



State Responsibility and Liability for Long Term Carbon Capture and Storage in the Event of Leakage from the Sub Seabed.

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Summary: This thesis considers and analyses the applicable international rules and regulatory regimes of state responsibility and liability for long-term storage of Carbon Dioxide (CO₂)¹ into the sub seabed geologic formations in the event of leakage. Depending on where the leakage of stored CO₂ may occur, the legal implications differ due to the impact of national borders or jurisdictional zones. The purpose of the thesis is to tackle the international aspect of leakage of CO₂ that which has clear transboundary or international implications.

The thesis will examine three pieces of international treaties: the United Nations Convention on the Law of the Sea 1982 (UNCLOS)², the Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter (London Convention)³ and the Protocol of 1996 to the London Convention (London Protocol)⁴ and Convention for the Protection of the Marine Environment of the North-East Atlantic 1992 (OSPAR Convention)⁵. In addition the thesis will analyse relevant international case laws to substantiate state liability in the event of a leakage of stored CO₂ causing transboundary harm. Two international principles - the Polluter Pays Principle (“PPP”) and Precautionary Principle will also be discussed as arguably both principles have secured a place in customary international law with respect to the environment

From a legal standpoint the ocean is divided into different jurisdictional zones, the thesis examines the long term state liability and responsibility of stored CO₂ into the exclusive economic zone as this could prove the most crucial storage zone and from the perspective of the storage state.

¹ CO₂ storage and Carbon Capture & Storage (CCS) in this thesis refers to long term storage of carbon dioxide and is used interchangeably.

² United Nations Conventions on the Law of the Sea, Done at Montego Bay, 10 December 1982; entry into force, 16 November 1994 1834 UNTS 397 [Registration Number 31363] [hereinafter UNCLOS]

³ Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Done at London, 29 December 1972; entry into force 30 August 1975 1046 UNTS 138 [Registration Number 15749] [hereinafter London Convention]

⁴ Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Done at London, 7 November 1996; entry into force, 24 March 2006 IMO Doc. LC/SM 1/6, 14 November 1996 [hereinafter London Protocol]

⁵ Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention), Done at 22 September 1992, entry into force, 25 March 1998 (1993) 23 LOSB 32

The issue that arises in the discussion and in the analysis of the chosen topic in this thesis is that there are no international legal and regulatory frameworks relating specifically to long-term liability of CO₂ leakage. The lack of dedicated international treaty affects the interpretation of the legal status of CCS and storage of CO₂ as we shall see and most importantly state liability principle in the area of international law of the sea for long term CO₂ storage.

1. Introduction.

1.1. Objective of the thesis

Analogous to conventional oil and gas, spillages usually occur whilst the operator usually private company is still viable and there are civil liability regimes available⁶ ⁷. Long term CO₂ storage leakage however is different, in the sense that storage is for long term for instance hundred or thousand years'. Therefore the question is who will be responsible in the event of a leakage of the stored CO₂ in a hundred or thousand years? In other words should the operator of the storage be liable in perpetuity, or should liability lie with the State in the event of a leakage of the captured CO₂? Crucially it's who will be responsible or liable if CO₂ leaks out of storage formation after a thousand years and causes damage to the ecosystem or health to a neighbouring state. In this thesis long-term liability is used to refer to liabilities arising after CO₂ injection and active monitoring of the site has ceased completely.

The objective of this thesis is to discuss and analyse marine international law on state liability of long term CO₂ storage. That is once the CO₂ is stored and left into the geological formation in the sea for centuries. The proposal is that liability and responsibility in the event of leakage causing harm should rest with the storage state. This is because firstly long term CO₂ storage is expected to be over centuries and as a result there is extraordinarily long duration of risks associated after storage. That unlike conventional oil and gas spillages which occur whilst the operator is viable which can be held responsible and there exist civil liability regimes. Secondly all off-shore oil and gas rigs are owned, operated or controlled by a

⁶ International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER) 23 March 2001; Entry into force: 21 November 2008

⁷ International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND) 18 December 1971; Entry into force: 16 October 1978; superseded by 1992 Protocol: Adoption: 27 November 1992; Entry into force: 30 May 1996.

solvent or substantial multi-national oil company that can be held liable in the operations on the basis of international and national civil liabilities, therefore states don't have to be held liable for their activities. That, long-term liability in the event of stored CO2 leakage, is different because the operator may not be responsible of the site anymore, is insolvent or non existence and as such liability is best suited to rest with the storage state and covered under international rules of state responsibility and liability mechanisms.

Although financial responsibility is required until closure of the CO2 sequestration site, the focus of this thesis is long-term liabilities arising during the post-closure period. The risks during the operational and closure monitoring of CO2 projects are similar to current offshore oil and gas industrial activities that can be underwritten in the financial and insurance sectors. Liabilities associated with the capture or transportation of CO2 do not fall within the scope of this thesis. The discussion below also does not address liability of CO2 storage sites before the end of the post-closure phase.

One of the greatest global challenges facing CO2 storage today is long term liability issues associated with the leakage of CO2 to the atmosphere and not technology. The uncertainty of where policy and regulatory frameworks are going-if anywhere. Crucially it's who will be responsible or liable if CO2 leaks out of storage formation after a thousand years and causes damage to the ecosystem or health to a neighbouring state. In addition realising the full potential of CO2 storage will depend on the development of effective legal and regulatory frameworks that can deal effectively the challenges raised by long term liability but without stifling a new technology of potential great public benefit and discourage more investment⁸. In order to make CCS an attractive and viable

⁸ Hans Christian Bugge, 'Transboundary Chains for Carbon Capture and Storage' in Ian Havercroft, Richard Macrory, Richard B Stewart (eds) *Carbon Capture and Storage Emerging Legal and Regulatory Issues*. Oxford : Hart, 2011Pg. 129. *Carbon Capture and Storage Emerging Legal and Regulatory Issues*. Havercroft, Macrory, Stewart. Pg.124

industry, the developers and operators require unambiguous liability rules.

The thesis analyses three Conventions - UNCLOS, the London Convention and London Protocol and OSPAR Convention - and in their application to state liability in the event of a leakage of long term stored CO₂ causing transboundary harm. In analysing these Conventions we will firstly give a brief description of CCS's and its role in reducing global CO₂ emissions. Secondly we will look at states' rights to undertake CO₂ storage and the regulatory barriers to implementing such activity. We will analyse the relevant provisions in the Conventions on states' obligation to protect the marine environment and not to cause harm to other states through activities under another state's jurisdiction and control. Neighbouring states will want to be satisfied that storage of CO₂ is secure and that in the event of a leakage posing threat to human health, environment and ecosystem they can get compensated and know who to hold liable. Out of the states' responsibility to protect the marine environment and not cause harm we will establish state responsibility and liability in case of loss from transboundary harm arising out of CO₂ leakage.

