



The Use of CO₂ for Enhanced Oil Recovery on the UKCS

Selected legal and regulatory issues with a specific
focus on property

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1. Introduction

(a) CO₂, GHG, CCS

CO₂ has been transformed in recent years in both scientific and popular understanding from an inert gas of limited significance beyond certain industrial processes to a substance whose presence in increased quantities in the atmosphere is now known to pose considerable risks in the shape of global warming and climate change. In this context, a wide array of international, regional and domestic initiatives have been undertaken with a view to reducing its emission into the atmosphere.¹ Recognising that ultimately the required level of reduction will depend upon a substantial shift from dependence on fossil fuels to renewable sources of energy, but also that this shift is unlikely to occur quickly enough to prevent problems given political, economic and technological constraints, interest has grown in the possibility of capturing CO₂ as it is produced in the burning of fossil fuels or in other industrial processes, and then sequestering it permanently in geological formations (such as saline aquifers or depleted hydrocarbon reservoirs) – a process known as carbon capture and storage (CCS).

This response to the problem of CO₂ raises both technological and legal challenges. Within the EU there is a desire to see the required technology developed and demonstrated in order that CCS may become part of the overall solution to the problem of greenhouse gases (GHGs). To this end, the Carbon Capture and Storage Directive² establishes a framework within which commercial actors may be reassured about the extent of the liability they are taking on and the point at which they may transfer long-term liability for sequestered CO₂ to the state. In parallel, of course, the Directive also seeks to reassure states that they are only taking on long-term liability for sequestered CO₂ at the point at which they may be reassured that it will indeed remain where it has been put.

(b) CO₂ for EOR

There is, however, an intriguing hybrid response to the problem of CO₂ – and one that recognises implicitly both that the transition to a low carbon economy will not happen overnight and that a complex web of economic and geopolitical realities means that it is seldom a matter of indifference to any given state whether it produces its own hydrocarbon reserves rather than relying on imports from abroad. This response is the proposed use of CO₂ for enhanced oil recovery (EOR). The need for EOR arises because in a conventional hydrocarbon reservoir the

¹ See, for example, the UN Framework Convention on Climate Change 1992, the Kyoto Protocol to that Convention 1998 and the range of initiatives that they have given rise to, not least the EU's ambitious, but flawed, Emissions Trading System (Directive 2003/87/EC (as amended by Directive 2009/29/EC)).

² Directive 2009/31/EC.

pressure under which the oil and/gas are naturally trapped inevitably and inexorably falls as production proceeds. In due course, all else equal, production will cease not because there are no more hydrocarbons in the reservoir, but rather because the pressure is no longer sufficient to drive them up the well to the surface. Considerable quantities of hydrocarbons will, therefore, never be produced. Oil companies can, however, improve recovery rates by taking action to maintain pressure within the reservoir (for example by injecting water or re-injecting produced gas). Equally, they can achieve a similar objective by hydraulically fracturing the reservoir – in essence to improve the permeability of the formation to permit hydrocarbons to flow more easily to the well.

In recent years, however, interest has been expressed in the use of CO₂ for EOR.³ Insofar as this gas could indeed be used to increase the pressure within reservoirs, then it would be doubly attractive insofar as this could also represent a process whose effect (if not immediate intention) would be to sequester considerable quantities of CO₂. The desirability of developing and deploying this technology in the UK is clear. Not only has the state set itself some of the most ambitious (and legally binding) targets for GHG emissions,⁴ but it is also home to a mature offshore hydrocarbon province where a combination of ageing infrastructure and the probability that most if not all discoveries will now be smaller and potentially more marginal is raising the spectre of early decommissioning,⁵ notwithstanding the likelihood that some 10 or 20 billion barrels of oil equivalent remain to be produced.⁶ Were it to be possible to develop an operational CO₂ EOR infrastructure, then the prize would indeed be considerable. Among the technical challenges involved in achieving this objective, of course, will be gaining access to sufficient quantities of CO₂ and developing a means of transporting it to the fields that could make use of it on the UK continental shelf. In all probability, in due course, the most desirable solution would be to have CO₂ being captured at, for example, gas-fired power stations, and then transported via an onshore and offshore pipeline network to the continental shelf. As well as offering economies of scale and the widest possible access to this EOR opportunity, such an approach would have the added attraction that it would also make the ultimate transition to CCS as a widespread solution, as opposed to a pilot demonstration project, even more straightforward.

³ See, for example, DECC, Next Steps in CCS: Scoping Document, August 2014, esp. chapter 8 “Enhanced oil recovery (EOR)”.

⁴ Climate Change Act 2008, s1.

⁵ The situation is, of course, exacerbated at the time of writing (early March 2015) by the relatively low oil price.

⁶ Sir Ian Wood, UKCS Maximising Economic Recovery Review: Final Report, February 2104, p5.

(c) The legal dimension – why property law is important

This report considers some of the key legal and regulatory issues that are raised by the foregoing observations. It is first of all important to stress that within the confines of the current project, the emphasis is upon CO₂ for EOR rather than on CCS. Accordingly, we make only passing mention of the CCS Directive, because while this instrument is crucial to any effort to inject CO₂ into a depleted hydrocarbon reservoir for the purposes of permanent sequestration, it has nothing to say about the injection of the same gas into a producing reservoir for purposes of EOR. Thus, while the former exercise is subject to a range of requirements relating to, for example, on-going monitoring to ensure that there is no release of CO₂, the same does not apply to the latter. Rather, the use of CO₂ for EOR is something that can be regulated simply as an adjunct to the rights and responsibilities that the operator has by virtue of holding a petroleum production licence.⁷ In other words, as regards the regulation of CO₂ for EOR, it would appear that a similar approach can be adopted to both the operation of pipelines and the deployment of the physical process itself as has been used for 50 years on the UKCS in relation to the production and transportation of hydrocarbons. This approach consists in authorisation from the Secretary of State for the construction and use of pipelines “in, under or over” the territorial sea and the continental shelf,⁸ his or her consent for specific interventions in a reservoir,⁹ as well as the application of general or specific environmental and health and safety law as required.

