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**ENERGY TRANSITION
PERSPECTIVES:
CARBON CAPTURE
AND STORAGE IN
THE UK AND EU**



— THOUGHT LEADERSHIP

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ENERGY TRANSITION PERSPECTIVES: CARBON CAPTURE AND STORAGE IN THE UK AND EU

With growing recognition of the role of carbon capture and storage (CCS) in meeting climate targets across Europe and the UK, projects are advancing, funding is becoming available, and innovative solutions are emerging. Expectations are high for continued tangible progress across the market. However, market and government collaboration are more critical than ever. In this extract from a recent webinar, we discuss the latest regulatory frameworks supporting CCS projects in the UK and the EU and consider the potential of CCS to transform the energy sector.

How is the market developing in the UK?

“It’s estimated that the UK has approximately 78 billion tonnes of CO₂ storage capacity in the North Sea and, in addition, it has pipelines and existing infrastructure that can be repurposed for CCS projects, meaning that the UK has one of the largest potential storage capacities in Europe and a significant head start when it comes to developing its CCS industry”, says Keith Hauck, a Senior Associate in Clifford Chance’s London office.

To capitalise on these advantages, both the previous Conservative UK government and the new Labour government have made CCS a part of their energy transition strategy and have been proactive in setting up the regulatory framework and business models to help incentivise investment in the industry. “The new UK government has provided a strong indication of its support through the commitment of substantial funds, approximately £22 billion, to support the first wave of projects. It’s a positive sign for the industry going forward. That being said, there has been more recent scrutiny from the UK House of Commons parliamentary public accounts committee around future funding for CCS projects, so it is hoped that the current UK Government spending review, which will conclude in June, will provide further clarity”, says Hauck.

The CCS industry in the UK is being set up around geographical clusters, which are centred on significant industrial hubs. The Track 1 clusters are situated in Merseyside, Teesside and Humberside

and are located close to large emitters. These are the obvious customers for the planned CO₂ transportation and storage projects. A second phase of Track 2 clusters will follow, including the Acorn cluster in Scotland and the Viking cluster in Humberside. The intention is that the process for finalising the Track 2 clusters will be more streamlined, based on learnings from Track 1.

The clusters typically involve a core transportation and storage company or consortium, coupled with various industrial emitters, hydrogen production projects and power projects, which are seeking to capture CO₂ from their operations and will function as the customers for these networks.

UK regulatory framework

The UK government has set up a range of different funding and support models. Of particular significance is the Transportation and Storage (T&S) Regulatory Investment (TRI) Model that will support the transportation and storage networks, which are the key to the clusters.

“The TRI Model is based on an established structure – the regulated asset-based model or the RAB model approach. It has been used for UK gas and water networks, but also for UK energy and infrastructure projects and it’s a key feature of new nuclear projects in the UK in terms of their regulatory underpinning”, says Hauck.

The rationale for the TRI Model is that the new CCS transportation and storage projects will have similarities

with these other assets, including high upfront costs, customers that must be physically connected and the potential for monopolies to develop across the industry.

The model has a few key components; firstly, an economic licence that will be granted by Ofgem as regulator to the relevant Transport and Storage Company (T&SCo). This licence sets the parameters for the activities that the project can carry out and what the T&SCo can recover from its customers via an allowed revenue mechanism, as well as other adjustments, incentives and price controls. Hauck continues: “The allowed revenue concept is really what drives the “user pays” revenue model for these projects, as the customers of the T&S networks will pay fees to the T&SCo and the allowable revenue will dictate what can be recovered from the users via those fees”. The allowed revenue calculation will have a number of separate building blocks, covering various expenditures, including capex depreciation, operating costs, decommissioning payments and tax, among other things.

The economic licence is supplemented by a Revenue Support Agreement and a separate Government Support Package. These are primarily incentive mechanisms and, under these contractual arrangements, the government is agreeing to assume certain risks and provide specific support to help get CCS transportation and storage projects off the ground.