The role of the Conventions will be discussed from two perspectives: 1) whether they contain any direct regulation of long term CO₂ storage and primary norms that could be applied i.e. in instances of leakage of CO₂ across national borders that damage the environment of another state as a cause of action for a State responsibility and liability claim and 2) to what extent the treaties can be used to demand that States are liable for consequences of long term CO₂ storage. Analysis of the treaties will point out that a novel approach needs to be considered in detriment of a classic approach of state responsibility. It will be illustrated that state liability for long term CO₂ storage can be established with the existing regulatory frameworks.

The purpose of this thesis is not to make an assessment of the normative legal problems of state responsibility and liability. As mentioned some regulations for operations of CO₂ storage do exist that may be relevant or, in some cases, directly applicable to CO₂ storage, but there are no specifically developed legal or regulatory frameworks for long-term CO₂ storage.

Finally the conclusion of whether it is necessary for a future comprehensive treaty on long term CO₂ storage or if there is in existing treaties and customary international law a cause of action for a State responsibility claim.

1.2. What is CO₂ storage?

CO₂ storage involves deployment of technological solutions which can capture carbon emissions either before combustion with the fossil fuel, or recapture the carbon after burning of fossil fuel.

Storage of CO₂ process will usually consist of three main components: capture, transport and storage⁹. After capture the CO₂ is then purified and compressed into a liquid state, which then can be injected deep below ground in several geological contexts. The stored CO₂ should remain stored deep down below ground for tens thousands of years into the future.¹⁰

There is experience of injecting natural carbon dioxide to improve oil recovery, as this can both be re-pressurise the deep hydrocarbon reservoir driving the oil upwards and CO₂ can also chemically dissolve into the oil, forming a less viscous fluid, which flows more easily to the surface. CO₂ injection for full-scale CCS would be

⁹⁹ Martha M Roggenkamp and Evelien Haan-Kamminga, 'CO₂ Transportation in the European Union: Can the Regulation of CO₂ Pipelines Benefit from the Experience of the Energy Sector?' in Ian Havercroft, Richard Macrory, Richard B Stewart (eds) Carbon Capture and Storage Emerging Legal and Regulatory Issues. Oxford : Hart, 2011 Pg. 7.

¹⁰ Ibid. P.8.

similar.¹¹ This process of exploration and production of oil and gas (hydrocarbon) in the subsea-deep geology has been happening for decades.

1.3. Different types of CO2 leakage from transportation to storage

Since storage of CO2 process consist of three main components: capture, transport and storage Leakage can occur at any of the three stages in the chain. The first two stages of the process are usually termed as the operation period where generally a private operator such as a company undertakes the capturing, transportation and storage until the geological formations are sealed. In the event of leakage during this process generally the operator is liable for damages. It is similar to conventional oil and gas spillage liability issues which usually occur whilst the operator (private company) is still viable and there are civil liability regimes available. Similarly Existing laws and regulations regarding inter alia oil and gas operations, pollution control, waste disposal, and treatment of high-pressure gases may be relevant during the capture, transportation and storage operations. Existing civil liability international regulatory frameworks governing the oil and gas industries can probably be used to get compensation from the operator in the event of CO2 leakage in the short term or the operational liabilities because they have similar legal issues.

As stated above the purpose of this is to examine and analyse international marine rules dealing with state responsibility and liability in the event a leakage of CO2 causing transboundary harm.

¹¹ Hans Christian Bugge, 'Transboundary Chains for Carbon Capture and Storage' in Ian Havercroft, Richard Macrory, Richard B Stewart (eds) Carbon Capture and Storage Emerging Legal and Regulatory Issues. Oxford : Hart, 2011Pg. 129. Carbon Capture and Storage Emerging Legal and Regulatory Issues. Havercroft, Macrory, Stewart. P.129

1.4. The aim of long term CO2 storage

Burning of carbon has been a fundamental energy source throughout evolution and development of industrialised countries. Carbon dioxide emission prompted by industrialisation has first produced increased atmospheric carbon dioxide substance, leading to global warming and climate change. The dissolution of increased carbon dioxide from the atmosphere into upper ocean is producing a measurable increase in the acidity of ocean water¹²

International concern about climate change led to the signing of the United Nations Framework Convention on Climate Change¹³. The objective of the UNFCCC is the “*Stabilisation of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system*”¹⁴. These adverse effects of the atmosphere is now days recognised by many governments around the world and many are finding ways to cut back emissions. The promotion of energy efficiency improvements and fuel switching are one among the most frequently applied policy measures that result in mitigation of CO2 emissions. CO2 storage appears to be a potential contribution to combating precarious climate change and gapping the global transformation to a low-carbon economy. It is estimated that long term CO2 storage could capture from 15% to 55% of the world CO2 emissions¹⁵ States have already started the process of enacting and implementing legislation and regulations within the objective of the UNFCCC, the Kyoto Protocol to the United Nations Framework Convention on Climate Change¹⁶ and the Copenhagen Summit.

¹² Hans Christian Bugge, ‘Transboundary Chains for Carbon Capture and Storage’ in Ian Havercroft, Richard Macrory, Richard B Stewart (eds) Carbon Capture and Storage Emerging Legal and Regulatory Issues. Oxford : Hart, 2011Pg. 129.

¹³ United Nations Framework Convention on Climate Change, May 9, 1992, entered into force 21 March 1994, 1771 U.N.T.S. 107, 31 I.L.M. 849 [hereinafter UNFCCC]

¹⁴ Article 1 UNFCCC

¹⁵ PembinaA Institute , Carbon Capture and Storage Fact Sheet (2008), available at <http://pubs.pembina.org/reports/ccs-fact-sheet.pdf>. accessed 07.04.2014

¹⁶ Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 1771 U.N.T.S. 148, 37 I.L.M. 22 [hereinafter *Kyoto Protocol*] (entered into force Feb. 16, 2005).

