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Wind Energy in the future: the challenge of deep-water wind farms

Francesco Ricciardelli

Department of Engineering, University of Campania "Luigi Vanvitelli", Aversa (CE) Italy
friccia@unicampania.it

ABSTRACT

Recent years have seen a considerable effort towards the development of offshore wind turbine technology, where alongside shallow water turbines, floating turbines have made their appearance; these represent the next challenge in the wind power industry. The offshore wind sector has reached a global installed capacity of more than 18.8 GW at the end of 2017, and is expected to reach 20% of the total installed power by 2020, having started from to 2% in 2005. These figures also reflect the decrease in the costs of offshore wind farms, and the expected shortage of suitable onshore areas for wind generation, especially for densely populated countries or areas prone to high environmental risks. This brought the vision of floating offshore wind energy generation, which has now entered into a prototyping stage. The advantages of floating wind generation are the availability of an almost unlimited resource, together with lower visual and acoustic impact. Moreover, in the deep water environment a larger producibility can be achieved, due to higher winds with lower turbulence. On the other hand, floating offshore wind turbines have the disadvantage of higher complexity and of higher installation, maintenance and decommissioning costs.
Currently, only research prototypes of floating turbines exist. In particular, Hywind is the first prototype wind farm using Spar Buoy (SB) platforms; it is located in the North Sea, off the Scottish coast, featuring five turbines with total installed power of 30 MW. WindFloat is a single Semi-Submersible Platform (SSP) prototype, located in the Atlantic Ocean off the Portuguese coast. Finally, Gicon is a single Tension Leg Platform (TLP) prototype to be installed in the Baltic Sea. Other prototypes are currently being considered for installation.
The current status of the applied research on technical and economic aspects regarding floating offshore wind farm development is tracked.

REFERENCE

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