Of course, were that to be the whole story, this could be a relatively short report and one that would introduce the reader to nothing he or she was not already broadly familiar with. It is our contention, however, that this is by no means the whole story and that a range of issues, specifically related to property law, need to be considered if the development of CO₂ for EOR is to proceed efficiently. Further, while as we have said we will not devote much time to the CCS Directive, it is paradoxically the role of the Crown Estate in relation to the development and implementation of that technology specifically which gives rise to the legal questions affecting CO₂ for EOR that are the primary focus of this report. This is because while for five decades hydrocarbon operations on the UKCS have proceeded without the direct involvement of the Crown Estate, but rather only on the basis of the licensing, authorisation and consenting activities of the Secretary of State responsible from time to time for offshore oil and gas, the same is not true of operations on the UKCS in relation to CCS.

The Energy Act 2008 at first glance appears to establish a regime for CCS that is directly

⁷ Petroleum Act 1998, s3.

⁸ Petroleum Act 1998, ss14 and 15, and Schd. 2.

⁹ See, for example, the various consents required under a petroleum production licence. Petroleum Licensing (Production) (Seaward Areas) Regulations 2008, SI 2008/225.

analogous to that for hydrocarbon operations offshore insofar as it establishes a licensing regime. Thus, activities related to CCS are prohibited without a licence¹⁰ and the Act goes on to provide what specifically the licencing authority (currently DECC for all areas except the territorial sea around Scotland¹¹) may grant a licence for.¹² In fact, however, the position is somewhat different for CCS than for hydrocarbons. The UK exploits hydrocarbons offshore beyond the territorial sea on the basis of the Continental Shelf Act 1964, s1 which vests any rights exercisable by the UK in such area in Her Majesty. At the time of the passing of the 1964 Act, the UK's rights were those established in international law by the Convention on the Continental Shelf 1958. In due course, the UK's rights in this regard were contained in the UN Convention on the Law of the Sea (UNCLOS) 1982 (Part VI). The 1982 Convention (Part V) also introduced the concept of the Exclusive Economic Zone (EEZ), which in most cases is coterminous with the continental shelf but which is distinguished, among other things, by also including the water column above the shelf and by requiring the coastal state to make an active claim to it. In this regard, s1 of the Energy Act 2008 is important insofar as it allows the Crown to designate an area as a "Gas Importation and Storage Zone" in exercise of the UK's rights under Part V of UNCLOS 1982.¹³ This was done by the Gas Importation and Storage Zone (Designation of Area) Order 2009.¹⁴ Subsequently, s41(3) of the Marine and Coastal Access Act 2009 provided the statutory authority for the UK to establish an EEZ, which power was exercised in 2013,¹⁵ meaning that while the "Gas Importation and Storage Zone" still exists, it is now defined in terms of the Exclusive Economic Zone.¹⁶

This is important because while, as mentioned above, the Energy Act 2008 is principally concerned with the establishment of a licensing regime for CCS, it also allows for the possibility that the precise area in respect of which a licence is granted "may be determined by reference to the provisions of a Crown lease which has been or may be granted".¹⁷ The Act continues: "For this purpose a "Crown lease" means a lease of property forming part of the Crown Estate, or an authorisation to exercise rights forming part of that Estate (whether by virtue of section 1 or otherwise)."¹⁸ These provisions mean that, in relation to CCS, a licensing regime (familiar

¹⁰ Energy Act 2008, s17(1).

¹¹ Energy Act 2008, s18.

¹² Energy Act 2008, s17(2).

¹³ In this regard, the approach to CCS follows approach established by the Energy Act 2004, s84 in relation to Renewable Energy Zones.

¹⁴ SI 2009/223.

¹⁵ The Exclusive Economic Zone Order 2013, SI 2013/3161.

¹⁶ Marine and Coastal Access Act 2009, Schd. 4, para 5.

¹⁷ Energy Act 2008, s18(3).

¹⁸ Energy Act 2008, s18(4)

from hydrocarbon exploration and production) operates in conjunction with a leasing regime.

This leasing regime is constituted by three instruments which the Crown Estate has developed on the basis of the power granted to it under the 2008 Act: “an Agreement for Lease (AfL), a lease and a pipeline lease (if necessary)”. Insofar as this is the case, the issue of property rights on the continental shelf or in the EEZ need to be considered to the extent that they may have an impact on all activities taking place there, not just those that are covered by a Crown lease. Heretofore, this dimension has not been at the forefront of the minds of those engaged in licensing or contracting in relation to oil and gas operations, but the clear identification of what appear to be property rights in the hands of the Crown Estate means that this approach is no longer appropriate. All parties are now on notice that property rights may be an issue and as such it is appropriate to consider how they may impact upon important (and financially significant) issues such as liability for damages. Among the parties who need to be aware of this issue are those involved in the use of CO₂ for EOR.

This report continues by beginning the process of identifying the issues and some possible scenarios. It does not pretend to offer firm conclusions in every case, given the uncertainties involved, but it does indicate the direction in which future research could usefully proceed.

2. The basic property law issues

(a) Things and Rights

In order to familiarise the non-lawyer with some fundamental concepts necessary for an understanding of the implications of the foregoing observations, it is necessary first of all to introduce basic items that are important for property lawyers: (a) things and (b) rights. Most things that are encountered by the law are solid objects. For example, a pipeline conveying gas to or from an energy installation is such a thing. However, things can also be liquid or gaseous. In whatever form it is encountered, solid, liquid or gaseous, CO₂ is a thing. The fact that, at room temperature and under normal atmospheric conditions, it is a gas does not stop it from being a thing. The physical state of the thing does, however, have the potential to require different approaches to the legal rights and obligations that flow from an encounter with the thing. Intriguingly, when CO₂ is captured and compressed for transportation and injection into a reservoir, its state is described as “near liquid”.¹⁹ From a legal point of view, it may be assumed that it would still be treated as a gas.

