrics as compared to other traditional hull configurations.







Sensors & Controls

- Look-ahead LiDAR
- Rotor Thrust
- Blade Root Moments
- RNA Accelerators
- Generator Power
- Rotor Speed
- Collective Blade Pitch
- Generator Torque

- Tower Base Moment
- Platform Heel Angle
- Wave Conditions
- Turned Mass Damper Damping Ratio

Controllable Responses

- Power Capture
- Blade Root Loads
- Nacelle Acceleration

- Tower Base Movement
- Platform Heave Motion
- Platform Heel Motion
- Fairlead Tension