

# Terms and Concepts

This Information Sheet describes the main technical terms and processes that are used in discussing Carbon Dioxide Capture and Storage (CCS). It is not a complete explanation of every component, but covers most of those that are needed to give you a good introduction to the processes involved in CCS.

## Carbon

Carbon is one of the basic building blocks of life on Earth; humans and other animals are all carbon based, and as an example, humans are about 18% (or just under one fifth) carbon.

Because of its role in creating and forming life, carbon is continually on the move, being absorbed and released by living things during life, growth, and finally death. This movement of carbon into different places and things is referred to as the Carbon Cycle, and describes how the carbon can move from one location to another; from a living animal or plant, through decomposition into gas form into the atmosphere, before being reabsorbed by plants breathing, or by the sea or other water bodies.

## Carbon Dioxide - CO<sub>2</sub>

This is what CCS is all about: carbon dioxide. CO<sub>2</sub> is a gas made up of carbon and oxygen. It is a large component of what humans and other animals breathe out, and what plants breathe in. In return, plants breathe out oxygen, and humans and animals breathe this in, completing part of a cycle.

CO<sub>2</sub> is also released by burning fossil fuels (see below) in generating electricity, and this is the main focus of CCS; capturing this and preventing it from being released into the atmosphere.

## The Greenhouse Effect

Closely linked with both global warming and climate change, the greenhouse effect is what causes these to occur.

The 'greenhouse effect' is so called because the effect is exactly like being in a greenhouse where the glass prevents heat escaping back out, whereas in the atmosphere it is gases such as CO<sub>2</sub>. There are a few other gases that have the same effect, but the impact of CO<sub>2</sub> is greater, and more directly linked to human activity. These gases are collectively known as greenhouse gases because of the role they play in this process.

The greenhouse effect is important; without it, life on this planet would not have been possible, but the impact humans are having on the amount of CO<sub>2</sub> in the atmosphere is increasing this effect beyond the Earth's capability to correct it. Since the industrial revolution in the 1800's, the

amount of CO<sub>2</sub> in the atmosphere has increased greatly, as a direct result of burning fossil fuels like coal, oil and gas. We need to reduce the amount of CO<sub>2</sub> released by the burning of these fossil fuels, but of course we cannot instantly reduce the amount of electricity used by humans, so we need to find a way to remove the CO<sub>2</sub> from the exhaust gases from power stations; hence the need for CCS.

## Carbon Dioxide Capture and Storage (CCS)

CCS is the name given to the process where CO<sub>2</sub> is captured from power stations or other sources, transported via pipelines or ships and injected into storage formations deep underground preventing the greenhouse gases from reaching the atmosphere and contributing to the greenhouse effect.

## Fossil Fuels

Coal, oil and gas are fossil fuels. These fuels were created when organisms died on the Earth's surface and were subsequently buried by geological processes over millions of years. Different fossil fuels are created depending on which living things have been buried and the processes they are exposed to over a very long period of time. All of these carbon-rich materials can be burned as a fuel to produce energy. Currently, over 80% of the world's energy comes from burning fossil fuels.

## Coal

Coal was formed by the burial of ancient forests under water (swamps and lakes). Over millions of years, the plant material was gradually compressed and heated in an environment where it was unable to decay. Coal is the world's second largest source of energy, providing 30% of the total supply. Due to the scale of its use and the large amount of carbon it contains, burning coal is the largest source of CO<sub>2</sub> emissions to the atmosphere from human activity, at 40% of the total.

## Oil

Oil was formed from large quantities of tiny sea based organisms (such as algae) that have been buried under layers of other rocks over hundreds of millions of years, and subjected to high heat and pressure deep underground.

Around 4 billion tonnes of oil is produced and used each year, making it the third largest source of human CO<sub>2</sub> emissions, at 18% of the total.