It is also important to note that things may be owned or unowned and still remain as things. The

¹⁹ For example, ccsbrowser.com (accessed 5 March 2015).

fact that a thing is ownerless does not prevent it being a thing in Scots law. This rather obvious point must be made immediately as there is a misconceived view – sometimes even stated in print – that if the seabed outside the territorial sea is not owned by anyone it cannot be regarded as immovable property in Scots law.²⁰ This misconceived view leads to the conclusion that whatever is in the seabed outside the territorial sea is somehow “non-existent” or “invisible” to or “off the radar” of Scots law. That is wholly incorrect. It remains the case that, even if the seabed outside the territorial sea is un-owned, activities on the seabed and materials placed in the subsurface – such as CO₂ for EOR – can give rise to legal rights and obligations and can lead to legal consequences.

(b) The Physical State of CO₂

The physical state of CO₂ has a material bearing on the nature of the rights that can be held in that thing. This has a bearing on the use of CO₂ in EOR. This issue will be examined through a series of steps to build up the full picture of CO₂ from the perspective of property law.

(i) Air and Airspace

The air in its natural state, with all its constituent parts (including CO₂ mixed in with other gasses) is regarded as a thing but, in that state, it is the sort of thing that is incapable of ownership or any other sort of rights such as lease. No one can own the air we breathe in or out. Lawyers call this sort of property that may not be owned “property *extra commercium*” – beyond the bounds of commerce. This Latin phrase is still widely used and is well understood. It basically means that the air itself is a thing open to the use of the whole world and cannot be appropriated exclusively for private or individual benefit or at least there are some limitations on such appropriation. However, this does not mean that a company or a state engaged in EOR cannot own or obtain and retain lesser rights in airspace. Airspace is not the mixture of gas itself but the space within which air or any other gas is located. In addition, it does not exclude the appropriation of use of air or its constituent parts by means of the doctrine of capture.

(ii) The Airspace Itself

Who owns airspace in Scotland? When a party owns the surface of land in Scotland then, unless there have been prior split offs of the subjacent or super-jacent areas such as the

²⁰ The problem appears to arise as a result of the distinction that is drawn in international law between the rights enjoyed by the coastal state in the territorial sea and the continental shelf respectively. UNCLOS 1982 confers “sovereignty” in the territorial sea (Art. 2), but “sovereign rights” in relation to certain specified things and activities in relation to the continental shelf and the EEZ (Arts 56 and 77).

minerals or the airspace,²¹ that party is presumed to own to the heights of the sky above the surface and down to the centre of the earth below it. This is a very ancient rule of law that has its origins in an extension of what is known as the Accursian Gloss of the *Digest of Justinian*. It is a rule that is old but it cannot be ignored. It was applied by the Supreme Court as recently as 2010 in the context of drilling for oil onshore in England.²² This rule has the effect that a party owning the surface can exclude all others from the ground beneath or from his airspace unless the other parties can establish a right to be there or to carry out activity there. This possibility of exclusion is, in effect, the application of an aspect of the law of trespass and encroachment. It is a complete myth that there is no law of trespass in Scotland. A right of property is an exclusionary right. It entitles the owner to exclude others and to have the monopoly of use of that land unless they can prove they have an existing right they can enforce against the owner. The basic law was stated several centuries ago but remains good law in the case of *Livingstone v Earl of Breadalbane* (1791) 3 Pat. App. 221 per the Lord President at 222. In rejecting a claim of access to private land to shoot game the Lord President stated:

“...every man is proprietor of his grounds, and entitled to the exclusive possession of them, if subject to no servitude. ...No man can claim a road or passage through another man’s property, even for the purpose of going to church, without a servitude, far less for amusement of any kind, however necessary for health. ... the banks of the river, and even the *solum* of it, may be private, and may be defended against any encroachment or access whatever”.

There is a report of this case albeit no quotation in *Earl of Breadalbane v Thomas Livingstone*, June 16, 1790, June 1790, F.C. 276, case no. 140. See also 1 Hailes, 1084 (also reported Fac Coll. 10, 276, M. 4999, where the Lord Justice Clerk at 1084 opined: “Property is sacred: no man can touch my ground without my leave; this point is clear in the civil law”. Lord Hailes also stated at 1084:

“While landowners of Scotland possessed large tracts of ground, which they knew not how to use, *there* was much latitude used reciprocally in hunting and fowling; but this gave no right, constituted no servitude”.

There have been some statutory relaxations of the rigours of the law of trespass,²³

²¹ This is very common in mining areas and some of these extend offshore in parts of Scotland such as in Fife. See, e.g. *Lord Advocate v Wemyss* (1899) 2F. (HL) 1; [1900] AC 48; (1899) 7 SLT 172. However, broadly speaking, the strata within the territorial sea are owned by the Crown because the default position has not been displaced.

²² *Bocado v Star Energy UK Onshore Ltd* [2010] UKSC 1 AC 380. Although this was an English case, its holding will be regarded with considerable respect in Scotland especially as the Scottish judge, Lord Hope, delivered his opinion in the case. See also *Lejonvarn v Cromwell Mansions Management Co Ltd* [2011] EWHC 3838 (Ch).