The long-term storage of CO₂ from the atmosphere is increasingly perceived as one of the main technologies that will be needed to handle the challenges of climate changes¹⁷. It has the potential to remove significant quantities of CO₂ from the atmosphere while allowing economies to continue to use otherwise potentially high greenhouse gas (GHG)-emitting fuel sources which, in the near term at least, are likely to remain generally cheaper than alternative energy sources such as biofuels, solar, wind, wave and geothermal power. CO₂ storage however presents a number of challenges that states and the international community are just starting to address. Long term legal liability for CO₂ leakage from the sub seabed is one of the major critical issues that need to be clarified for the viability of CO₂ storage as a long term solution to climate change.

Due to the large scale of commercial CO₂ storage operations and the potential hazards posed by long term CO₂ storage, liability could also be triggered under international law in the case of transboundary across the territory of other states or in areas beyond national jurisdiction. This would entail the liability of both the operator and the state where the storage site is located. However no dedicated international legal framework exists to address the international liability for long term CO₂ storage activities. This regulatory regime entails a long-term monitoring and control of storage sites requiring a regulatory or other competent authority to monitor and report leakage or potentially remediation of storage sites over the next hundred years and beyond. The monitoring and control, in turn, requires long-term financing to ensure continued stability and maintenance. This final responsibility for long term liability is still undefined.

¹⁷ Hans Christian Bugge, 'Allocation under the Climate Regime between the State Parties of Emissions due to Leakage' in Ian Havercroft, Richard Macrory, Richard B Stewart (eds) Carbon Capture and Storage Emerging Legal and Regulatory Issues: Transboundary Chains for Carbon Capture and Storage. Pg. 131.

2. Long Term CO2 Storage and the relevant International Law.

There are no international legal and regulatory frameworks relating specifically to long-term liability of CO2 leakage. The storage of CO2 is a relatively new technology and was not viable until recently, whereas, some of the international marine conventions are thirty years old. The international marine laws that could apply to geological carbon sequestration were not made with this in mind. Despite the lack of specific long term liability rules, existing international marine treaties can be used to redress leakage of long term stored CO2 resulting in damages beyond national jurisdiction namely: UNCLOS, the London Convention and the London Protocol and the OSPAR Convention. Although the three Conventions and the Protocol have no mention of offshore CO2 storage in them, they are relevant to the regulation of long term offshore CO2 storage. They relate to marine and environmental protection in the sea and using them together in practice and not separately together they provide state responsibility and liability mechanisms for long term storage of CO2.

UNCLOS is the main international treaty that is relevant to CO2 storage under the seabed. UNCLOS regulates all uses of the sea and establishes general legal rules for all issues of the use and protection of sea, including exploration of natural resource, prevention of pollution and protection of the marine environment. UNCLOS is written in a general framework, and obliges States acting through international organisations, and governmental conferences to enact specific '*global rules and standards*' to regulate pollution by dumping¹⁸.

The global rules in relation to marine pollution are found in the London Convention and London Protocol, which at the present is the most significant global convention to protect the marine environment and conserve the species and ecosystem. States which

¹⁸ UNCLOS Article 210(4)

have ratified both UNCLOS and the London Convention and London Protocol are required to adhere to the rules and regulations in accordance with UNCLOS¹⁹. UNCLOS and the London Convention London Protocol encourage States to adopt regional agreements to further the objectives of the conventions²⁰.

In order to develop protection of the marine environment, parties to both the London Convention and London Protocol are encouraged to create regional agreements which further their objectives²¹. The regional agreements can provide a greater degree of environmental protection in the regions that they cover but they must endeavour to be consistent with the Convention and Protocol. For the purposes of this thesis, the OSPAR Convention is the relevant regional agreement, and although it is similar to the Protocol and London Convention it is stricter in scope as it is more modern than the Convention and takes into account other sources of pollution. Although OSPAR does not have the global implications of the London Convention and London Protocol, it includes 15 countries and the European Union, which represent a group of the most advanced countries with the capability to deploy the technology and finance. Thus setting an example for other regional groups to emulate OSPAR as model for the creation of other regional agreements.

It should be noted all three Conventions are still developing and evolving and can respond to such changes of the deployment of CO₂ storage in the world. The question whether the legal principles that are in place will apply is also untested water in the courts²².

The above Conventions and general principles of international law on state liability will be considered in the analysis of state liability in the event of a leakage of long term CO₂ causing transboundary harm. Within these Conventions we will analyse relevant provisions

¹⁹ Ibid

²⁰ London Convention Article VIII, London Protocol Article 12

²¹ London Convention Article VIII; London Protocol, Article 12

²² See Ray Purdy and Richard Macrory, Geological carbon sequestration: critical legal issues. January 2004. <http://www.tyndall.ac.uk/sites/default/files/wp45.pdf> accessed on 06.04.2014

that are applicable to long term storage of CO₂, what will constitute leakage of CO₂ and whether states could be held liable for long term leakage. International case law concerning state activities that cause harm outside their national territories, will be used to support the case for state liability and to give indication as to the direction of the courts might be willing to follow, but this is not certain.

3. States' Rights to store CO₂ into the sub-seabed

The relevant starting point of states' rights with respect to CO₂ storage is the concept of the state itself. Under international rules the state is an actor in the international community and its relationship with other states derives from the concept of 'sovereign state'.

It is accepted that under general principles of public international law States can exercise their sovereignty in their territories under international law²³ and could undertake activities related to exploring and exploiting their natural resources. States' sovereign rights over their natural resources have led to the principle of permanent sovereignty over natural resources²⁴. States are free to use their territory, for the purposes of exploring and exploiting natural resources. In other words for the benefit of their economies and other purposes. Through state practice and decisions of international courts and in doctrine²⁵ the principle of sovereign rights over natural resources was given increased attention to accommodate the realities of economic and environmental globalisation. Customary international law requires, that states take into account the impact their actions have on the environment of

²³ See generally, I Brownlie, *Principles of Public International Law*, (5th edn, Oxford University Press, Oxford 1998) Pg. 105-125

²⁴ Resolution on Permanent Sovereignty over Natural Resources, 1962; UNGA Res 1803 (XVII) 14 December 1962.

²⁵ The Charter of Economic Rights and Duties of States 1974, elaborates upon certain aspects of the 'full' permanent sovereignty over natural resources; UNGA Res 3281 (XXIX) (1975) 14 ILM 251

other states, so that their actions within their jurisdiction do not cause harm to the territory of other states.

The interpretation and application of permanent sovereignty over natural resources as a source of duties as well rights with respect to proper management of living and non-living natural resources. The principle has evolved from rights to duties and control over natural resources to environmental conservation. And since the adoption of UNCLOS the discussion has gradually moved from sovereign rights over natural resources to the need to preserve the environment and management of living and non-living resources.