The Revenue Support Agreement will ensure that the T&SCo can still recover its allowed revenue where its actual revenues fall short under the economic licence in certain circumstances, such that it mitigates revenue gaps in the early stages of development through top-up payments. The counterparty providing the revenue support will be the Low Carbon Contracts Company (LCCC), which performs this role in other CFD-style structures that have worked well in other UK renewable industries.

“This structure will help the T&SCo recover operating expenditure and allow for the cost of debt if the first user for their project is delayed in connecting. Given the first-of-a-kind nature of some of

these hubs and clusters, this is a real risk that these projects are going to face”, says Hauck.

Finally, a separate Government Support Package will protect the T&SCo from certain high impact but low probability risks. This includes a Supplementary Compensation Agreement for the mitigation of certain CO₂ leakage risks that will not be covered by commercial insurance products, a Discontinuation Agreement to help address the scenario where transportation and storage networks become a stranded asset, and a Liaison Agreement, which will coordinate governance and reporting between the T&SCo and the various government and regulatory stakeholders.

EU market overview

The EU Emissions Trading System (EU ETS) has put a price on CO₂ emissions and, since 2013, has incentivised the capture of CO₂ for permanent storage in the EU and the European Economic Area (EEA), as allowances for emissions considered to have been permanently captured and stored do not need to be surrendered.

“In 2023, the EU ETS framework was revised and, as well as covering the capture and storage parts of the chain, the revised Directive now also applies to the transport of CO₂ for geological storage. In terms of transport, it’s not just pipelines, but any type of transport for the purposes of geological storage will be covered”, says Epistimi Oikonomopoulou, a Senior Associate in Clifford Chance’s Paris office.

The Net Zero Industry Act (NZIA)

The NZIA was adopted by the European Commission in March 2023 following its announcement in the Green Deal Industrial Plan. The NZIA was partly a response to the US Inflation Reduction Act (IRA) and to the need to develop a coherent EU industrial policy to meet the EU’s 2030 climate target of reducing greenhouse gas emissions by 55% and achieving climate neutrality by 2050. The primary aim of the NZIA is to ensure that the EU has access to secure and sustainable net zero technologies by scaling up manufacturing capacity within the EU. The NZIA introduces a target of

achieving an annual CO₂ injection capacity of at least 50 million tonnes by 2030 and requires oil and gas producers identified by Member States to contribute to this target proportionately to the emissions they generate.

Oikonomopoulou says: “A further incentive is the possibility for CCS projects to apply for the status of “Projects of Common Interest” (PCIs), which are cross-border energy infrastructure projects, such as interconnectors, gas pipelines and CCS transport and storage projects, that the Commission selects every two years. These projects have access to a dedicated EU funding tool, The Connecting Europe Facility, and enjoy specific benefits, such as a very streamlined permitting process”.

The CCS Directive and third-party access

There is only one piece of legislation governing CCS specifically – the CCS Directive, which was adopted in 2009, but which has never actually applied in practice. Article 21 of the CCS Directive provides that Member States must make sure that ‘potential users’ (a term that is not properly defined) are able to access CO₂ transport networks and storage sites in a transparent and non-discriminatory manner.

The third-party access requirement could make it more difficult to finance these projects as, unlike the EU Electricity and Gas Directives, the CCS Directive does not provide for a third-party access exemption process and criteria and it remains unclear as to whether an exemption could be granted by the competent authorities of the relevant Member State, at least during their first phases of operation. It remains to be seen how this article will be interpreted in each jurisdiction and what the approach of the national and EU authorities will be.