²³ Most notably, The Land Reform (Scotland) Act 2003, asp. 2, Part 1. See also *Lord Bernstein v Skyviews and General Limited* [1978] QB 479 (dealing with airspace and the application of Civil Aviation Act 1949, s.40(1) now repealed and replaced by Civil Aviation Act 1982, s.76(1)). See further Jill Morgan, *Digging Deep: Property Rights in subterranean Spaces and the Challenge of Carbon Capture and Storage*, (2013) I C L

including, of course, the recent example in the Infrastructure Act 2015, which allows a party to exploit “deep level land” (defined as land beneath at least 300 metres) under another’s property for the purposes of, among other things, exploiting petroleum.²⁴ Whereas the impetus behind this statutory exception was the desire to facilitate the development of shale gas in the UK, the statute is so worded as to allow CO₂ to be injected into a well that passes into land belonging to another below 300 metres without the need to obtain the consent of the surface owner.²⁵ but none of them apply to EOR or the activities of energy companies or oil and gas companies generally. So too, the State or executive government cannot simply abrogate a private property owner’s entitlement to interdict (i.e. prevent) a trespass whenever he wishes. Indeed, this right of private property and its full exercise is protected in terms of Article One, Protocol One of the European Convention on Human Rights. Commercial companies too are entitled to Human Rights. A landowner may always seek to exclude an unwanted intruder from his land and this applies equally in a commercial venture. That landowner may stop structures being projected into his airspace by means of interdict.²⁶ In the commercial venture, the law of trespass provides to a landowner an opportunity to make a commercial return. He may charge a fee and obtain an income from allowing other parties to use these spaces owned by him unless they can prove they have an existing right. What is stated in this paragraph, of course, also has a bearing on the issue of taking pipelines through the land of another party.

One should also recall that there is an additional complexity in this matter in that leases are an exclusionary right. If an energy company wishes to obtain a right to take a pipeline through land that is privately owned and subject to a lease the company must obtain the

Q 62(4) 813-837. Note the remedy for material loss or damage caused in specific incidents of negligence was preserved: *Steel-Maitland v British Airways Board* 1981 SLT 110.

²⁴ See section 43.

²⁵ In this regard, see section 44(1)(d) which states that the manner in which the right be exercised includes “passing any substance through, or putting any substance into, deep-level land or infrastructure installed in deep-level land”.

²⁶ *Brown v Lee Constructions Ltd* 1977 SLT (Notes) 61. Similar conclusions have been reached in the law of England in regard to various structures and operations: *Anchor Brewhouse Developments Limited v Berkley House (Docklands Developments) Ltd* (1987) 38 Building Law Reports 82 (tower crane); *Franklin Mint Limited v Baxtergate Investment Company* [1998] EWCA Civ 442 (tower crane); *Kelsen v Imperial Tobacco Company (of Great Britain and Ireland) Ltd* [1957] 2 QB 334 (advertising sign); *Gifford v Dent* [1926] W.N. 336 (projecting sign); *Wandsworth District Board Works v United Telephone Company Limited* (1884) 13 Q.B.D. 904 (telephone line in airspace); *Liaqat v Majid*, [2005] EWHC 1305 (QB) (extractor fan) and *Perlman v Rayden* [2004] EWHC 2192 (Ch) (overhanging guttering).

consent of both the landlord (usually the landowner) and the tenant.²⁷ The practical upshot of this is additional time and cost in any project of placing a new pipeline in land that is privately owned.

(iii) *Capture*

Notwithstanding the foregoing, air in its natural state may be captured²⁸ and subjected to rights. So too may it be the subject of a process to extract a particular gas from the air and the constituent parts, whilst they remain captured, can be owned. There is, therefore, no doubt that CO₂ extracted from gases produced from the combustion of fossil fuels or other industrial processes may similarly be owned. While it is unlikely that a legal concept was at the forefront of the minds of those designing and describing CCS, it so happens that the initial appropriation of a gas in this way is known as the doctrine of *occupatio* or capture. The container in which the CO₂ remains captured may be small or large. It can be a metal cylinder or a vast subsurface geological formation. It is also the case that gas can be still or moving whilst it is captured in the legal sense. So, CO₂ in a storage tank is captured. So too is CO₂ in a pipeline as it moves from one end of the pipe to another. To be clear, gas that is moving, whether during transport in a pipeline or during sequestration in a geological formation, can remain captured from a legal point of view. After CO₂ is captured and whilst it remains captured that thing may be subject to rights. It may be owned or rented. The benefits of this include the fact that the owner of a thing has the rights of use, abuse and destruction. He or she can use the CO₂ for a commercial process even if this causes its destruction or places it beyond retrieval.

(iv) *Moveable Property*

CO₂ when captured is a form of moveable property. Thus, for example, it is not regarded as part of the land upon which a metal cylinder it is contained within sits. That means the CO₂ may be sold or transferred like moveable property in the form of a sale of goods. It may be exchanged or given away. The type of rights in the CO₂ in this form exclude those that relate only to immovable property (mainly land). So, in this form CO₂ cannot be the subject of a lease

²⁷ Sometimes, where there has been foresight, the landlord will retain the right to grant pipeline servitudes and leases and similar rights in terms of the lease. In such a case the consent of the tenant is not required provided the pipeline in question and the intended right both fall within the scope of the reserved right. This is relatively rare and should not be anticipated for a new technology such as EOR as it involves foresight. It should also be remembered that the intention of such a clause is not to confer on the energy company a free hand to install a pipeline but to confer on the landlord the sole right to consent and confer on him the “golden key” for which he expects to be paid in full.

²⁸ There may be some maximum legal limit as to how much air can be captured but this has never been the subject of any judicial determination.

or a standard security. These technical points have major implications for the structure of any transaction. However, if the container in which the CO₂ is captured is very large and fixed permanently to the ground, that container becomes a fixture and forms part of the ground. In other words, it ceases to belong to the person who constructed it and the ownership of the structure passes whether he likes it or not to the owner of the underlying land. The parties cannot, by contract, confirm that the structure is to remain moveable. In Scots law, unlike English law, the intentions of the parties are irrelevant. On this basis, the buildings within an oil terminal at Shetland were held to be fixtures and not moveable despite the terms of a contract between the party occupying the land and the owner.²⁹ This same principle applies to major pipelines attached to the land. Their annexation makes them immovable as a matter of law whether buried in the ground or attached to the surface of the land. It potentially applies to structures attached to land covered by water such as the seabed. This raises the important issue of who it is that actually owns the seabed as there is the potential for seabed pipe-lines to be owned by whoever owns the seabed whether they like it or not. This is important as ownership has the potential to attract liabilities. This ownership cannot be transferred by mere agreement between the owner of the land and anyone else such as a company transferring CO₂. The basic rule in Scots law is this that mere agreement cannot transfer ownership. This is consistent with longstanding principle: *traditionibus, non nudis pactis dominia transferuntur*³⁰ or, stated in longer terms, *traditionibus et usucapionibus, non nudis pactis, dominia rerum transferuntur* – this means “delivery, not a bare contract, transfers the ownership of things”. This is no ancient relic of the law³¹ but remains important today and is applied in modern commercial situations by all Scottish Courts.³² On the same principle, no declaration by a single party or any agreement between parties that a moveable substance will remain moveable despite annexation is effective in Scots law.

