# Carbon capture and storage

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## CCS potentially offers a revival of coal power with dramatically reduced carbon emissions. But much is unproven

Carbon capture and storage (CCS) is a new, developing technology that would capture the carbon dioxide (CO2) from fossil fuels either before, during or after combustion in energy generation. The CO2 would then be transported and stored long-term in underground geological formations, such as saline aquifers and depleted oil and gas reservoirs.

### WHY IS CCS NEEDED?

Despite legally binding targets to reduce greenhouse gas emissions, 91.5% of UK energy supply in 2008 was met by use of carbon-intensive fossil fuels.

About a third of UK electricity is generated from coal, but it emits more CO2 per unit of electricity than all other forms of generation: roughly twice that of an equivalent gas-powered station. Tackling emissions from coal is therefore seen as a priority for the UK, and also in India and China, where coal consumption is increasing rapidly.

### COAL

- The UK produced around 18 million tonnes of coal in 2009, compared with 48 million tonnes in 1997 and 122 million tonnes in 1979.
- Most of the UK's coal is now imported, principally from Russia, South Africa and Columbia.
- The IEA predicts that coal demand will nearly double in China and more than double in India by 2030.

Approximately 90% of the CO2 produced by a coal fired power plant could be captured with CCS. Potentially, CCS could help to make up to 20% of the global cuts in emissions needed by 2050.

CCS could also contribute to a diverse energy mix and create economic development opportunities. The Government estimates the first-mover advantage gained from demonstrating CCS technology could bring the UK business worth about £3–6.5 billion a year by 2030. The industry could also sustain up to 60,000 jobs in Britain by 2030.

### WHAT ARE THE CONCERNS?

- Capture: the technology is not yet proven on a large scale and there are no commercial scale integrated CCS power plants.
- Transport: onshore CO2 pipeline transport is proven, but there is limited experience of offshore transportation. A network of pipes at a scale equivalent to the North Sea oil and gas industry to transport the CO2 may be required for CCS to work.
- Storage: techniques for secure storage of CO2 and to remediate serious leaks are still being developed. 7 to 10Gt of CO2 could be stored on the UK Continental Shelf, but such capacity will need to be filled annually for CCS to contribute to 20% global cuts in emissions. Estimates of the UK's saline aquifer capacity are varied, ranging from 20 to over 200Gt.
- Cost: capturing CO2 reduces the efficiency of power plants by approximately 20-25%. The cost of CCS and its associated infrastructure is uncertain. Industry requires significant financial support or some other form of carbon reduction incentive to make the technology commercially viable.
- Reliance on fossil fuels: support for CCS could deter investment in other low carbon energy technologies. If CCS turns out not to be viable, or takes too long to develop, it may inadvertently lead to unabated coal-fired power stations in the longer-term.

### WHAT'S BEING DONE TO SUPPORT CCS?

Two projects are bidding in a competition to receive Government finance for a CCS post-combustion demonstration project: the E.on consortium at Kingsnorth in Kent and the Scottish Power consortium at Longannet in Fife. Completion is expected in 4-6 years' time. A process to select a further three demonstration projects is due to begin later this year and finish in 2011. Other developed countries also have demonstration projects planned.

The *Energy Act 2010* provides for a levy on electricity supplies and suppliers to support CCS demonstration, but further Regulations will be needed. It could raise £9.5 billion over the next two decades and add 2-3% on household electricity bills by 2020.

Under Labour Government policy, any proposals for new combustion-powered generating plants over 300 MW of electricity would have had to demonstrate carbon capture readiness. No new coal plant would have been permitted unless at least 300 MW of the proposed capacity had CCS installed. Whilst the new Government hasn't yet set out this level of detail, it supports CCS and has said that it will continue with the planned public sector investment in CCS technology for four coal-fired power stations.

### THE FUTURE

Broad commercial deployment of CCS is envisaged in the mid 2020s.

Exactly how will CCS be supported? Energy companies have called for urgent Government action to set out the exact legal, regulatory and financial frameworks to enable CCS to become viable.

Do we need an Emissions Performance Standard to limit the amount of CO2 that all power stations could generate? The Conservatives and Liberal Democrats support an EPS, saying it would provide certainty to investors in clean energy. Labour called an EPS "premature", arguing it could deter investment in new coal, given that CCS is still not yet commercially proven.

Does our planning regime allow for CCS in practice? The energy industry argues that it is not possible to conduct a meaningful CCS readiness assessment given the early stage of the technology. It seeks further guidance on how planning bodies will determine such applications.

**CCS could be the invention of the century and the UK could benefit from first-mover advantage. It has been broadly welcomed by industry and the three main political parties alike. However, its future is far from assured. There may be danger in putting all our eggs into one unproven basket and it may not work at all without bold support from Government.**