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Precast concrete floating platform to support Off-shore deep sea wind turbines

A new system including the design of the platform and erection process has been developed to produce economical and high-reliable floating support to off-shore wind turbines in deep sea waters. A prestressed concrete structure built in a dry-dock, which includes both the floater and the tower is towed to the final position, where it is erected in a simple operation. The nacelle and the turbine can be placed without using a high crane. Partners to further develop the system and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

Off-shore wind energy presents both a huge opportunity to produce energy in places with a high wind resource and a technical challenge due to the harsh conditions in deep sea waters. Most sea borders are practically unable to be a location for seabed fixed wind turbines because there is no continental platform, and the sea depth sharply increases to hundreds of meters. The main interests on going off-shore are the larger wind resource which exists on the sea –usually more than two fold than the existing on-ground– and the almost nil visual impact. Then, there is a necessity to design and produce economical floating platforms to support turbines on deep sea waters. In recent years, several designs have being investigated, mostly inspired in off-shore oil structures, such as TLP (Tension Leg Platform), barge systems and spar buoyancy. The latter is the one which requires less active and mechanical systems, as several international studies have already demonstrated.

The Technology

Right now, most wind off-shore support structures are been built in steel. However, with the increase of the power of the turbines and the need of larger support structures, particularly floating structures, concrete becomes very competitive, as has occurred with the largest on-shore wind towers. In addition, marine conditions allow to move large constructions at a minimum cost and, also, to emerge and partially submerge the platform. The design is based on a monolithic prestressed concrete spar type structure which includes both the floater and the tower, with a total length between 150 and 300 m, depending on turbine's power and the sea environment. The system to place, erect and emerge of the platform is consistent whit the size of the members.

Innovative advantages

- Economical and endurable materials and design.
- Easy and safe tow and erection processes.
- Easy change of the nacelle or other turbine's elements.
- Passive systems with no maintenance unless the turbine.
- Small pitch and yaw displacements in service.

Current stage of development

Complete structural analysis in both service and temporary conditions, and cost analysis have been developed. There is a need for a scale prototype to tune the final design and then, also, full scale prototype.

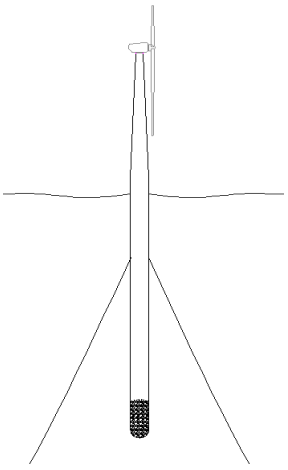
Applications and Target Market

- This novel design is of much interest for energy utilities producing renewable off-shore energy.
- This design can be used throughout the world, in places where off-shore wind turbines have to be supported by floating platforms, offering new sustainability market opportunities.

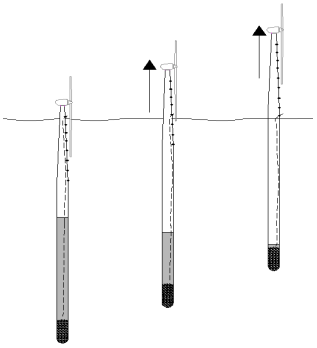
Reference number

MKT2012/0095_E

New complete system to support off-shore floating wind turbines



Economy, reliability and durability; easy moving and placing.



Passive system with almost no maintenance

Small pitch and yaw in service conditions

Business Opportunity
Technology available for licensing with technical cooperation

Patent Status
EP,US, JP, KR application

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