

Wind Turbine Technology

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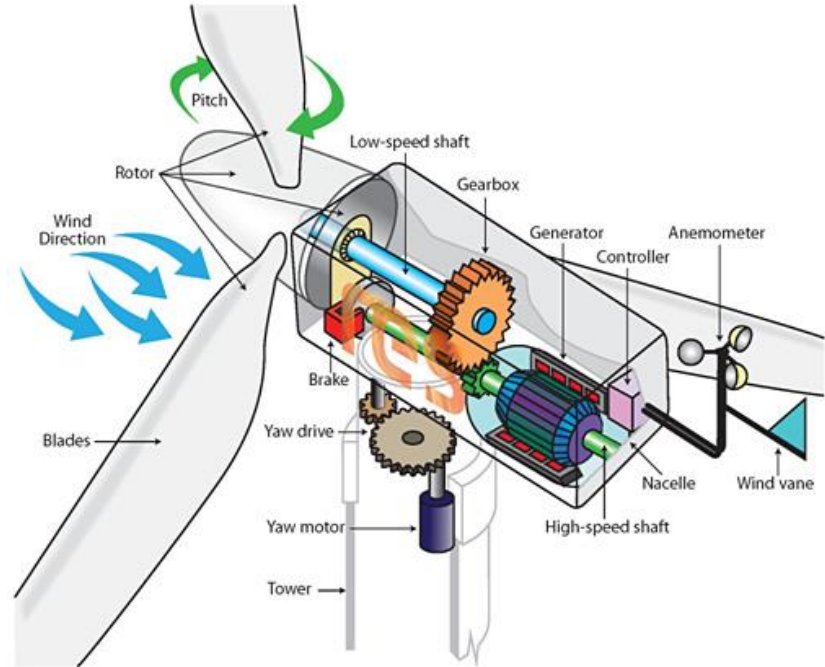
How does a wind turbine work?

Wind Turbines convert energy

- The kinetic energy in the wind applies a force on the blades
- This rotates the rotor which is fixed to a low speed shaft
- A gearbox increases the rotational speed
- The high speed shaft drives a generator which produces electricity
- The voltage is increased using transformers to match the network

Control systems

- Blades can pitch in response to wind speed
- The nacelle rotates to face the wind direction



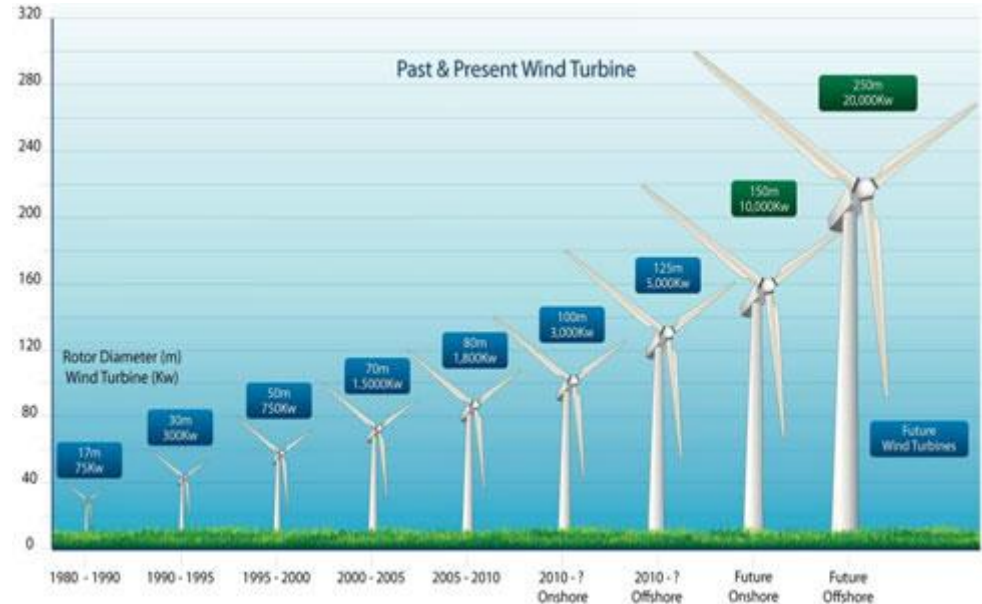
How big are wind turbines?

Wind Turbines have increased in size

- Technological advances have allowed turbines to increase in size
- This has been one of the drivers in reducing the cost of wind energy
- Swept area increases in proportion to the rotor diameter
- Economies of scale have also drive down costs

Approval condition

- Coopers Gap wind turbines will be a maximum of 180m at the tip



How much energy does a wind turbine produce?



Wind Turbine

- Output increases with wind speed
- Wind turbines have a cut-in and cut-out wind speed
- Wind turbines have availability > 98%
- Capacity factor
- One 3.6MW turbine (40% cap factor) produces 12,600 MWh / year = enough to supply 2,200 houses
- Average Household energy use = 5.7 MWh/year
- The carbon footprint is paid back in 3-6 months

Dealing with intermittency

- The National Electricity Market is in a period of transition

