

Carbon Capture and Storage

Carbon capture and storage (CCS) is a method of reducing carbon dioxide emissions to the atmosphere from sources such as fossil fuel power stations. It involves capturing the carbon dioxide, either before or after burning, transporting it in pipelines or by ship and permanently storing it deep underground in suitable geological formations.

CCS has the potential to reduce carbon dioxide emissions from power stations by around 90%, enabling fossil fuels to continue to be an important element of a secure and diverse low carbon energy supply. The geology under the North Sea is considered to be particularly suitable for storing large quantities of carbon dioxide – equivalent to many years output from all the UK power stations.

The individual elements (capture, transport and storage) are established industrial processes but they have not been put together to create a fully operational CCS chain on a large scale power station. The European Community is funding a number of CCS demonstration projects and there are similar developments in the rest of the world, notably in the USA, Australia and China.



Government policies to implement CCS

The Climate Change Act 2008 created a legally binding target to reduce the UK's emissions of greenhouse gases to at least 80% below 1990 levels by 2050.

The Government believes that CCS has the potential to be an important technology in climate change mitigation. It therefore has a number of activities underway to support the demonstration of CCS technology and facilitate its development in the UK.

In May 2010, the coalition programme confirmed continuing support for a programme of 4 commercial scale CCS demonstration projects and a commitment to introducing an emissions performance standard (EPS) that will prevent coal-fired power stations being built unless they are equipped with sufficient CCS.

In July 2010 the Government indicated that it will consider whether CCS on gas-fired, as well as coal-fired power stations, would prove beneficial and add value to the CCS demonstration programme.

The October 2010 spending review confirmed funding of up to £1bn from general public spending for the first demonstration project. A decision on the funding mechanism for projects 2-4 will be made following the outcome of the planned consultation on electricity market reform.

The Environment Agency's role

Environmental Permitting Regulations (EPR)

We are responsible for regulating all large fossil fuel power stations under EPR. The permit regulates the operation of the installation and all the emissions apart from carbon dioxide. Operators must report their emissions to us and we publish the data. We use EPR to implement the requirements of the EC Large Combustion Plants Directive (such as reducing NO_x and SO_x releases) and the EC Integrated Pollution Prevention and Control (IPPC) Directive which requires the use of "Best Available Techniques" (BAT) to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole".

In September 2010 the Government launched a consultation on transposing the requirements of the EC CCS directive that will make the operation of a carbon dioxide capture plant an EPR activity in its own right.

Several existing power stations have proposals to build small carbon capture pilot plants that will allow them to test the chemicals used to absorb carbon dioxide but will not involve its transport or storage. We will regulate the environmental impact of these by issuing a variation to their EPR permit. Similarly, if any existing power stations want to build a CCS demonstration plant we will regulate the environmental effects by issuing a variation to their EPR permit.

Several operators have proposals to build new coal-fired power stations using both pre-combustion and post-combustion CCS technology. We will regulate the environmental impact of these by issuing a new EPR permit.

Several operators have proposals to carry out underground coal gasification (UCG), a process has not been carried out in the UK since trials in the 1950s. This will be an EPR activity that we will regulate by issuing an EPR permit. If the syngas produced by UCG is used to generate electricity then CCS will be required. For more details see our factsheet on UCG.

EU Emissions Trading System (EUETS)

Since 2005, all power stations over 20MW and other energy intensive industrial installations must apply to us for an EUETS permit. They have to monitor and report their carbon dioxide releases on an annual basis and we verify their data.

Phase III of the EUETS will come into force in January 2013 and will require the operators of carbon dioxide capture, transport and storage activities to have an EUETS permit.

Control of Major Accident Hazards (COMAH) regulations

These regulations apply to establishments that store large quantities of dangerous substances and implement the requirements of the EC Seveso Directive. We are the joint regulator with the Health and Safety Executive (HSE). The regulations already apply to some fossil fuel power stations and may apply to more stations when carbon capture equipment is installed because they will store and use additional chemicals in sufficient quantities to exceed the thresholds set in the COMAH regulations.

Carbon Capture Ready (CCR)

In April 2009 the Government introduced a policy requiring any new fossil fuel power station to be built "carbon capture ready", so that CCS can be retrofitted at a later date. Under the Planning Act 2008, applications to build new power stations have to be submitted to the Infrastructure Planning Commission. We are advising them on some CCR aspects of each application they receive - whether the station has been designed appropriately and if it has sufficient space available.

Our future role on CCS

There are a number of additional CCS roles that we might carry out including: advising on the technical aspects of carbon capture plant on section 36 applications for new power stations, monitoring and technical advice for demonstration projects, advising when CCS is proven technology and implementing an emissions performance standard. The Government will decide how these issues will be handled following the consultation on electricity market reform in Autumn 2010 and the white paper due to be published in April 2011.

CCS factsheet - updated November 2010

We have major responsibilities for helping to limit greenhouse gas emissions and adapt to climate change in England and Wales. We also administer schemes that cover a large proportion of the UK's greenhouse gas emissions, and play a leading role in reducing the risks from climate change, such as increased flooding, drought, and sea level rise.

For more information, visit our website <http://www.environment-agency.gov.uk/> or contact the Climate Change Team on 08708 506 506 or enquiries@environment-agency.gov.uk