UNCLOS, Article 56(1)(a) enshrined the notion of sovereignty over natural resources when providing that: ***“In the exclusive economic zone, the coastal State has: sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and subsoil, and with regard to other activities for the economic exploitation of the zone, such as the production of energy from the water, currents and winds”***.

CO₂ storage activities take place in the exclusive economic zone which coastal states enjoy full sovereign rights to exploit and explore, conserve and manage their natural resources, whether living or non-living of the sea-bed and subsoil and the superjacent waters.²⁶

3.1 Storage of CO₂ in the Exclusive Economic Zone (EEZ)

UNCLOS establishes zones in the ocean and recognises different rights and duties of the states for each zone. The zones divided by UNCLOS are repeated and adhered to in all other international

²⁶ UNCLOS Article 56

marine laws such as the London Convention and London Protocol and OSPAR.

The different maritime zones, includes territorial waters of states up to 12 nautical miles under UNCLOS Article 3, the exclusive economic zone (EEZ) not exceeding 200 nautical miles under UNCLOS Article 57 and the continental shelf area under UNCLOS article 76(1) all measured off the coastline or “baselines”. Outside these maritime zones, UNCLOS defines the high seas and all States have equal rights also known as freedom of the high seas where it is open to all states to navigate, fish and exploit subject to certain limitations set by UNCLOS.

The EEZ extends from the end of the territorial sea out to a maximum of 200 nautical miles from the baselines of the coast²⁷. Within the EEZ the coastal States have sovereign rights of exploration, exploitation and managing the natural resources in the seabed, its subsoil and water above it²⁸.

An EEZ can be claimed by a coastal state around its territory, if they want to exercise their rights to explore and exploit natural resources in the 200 mile radius from their coastline. Jurisdiction over the EEZ however can only be claimed in so much as international law is acceptable and before a state can exercise EEZ rights conferred by UNCLOS, there has to be legislation at national level which vests such rights with an authority competent to exercise them.

Given that CO2 storage activities occur in coastal states’ EEZ who enjoy full sovereign rights to explore and exploit their EEZ, we will examine what is meant by sovereign rights over natural resources and how CCS activities relates to that. The question is whether CO2 storage falls within the scope of the coastal States rights to explore

²⁷ UNCLOS, Article 57

²⁸ Ibid, Article 56(1)(a)

and exploit of their EEZ's natural resources. In addition the long term storage of CO₂ in the sub seabed raises the questions of whether CO₂ storage (1) is subject to similar qualifications and restrictions of the management of living and non-living natural resources and (2) the same provisions apply dealing with states' responsibility and liability arising from pollution caused by leakage of stored CO₂. Each of these questions will be discussed below.

3.2 Is CO₂ storage activity a natural resource?

Whether storage of CO₂ in the EEZ is a "natural resource" will depend on the interpretation of article 56(1) UNCLOS. It's clear that UNCLOS was not drafted with CO₂ storage in mind, a strict interpretation of the words 'natural resources' within the meaning of UNCLOS, article 56(1) will have to exclude storage of CO₂ in the EEZ as a 'natural resource'. However, a normal interpretation of the expression '*other activities for the economic exploration or exploitation of the zone*' already covers the use of the seabed for storing CO₂²⁹. A form of storage of natural CO₂ in the sub seabed already takes place as CO₂ is injected in the sub seabed to improve oil recovery, as this can both be re-pressurise the deep hydrocarbon reservoir driving the oil upwards and CO₂ can also chemically dissolve into the oil, forming a less viscous fluid, which flows more easily to the surface. It follows therefore that use of the seabed for CO₂ storage within the EEZ comes under Article 56(1). It is also possible that States could claim that their rights to exploit the EEZ extends to exploiting the empty spaces in the geological formations for CO₂ storage purposes. However the sovereign right of States to exploit their natural resources in the EEZ, is flanked by their duty

²⁹ Hans Christian Bugge, 'Allocation under the Climate Regime between the State Parties of Emissions due to Leakage' in Ian Havercroft, Richard Macrory, Richard B Stewart (eds) Carbon Capture and Storage Emerging Legal and Regulatory Issues: Transboundary Chains for Carbon Capture and Storage. Pg. 131.

to protect and preserve the marine environment and not to cause damage by pollution which will be described and analysed below.

The storage of CO₂ in the EEZ however is more likely to be regarded as dumping since CO₂ is a waste, which States can undertake provided that they have due regard to the rights and duties of other states, they respect their obligations under other international marine pollution rules, and they are placed under a duty not to cause damage by pollution to the territory of other states or areas beyond national³⁰. Dumping within the EEZ cannot be undertaken without the consent of the coastal State³¹ and has the power to regulate pollution arising from or in connection with seabed activities³². Ensuring CO₂ storage does not constitute dumping is an important part of the discussion of state liability. Whether CO₂ storage constitutes dumping under international law will be explored below.

3.3 Is long term CO₂ storage dumping?

Considering that stored CO₂ in the EEZ can unintentionally leak causing adverse effect to marine environment and the ecosystem, it is probable that the storage of CO₂ in the EEZ could potentially be classed as a “pollution of marine environment” within the relevant provisions of UNCLOS, London Convention, London Protocol and OSPAR Convention.

UNCLOS, the London Convention, the London Protocol and OSPAR contain somewhat a mixture of the legal basis on whether long term CO₂ storage constitutes waste and thus illegal or allowed for dumping can be discerned. The requirements under the London Convention and Protocol, are of global application to all signatories. The provisions contained in the Convention and Protocol are not

³⁰ UNCLOS, Article 194(2)

³¹ Ibid, Article 210(5)

³² Ibid, Article 194(3)

always the same and will be dealt with separately where appropriate.

3.4 Is CO2 storage in the sub seabed dumping under UNCLOS?

The scope of UNCLOS is wide and is generally referred to as wide international legal framework, covering the utilisation of resources, shipping, marine research, the exploitation of the exclusive economic zone and continental shelf, and the prevention and avoidance of marine pollution. As legal framework it contains broad principles and articles that allow Contracting Parties to adapt specific international, regional and national rules in relation to the marine environment.

As such the legality of CO2 storage in the EEZ is not expressly excluded or even referred to in UNCLOS. UNCLOS defines dumping to be ***“any deliberate disposal of sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea”*** but does not include ***“placement of matter for a purpose other than mere disposal”***³³.