CO₂ leakage liability regime in the EU

The 2009 CCS Directive regime focuses primarily on the liabilities of the storage operator, who must take corrective measures in the event of leakages and remains liable for at least 20 years post closure. Under the EU ETS, the operator of each of the three distinct activities –

capture, transport and storage – will be liable for any emissions generated due to CO₂ leakage that takes place in their facilities and will have to surrender the respective EU allowances. The issue that arises here is that the economic burden appears to be disproportionately heavier for the operator of the storage facilities, given that year by year, the volume of stored CO₂ will increase and, by extension, the EU allowances that they would have to buy in the event of a leak. There may also be civil liabilities depending on the legal system of each Member State, environmental damage liabilities under the EU Environmental Liability Directive, and liabilities in respect of public international law under the London Protocol (see further below).

What’s on the horizon?

In February 2024, the European Commission published its Industrial Carbon Management Strategy, which sets targets for 2030 with proposed policy measures and support to be provided by Member States and the Commission. It’s not a legally binding text but demonstrates the EU’s intention. With this new mandate, the Commission may look at incorporating the measures into a new legislative act.

At the EU Commission’s annual Industrial Carbon Management Forum in 2024, four key issues were highlighted:

- Additional EU and national funding is needed. Currently, there’s not a dedicated EU funding tool for CCS – lots of emitters have been granted EU funding to develop their projects, but the EU is lagging in the development of storage sites. There have been recommendations for an EU-run scheme, such as the EU Hydrogen Bank.
- In terms of regulatory certainty and risk sharing, the framework is not clear; it needs to be revised.
- Further cross-border international cooperation is needed.
- Consideration needs to be given to whether the EU should set up an aggregation platform to allow small emitters to access storage sites at fair prices and to enable the allocation of liability.

Spotlight: The Netherlands

“To achieve our climate goals, we do not have the luxury to make choices. We need all the options available to reduce CO₂ emissions and carbon capture and storage is essential to meet the targets that have been set by the Dutch government”, says Lotte de Bruin, a senior associate in Clifford Chance’s Amsterdam office.

The Dutch government’s initial goal was to lower CO₂ emissions by 49% by 2030. The Dutch government initially increased this to 55%, but is now aiming for a reduction of 60% by 2030 to ensure achieving net zero by 2050.

Netherlands case studies

Porthos

This is a collaboration between three state owned companies – the Port of Rotterdam Authority, Gasunie and Energie Beheer Nederland (EBN). The Porthos project will serve as a transitional solution for industries moving from fossil fuels to low carbon or carbon-free alternatives. Construction started in September 2024 and marks the beginning of the development of a future CO₂ network in northwestern Europe. The project will store 2.5 million tonnes of CO₂ per year for 15 years, totalling 37 million tonnes. The onshore Porthos pipeline is capable of handling 10 million tonnes of CO₂ per year, allowing it to support future projects such as the Aramis project. Porthos will store CO₂ captured by four emitters – Air Liquide, Air Products, ExxonMobil and Shell, and is expected to be operational in 2026.

CO₂Next

CO₂Next is being developed by Gasunie, Vopak, Shell and TotalEnergies and is expected to be operational in 2029. The CO₂Next terminal will receive liquid CO₂ by vessels (and potentially in future by rail), temporarily store it and pressurise it. From the CO₂Next terminal, CO₂ can be stored in depleted gas fields, for example, via the infrastructure of Aramis. It has a launch capacity of approximately 5.4 million tonnes per year and, depending on market demand and the development of CCS chains, a potential to grow its capacity to approximately 15 million tonnes per year. Additionally, CO₂Next aims to facilitate the onward transportation of CO₂ from the terminal for future reuse (CCU).

Aramis

Aramis is a public private partnership between two state-owned companies, EBN and Gasunie, and TotalEnergies and Shell. Aramis uses an open access approach whereby emitters transport the CO₂ from their facilities to a collection hub, either via onshore pipelines or by ship. The collection hub includes the CO₂Next terminal and the Porthos compressor station, demonstrating the interconnection between all these projects.

The CO₂ will then be transported via an offshore pipeline to an offshore distribution platform and then to the injection platforms of the storage providers – TotalEnergies, Shell and ENI Energy Netherlands. Aramis is expected to be operational by the end of 2028.

