

Onshore Wind

In 2007 the UK had around 2 GW of installed onshore wind capacity. This figure excludes small wind turbines (micro and mini turbines), which are considered separately.

Level 1

Level 1 assumes that only turbines that are advanced in the planning process today are built. Onshore wind capacity therefore rises from 3.9 GW in 2010 to a peak of 11 GW at 2025, before falling back to zero in 2050 as the turbines reach the end of their useful life. 11 GW is equivalent to 4400 2.5-MW turbines (slightly bigger than those shown in Figure 1), and generates around 29 TWh/y in 2025.

Level 2

Level 2 assumes that capacity rises to 20 GW in 2030 and is maintained at that level by replacing retired turbines. Level 2 represents a 1 GW/y build rate from 2010 onwards, producing around 8000 2.5-MW turbines by 2030. This would be a five-fold increase in onshore wind compared to 2010. 20 GW of onshore wind turbines generates around 53 TWh/y in 2050.

Level 3

Level 3 assumes that capacity rises to 26 GW by 2025, then to 32 GW by 2050. As Figure 2 shows, level 3 roughly corresponds with the high levels of

deployment in Germany and Spain over the last decade or so. Level 3 assumes that capacity is built at the rate of 1.6 GW/y from 2015 onwards. That means building about 13 000 2.5-MW turbines across the country. The total area of the wind farms would be about 4000 km², or 1.5% of the UK. If 13 000 turbines were spaced evenly alongside all of Britain's motorways, dual carriageways and trunk roads, you would find one every 920 metres. 32 GW of onshore wind turbines generates around 84 TWh/y in 2050.

Level 4

Level 4 assumes that capacity rises to 34 GW by 2025, then to 50 GW by 2050, with a sustained installation rate of about 1000 turbines per year. There are significant interconnection and storage requirements, as discussed in the section on 'Storage, demand shifting and interconnection'. The level 4 output of 132 TWh/y could be delivered by about 20 000 2.5-MW turbines in 2050, although in reality we would expect turbine capacities to increase over that time period. The total area of the wind farms would be about 6000 km², or 2.5% of the UK. If 20 000 turbines were spaced evenly alongside all of Britain's motorways, dual carriageways, and trunk roads, there would be one every 600 metres.



Figure 1. Red Tile wind farm, East Anglia. Each turbine has a capacity of 2 MW

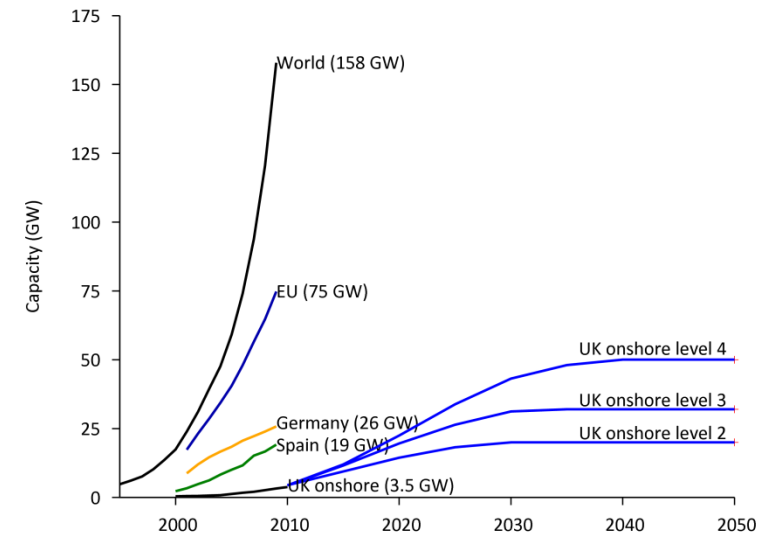


Figure 2. UK onshore wind capacity versus time, historic (to 2010) and assumptions (from 2010 onwards), compared with Spain, Germany, the EU, and world totals.

