

# Limiting climate change

## Underground Coal Gasification

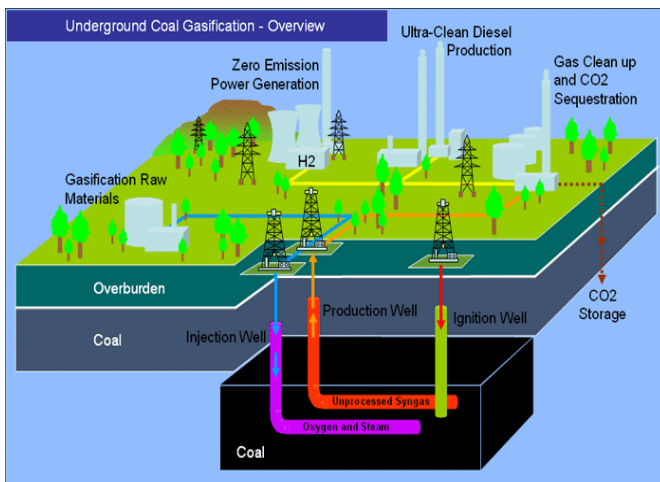


Diagram courtesy of UCG Association

Underground coal gasification (UCG) is carried out in-situ, by drilling boreholes into the coal seam, injecting water/oxygen mixtures down one pipe, igniting and partially combusting the coal and extracting the gasification products (known as syngas) through another pipe. It produces a mixture of gases, (mostly carbon monoxide, carbon dioxide, hydrogen and methane) that can be processed to provide fuels for power generation, vehicle fuels and chemical feed-stocks.

UCG has not been carried out in the UK since trials in Derbyshire in the 1950s. There has recently been increased interest because of rising energy costs and security of supply concerns. There are large UK

coal reserves that are suitable for UCG and cannot be accessed by conventional mining. The UK Government supports UCG and in 2009 the Coal Authority started issuing exploration licences. Operators and trade associations have approached us for advice on UCG operations.

### UCG and Carbon Capture and Storage

It is UK Government policy that carbon capture and storage (CCS) will be required if the syngas is used for power generation. CCS reduces carbon dioxide emissions to the atmosphere by capturing the carbon dioxide, transporting it in pipelines or by ship and storing it underground in empty oil and gas fields, coal seams or deep saline aquifers. UCG with CCS would involve converting the syngas into a mixture of carbon dioxide and hydrogen. The carbon dioxide would be separated leaving the hydrogen to be used as a fuel to generate electricity. UCG with CCS would reduce the UK emissions of greenhouse gases. For more details see our factsheet on CCS.

However, at the present time, if the syngas is not used for power generation (e.g. used for vehicle fuel) then CCS will not be required.

## **The Environment Agency's role**

### **Water Resources Act (WRA)**

Before a company can drill a borehole to explore for coal they must notify us under WRA. We may serve a conservation notice to ensure that the drilling activities do not damage the environment or groundwater resources.

### **Environmental Permitting Regulations (EPR)**

We are responsible for regulating coal gasification, syngas refining and 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 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". Although we have not regulated UCG before, we do have many years experience of regulating coal gasification and syngas refining at steelworks, and of regulating coal fired power stations.

Operators might want to carry out trial burns to confirm the suitability of a coal seam for UCG before they commit themselves to the expense of building the syngas processing equipment. These trials

are likely to require an environmental permit. If the trial is successful the operator could apply for a variation to the permit that will allow them to move into full scale production.

### **EU Emissions Trading System (EUETS)**

Since 2005, all power stations over 20MWth and other energy intensive industrial installations must apply to us for a greenhouse gas emissions permit. UCG operators may need a permit, which will require them to monitor their emissions and report them to us. We then verify their data.

### **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 will apply to UCG establishments storing large quantities of oxygen, carbon monoxide or hydrogen. Alternatively the operator may reduce the risk of a major accident by designing the process so that the quantities of dangerous substances are below the COMAH thresholds.

For further details about the underground coal gasification technology visit the website of the trade association, the UCG Association at [www.ucgp.com](http://www.ucgp.com)

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