(v) CO₂ in the subsurface

There is, however, a lack of clarity in the law as to what is the state of ownership of or rights in CO₂ when it is forced into subsurface strata and permeates tiny spaces within a depleted hydrocarbon reservoir or saline aquifer. The lack of clarity arises not because the principles of law are unclear but because the matter has never been litigated and never judicially determined. On principle, however, the most likely position in law is that

²⁹ *Shetland Islands Council v B.P. Petroleum Developments Ltd* 1990 SLT 82.

³⁰ *Clerk v John Warden* 3 Feb. 1699, 4 B.S. 437; *Anne and Margaret Landales v Thomas Landale* 12 June 1752 no 129 Remarkable Decisions 1730-1752 279 280 and 281; *Landales v Landale* 12 June 1752 Faculty Decisions 24 case no 13 25 per counsel. See also Menzies *Lectures on Conveyancing* ch VI 538.

³¹ The maxim comes from *Codex* 2 3 30. It is accepted in Scots law: Craig *Ius Feudale* 2 7 1; Stair *Institutions of the Law of Scotland* 3 2 5; Erskine *An Institute of the Law of Scotland* 2 1 18; Bankton *The Institute of the Laws of Scotland* 3 2 2.

³² E.g. *Farstad Supply A/S Enviroco Limited* [2011] UKSC 16 at paras 59-60 per Lord Hope and at 67-69 per Lord Rodger.

the CO₂ ceases to be owned by the person who injected it. It becomes owned by the person who owns the subsurface strata. Again, the operating principle seems to be the principle of annexation. Although the law is unclear it seems likely that the CO₂ when injected into strata cannot be owned separately from the strata,³³ neither can anyone else have any real rights in relation to that CO₂ unless they acquire a full property right in the strata and divest the existing owner of the strata of that right of property. In this context the CO₂ becomes part of the strata by virtue of the law of annexation. As already indicated above, this is a doctrine that operates quite independently of the intentions of the parties. So, nothing the parties might state in a contract or lease or servitude or any other document can alter this. Put another way, the owner of the strata will be obliged by virtue of this doctrine of law – *annexation* – to accept ownership of the injected CO₂ whether they like it or not. The second consequence is that any ownership that anyone previously had in the CO₂ is extinguished. This is because no two persons can be exclusive owners of any substance in Scots law at any one time.³⁴ Even if the owner of the strata enters into an agreement with the parties who inject CO₂ into the strata declaring that those latter parties remain the owners of the CO₂ within the strata this contractual provision will be ineffectual.

It is also possible to argue that the relevant principle of law that is applicable when CO₂ is injected into strata is the principle of *commixtio*. This principle operates when a gas is mixed with another gas or a gas is mixed with a liquid or two liquids are mixed. Ownership of one of the constituent substances may transfer to a shared form of ownership and the shared ownership is held in proportions by the parties who owned the original substances.

Applying these principles to the use of CO₂ for EOR it would appear that the position is as follows. Firstly, CO₂ that is injected into subsurface strata and remains there will be owned by the owner of those strata (an issue that has been touched on briefly in the introduction and that will be discussed at greater length below). Secondly, CO₂ that is commixed with hydrocarbons will belong to the owner of those hydrocarbons. Accordingly, CO₂ commixed with hydrocarbons that are still contained within the reservoir will be owned by whoever owns such hydrocarbons – a matter which is not

³³ See the comments in *Crichton v Turnbull* 1946 SC 52; 1946 SLT 156 about percolating water and its inability to be conveyed separately from the land in which it percolates.

³⁴ It is beyond all question that no two parties can be exclusive proprietors of one plot of land at any one time. This is recognised both by the institutional writers and in case law. (For the recent judicial view in reported case law see *Sharp v Thomson* 1995 SC 455 at 469F per L.P. Hope; *Safeway Stores plc v Tesco Stores Ltd* 2004 S.C. 29; 2004 S.L.T. 701 at para 13 the latter report merely noting counsel's argument). The principle is well imbedded in Scots law.

settled in Scots or English law, with some arguing that such hydrocarbons are incapable of ownership.³⁵ Ownership of CO₂ contained within produced hydrocarbons will lie with the licensee as soon as those substances pass the wellhead. It is worth mentioning that while the focus of the discussion here is CO₂ for EOR, the implications of the above observations for the CCS regime are clear: whatever the intention of the CCS Directive in terms of the point at which liability for CO₂ sequestered in subsurface formations transfers from the commercial actor to the state, property law may actually produce a quite different result.

(vi) *Release*

The reverse of the process of capture described above is also relevant, that is, the process of release. Such release could be deliberate or accidental. Should captured CO₂ escape, then the ownership of that material may be lost as the CO₂ is again mixed into the natural air. However, a loss of ownership does not mean a loss of liability for damage caused to the property of others as a result of that loss. However, pinning the responsibility for that on the party who put the CO₂ in the ground in the first place will depend not on principles of property law but on other doctrines such as delictual liability and nuisance. It could be that the escaping CO₂ could adversely affect the property of a third party. That third party would seek to recover from whoever it regarded as liable. It is quite possible that the party who would be sued would include the person from whose property the CO₂ escapes in addition to any party carrying on commercial activity within that property. Where third party property is damaged by escaping CO₂ the owner of that property will simply sue everyone with a connection to that escape and leave it to the defenders to sort out the liability *inter se*. The type of legal action seen in the American Courts as a result of the escape of oil in the Gulf of Mexico and involving BP is a classic example.