Aramis has been designated as a Project of Common Interest by the European Commission, reflecting its status as a high-priority initiative for achieving interconnected energy system infrastructure in the EU.

These three projects all being developed in Rotterdam are the beginning of a CCS chain that can grow into an international CCS network with the Delta Rhine Corridor and other connections.

The Netherlands is leading the way in CCS projects. “This is due to its unique position, having energy-intensive industry with large CO₂ emissions concentrated in a few locations relatively close to the coast, which is favourable for offshore storage sites”, says de Bruin. “There is considerable CO₂ storage capacity in the North Sea together with oil and gas infrastructure, which is ideal for reuse for the transportation and storage of CO₂. In addition, the Netherlands has excellent logistical pre-conditions for CO₂ transport, such as pipeline and waterway infrastructure, as well as ports for transporting CO₂ by sea. All this makes CCS cost efficient compared to alternatives for reducing CO₂ emissions”.

Regulatory framework

The Netherlands has transposed the CCS Directive into national law in the Mining Act (*Mijnbouwwet*). CCS projects are, amongst others, also subject to regulation under the Environmental Management Act (*Wet Milieubeheer*), the Environment and Planning Act (*Omgevingswet*) and the Water Act (*Waterwet*). The Minister of Climate Policy and Green Growth is the competent authority for issuing the various permits that are required.

The State Supervision of Mines (SSM) (*Staatstoezicht op de Mijnen – SODM*) monitors compliance with the Mining Act. At the end of 2024, [in an unsolicited advice to the Minister, the SSM asked for additional monitoring of the underground CO₂ storage in the Porthos Project. Additional monitoring, with extension of the seismic measurement network to the sea, will make it possible to also measure smaller earthquakes in the CO₂ storage field and locate them more accurately. This creates the possibility of earlier and less far-reaching intervention if necessary. Now, the SSM’s action perspective in such a case is limited to completely turning the CO₂ injection on and off. The likelihood of this being necessary is very small.

A consultation has been running in respect of the Climate and Green Growth Collective Act (*Verzamelwet Klimaat en Groene Groei*), which will revise certain

provisions of the Mining Act and the Environmental Management Act, including the clarification of decommissioning responsibilities, by making it explicit that the last permit holder is obliged to remove the mining work when the permit no longer applies. The consultation period has now ended and it will be important to monitor ongoing developments in the CCS regulatory framework.

In addition to incentives at the EU level, there are various incentives in the Netherlands for the development of CCS projects. The SDE++ scheme subsidises the difference between the cost of CCS and the ETS market price of CO₂. Currently, the SDE++ subsidy is only available if the CO₂ is actually stored in the Netherlands. For the opening of the SDE++ 2025 round, subsidies for projects with capture in the Netherlands but storage abroad will be included.

Another example is the Energy Investment Allowance (EIA), which makes part of the investment cost deductible from taxable profit, and for certain projects in the Netherlands, we’ve seen more bespoke agreements entered into with the government on a project-by-project basis.

In addition, there is a joint public-private task force that has been launched, led by the Dutch Ministry of Climate Policy and Green Growth and the Aramis project, as well as the Eni, Shell and TotalEnergies storage projects, to look at the bottlenecks and discuss solutions to the potential cost risks.

Key issues and challenges in the EU and UK

Emissions Trading Scheme Divergence

There are some major differences between the EU and the UK approach. Under the EU ETS, the allowances for emissions that are considered to have been permanently captured and stored do not need to be surrendered and so EU emitters that store their CO₂ in the EU are exempted and the same applies to UK emitters that store CO₂ in the UK under

the UK ETS. However, an EU emitter is not currently permitted to surrender allowances under the EU ETS if its CO₂ is stored in the UK or another non-EU jurisdiction where there's no mutual recognition of the carbon pricing systems.

This is potentially an obstacle to the development of storage projects in the EU and the UK, where it might be more cost effective to store the CO₂ elsewhere. There have been some discussions between the EU and the UK on this issue.

