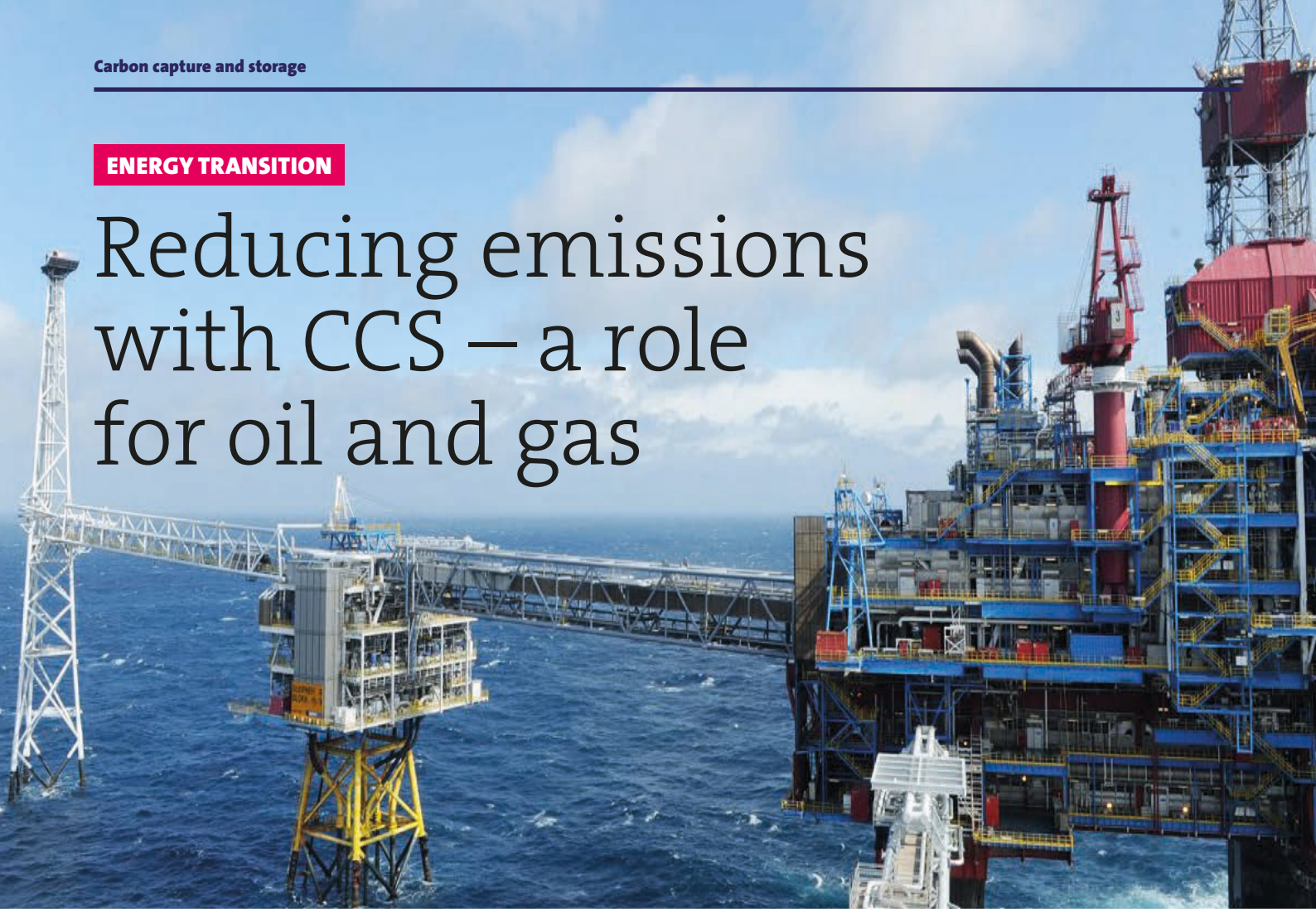
ENERGY TRANSITION

Reducing emissions with CCS – a role for oil and gas



The UK's oil and gas developers have the skills and experience to help deploy CCS at scale. *Rebecca Bell* looks at how the industry could work to ensure an equitable energy transition.

