Geosequestration

Geosequestration technologies can remove carbon dioxide (CO_2) directly from the atmosphere and store it in soils, building materials, rocks or other parts of the geochemical system. In 2007 these were new and emerging techniques which did not exist at commercial scale.

Technologies that capture carbon dioxide in power stations and industrial facilities, rather than from the atmosphere are described separately in the Carbon Capture and Storage (CCS) and industry sections.

Level 1

Level 1 assumes that the UK does not implement any geosequestration by 2050.

Level 2

Level 2 assumes that by 2050 about 1 $MtCO_2$ a year is removed from the atmosphere by optimising some processes such as chalk and cement production, to maximise their capture of CO_2; and by burying biochar in soils.

Level 3

Level 3 assumes that by 2050, carbon sequestration machines remove about 30 $MtCO_2$ a year (roughly 4% of the UK's CO_2 emissions in 1990).This might require roughly 60 000 carbon sequestration devices each the size of an upended shipping container and requires a flow of CO_2 into storage equal to half the mass of oil that the UK is currently extracting from the North Sea. The machines might need about 100 TWh/y of energy to power them. This is the amount of electricity produced by 10 nuclear power plants the size of Sizewell B.

Level 4

Level 4 assumes that by 2050, carbon sequestration machines remove 31 $MtCO_2$ a year. Britain also funds large-scale carbon capture in other countries; this overseas carbon capture costs energy but this energy cost does not appear in the 2050 Calculator, which describes UK energy consumption only. The total carbon sequestered in the UK and overseas is around 110 $MtCO_2$ a year.

Interaction with other choices

Electricity is required to power the sequestration machines in levels 3 and 4. If the options chosen for the supply sectors mean greenhouse gases are released in the production of this electricity, then the net sequestration will be lower.

There is significant demand for CO_2 transport infrastructure and storage capacity under three sectors: industry, carbon capture and storage, and geosequestration. Calculator users may wish to consider these options together to take a view on whether the total demand for CO_2 transport and storage infrastructure is feasible.

Figure 1. Professor David Keith at the University of Calgary, standing next to the tower of a prototype carbon sequestration machine, capable of capturing about 1 tonne of CO_2 per day.