If CO2 is transported by ship or by a pipeline to a disposal site and then injected from a platform or a ship then it might be considered to be dumping under the purposes of the Convention.

UNCLOS Article 192 imposes a general obligation on states to protect and preserve the marine environment in all of the territorial zones of the seas. Coastal State’s are obliged to regulate pollution arising from or in connection with seabed activities³⁴.

UNCLOS Article 194 states the measures taken pursuant to this part shall deal with all sources of pollution of the marine environment, including dumping. It appears the provisions in UNCLOS Article 194

³³ United Nations Convention on the Law of the Sea, Article 1(5)(a&b).

³⁴ Ibid, Article 194(3)

will apply if CO2 storage is determined to be 'pollution'. Pollution is defined as *“the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities”*³⁵.

From this definition however it is unclear whether CO2 is pollution. Some commentators have argued that it probably is not a pollutant, although if large quantities of CO2 are stored then this could cause pollution if it resulted in harm to living marine resources³⁶. If CO2 is transported by ship or by a pipeline to a disposal site and then injected from a platform or a ship it might be considered to be dumping under the purposes of UNCLOS.

As considered at the start of paragraph 2, UNCLOS is a framework treaty that is general in character, it sets relevant international organisations and states to establish more dedicated laws or known in UNCLOS as - *'global rules and standards'*³⁷. As stated these global rules are widely accepted to be contained in the London Convention, the London Protocol and the regional OSPAR Convention, which we will analyse below in reference to whether CO2 storage constitutes pollution by dumping.

3.5 Is CO2 storage dumping under London Convention and London Protocol

The London Convention was one of the first international treaties to control and regulate the disposal at sea of wastes and other

³⁵ Ibid Article 1(4).

³⁶ McCullagh J, "International Legal Control Over Accelerating Ocean Storage of Carbon Dioxide," in IEA Greenhouse Gas R&D Programme, Ocean Storage of CO2, Workshop 3, International Links and Concerns, (1996)

³⁷ Ibid, Article 210

material in the seas³⁸. The London Protocol³⁹ was adopted on 7 November 1996 to revise and ultimately supersede the London Convention.

The London Convention controls ship and platform based dumping activities. The principle objective of the London Convention is to prevent, reduce and where practicable, eliminate pollution caused by disposal or incineration at sea. It does not define pollution, but recognizes that dumping is one of the many sources of marine pollution and seeks to control pollution by controlling dumping of wastes and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea. Therefore, on a basic level if CO2 injection and storage into geological formations under the sea could cause pollution then it could be prohibited.

The definition of dumping in London Convention and the London Protocol is the same as that in UNCLOS. The London Convention prohibits the disposal of all wastes or other matter specified in Annex I (known as the black list)⁴⁰. This is because these are known to cause harm to the marine environment and living organisms. Wastes or other matter listed in Annex 2 (known as the grey list) requires special consideration if the quantity exceeds 'significant amounts' and a permit can be issued under certain circumstances⁴¹.

The London Protocol Article 2 provides that contracting parties must protect and preserve the marine environment from all sources of pollution and take effective measures to prevent, reduce and where practicable eliminate pollution caused by dumping or incineration at sea of wastes or other matter. The London Protocol Article 4 requires contracting parties to prohibit dumping of any

³⁸ "Sea" is defined in Article III of the London Convention to mean "all marine waters other than the internal waters of States".

³⁹ "Sea" is defined in Article 1 of the London Protocol to mean "all marine waters other than the internal waters of States, as well as the seabed and the subsoil thereof; it does not include sub-seabed repositories accessed only from land".

⁴⁰ London Convention Article IV.1(a).

⁴¹ Ibid, Article IV.1(b).

wastes or other matter. This requirement is subject to an exception for those wastes or other matter listed in Annex 1 (Wastes or other matter that may be considered for dumping). Dumping of the wastes and other matter listed in Annex 1 is subject to certain conditions set out in the London Protocol, primarily in Annex 2.

CO₂ is not specifically referred to in any of the lists that are prohibited for disposal in Annex 1. Likewise CO₂ not listed in Annex 2, which includes wastes requiring a permit system. What is relevant in considering whether CO₂ is a waste or other matter is whether it is classed as an “industrial waste”, which was added to the Annex 1 list with effect from 1 January 1996. “Industrial waste” means “*waste materials generated by manufacturing or processing operations*” and the Convention lists a number of substances that this does not apply to⁴². Since CO₂ is not specifically referred to in the London Convention it’s legally arguable that the prohibitions are not applicable to CO₂.

3.6 2006 amendment enabling CO₂ storage⁴³

Annex 1 of the London Protocol was amended in 2006 to add CO₂ streams from CO₂ capture processes for storage to the list of wastes or other matter that may be considered for dumping (paragraph 1.8 of Annex 1). New paragraph 4 of Annex 1 provides that CO₂ streams may only be considered for dumping if:

1. *.disposal is into a sub-seabed geological formation; and*
2. *.they consist overwhelmingly of CO₂. They may contain incidental associated substances derived from the source material and the capture and sequestration processes used; and*

⁴² London Convention, Annex I Paragraph 11.

⁴³ 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (as amended in 2006) entered into force on 10 February 2007.

3. *.no wastes or other matter are added for the purpose of disposing of those wastes or other matter.*

The effect of the amendment was to provide for sub-seabed storage of CO₂ under the London Protocol subject to controls, including the issuance of a permit.

3.7 Is CO₂ storage dumping under OSPAR Convention

As considered above, UNCLOS is an overarching general framework Convention which is to be supplemented by further dedicated international legislation on marine pollution, which was created through the London Convention and London Protocol, which encourages the creation of regional agreements.

The OSPAR Convention is considered in this thesis as relevant regional agreement which has been implemented to deal with CO₂ storage in the sub seabed. Its geographic scope is North-East Atlantic maritime area⁴⁴. OSPAR deals with “*the introduction by man, directly or indirectly, of a substance into the marine area which results, or is likely to result, in hazards to human health, harm to living resources and marine ecosystems, damage to amenities or interferences with other legitimate uses of the sea*”⁴⁵. As compared to the London Convention, the OSPAR Convention also has increased scope of coverage and is legally tighter. It gives legally binding status to the precautionary principle and the polluter pays principle and Contracting Parties must also take into account best available techniques and best environmental practice in any measures they adopt⁴⁶.

