

# CO<sub>2</sub> Capture and Storage

Directorate-General  
for Energy



- **DEMONSTRATION PROJECTS**  
supported by the European Energy  
Programme for Recovery (EEPR)

## €1 billion to six CO<sub>2</sub> Capture and Storage Projects

In response to the economic crisis, the European Council and the European Parliament adopted the Commission proposal for a European Energy Programme for Recovery (EPR) in July 2009. The EPR funds projects in the field of gas and electricity infrastructure as well as offshore wind energy and CO<sub>2</sub> capture and storage (CCS). 12 CCS projects applied for assistance under the EPR. In December 2009, the European Commission granted financial assistance to six projects that could make substantial progress with project development in 2010. These projects will receive overall funding of €1 billion under the EPR.

Instead of being released to the atmosphere, CO<sub>2</sub> is captured during the generation of energy



## Why fund CCS projects?

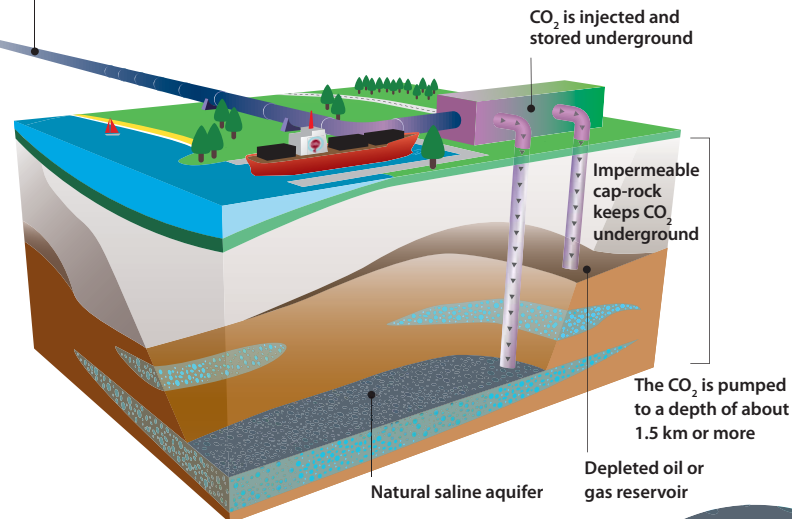
The groundbreaking CCS technology represents a potentially powerful instrument for fighting climate change by minimising CO<sub>2</sub> emissions from fossil fuel power plants and heavy industry (e.g. cement, steel and chemicals). The International Energy Agency (IEA) considers CCS technology as essential to ensure global temperature increases remain under 2°C. While the different components of CCS technology are proven, the full CCS chain has not yet been demonstrated on a commercial scale. The next milestone is to prove its technical and economic viability on large-scale power plants. In this respect, the EPR support will be decisive in facilitating wider demonstration of CCS technologies in Europe.

## CCS Technology

CCS technology can capture approximately 80-90% of CO<sub>2</sub> emissions produced by coal power plants and heavy industry, transport them in liquid form by pipeline or ship, and subsequently inject them into geological formations deep underground where they are stored permanently below the earth's surface. CO<sub>2</sub> can be captured using three existing technologies: pre-combustion, post-combustion or oxyfuel combustion.



The distance between the power station and the CCS storage facility can extend to distances of over 500 kilometres



CO<sub>2</sub> is injected and stored underground

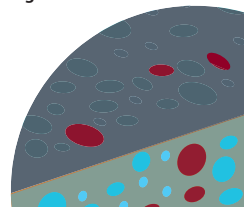
Impermeable cap-rock keeps CO<sub>2</sub> underground

The CO<sub>2</sub> is pumped to a depth of about 1.5 km or more

Depleted oil or gas reservoir

Natural saline aquifer

CO<sub>2</sub> becomes stabilised within the porous rock as it forms natural compounds with the surrounding brine and minerals





## The European Energy Programme for Recovery (EPR) Projects

### Hatfield, United Kingdom

The aim of the Hatfield project is to demonstrate the innovative integrated gasification combined cycle (IGCC) technology on a new 900 MW power plant at a 91% CO<sub>2</sub> emissions capture rate. The transport infrastructure will be developed as a 'backbone' multi-user pipeline that could transport CO<sub>2</sub> from other sources in the future. It is estimated that up to five million tonnes of CO<sub>2</sub> will be stored by the Hatfield project per year. This plant is located in the Humber region in northern England – an industrial cluster that has the potential of developing to deliver a total of 40 million tonnes of CO<sub>2</sub> stored per year.