3. The Position of the State

From the foregoing, it will already be clear that it is impossible to discuss the use of CO₂ for EOR offshore without considering the position of the State. In this regard, one must distinguish three broad geographic areas: (a) land on the mainland and islands of Scotland; (b) land forming the seabed within the territorial sea; and (c) land forming the seabed outwith the territorial sea.

³⁵ For a discussion, see Greg Gordon, "Petroleum Licensing" in Gordon, Paterson and Usenmez, *Oil and Gas Law: Current Practice and Emerging Trends* (2nd ed.), Dundee: Dundee University Press, 2011, para. 4.8.

(a) Land on the Mainland and Islands of Scotland

Briefly stated, land in these areas is subject to private property. It may be owned by government agencies but it is largely owned by individuals, partnerships and private companies.

(b) Land Forming the Seabed within the Territorial Sea

The extent of the territorial sea is determined by the Territorial Sea Act 1987 to comprise a band of sea 12 nautical miles around Scotland.³⁶ Whereas a cursory reading of the statute might lead one to consider that only the water is included in this area, the relevant international legal instrument makes it clear that the air above and the seabed and subsoil beneath are also included.³⁷ The baselines for the measurements are established by Order in Council.³⁸ International law grants the coastal state “sovereignty” in its territorial sea and this explicitly includes the seabed and subsoil. In other words, the state’s rights in relation to the territorial sea are indistinguishable to those it enjoys in relation to the dry land. Broadly speaking, then, as regards principles of property law, the territorial sea is the same as land forming part of the mainland and islands of Scotland. However, the incidence of ownership by State-related entities as compared to private property is very different. In very large measure the land forming the seabed within the territorial sea is owned by the Crown Estate in a form of trust for the Crown (the executive government). Interestingly, a visit to the website of the Crown Estate reveals that this body itself stresses that its role is to “manage” the seabed out to 12 nautical miles,³⁹ which leaves the question of ownership open. In relation to the establishment of a carbon capture and storage project, however, the Crown Estate is clear that the business involved would require, inter alia, “a grant of property rights from The Crown Estate”.⁴⁰ In other words, it would surely be more accurate for the Crown Estate to describe itself as owner rather than manager. This is certainly the position the body itself has sought to assert through the Scottish courts and the position those courts have unhesitatingly confirmed.⁴¹

It would, therefore, be fair to say that the balance of ownership in the territorial sea and the pattern thereof resembles a communist system in that private ownership is largely absent. This has significant commercial implications as it provides the state with virtually a monopoly position,

³⁶ Section 1(a).

³⁷ See United Nations Convention on the Law of the Sea 1982, Article 2.

³⁸ The most recent is the Territorial Sea (Baselines) Order 2014/1353.

³⁹ <http://www.thecrownestate.co.uk/energy-and-infrastructure/carbon-capture-and-storage/> (visited 27 February 2015).

⁴⁰ Ibid.

⁴¹ See *Shetland Salmon Farmers Association v Crown Estate Commissioners*, 1991 S.L.T. 166; *Crown Estate Commissioners, Petitioners*, 2010 S.L.T. 741

which it can protect by normal rules of property law.⁴²

It is clear that within the territorial sea the Crown Estate can act like any other owner. It has the power of exclusion and can invoke the law of trespass and encroachment. It can grant servitudes and leases. It can sue and be sued as landowner. For example, in modern practice, the Crown Estate generally grants leasehold rights as regards pipelines crossing the territorial sea.⁴³

(c) Land Forming the Seabed Outwith the Territorial Sea

The regime of law outside the territorial sea is *probably* utterly different from ownership (a) on the mainland and islands of Scotland or (b) ownership within the territorial sea. The word *probably* has been used deliberately because traditionally it has always been accepted that this is indeed the case. However, in much more recent times, the Crown Estate has given some signals which seem to indicate their view that there is no such difference as regards private property law. For example, on its website, the Crown Estate is clear that a business seeking to establish a carbon capture and storage project “on the continental shelf” would require, among other things, “a grant of property rights from The Crown Estate”.⁴⁴ It is somewhat difficult to determine which of these approaches is correct – and we do not need to rehearse the detail of the arguments in this report – but there seem to be a number of principal alternatives:

(i) *Ownerless*

The seabed outside the territorial sea is ownerless and the Crown cannot grant any rights such as servitudes and leases in respect of it. This does not mean that the Crown has no sovereign rights in this area⁴⁵ and it still may regulate the activity that goes on within this area by means of statute, contracts, and the grant of licences. However, the fundamental point is this: according to this view the Crown cannot grant derivative real rights like leases and servitudes, although it could grant personal rights.

(ii) *Ownerless, but title could be established*

⁴² Ibid.

⁴³ For an interesting variation on this theme, which nevertheless confirms the basic proposition regarding ownership, see the Channel Tunnel Act 1987, s4.

⁴⁴ <http://www.thecrownestate.co.uk/energy-and-infrastructure/carbon-capture-and-storage/> (visited 27 February 2015).

⁴⁵ As mentioned above, the coastal state is accorded sovereign rights in the continental shelf and the EEZ by UNCLOS 1982.

The seabed outside the territorial sea is ownerless, but the Crown has other rights in it generated by concepts of sovereignty and the application of the legal maxim *quod nullius est fit domini regis*.⁴⁶ As a result, provided it makes up title in a suitable way (how it does that is completely unclear) the Crown may grant rights to third parties in respect of that land such as leases and servitudes. These are in addition to all the methods of control identified above.