Leakage liability risks

The leakage of sequestered CO₂ from a reservoir is viewed as a remote risk. However, if a leak were to occur, there would be material financial exposure for the CCS project. As a result, this is a key issue that governments, regulators and project proponents have been assessing in order to come up with ways in which to manage and sensibly allocate such risk, so as to get these CCS projects off the ground.

There are several different sources of liability that might arise in the event of a leak. There will be an impact on revenue under offtake contracts, as well as liability under relevant EU and UK regulations. In addition, a significant potential source of liability is that the storage provider will be liable to pay for the purchase or surrender of ETS allowances equivalent to the amount of the leak at the prevailing ETS price per tonne applying at the time. If they don't comply with that, punitive damages will apply on a strict liability basis. This could be quite a significant financial hit to the project.

Mitigation

The first port of call is the insurance market, and projects can attempt to seek coverage under traditional property damage, business interruption and other insurances that provide cover for environmental damage. They may also look at tailored insurance products, primarily in respect of some of the ETS costs.

In the UK, a novel solution has been proposed as part of the government support package – the Supplementary

Compensation Agreement, which is designed to provide cover for certain events, including the risk of certain CO₂ leakage liability where coverage is not available via the commercial insurance markets.

By way of contrast, in the Netherlands, the liability remains with the operator until the storage licence is terminated and the liabilities are then transferred to the Dutch State after a period of at least 20 years as long as it is evidenced that the CO₂ is completely and permanently contained and a financial contribution has been made to the Dutch State to cover the anticipated monitoring costs for a period of 30 years.

“This is a key difference between the regimes and this is one of the biggest barriers in Europe to implementing these projects”, says Richard Tomlinson, a partner in Clifford Chance's Paris office. “Whilst it should be a low technical risk, the magnitude of the financial impact is quite extraordinary. For example, for a store receiving 5 million tonnes of CO₂ per year over 15 years, the expectation is that the EU allowance price – currently EUR64 per tonne – is going to go up and up, and you're looking at multiple billions of euros of exposure with very limited mitigation. While governments and regulators are not insisting that companies demonstrate that they have that kind of financial backing from the outset, they are focusing on ensuring that limited recourse structures are not being used and that appropriate guarantees and insurance products are being made available, as well as ensuring that these amounts would be covered if they were ever to arise”.

Cross-border CCS issues – The London Protocol

The London Convention and the London Protocol are global agreements that protect the marine environment from pollution. Article 6 of the Protocol prohibits the export of waste for dumping at sea and it also prohibits the cross-border transport of CO₂ for permanent geological storage.

In 2009, the contracting parties to the Protocol adopted an amendment to allow the export of CO₂ for disposal in subsea geological formations, while imposing two conditions. Firstly, there must be an agreement or arrangement between the countries concerned and secondly, the parties have to notify the International Maritime Organization (IMO) about the agreement. However, in order to enter into force, the amendment requires ratification by two-thirds of the London Protocol's contracting parties, i.e. 36 countries, and that has not happened yet. Only 10 parties have ratified the amendment so far – nine of them are European countries and the tenth is South Korea.

The first bilateral agreement under Article 6 of the Protocol was signed between Belgium and Denmark in 2022.

There is no agreement in place at the moment between the EU Member States and the UK. Hence, cross-border CCS is a potential opportunity for the UK, but without bilateral agreements to allow for the export or import of CO₂ and the lack of mutual recognition under the ETS in terms of the incentives, it remains out of reach.

Notwithstanding the current restrictions, we see shipped CO₂ being factored into the longer-term planning for some of the UK's CCS projects, perhaps as an expansion opportunity for these projects once they are up and running. Given the vast amounts of storage in the UK, the opportunities are there.



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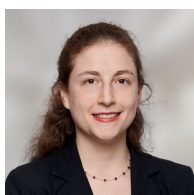
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