⁴⁴ Geographical scope and contracting parties See http://www.ospar.org/content/content.asp?menu=0148120000026_000000_000000 accessed on 06/04/2014

⁴⁵ Ibid, Article 1(d).

⁴⁶ OSPAR, Article 3(a&b)

OSPAR defines dumping⁴⁷ as the deliberate disposal in the maritime area of wastes or other matter from vessels or aircraft, or from offshore installations. This includes the deliberate disposal of vessels, aircraft, offshore installations and pipelines themselves. The first half of this definition may be relevant to CO2 storage activities and it may be suggested that CO2 activities could be viewed as dumping. However, the storage of CO2 which is captured 'within the normal operations' of vessels and offshore installations, is excluded from the definition of 'dumping', and presumably it could then be stored in accordance with the Convention. The general purpose of OSPAR Convention is to stop adverse activities and consequently the risk of pollution taking place in the marine environment.

In 2007 OSPAR was amended⁴⁸ to allow the storage of CO2 in geological formations under the seabed. Before the amendments OSPAR did not expressly allow CO2 storage and most of its provisions in relation to the prevention of pollution from diverse sources presented obstacles to the CO2 storage in the sub seabed. The amendments added CO2 storage to the list of exceptions to the general prohibition placed on the dumping of wastes by OSPAR.

4. State Responsibility and Liability for Pollution to the marine environment

Long term state liability of stored CO2 in this thesis is in the context of financial compensation for the affected individuals or entities in the event of leakage that causes transboundary harm to people or the environment.

International law does not allow states to undertake or permit activities within their territories without regard to the risk such activity pose to other states or transboundary harm. Based on the

⁴⁷ OSPAR Convention, Article 1 (f)

⁴⁸ OSPAR Convention Amendments to Annex II and Annex III. See <http://www.globalccsinstitute.com/networks/ccip/legal-resources/offshore-co2-storage/europe/ospar#amendments> accessed 06.04.2014

principle of state responsibility, an injured state can bring a claim against the offending state in the event of leakage of stored CO₂ causing transboundary harm⁴⁹. States however have preferred to avoid the law of state responsibility and to rely on other methods of establishing liability using national law. Some academics observed that no modern pollution disaster, including *Chernobyls*, *Sandoz*, or *Amoco Cadiz*, has resulted in the adjudication of an international claim against the state concerned⁵⁰. The tenor of international marine law has been focused on pollution deriving from ships and oil platforms rather than pollution originating on land thus generally attaching liability to ship-owners, oil companies and insurers instead of liability at state level. This is seen from the emergence of MARPOL⁵¹ and a number of other regimes in the late 1960s and early 1970s, which hastened to cover the cost of environmental damage and liability attached to ships and oil operators.

Nonetheless liability flows where one state permits an activity that causes harm extends beyond its territory into the territory of another state. The principle has been described as lying at the heart of international environmental law⁵², creating what amounts to an international law equivalent of the Latin maxim *sic utere tuo alienum non laedas* or not allowing activities on your property to harm another's property⁵³. An extension of the *sic utere tuo* principle requires states to endeavour to prevent injury to another state. This finds support in the *Daigo Fukuryu Maru* incident for example, Japan claimed and received from the United States \$2 million compensation for injuries⁵⁴. International decisions, practice and

⁴⁹ See *Trail Smelter Arbitral Decision*, 33 AMERICAN JOURNAL OF INTERNATIONAL LAW 182 (1939) [hereinafter "*Trail Smelter*" (1939)"]

⁵⁰ See Birnie Patricia, Alan Boyle and Catherine Redgwell. *International law and the marine environment*. 3rd edn. New York, (Oxford University Press) 2009. Pg. 212.

⁵¹ International Convention for the Prevention of Pollution from Ships, as Modified by the Protocol of 1978 Relating Thereto (MARPOL 73/78) Done at London, 2 November 1973 and 17 February 1978; entry into force, 2 October 1983. 1340 UNTS 62 [Registration Number 22484]

⁵² See Alfred P. Rubin, Pollution by Analogy: The Trail Smelter Arbitration, 50 OREGON LAW REVIEW 259 (1971) Pg 59.

⁵³ Karin Mickelson, *Rereading Trail Smelter*, 31 CANADIAN YEARBOOK OF INTERNATIONAL LAW 219, 220 (1993) Pg 93

⁵⁴ See Brian D. Smith, *State Responsibility and the Marine Environment: The Rule of Decision*, Clarendon Press. Oxford 1988 Pg. 87.

opinion evidence this international obligation designated to check the potentially intrusive liberty of states that have transboundary effects.

This thesis takes the view that the State is the only entity that might exist long enough to provide the long-term compensation in the event of leakage. That the operator or owner of the site should be responsible during the operational phases of the project and immediately after injection since liabilities arising during this period can be managed with existing oil and gas industry international and national liability laws.

The key points in the analysis below will be around the legal provisions and liability mechanisms within UNCLOS, London Convention, London Protocol and OSPAR that are applicable to States in the event of unexpected leakage that causes transboundary harm to human health and or the environment in the future. The criteria necessary for States to be held responsible will be analysed.

4.1. State Liability under UNCLOS with regards to leakage of stored CO2.

As considered above states have obligations to protect the marine environment as expressed by UNCLOS Articles 192-5. UNCLOS Article 194(1) requires states to take individually or jointly all measures necessary to prevent, reduce, or control pollution using the best practicable means at their disposal and in accordance with their capabilities. This duty increases under UNCLOS Article 194(2) where the activity threatens to damage the territory of another state, whereby states must take all measures necessary to ensure that the activity does not cause damage to other states. If stored CO2 leaks and causes harm affecting the marine environment of another state, then the offending state could be held to be in breach of UNCLOS Article 194.

UNCLOS Article 235(1) provides that: '*States are responsible for the fulfilment of their international obligations concerning the protection and preservation of the marine environment*' and continues that '*They shall be liable in accordance with international law*'. This responsibility extends to leakage of long term stored CO₂, because of the serious risk this poses to another state and the marine environment. The offending state will be liable for failure to carry out its responsibility and thus will be liable for damage caused to the other state.

This is a general provision on state liability however and provides little specifics other than providing damage caused by pollution of the marine environment are to be determined in accordance with international law. Which part of international law is not specified or applicable procedure? The issue of liability for the damage to marine environment caused by the process of sub-seabed CO₂ storage is not fully discovered in the international law.