### Rotterdam, The Netherlands

The Rotterdam project aims to demonstrate the full chain of CCS on a 250 MW coal-fired power plant. The chosen technology is post-combustion capture at a 90% CO<sub>2</sub> emissions capture rate. It will capture approximately four tonnes of CO<sub>2</sub> per day. The captured CO<sub>2</sub> will be transported to an offshore depleted gas field located 25km from the CCS plant. It is estimated that 1.1 million tonnes of CO<sub>2</sub> will be stored per year.

### Compostilla, Spain

The Compostilla project aims to demonstrate the full CCS chain, using oxyfuel capture technology and circulating fluidised bed technology. This technology will first be tested on a new 30 MW coal-fired pilot plant that will be scaled to a demonstration plant of about 323 MW by the end of 2015. The CO<sub>2</sub> emissions capture rate is expected to be 91%. Captured CO<sub>2</sub> will be stored in a nearby saline aquifer. It is estimated that five million tonnes of CO<sub>2</sub> will be stored during the first five years of operation.

### Porto Tolle, Italy

The Porto Tolle project aims to install CCS technology on a new 660 MW coal power plant to be built in order to replace an existing oil-fired facility. The post-combustion capture concept will be demonstrated on 250 MW and will treat flue gas from the co-firing of coal with biomass (up to 5% of thermal input). The CO<sub>2</sub> emissions capture rate is expected to be over 90%. CO<sub>2</sub> will then be transported to an offshore saline aquifer and injected underground. It is estimated that one million tonnes of CO<sub>2</sub> will be stored per year.

## SELECTED PROJECTS CO<sub>2</sub> CAPTURE AND STORAGE



### Bełchatów, Poland

The Bełchatów project aims to demonstrate the full CCS chain on a new 250 MW supercritical unit that is part of the existing coal-fired power plant. The capture technology is post-combustion whereby the flue gas from the boiler is treated to separate the CO<sub>2</sub> from other gases. The CO<sub>2</sub> emissions capture rate will be in excess of 80%. The compressed CO<sub>2</sub> will be transported by pipeline for sequestration in an underground saline aquifer. It is estimated that more than one million tonnes of CO<sub>2</sub> will be stored per year.

### Jänschwalde, Germany

The project in Jänschwalde aims to demonstrate both oxyfuel and post-combustion capture. The 385 MW demonstration plant will be integrated into the existing lignite power plant Jänschwalde. Producing approx. 2.7 million tonnes of liquified CO<sub>2</sub> per year, this CCS unit will be connected to the grid in 2015 at the latest. The CO<sub>2</sub> emissions capture rate for both the oxyfuel and the post-combustion process is expected to be in excess of 90%. A potential storage site for the captured CO<sub>2</sub> has been found in a depleted natural gas field; another viable option is to store the gas in saline aquifers.



## The European CCS Demonstration Project Network

Under the EEPR initiative, the six funded projects will be required to share and disseminate effectively some of the key results of their technological advances and project progress. To encourage and facilitate knowledge sharing among the EEPR projects and other European CCS projects, the European Commission initiated the European CCS Demonstration Project Network. The Network will use this knowledge to increase public understanding of the potential of CCS. This will accelerate learning and ensure that CCS can be safely implemented on a wide scale, both in the European Union and in cooperation with international partners.

For more information on the CCS Network, please consult:  
**[www.ccsnetwork.eu](http://www.ccsnetwork.eu)**

For additional information on the EEPR, please consult:  
**<http://ec.europa.eu/energy/eepr/>**

© Photos courtesy of: Vattenfall Europe AG



■ Publications Office