inconvenient. Offshore wind turbines are more complex compared to its onshore counterpart. They are also harder to install and maintain (Bilgili, Yasar & Simsek 2010)

Advantages of offshore wind turbine:

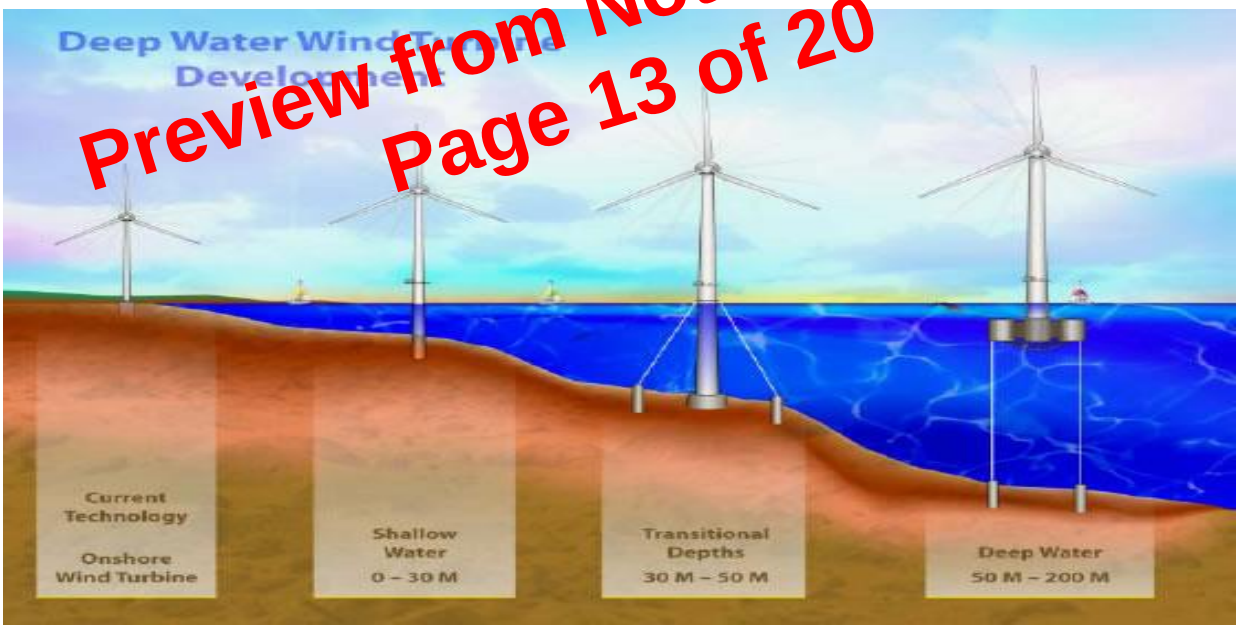
- Receives stronger winds which increases the energy output of the turbine.
- Steadier winds which outputs to a steadier source of energy.

Disadvantages of offshore wind turbine:

- Very difficult to construct as the foundation is on a body of water.
- Waves created damages the structure over time.
- Expensive to have power transmission cables away from where it is being used.

(AGI 2017)

Both the offshore and onshore wind turbines have advantages of a wind turbine which is to harvest renewable energy to produce a clean source of energy that is inexhaustible.



(Miller 2012)

The figure above shows an onshore wind turbine and the different types of offshore wind turbines.

gearboxes or generators, there have been records of turbines catastrophically failing and resulting in complete destruction of units.

Power electronics

Power electronics relates to the components capable of converting mechanical power into electrical power, various manufacturers of wind turbines have different setups. Generally the arrangement of electronical components are dependent on the arrangement of the turbine.

An example would be the difference between direct drive or gearbox turbines. (Morris 2011) Some limiting factors are: the impedance of transmission lines, the grid frequency, and thermal limitations of electricity transfer. All these factors determine the makeup and requirements for power electronics in turbines.

Cooling

The thermal capabilities of components can affect the overall performance of wind turbines, critically it is important to cool and maintain the temperature in high ticket items. The lifetime and overall performance will be improved significantly("Cooling Systems For Wind Turbines")

Diagnostics

Modern wind turbines can be monitored live with Vibrational Analysis, various frequencies can detect defects of big ticket components before damage is caused to the wind turbine, this innovation has resulted in improved utilization and decreased downtime of wind turbines.

Computer maintenance management systems are often used to manage regular maintenance of wind turbines, a wind farm may be monitored similar to a Fleet of vehicles, and the CMMS for short is capable of raising alerts

Anemometers can be fitted to wind turbines to determine wind speeds, recorded wind speed data allows wind turbines to be cut in or out when wind speeds are too low or exceed safe operational limits, these controls can be setup automatically.