UNCLOS Article 235(3) provides for: '*...the implementation of existing international law and the further development of international law relating to responsibility and liability for the assessment of compensation for damage...*' This provision obliges states to implement protection of the marine environment, and cooperate with an appropriate international organisation or diplomatic effort to legislate. In other words the measures act as a guide, with a series of more dedicated agreements dealing with specific areas to be concluded by governments. No progress has been made in implementing dedicated state liability regulations, and the issue of state liability for pollution by dumping remains unresolved under UNCLOS.

No state in practice has so far invoked UNCLOS Article 235(1) with respect to injury to its marine environment and has taken another state to Court or tribunal. There is a lack of state practice as

precedent that concluded assessment of state responsibility and liability in accordance with the provisions of UNCLOS Article 235(1). Pollution to the marine environment of another state even in cases of serious harm liability has been dealt under national law or civil liability schemes⁵⁵.

Despite most marine pollutions being resolved in civil claims, it is correct to say that on paper 'the international legal order currently possesses a perfectly adequate foundation for an equitable and effective regime of state responsibility for marine environment injury'⁵⁶. The reason for lack of use of this foundation lies with states' reluctance to engage liability claims under UNCLOS 235(1). In case law though State-to-state liability has been confirmed in the statement that: "no State has the right to use or permit the use of its territory in such a manner as to cause [environmental] injury ... in or to the territory of another,"⁵⁷ and its requirement that Canada pay the United States compensation for damages.

Although *Trail Smelter* arbitration is distinct from UNCLOS Article 194(2) in that the EEZ is not part of the sovereignty of a coastal or a neighbouring state, the reasoning linking it to transboundary pollution and damage in *Trail Smelter* arbitration is similar. For instance allowing harm to spread beyond national jurisdiction is not permissible, with the implicit effect that a failure to discharge the obligation will give rise to liability. UNCLOS Article 195 provides that states have a duty not to transfer damage or harm caused by pollution from one area to another. This express measure draws out a principle for the prohibition of the movement of pollution similar to that developed in the *Trail Smelter* arbitration. Similarly UNCLOS 235(1) provides for state liability measures to pollution of the marine environment resulting from breach of state responsibility.

⁵⁵ See Birnie Patricia, Alan Boyle and Catherine Redgwell. *International law and the marine environment*. 3rd edn. New York, (Oxford University Press) 2009. Pg. 431.

⁵⁶ Brian D. Smith, *State Responsibility and the Marine Environment*, The Rules of Decision, Clarendon Press. Oxford 1988. Pg. 255

⁵⁷ See *Trail Smelter Arbitral Decision*, 33 AMERICAN JOURNAL OF INTERNATIONAL LAW 182 (1939) [hereinafter "*Trail Smelter*" (1939)"]

Although UNCLOS sets forth the obligations it does not make clear how, and to what degree, states may be held liable for a failure to meet those obligations. UNCLOS does not define 'damage' which is crucial to the determination of liability. Help maybe sought from the definition of 'pollution' in UNCLOS Article 4(1) that '*deleterious effects as harm to living resources and marine life, to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities*'. In assessing damages this standard maybe helpful, but it is not enough to define when assessing liability. In addition UNCLOS does not set mechanism for compensation. It leaves liability to be determined in accordance with international law under UNCLOS Article 235(1).

In the context of leaked CO2 liability at a state level causing transboundary harm, the *Trail Smelter* arbitration reasoning offers guidance for liability and provides reparation remedies as a response to breach of international obligation and could be used as subsequent development of international court cases on state liability of stored CO2. Furthermore in the *Corfy Channel*⁵⁸. Case the Court endorsed 'every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States'⁵⁹ The International Court of Justice articulated a basis on which to impute liability to the state such as due diligence obligation In this case it would have to be shown that the offending state had prior knowledge of incident and of its harm to the neighbouring state, and has failed to take reasonable steps to control or prevent the damage. In the case of stored CO2 this due diligence principle may hold some assistance as the potential leakage occurs over time and the consequence of damage may come to be realised after a century or so, which given the length may make it state responsibility less

⁵⁸ Corfu Channel Case (*United Kingdom v Albania*), 1949 I.C.J. 4 (April 9)

⁵⁹ *Ibid* at 22

difficult to attribute since it flows from knowledge of a dangerous situation and failure to take steps to prevent injury.

Another international case law principle that can be applied is articulated in *Gabcikovo-Nagymaros*⁶⁰ case which provides the obligation is a continuing one: 'It implies the need for States to review their obligations of prevention in a continuous manner to keep abreast with the advances in scientific knowledge'⁶¹.

The principle of good faith was affirmed in the Declaration on Principles of International Law Concerning Friendly Relations and Cooperation among States adopted by the General Assembly⁶² and later affirmed in the *Nuclear Tests Cases*⁶³. As UNCLOS Article 235(1) provides for liability in accordance with international law, this principle has helped shape the observance of existing rules of international law and thus may be applied in state liability in the event of CO₂ leakage. Although the principle is not as strong as treaty obligations, it forms a duty of good faith between states in respect of the rights and obligations arising out of UNCLOS Article 235(1).

4.2. State liability under the London Convention and London Protocol with regards to leakage of stored CO₂

The London Convention and the London Protocol provide that if a state proceeds with a CO₂ storage project they could be liable for any damage caused in the event of an escape. Both the London Convention⁶⁴ and London Protocol⁶⁵ state that liability is in accordance with the principles of International Law regarding State responsibility for damage caused to the environment of other States or to any other area of the environment. States are required to take

⁶⁰ See, *Gabcikovo-Nagymaros Case*, ICJ Reports (1997) 7

⁶¹ Ibid para 140

⁶² Resolution of the United Nations General Assembly 2625 (xxv)

⁶³ *New Zealand v France (The Nuclear Tests Case)* [1974] ICJ Report. 457

⁶⁴ London Convention, Article X.

⁶⁵ London Protocol, Article 15.

all 'practical'⁶⁶ measures to prevent environmental harm and must also undertake to develop procedures regarding liability arising from the dumping of wastes or other matter.

The London Convention and the London Protocol require the state to take all precautionary⁶⁷ measures to make sure operations undertaken within its territory do not cause adverse effects on human health and the environment in other states or areas beyond national jurisdiction. Although the precautionary principle is not mentioned in the Convention, contracting parties agreed to apply the precautionary approach in environmental protection within the framework of the London Convention in a resolution to the Convention⁶⁸.

