Innovative Wind Conversion Systems
10 - 20 MW
FOR OFFSHORE APPLICATIONS

The INNWIND.EU consortium is made up of leading industrial partners, research institutes and universities.

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**Project overview**

The INNWIND.EU project is about innovative wind turbine design.

It will:
- Investigate and demonstrate new designs for 10-20 MW offshore wind turbines and their components.
- Develop methodologies for assessing innovative subsystem and turbine system designs.

**Introduction**

Commercial offshore wind turbines are, currently, predominantly bottom fixed, mainly through monopile, tripod or gravity based sub-structures in waters up to 40 metres deep.

Moving into waters 50 metres deep or more opens huge opportunities for offshore wind power generation and is an important step in meeting Europe’s offshore wind energy targets. Ensuring this innovative technology’s reliability and cost-effectiveness requires new alternatives to the conventional design of wind turbine components.

A previous EU-funded project, UPWIND (www.upwind.eu), demonstrated that the development of large wind turbines (10 MW) is technically feasible but not yet cost-effective. To develop offshore wind farms in deep waters and further from shore, it is more cost-efficient to install turbines with a high rated capacity, 10 MW or more.

INNWIND.EU will build on the UPWIND project to increase cost-effectiveness of deep offshore wind farms by investigating and demonstrating new technologies.

**The project in more detail**

INNWIND.EU will investigate and demonstrate innovative designs for large wind turbines of rated capacities between 10 MW and 20 MW and their key components.

The project will also develop methodologies for assessing innovative designs at the turbine and subsystem levels.

The integrated wind turbine concept will be supported by innovations and demonstrations of the key components of the 20 MW wind turbine:

- **Lightweight direct drive generators**
  Superconducting Direct Drive and magnetic Pseudo Direct Drive (PDD) generators can offer high shear stresses and, thereby, more lightweight and compact machines compared to conventional direct drive generators. Key performance indicators such as size, weight, efficiency and cost will guide the development of a 10-20 MW offshore turbine by striving for decreasing the cost of energy. Demonstrations of down-scaled superconducting poles and a PDD generator are also part of the project.

- **Lightweight rotor**
  with a combination of adaptive characteristics from passive built-in geometrical and structural couplings and active distributed smart sensing and control.

- **Integrated design**
  - Innovative sub-structures with modular construction for mass production;
  - Advanced controls for load mitigation;
  - Water depths of 50 m and beyond.

- **Standard mass-produced integrated tower and substructure**
  simplifying and unifying turbine structural dynamic characteristics at different water depths.