(iii) *Owned by the Crown*

The sea outside the territorial sea is already owned by the Crown by virtue of the principle enshrined in the maxim *quod nullius est fit domini regis* even though it has not taken any formal steps to make up title to that land. This is the most expansive of the views of the rights that may be held by the Crown in and to the seabed outside the territorial sea. Such a view could, however, be inferred from the case law that has considered the position of the Crown vis-à-vis the territorial sea. Responding to arguments that the principle *quod nullius est fit domini regis* had no application in relation to the territorial sea, Lord Justice-Clerk Ross noted that would mean “there was a legal vacuum, and that no one had any right of property in the sea bed. That would be a surprising result and might well produce practical difficulties”.⁴⁷ Applying the same reasoning to the continental shelf and EEZ, in which there can be no doubt that the coastal state enjoys sovereign rights, it could be suggested that insofar as a judge might be said to abhor a legal vacuum he or she would be minded to conclude that the Crown Estate must be the owner of the seabed and subsoil to the extent that any alternative view “might well produce practical difficulties”.

There is considerable complexity in the reasoning underlying all three positions. There are, in addition, a number of variants on each position. Rather than enter upon this now, it is more productive to detail a select number of the important legal and commercial consequences of each position.

⁴⁶ “That which belongs to no one becomes the King’s”. This is the definition offered by the Office of the Queen’s and Lord Treasurer’s Remembrancer. <http://www.qltr.gov.uk> (visited 27 February 2015).

⁴⁷ *Shetland Salmon Farmers Association v Crown Estate Commissioners*, 1991 S.L.T. 166 at 174.

(d) Ownership and Possession Distinguished

Mere possession alone does not create ownership in Scots law no matter the length of that possession.⁴⁸ The initial act of possession in terms of which unoccupied land could be claimed for a country by means of something like planting a flag is controversial in the modern era and probably has no clear relevance to the seabed given the existence of the United Nations Convention on the Law of the Sea 1982.

(e) Assume the Seabed is Ownerless

The rules of property law generally require that a person must be an owner of land before he can grant a lease of the same land.⁴⁹ If he is not such an owner, the lease remains valid as a contract but confers on the tenant no “real” right. Amongst other things the term “real” right means the holder can sue third parties directly if they interfere with the activity he wishes to carry out. So, if the person who wishes to use CO₂ under the seabed obtains from the Crown a real right of lease in the seabed, then the tenant in that lease can independently defend his own rights by suing third parties. He does not have to revert to the Crown and have the Crown sue the third party as a trespasser. The trespasser has no direct legal relationship with anyone who has a mere contractual relationship between itself and the Crown. The rule here is privity of contract or as it is better known in legal systems outwith the Common Law world, the principle enshrined in the maxim: *nec paciscendo nec legem dicendo nec stipulando quisquam alteri cavere potest*.⁵⁰ This means “neither by agreeing nor by stating a contract nor by stipulating can anyone make a provision for another.” Nothing in a contract between the Crown and the party carrying out an activity using CO₂ to recover oil and gas can bind a third party. As a result, recourse would have to be had to other, less clear legal doctrines, such as the law of nuisance or the law of negligence,⁵¹ to protect the interests of any person having a right by means of contract only to put CO₂ into the seabed or a gas field under the seabed. The legal implications of such a position are not entirely clear in Scotland. Much may depend on the quality of possession and whether it is exclusive or not.⁵² There is the potential here for complex, costly

⁴⁸ See *British Railways Board v Lady Pauline Anne Ogilvie-Grant Sykes and others* (1985), Outer and Inner House, reported in Paisley and Cusine, *Unreported Property Cases* 34 and available on LEXIS.

⁴⁹ This follows inexorably from the *nemo dat* maxim, meaning that you cannot give what you do have.

⁵⁰ *Digest*, 50,17,73(4) (Quintus Mucius).

⁵¹ *Nacap Ltd v Moffat Plant Ltd* 1987 SLT 221 (issue of title to sue in respect of damage to pipeline not owned by party who had undertaken to make good damage). The pipeline was owned by the British Gas Corporation. The matter involved a judgement of reasonable foreseeability which is always a context specific judgement.

⁵² *TCS Holdings Ltd v Ashtead Plant Hire Co Ltd* 2003 SLT 177 – tenant had no right to sue for damage to a pipeline as the possession was insufficiently exclusive.

and time-consuming litigation. The position is further complicated by the fact that for wholly unexplained reasons a pipeline to carry CO₂ over the seabed to an injection point beyond the territorial sea requires a Crown lease if the purpose of injection is sequestration, but not if the purpose is EOR.

(f) Assume the Seabed is Owned by the Crown

If the seabed is owned by the Crown, the benefit is that they may grant leases and servitudes. The downside is that the ownership of the CO₂ inserted into the seabed passes to the Crown when it is injected into the seabed. Nothing in the contract, lease, servitude or licence can prevent this. This means that, if the CO₂ causes damage to third party property, that third party may seek to establish liability on the part of the Crown because the CO₂ belongs or has belonged to the Crown. We appreciate that mere ownership of a thing does not mean the owner attracts liability automatically because of the ownership of that thing. However, there are other principles of law arising, for example, under the law of delict that impose on an owner liability for allowing the introduction into his land of dangerous or potentially dangerous things and liability for this cannot be passed off to the contractor or party who actually carried out the works to introduce the dangerous material. It may well be that these principles would afford a basis upon which liability could attach to the Crown for the use of CO₂ in EOR. Of course, the Crown may seek to offset these liabilities by a suitable indemnity in any contract or lease or servitude. However, those indemnities are only as valuable as the covenant of the party giving the indemnity. If that party, such as would be the case with a liquidated company, ceases to exist, the indemnity would cease to exist. The Crown, in such a case would be left carrying the can. Strikingly, of course, while the Crown is very substantially involved where CO₂ is being transported over the seabed beyond the territorial sea for purposes of sequestration (via a Crown lease and a pipeline lease, meaning that there are instruments within which it could provide for such an indemnification), the same is not true where transportation and injection are for the purpose of EOR.

