

Energy and infrastructure key facts 2015-16

UK Carbon Capture and Storage



Carbon capture and storage: essential infrastructure in a low carbon world

What is CCS?

Carbon Capture and Storage (CCS) involves removing CO₂ from the exhaust of power plants and industrial processes, transporting it via pipelines or ships, and then pumping it more than a kilometre underground into stable geological formations where

it is stored permanently like the oil and natural gas accumulations of the North Sea.

Essential infrastructure

Enabling investment in the independent development of CO₂ transport and storage infrastructure projects which can follow on from first-of-a-kind full chain CCS projects will be key to achieving a lowest cost decarbonisation pathway for the UK to meet its climate change emissions targets by 2050.

Critical to the deployment of CCS, however, is the availability of de-risked storage sites in advance of source capture projects being able to take their Final Investment Decisions.

At the moment, there is no economic incentive for developers to do this. Therefore, investment in these activities is unlikely to occur without government support, including a mixture of additional policies and mechanisms beyond those purely designed to reform the domestic electricity market.

The Crown Estate is developing a methodology with Imperial College London for understanding the value of different transport and storage infrastructure investment options. This approach recognises the value-creation potential resulting from decision makers' active management of their choices and investments over time, thereby setting up a virtuous cycle that optimises the timing of storage appraisal and construction of capture facilities.

CO₂ in the subsurface

Working with Durham and Herriot Watt Universities, we are looking at how CO₂ behaves and flows in geological formations more than a kilometre under the seabed.

We are researching and investigating sub-surface injection and fluid flow processes to understand the uncertainties that have the biggest impact on costs for next phase of storage infrastructure.

The lower cost results from the benefit of CCS in industry, flexible low carbon fuels (for transport and heating), power generation and "negative emissions" using biomass. The value of CCS comes from providing secure low carbon base load and back-up power generation as well as it being the only known way to abate emissions from industries such as steel making, cement, and fertiliser production.

The Goldeneye depleted gas field (platform pictured) is an example of infrastructure that is planned to be converted to use for CO₂ storage operations.

Storage appraisal

The first full chain CCS projects in the UK will, when built, create the beginnings of an offshore transport and storage infrastructure that will have excess pipeline capacity providing scope for future storage expansion.

CO₂Stored®



In partnership with the British Geological Survey we develop and steward an online website database and interactive mapping tool known as CO₂Stored®, which offers unprecedented access to information for developers on where carbon dioxide (CO₂) can be stored around the UK continental shelf.

This £1 million project to 2018 aims to help government and industry make informed decisions about how to best develop CCS infrastructure.



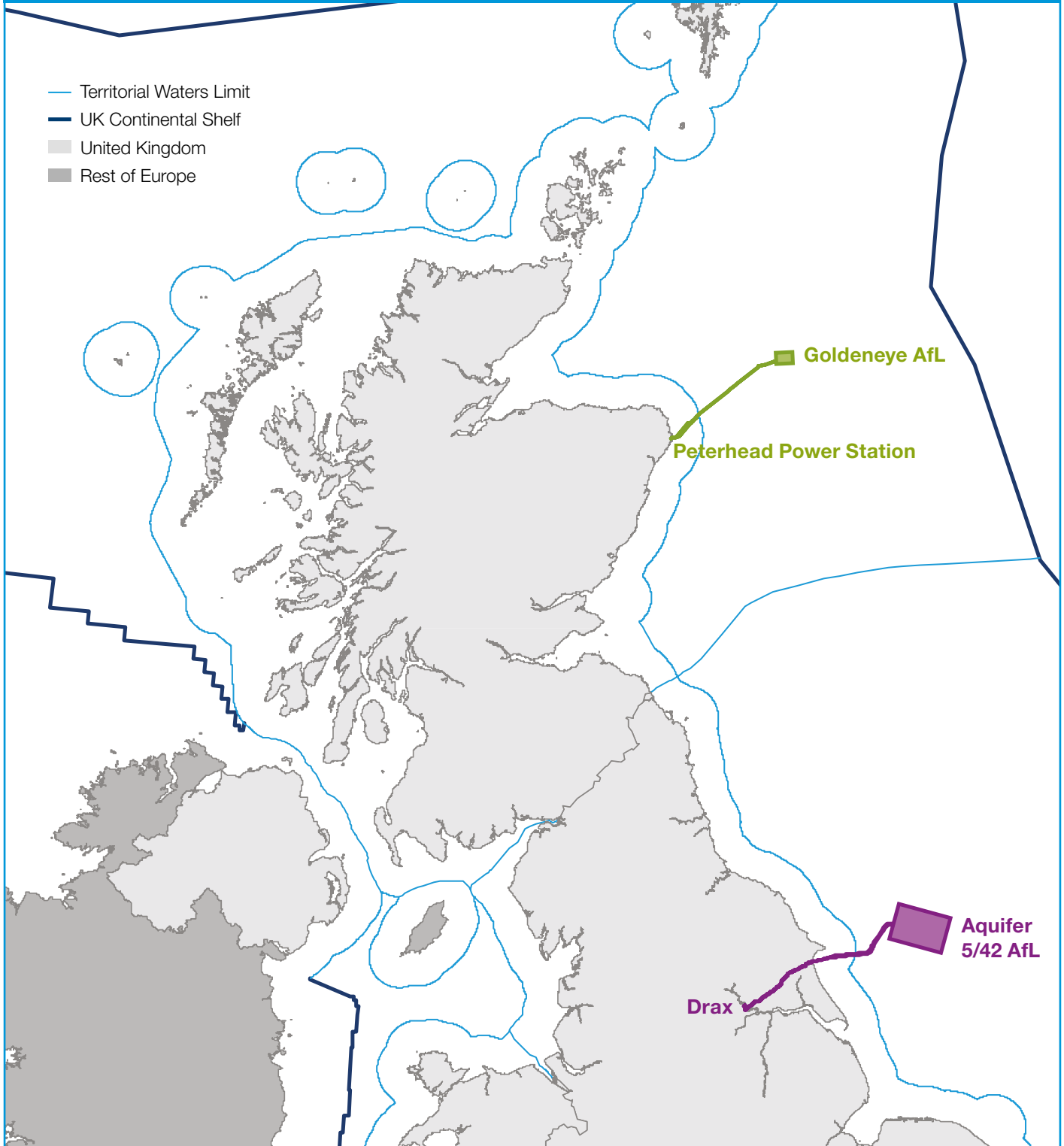
"A successful UK Carbon Capture and Storage (CCS) sector could save tens of billions of pounds (something like 1% of GDP) from the annual costs of low carbon energy by the 2040s."

