

CCS IN EUROPE

CCS projects have been operating successfully across the world since the mid-1990s. As of November 2014, there were 22 large-scale projects in operation or construction – a 50% increase since 2011. These have the capacity to capture up to 40 million tonnes of CO₂ per annum, equivalent to 8 million cars being taken off the road every year. The first commercially-viable power sector CCS projects in Europe could be in operation before the end of the decade. Significant projects include:

Sleipner and Snøhvit in Norway: The Sleipner project has captured nearly 1 million tonnes of CO₂ a year since 1996 from gas production and injected it into a deep saline formation under the North Sea. CCS technology also operates on a Liquefied Natural Gas plant in Snøhvit, storing up to 700,000 tonnes of CO₂ per year in a depleted natural gas reservoir deep below the seabed.

White Rose and Peterhead projects in the UK:

White Rose will capture CO₂ from a coal/biomass facility, while Peterhead will capture CO₂ from a gas fired power plant. In total, these projects will capture and store approximately 3 million tonnes per annum of CO₂ in the North Sea. Both projects are currently progressing through detailed engineering studies with the support of the UK Government.

ROAD in the Netherlands: This project will capture CO₂ from a new power plant located on the Maasvlakte and store it in a depleted gas reservoir in the North Sea. It aims to capture 1.1 million tonnes of CO₂ per year.

The transition from high-carbon to low carbon economy is underway around Europe. But to effectively tackle climate change, the transition must be rapid. Experience gained from large demonstration projects will be essential, both to perfecting technical solutions and driving down costs. Ultimately, a huge scale-up of CCS in Europe is required if we are to make a meaningful impact on global emissions whilst maintaining a competitive EU economy.

Carbon Capture and Storage Association

Tel: +44 (0) 20 3031 8750 | email: info@ccsassociation.org

CCS IN EUROPE

A QUICK GUIDE

Carbon capture and storage (CCS) is an integrated suite of technologies which prevent large quantities of carbon dioxide from being released into the atmosphere.

CCS^a

CCS^a

Carbon Capture and Storage Association

Tel: +44 (0) 20 3031 8750 | email: info@ccsassociation.org

EUROPE HAS A UNIQUE COMBINATION OF PHYSICAL AND HUMAN ASSETS TO DEVELOP CCS, PROVIDING THE OPPORTUNITY TO BECOME A GLOBAL LEADER IN THE CCS SECTOR.

WHAT IS CCS?

Carbon dioxide (CO₂) is captured – typically from power plants or CO₂ intensive industries – before it is released into the atmosphere. CCS promises to achieve large emission reductions across a wide range of sectors and is widely considered a key option in tackling climate change. The Intergovernmental Panel on Climate Change recently identified CCS as an essential low-carbon technology needed to help cost-effectively decarbonise the global power sector – without it, the total cost of limiting CO₂ emissions could increase by 138%.

CCS involves three main stages:

- **Capture:** The separation and capture of CO₂ produced at large industrial process facilities such as power plants and CO₂ intensive industries such as steel and cement production plants.
- **Transport:** CO₂ is compressed and transported via pipelines or ships. This requires a network similar to those that exist today for transporting natural gas. Thousands of kilometres of CO₂ pipeline are already in operation around the world, enabling proven and safe transport at long distance.
- **Storage:** CO₂ is currently stored safely in carefully chosen offshore and onshore sites across the world. Europe has the potential to develop large and convenient offshore CO₂ storage, optimally located for major industrial and emission intensive clusters e.g. the North Sea region. CO₂ storage is not dissimilar to stores of gas found in nature – before extraction, natural gas is in permanent storage, trapped underground for millions of years.

All aspects of CCS technology have been undertaken successfully at scale across the world for many years and open up opportunities for carbon utilisation. Europe has a unique combination of physical and human assets to develop CCS, providing the opportunity to become a global leader in the CCS sector. The task for industry and government is to ensure that CCS is deployed on a wide scale; thereby achieving cost reductions and contributing to significant CO₂ reductions.

WHY CCS?

- **Tackling climate change:** According to the International Energy Agency, to achieve a 50% cut in global CO₂ emissions by 2050, CCS will need to contribute nearly 20% of CO₂ reductions. This means around 900 GW of total installed CCS power generation capacity is needed globally by 2050; which is around 1000 power stations.
- **Enabling renewables as part of a diverse energy mix:** CCS is complementary to other low carbon technologies and will be an essential component of a mixed energy portfolio. With an increase in intermittent generation from renewables there will be a need to develop complementary sources of dispatchable low-carbon electricity such as CCS.
- **Energy security:** In order to ensure a prosperous and competitive European economy, it's important to maintain a role for indigenous fossil fuels and ensure a diverse supply of energy. Fossil fuels still supply 80% of our global energy needs and this doesn't look set to change soon: CCS will be vital if we are to retain fossil fuels in our energy mix.
- **Lower energy costs:** Including CCS in Europe's future decarbonised energy portfolio is the least cost pathway to decarbonisation. Energy Technologies Institute analysis shows that in a decarbonised world, including CCS in the energy mix can deliver substantial reductions in the wholesale energy price of electricity in 2030 compared to scenarios where CCS is not included alongside other low-carbon technologies. This translates into lower electricity bills for households and industrial consumers. The International Energy Agency has also highlighted CCS as one of six crucial technologies for battling climate change.
- **Industrial competitiveness:** In some cases, CCS is the only viable technology for reducing emissions from vital energy intensive industries (ranging from iron and steel to chemicals, cement and refineries) and ensuring that they remain competitive. 40% of the world's CO₂ emissions come from such industrial activity. By 2050, industrial CCS offers to reduce CO₂ emissions by 0.4Gt across Europe.
- **European jobs opportunity:** An average CCS power plant (new-build) generates up to 2500 jobs during the construction period, and 200–300 longer term jobs in operation and maintenance. Additionally, industrial CCS will protect a significant number of existing jobs across energy intensive industries and reduce the risk of carbon leakage.
- **European export opportunity:** Early deployment will return Europe to the forefront of global CCS leadership, opening up substantial export opportunities. Additionally each CCS project delivers significant GVA benefits, creating a market worth over 125 billion Euros/year from 2020 – particularly in the US, China and India.

EARLY DEPLOYMENT WILL RETURN EUROPE TO THE FOREFRONT OF GLOBAL CCS LEADERSHIP, OPENING UP SUBSTANTIAL EXPORT OPPORTUNITIES.