Electricity: Offshore & Onshore Wind

This lever controls the sub-levers listed in the table, and ambition levels are for the end year shown on the right-hand side.

Wind energy is renewable and generates electricity without emitting greenhouse gases, but as with any technology, there are some emissions associated with construction. Wind turbines do not produce energy continuously since production depends on the amount of wind available, making wind an intermittent energy source. In the short term, intermittency can be managed by storage, importing or exporting electricity to other countries, or demand side response (getting customers to turn their electricity usage up or down to match the supply). However, the larger the percentage of intermittent energy on the grid, the harder it is to balance the grid.

There was nearly 10 GW of onshore wind generation in the UK in 2015.. The average size of onshore wind turbines in these projects is 2 MW. Onshore wind requires planning permission, which can face local opposition, but schemes are still being built in Scotland, under permits from the Scottish Executive.

5.1GW of offshore wind capacity was operational in the UK in 2015. The majority of offshore wind turbines in existing windfarms are in the range 2-4 MW capacity, but future projects are seeing proposals for much larger turbines (8 MW or more).

All the offshore wind turbines in operation today have fixed foundations and are suitable up to water depths of 30m for monopile foundations or up to 50m for jackets & tripod foundations. In water depths of 50m or more, floating wind turbines may offer the best solution. Floating wind turbines can operate in deeper waters where the wind resource can be of a higher quality. However, the costs of floating wind are currently not competitive, and technological developments are needed to reduce cost.

Key Interaction

Short term storage helps balance supply and demand, reducing the generation capacity required to meet peaks. Since back up capacity is often fuelled by unabated gas, this can reduce emissions, but will increase the costs of electricity.

Level 1

Wind generating capacity falls to zero, as onshore and offshore wind capacity is retired and not replaced.

Level 2

Wind capacity rises to 22 GW onshore and 55 GW offshore, capable of generating 300 TWh per year.

Level 3

Wind capacity rises to 35 GW onshore and 120 GW offshore[1], capable of generating 600 TWh per year.

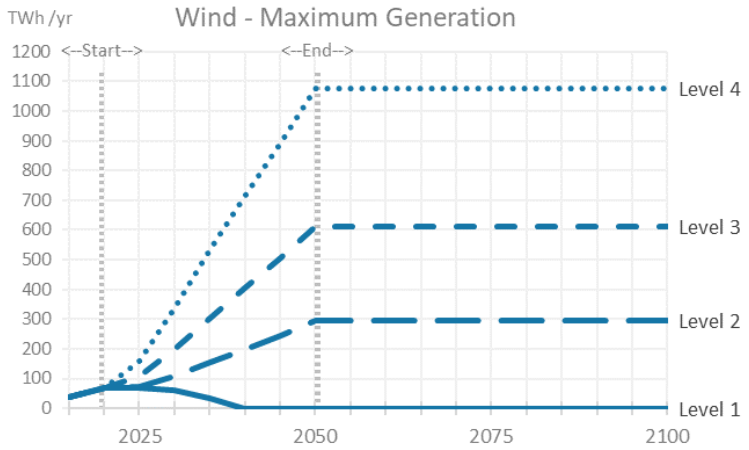
Level 4

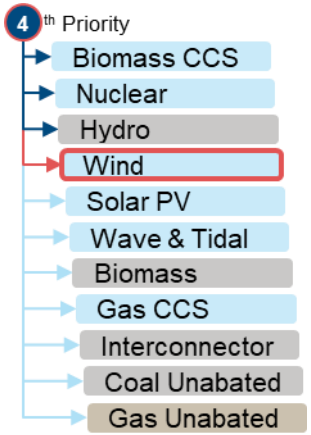
Wind capacity rises to 80 GW onshore and 200 GW offshore[2], capable of generating 1100 TWh per year.

Default Timing

Start year: 2020, End year: 2050

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Onshore Wind Capacity	GW	9.2	0	22	35	80
Offshore Wind Capacity	GW	5.1	0	55	120	200





Lever Priority

Wind power is fourth in the priority order for generating electricity.

Where supply would otherwise exceed demand, measures lower in the priority order will be superseded by those above them.

Unabated gas will meet any shortfall in demand.