

Carbon capture and storage power stations

Carbon capture and storage (CCS) technology captures carbon dioxide (CO₂) from fossil fuel power stations, which is then transported via pipelines and stored in deep underground structures such as depleted oil and gas reservoirs. Up to 90% of the carbon dioxide from a fossil fuel power station could be captured using CCS technology. CCS is unproven on a large scale, as yet.

In the 2050 Calculator the future shape of the CCS sector is determined by two choices:

- the CCS power station build rate (described here) and
- the CCS power station fuel mix (described on another page).

Trajectory 1

Trajectory 1 assumes no CCS plants or retrofitting of CCS technology to power stations.

Trajectory 2

Trajectory 2 assumes that CCS technology is demonstrated successfully and that by 2050 Ireland sequesters between 2.4 and 3.1 million tonnes of CO₂ per year (depending on whether the fuel is gas or coal). 800 MW of available CCS-fitted power plant capacity would be equivalent in size to Ireland's existing coal power station, Moneypoint, and provides around 5 TWh/y of electricity. That means building about 2*500 MW power stations with construction starting in 2040.

Trajectory 3

Trajectory 3 assumes that the Ireland builds 2.3 GW of CCS power station available capacity by 2050 with construction beginning in 2035, which is about 5*500 MW power stations, producing around 15 TWh/y of electricity, comparable to current gas and coal generation in Ireland.

Trajectory 4

Trajectory 4 assumes that Ireland builds 3.5 GW of CCS power stations by 2050, equivalent to around 7*500 MW power stations, producing around 23 TWh/y of output (comparable to current electricity consumption). Construction runs from 2030 to 2050 at a rate of around 200 MW per year. This amount of CCS plant also requires the construction of infrastructure for transporting and storing the captured CO₂ on a large scale.

Interaction with other choices

There is significant demand for CO₂ transport infrastructure and storage capacity in carbon capture and storage power stations. Calculator users may wish to consider these options together to take a view on whether the total demand for CO₂ transport and storage infrastructure is feasible.

Figure 15: Electricity produced and primary energy requirement for CCS under 4 trajectories