Energy Technologies Institute 2015

"The deployment of Carbon Capture and Storage (CCS) is critical to global efforts to mitigate climate change and keep global warming below 2°C above pre-industrial levels."

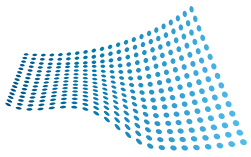
International Energy Agency 2011

CCS projects with rights granted for offshore transport and storage



The Crown Estate and CCS

At the Crown Estate, we focus on the second and third stages of the process, providing leases for the transportation and storage of CO₂ in areas of the 12-mile nautical seabed and continental shelf that we manage. Our work includes collaborating with industry and other stakeholders to understand the policies and mechanisms required to create a functioning market for CO₂ storage over the next 15 years, how to ensure value for money options are created for deployment of infrastructure, and how to de-risk technical, commercial and legal aspects of permanent CO₂ storage.



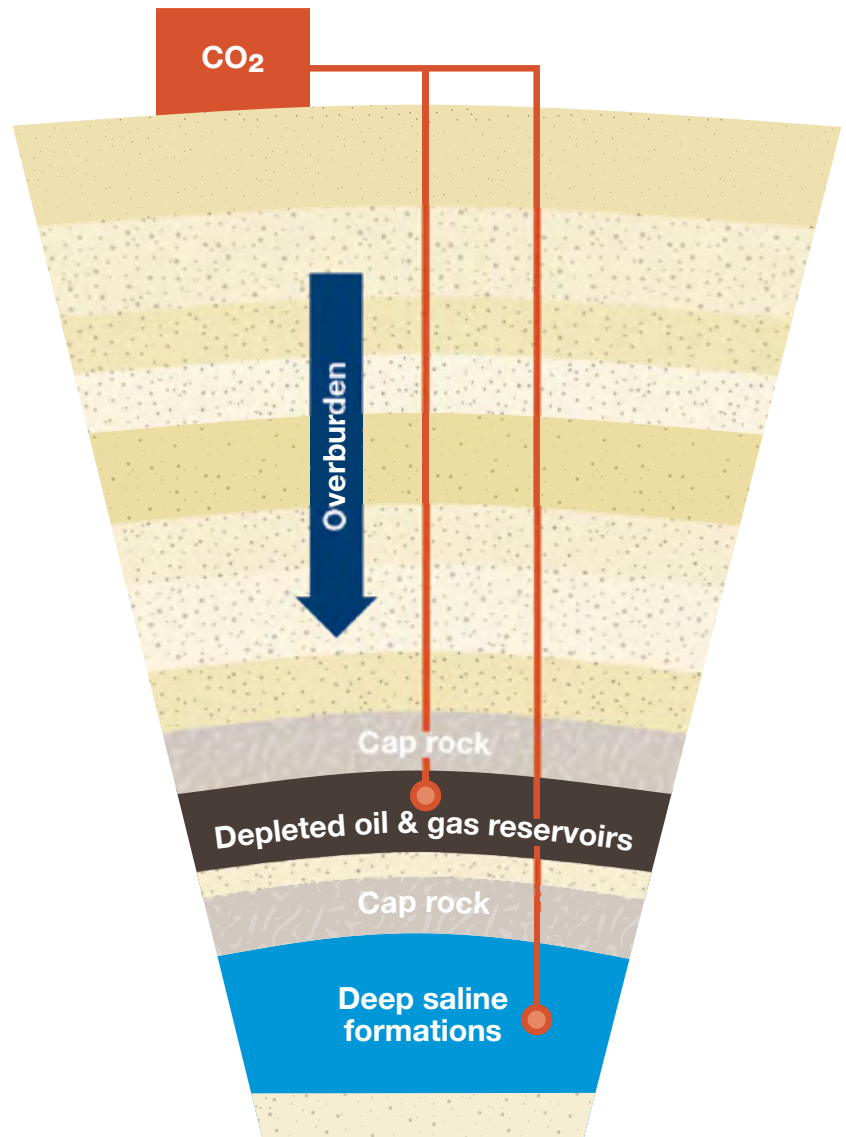
CO₂ Stored

CO₂ Stored provides access to data for over 500 potential storage units, classified as a range of storage types including saline aquifers and oil and gas fields. Information includes geological parameters of the storage units, potential geological risks and economic projections for cost of storage.

CO₂ Stored is a national asset, identifying a geological storage potential of over 70 billion tonnes of CO₂ under the UK seabed. The UK is the first country to map this information interactively online, providing detailed information about storage units including:

- Injectivity
- Porosity
- Fracture pressure
- Capacity
- Storage economics
- Storage containment risk
- The depositional environment
- Storage capacity

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Correct as of April 2015. Cover images courtesy of Statoil (top and bottom) and SSE (middle).