Parliament has declared a climate emergency. The UK government has introduced a target of reaching net zero greenhouse gas emissions by 2050. Not to be outdone, the Scottish government has announced its own 2045 net zero ambition. School strikes, Extinction Rebellion protests and devastating and unprecedented wildfires across Australia mean that people – and the governments that represent them – are currently waking up to climate change as never before.

What this means in practice remains to be seen – but achieving net zero emissions means that no part of the economy, and no part of the country, can escape playing its part. Systemic changes are needed, and it is becoming increasingly clear that we will need all the tools in the box if we are to tackle climate change. There is no single solution. We can also expect to see some unexpected alliances in the move to a net zero future.

Industrial clean-up

The power sector has been the focal point for many decarbonisation efforts so far, and progress has been made through renewables, as well as nuclear energy. Meanwhile, much of the public debate around climate change has traditionally focused on individual actions and behaviour change. However, it's becoming clear that deep and significant cuts in emissions from other parts of the economy are needed, and quickly.

Emissions from industry in the UK are huge – making up 22% of the total. There's currently only one sure-fire way of seriously cutting these emissions – close high carbon industrial facilities and face the resulting loss of jobs and crucial materials as the devastation ripples across the economy.

This means that getting carbon capture and storage (CCS) up and running is crucial – it's the only way to cut emissions from industries with carbon dioxide (CO2) process emissions, such as cement, while keeping them operational. It is also the most likely option for reducing emissions from industries that rely on fossil fuels for heat, such as glass manufacture. While fuel switching might be possible in some cases, getting enough heat via renewable electricity is unlikely to be viable. In addition, the bulk availability of low-carbon hydrogen relies on the existence of CCS.

The Intergovernmental Panel on Climate Change (IPCC) and the UK's Committee on Climate Change (CCC) have both strongly advised governments worldwide that CCS will be a necessity, not an option when it comes to reaching net zero. This is where the oil and gas industry comes in – its resources and expertise will be vital to deploying CCS in the UK.

The Sleipner field has been used as a facility for carbon capture and storage by Equinor since 1996.

Harald Pettersen / Equinor ASA

Opportunity for oil firms

In the most basic terms, CCS is like the oil and gas lifecycle in reverse. CO2 is isolated from other gases in a flue stream, compressed, transported and then injected into porous rock deep below the seabed – either in depleted oil and gas fields or in saline aquifers – where it remains trapped. Thus, the CO2 is permanently prevented from reaching the atmosphere, as existing projects, such as Equinor's Sleipner and Snohvit installations in Norway, have proven.

Once CO2 transport and storage infrastructure is in place, it doesn't really matter where the CO2 that goes into it comes from. This means that a whole range of industries can use it to take away the CO2

produced by their operations. It also means that hydrogen can be produced through steam methane reforming, with the CO2 removed, opening up possibilities for replacing hydrocarbons in heat and transport.

With CCS, CO2 from biogenic sources, (such as biomass power, anaerobic digestion or fermentation) can be captured and stored, providing negative emissions, Finally, CCS infrastructure enables CO2 to be captured directly from the air and permanently removed.

It also doesn't matter which country the carbon comes from. Once transport and storage infrastructure is in place, the subsurface becomes a resource than can provide storage services for our neighbours. This is a crucial part of the CCS story – current knowledge suggests that the UK has around 40% of Europe's capacity for CO2 storage, and that capacity is huge – hundreds to thousands of years' worth of the UK's emissions at the current rate.

Compare the UK to Germany, for example, which has significant industrial emissions, but no storage available. The UK is at a huge advantage, with an opportunity to develop a CO2 storage industry alongside reducing its domestic emissions. Done right, the development of CCS will lead to the development of a supply chain, giving the UK a market for exporting CCS equipment, technology and expertise all over the world.