How long does the potential of liability last for? We have assumed no-one knows how long the CO₂ may be in the seabed. It may emanate in a form that causes harm to third parties years later. It may turn out there is no such downside but we have assumed this remains a potential as yet somewhat uncertain. The difficulty here is that ownership is a perpetual right. A lease is not. The maximum duration of a commercial lease in Scotland is 175 years.⁵³ A contract potentially has no limit of time (as the parties to it may be immortal corporations) but in both cases it must be recognised that the right of the landlord in a lease against his tenant and the right of the contracting party against the other is personal. The right to sue disappears if the

⁵³ Abolition of Feudal Tenure etc. (Scotland) Act 2000, asp. 5, s.67.

other party disappears by liquidation. So, even if it places an indemnity in a lease, the Crown must recognise there are limits to this protection. This proposition is in any case hypothetical in the case of CO₂ for EOR where no lease is currently required, whether in relation to the transportation of CO₂ by pipeline or in relation to the area of the subsurface into which the gas is to be injected.

All of this is placed in even sharper focus by noting that a right of property in Scottish land cannot be abandoned by the owner.⁵⁴ This means that the Crown, if they are indeed owners could end up in the position of taking on potentially perpetual liabilities that are offset by worthless indemnities and cannot be got rid of by abandoning the property. This applies both to the CO₂ in the seabed and also the CO₂ as it passes through pipelines crossing the seabed.

⁵⁴ *Joint Liquidators of Scottish Coal Co Ltd v Scottish Environment Protection Agency* 2014 SC 372.

4. Transportation to the Seabed

(a) Third Party Rights

The transportation of CO₂ to the continental shelf for EOR may involve such vast quantities of the substance that it will require the use of pipelines. Physically it may be possible to adapt an existing pipeline to transport the gas from a facility on dry land to oil and gas fields offshore. However, that does not mean that there are sufficient rights in those existing pipes to enable the use of them to be changed.

(b) The Structure of Land Ownership in Scotland

As indicated above Scotland is a Western democracy that recognises private property. The vast majority of land on the mainland of Scotland is privately owned. Even where various government departments own land in Scotland they enjoy the same property right as anyone else. They all have the right to refuse to allow a third party to enter their land unless that third party has an existing right to do this.

It is in this context that we need to consider the possibility of using some existing oil and gas pipelines to transport the CO₂. Instead of the oil and gas flowing from a well in the seabed the flow will be reversed and the substance changed. We understand that this may involve its own engineering problems but, at least as far as the required physical works are involved, is far cheaper than building wholly new pipelines. It may be that the cost differential would contribute significantly to the viability of the entire process of using CO₂ for EOR.

(c) The Legal Background of the Existing Pipes

Most of the existing pipelines are created by derivative real rights such as servitudes or leases (the latter being the preferred route of the Crown under present practice). Both have the following features in common. Both rights are invariably set up by a deed entered into by the oil and gas company and the landowner. Both set out the terms upon which the pipeline is to be laid and operated. In particular, they contain what is known as a “user” clause restricting the use of the pipeline to particular uses. By this means the landowner is enabled to restrict the activity of the oil and gas company.

It is important to note that the party using the pipeline can be interdicted from using the pipeline for any use that is outwith the stated terms of the use clause. If the document states that the use is for “oil and gas transportation”, this probably excludes transportation of CO₂. It may be that the wording is somewhat more permissive and allows uses ancillary to oil and gas production. In such a case it may be arguable whether the transportation of CO₂ for EOR is

ancillary to oil and gas production. It may be that the deed allows the transportation of “oil and gas products” but it is unlikely that even CO₂ captured from the combustion of oil and gas that had already been delivered to shore and subject to other processes would be regarded as such a product. In each case the documentation will have to be examined along the entire length of the relevant pipeline to check if a pipeline could be used for CO₂ transportation. This may involve many hundreds of documents if, indeed, the pipelines crosses the mainland or islands of Scotland as there may be a considerable number of parcels of land in private ownership. There is at present no method of seeking a judicial waiver of limitations in servitudes or leases of this nature. The landlord has a veto on determining the matter unless the lease or servitude provides otherwise.

The upshot is that the use of existing pipelines for the transportation of CO₂ for EOR will require a method of expanding the rights in the existing pipelines. Of course, the absence of a lease or servitude in relation to such a pipeline on the continental shelf means that at least this complication does not emerge in this part of the infrastructure – although the wording of the authorisation from the Secretary of State will need to be considered.

(d) Existing Compulsory Purchase Statutes Are Deficient

Many compulsory purchase statutes allow for the acquisition of rights held by landowners. There are several hundred of these. These statutes provide for the acquisition of existing rights. Far fewer of the statutes provide for the acquisition of new rights. There is no bespoke statute for the creation of rights for the purposes of CO₂ transportation. As far as we can ascertain a new statute would be required to enable such rights to be created.

5. Conclusion

The issues discussed in outline above are clearly of fundamental importance to the operability of CO₂-EOR technology. They require to be clarified to enable better drafting for matters as diverse as funding, insurance, indemnities, liabilities, and new regulation. To date, the issues have simply been dodged. It remains the case, however, that unless they are clarified then unexpected and potentially expensive problems may arise, both for contractors and the Crown. The position is all the more confused because of the apparent disjunction between the approach adopted when CO₂ is transported and injected into the subsurface offshore for purposes of sequestration and the approach adopted when the same basic processes are conducted but the intention is EOR. There appears to be no reason for the differential approach from the perspective of property law and indeed every reason to conclude that we are quite simply confronted with an incoherent and ad hoc approach the precise consequences of which remain to be seen. It is worth noting in closing, not least to stress the significance of what can

at first sight sometimes appear to be rather obscure legal points, that the observations made here also have ramifications for other issues of current significance beyond the territorial sea, including liabilities for decommissioning of oil and gas infrastructure and residual liabilities for decommissioned infrastructure that is permitted to remain in the seabed.