Storage, demand shifting and interconnection

To avoid power outages, electricity demand needs to balance with electricity supply at all times. This is a tricky task as both demand and some forms of supply fluctuate throughout any day, over a week and between the seasons. Some electricity generation fluctuates more than others, as for example the supply from renewable sources such as wind and solar depends on the weather and the level of sunshine.

At present Ireland has a number of tools to balance the electricity network, including the north south 100-200 MW interconnector between the Republic of Ireland and Northern Ireland, the 500 MW Moyle interconnector between Northern Ireland and Scotland (reduced to 250 MW in 2011 due to outages), and the 500 MW east-west interconnector between Ireland and Wales.[60] During 2013 the Ireland imported 2.5 TWh and exported 0.4 TWh to the UK.[61]

In addition, Ireland has 300 MW of pumped hydro storage in Turlough Hill, County Wicklow. There is also some ability to shift demand through demand side management (DSM) schemes, which rewards large industrial electricity users for reducing their electricity demand at peak winter hours if the grid has a shortfall in supply. In the future we could have a smart grid that could shift the timing of millions of pieces of demand, to help balance the grid.

Level 1

Level 1 assumes that by 2050 pumped storage capacity increases from 2 GWh to 8 GWh and interconnection capacity increases from 0.8 GW to 1.4 GW for balancing.

Level 2

Level 2 assumes that by 2050 Ireland has developed 1.8 GW of storage, with a storage capacity of 14 GWh, and 1.8 GW of interconnectors. Around 25% of all electric vehicles and plug-in hybrid electric vehicles allow flexible charging, enabling co-ordinated electricity demand shifting.

Level 3

Level 3 assumes that by 2050 Ireland has developed 3.5 GW of (air or hydro) pumped storage, with a storage capacity of 60 GWh, and 2.8 GW of interconnectors. This level also assumes that around 50% of electric cars allow flexible charging for co-ordinated demand shifting.

Level 4

Level 4 assumes that by 2050 Ireland has 5 GW of storage, with a storage capacity of 70 GWh, and 4.8 GW of interconnectors. This level also assumes that around 75% of electric cars allow flexible charging.

Figure 40. The assumed maximum energy that can be kept in pumped storage in GWh.

Note: This energy can be stored and then released many times over a year, and therefore these figures are not directly comparable to the TWh/y charts that appear at the bottom of other sector notes.

The EC's Joint Research Centre estimates that Ireland has up to 100 GWh of realisable pumped hydro energy storage.[62]