What we know about the UK's geology and its potential to store CO2 builds on decades of research in the oil and gas industry. The storage sites that are most well understood, and therefore ready to be used, are in mature oil and gas fields. Wells and pipelines that have reached the end of their oil and gas lifespan have the potential to be re-used for CO2 transport and storage. The skills and expertise in the North Sea workforce are exactly what's needed to get CCS going in the UK.

Just transition

Scotland, in particular, is well placed to lead the charge on deploying CCS. It is the Acorn CCS project in the north east that, given the right policy conditions, could be ready to start storing carbon in 2023. It has the North East Carbon Capture, Usage and Storage (NECCUS) Alliance of industries, academics and government bodies, which is poised to build on this first step and support the development of an industrial CCS network across Scotland.

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And it has cutting-edge knowledge and research in the form of Scottish Carbon Capture & Storage, the UK's largest CCS research partnership, which has been leading joint projects between industry, academia and the public sector for over a decade.

At a conference in Aberdeen last year, the chief executive of the Oil and Gas Authority said delivering CCS for the UK was remarkably achievable and that North Sea's depleted oil and gas fields held massive potential for CO2 storage. This echoes the CCC's finding that Scotland has a greater capacity to store CO2 than the rest of the UK – hence its recommendation that Scotland should aim for net zero five years earlier than the rest of the UK.

Inevitably, the conference included discussion about whether maximising oil and gas production from the North Sea is the best way to transition to net zero (a resounding 'no' from pretty much everyone outside the industry) and, equally inevitably, CCS was drawn into the debate.

Oil and Gas UK stated that the sector was 'supporting the development of carbon mitigating technologies [such as CCS], which offset emissions resulting from the use of oil and gas in the wider economy.' This implication that, firstly, CCS is just about dealing with fossil fuel emissions, and secondly, that CCS can offset emissions from fossil fuel use (presumably so that extraction and consumption can carry on as usual) is deeply flawed.

The emissions reductions provided by CCS will, rightly, be claimed by the industries that deploy capture technology on their processes – for the storage industry to claim the stored CO2 for themselves, and therefore as an offset for their own emissions, would be 'double counting'.

CCS will be a crucial part of a just transition to a low carbon economy. It can provide jobs for offshore workers and those in the oil and gas supply chain. It will also help retain jobs in industry by allowing industry to decarbonise without ceasing production. It will further enable us to continue using oil and gas while alternatives are developed. But this transition also has to include a move away from business-as-usual for oil and gas companies.

One way to make this happen would be to establish CO2 storage certificates as recommended by the Parliamentary Advisory Group on CCS. These mechanisms would require oil and gas companies to store, or pay someone else to store, an amount of CO2 equivalent to a fixed and rising proportion of the CO2 associated with the fossil fuels they produce. This would ensure that hydrocarbon producers begin to offset some of the emissions from the fossil fuels they supply.

It isn't practical to stop hydrocarbon production straight away, at least not until we have alternatives in place for the energy and products we need. But the word 'need' is key: while there will be a role for oil and gas as we transition to a net zero economy, we must do everything we can to reduce the demand for fossil fuels. This means not wasting energy, food and resources and tackling our 'throwaway' culture. It means tough political decisions about what the economy of the future will look like, and how we get there.

No excuse for inaction elsewhere

CCS is part of a hierarchy of actions to reduce emissions and it needs to happen alongside substantial decreases in energy demand, behaviour change across the board, increases in renewable power generation, process improvements and innovation in technology. CCS is essential, but it certainly can't solve climate change on its own – and it absolutely must not be used as an excuse for inaction in other areas.

Oil and gas companies' crucial role in delivering CCS doesn't mean that deploying it gives them a free pass. The sector's ability to develop CCS does not absolve it of its historical responsibility for greenhouse gas emissions, but it does offer an opportunity to start to redress the balance. Assuming that governments are serious about tackling climate change, there will be opportunities for companies with oil and gas expertise to profit from developing CCS.

In an ideal world, perhaps, the producers of polluting materials would not profit from cleaning up the mess those materials cause. But in an ideal world, governments would have taken global warming seriously thirty-plus years ago rather than deferring action until it was unavoidable. And then we would have had less or no need for geological CO2 storage and greenhouse gas removals. ●

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