

Concepts for offshore wind farms

Michiel B. Zaaijer
E-mail: M.B.Zaaijer@lr.tudelft.nl

Wind Energy Research Group
Faculty of Aerospace Engineering
Delft University of Technology
Kluyverweg 1
Room 520, 5th floor
P.O. Box 5058
2600 GB Delft
The Netherlands
Phone: +31 (0)15 278 6426
Fax: +31 (0)15 278 5347



Over several decades wind turbines have evolved to a very commonly applied concept: the horizontal axis turbines with three blades that can pitch and that can rotate at various speeds and a gearbox to increase rotation speed of the generator shaft.

The only serious competitive concept in the market is a direct drive, without gearbox and with a large size low speed generator.

In an offshore environment, these turbines are mounted on a tubular tower, which is mounted in turn on either a gravity base structure or a monopile, which is a cylindrical steel pile foundation. The installation is performed with a jack-up platform or vessel, following more or less the same steps as for an onshore wind turbine.

Although reliability of offshore turbines receives extra attention, operation and maintenance is essentially approached in the same way as for onshore wind turbines, although this approach is complicated by offshore access and low workability.

Much knowledge and experience of both (onshore) wind energy exploitation and offshore engineering is used in offshore wind farms. This gives existing concepts a tremendous head start for this relatively novel application.

However, it is legitimate to ask whether existing concepts are best matched to the exploitation of wind energy in this new environment.

In this research various concepts will be generated and their properties compared, to find the answer to that question. Part of the research is dedicated to finding an appropriate approach to concept design. The results will provide a justification of the current developments or suggest alternative directions with good potential.