

FLOATING OFFSHORE WIND TURBINE

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Introduction

European union in 2009 established that 20% of final energy consumption should be from renewable sources in 2020. In the transition from fossil fuels, wind power is taking the lead increasing at an annual rate of 25%.

A larger percentage of wind power is generated from onshore wind farms. However, wind generated from Offshore wind farms will increase due to reduced available locations and visual pollutions caused by large wind turbines onshore.

Offshore wind is playing an increasingly important role in driving global wind installations, with the sector installing a record 6.1 GW in 2019, accounting for a record share of 10 percent of new installations.^[1]

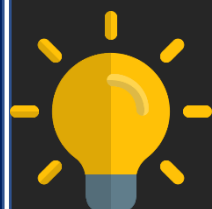
What is a Floating Wind Turbine?

It is an offshore wind turbine mounted on a floating structure that allows the turbine to generate electricity in water depths where fixed foundation turbines cannot be placed.

It stretches over 98ft high and its blade is as wide as a football field

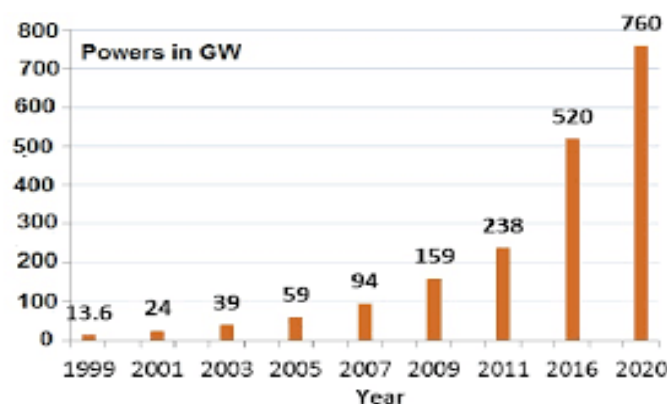
Advantages

- The quality of wind is better offshore
- They do not emit GHG.
- Reduces noise and visual pollution
- More available areas for installation
- Abundant offshore resources
- Potential for lower environmental impact
- Ability to utilize larger turbine designs



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Challenges and Solutions of Floating Offshore Wind Turbine



Global Cumulative Installed Wind Power

Challenges

- Minimization of the cost of electricity, LCOE (Levelized Cost of Electricity)
- Optimization of energy production
- Mitigation of fatigue

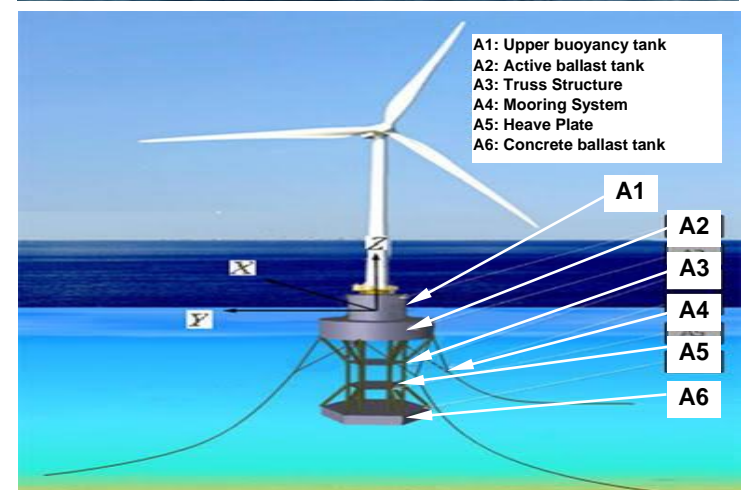
Solutions

- Stability of the floater while being towed to the production site to minimize LCOE
- Optimization of energy production
- Maintenance of the blade swept area perpendicular to the wind direction to mitigation of fatigue
- Control



Solutions to stability

- Damping using a damping pool
- Use of heave plate and ballast
- Light floater weight, Long span and distributed buoyancy while towing



Control

Control is the ability to adjust one or several parameters of an operating system to put this system in a more efficient position. This is used in the production phase.

Control tunes the torque, nacelle and the blade. It shuts down the system in order to keep the system safe from excessive wind.