Storage of CO₂ in sub-sea bed storage could invoke the precautionary principle. In the event of transboundary leakage from a stored CO₂, the international liability of the state could be invoked as a failure to apply the precautionary principle and exercise of due diligence. The precautionary principle requires states to take positive steps to resolve uncertainty and mitigate adverse effects of leakage of long term stored CO₂. The precautionary principle obliges the state to have regard to due diligence in monitoring, supervising and monitoring activities.

The London Protocol embodies a more simplified, modern and comprehensive regulatory framework than the London Convention, and is intended to provide greater protection to the marine environment. It is based far more on precaution and prevention and the preamble to the Protocol acknowledges the past accomplishments of the London Convention 1972 and declares the contracting parties must take further action to protect and preserve the marine environment and uses the language of sustainable development.

⁶⁶ London Convention, Article I

⁶⁷ London Protocol, Article 3

⁶⁸ London Convention, Annex 2 Resolution LDC.44(14).

In the event of unintentional leakage causing transboundary harm, the injured state can rely on the principle to hold the offending state for failing to exercise caution to prevent the leakage and thus a justification for state liability.

The principle is important in establishing liability because in questions of interpretation of the legal text the court of tribunal will look to the underlying purpose of provision. In addition application of the precautionary principle in state liability would move burden of proof on the side of the offending of state and would have to show evidence that the leakage of CO2 did not cause the harm.

The London Convention and the London Protocol uses similar words as UNCLOS, that liability to be determined in accordance with international law. It is arguable that the obligation to prevent transboundary harm is closely followed by the consequential to compensate once breach occurs. Thus state liability exists, somewhat its the concept of the damage that is missing and how to asses the liability of the consequence which follow from the breach of the obligation.

4.3. State Liability under the OSPAR Convention with regards to leakage of stored CO2

The main objective of the OSPAR Convention as considered above is to protect the marine environment against the adverse effects of human activities, so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected⁶⁹ - this objective is the minimum legal obligation placed on them. This is important because the London Convention and UNCLOS call for the prevention of pollution of the sea, while the OSPAR Convention refers to the protection of the marine environment.

⁶⁹ OSPAR Convention, Article 2(1)(a).

Also OSPAR contains polluter pays principle, which is one of the primary principles of international law, the other being the precautionary principle.

4.3.1. Precautionary principle

OSPAR provides for the use of the precautionary principle that it is often advantageous to prohibit or limit an activity despite the absence of scientific certainty that the activity will result in a detrimental result⁷⁰. The precautionary principle is incorporated in OSPAR as binding on the States which makes it legally binding. This forms strong state liability claim in the event of leakage of stored CO₂ causing transboundary harm. States may not claim they did not know suspected risks of damage on the basis that they were not confirmed. The principle creates a procedural obligation on States to prevent harm to other states, because it devises sophisticated tools or environmental management and risk assessment in order to provide clear criteria for the decision to undertake CO₂ storage to be made. Both the London Convention and the London Protocol embrace the precautionary principle approach as a mere policy statements and action plans, which are by nature non binding legal instruments.

Application of the precautionary principle on CO₂ storage strengthens the injured state's liability claim. The principle shifts the burden of proof to the offending state which has to show that their activity did not result the harm. The injured state could use to assess the standard of caution the offending state undertook to undertake CO₂ storage in its EEZ. Therefore state liability is less difficult to establish in the event of leakage. The precautionary principle also requires states to be proactive in identifying risks of

⁷⁰ , McCullagh, J International Legal Control over Accelerating Ocean Storage of Carbon Dioxide, in Ocean Storage of CO₂, Workshop 3, International Links and Concerns, pp85-115, IEA Greenhouse Gas R&D Programme, December, 1996

leakage and incidents that could have adverse transboundary impact and therefore, in developing corresponding preventive measures. It is argued that the precautionary principle gives rise to the enforcement of state liability because of its underlying philosophy of state responsibility to not undertake activities that can cause transboundary harm. This means that failure to take the requisite procedural steps in the pursuit of CO2 storage, could attach blame affecting the measure of apportionment of state liability. The principle is important in establishing liability because in questions of interpretation of the legal text the court of tribunal will look to the offending state failing to perform the obligation the underlying purpose of OSPAR.

4.3.2. Polluter pays principle

State liability could also be invoked by applying the polluter-pays principle, which is one of the fundamental principles of international and also referred in OSPAR⁷¹

The enforcement of the polluter-pays principle is referred to both under the OSPAR Convention and the London Protocol as a key objective. It should be noted that UNCLOS makes no explicit reference to the precautionary principle in determining whether some activity might cause harm to others. An offending state would, in failing to reach amicable agreement with the wronged state, be obliged to accept the compulsory jurisdiction of a judicial body to determine the dispute⁷².

The polluter pays principle provides that the damages for the pollution should be covered by the entity responsible. The principle is closely related to the state responsibility and liability analysed above, as it implies liability for the damage caused. As stated the

⁷¹ OSPAR, Article 2(2)(b)

⁷² UNCLOS Article 286

principle is legally binding in OSPAR and is under continuous development. It is contested that the principle has not found its true meaning yet and that whether its moving towards the status of customary law, and whether the several treaty affirmations of the principle imply that the principle is gradually moving from soft law to hard law⁷³.

The principle however could be used as an economic rule for cost-allocation⁷⁴. As the principle is legally binding to State Parties to OSPAR, then it should cause little difficult in applying to leakage of storage CO₂ causing transboundary harm. The state will be held liable as the entity that authorised the undertaking of the storage and as such would have caused the pollution. Although there are several interpretation as to who is the polluter, but in relation to long term storage of CO₂ ultimately its assumed that the state will bear responsibility.

Although this principle at state level has not been testes on international environmental liability, it is usually applied in the civil law liability regimes at national level. However according to the principles on state responsibility, the state is primarily responsible for the violating international obligations⁷⁵.

In stored CO₂ that causes transboundary harm, usually the harm is after such a long period that its probably the operator has handed control to the state or some competent authority or any in case it could be argued that the state has not only licensed the storage but also regulates and controls it. Therefore then the state can be held liable for the transboundary harm. Similar reasoning is expressed in the *Trail Smelter* arbitration – despite the Canadian company causing the pollution, the case was a state responsibility and

⁷³ According to Sands, the principle does not, however, enjoy the status of customary international law. P. Sands: *Principles of International Environmental Law*, Cambridge: Cambridge University Press, 2012 Pg. 280

⁷⁴ N. de Sadeleer *Environmental Principles: from political slogans to legal rules*. Oxford : Oxford University Press, 2002 Pg. 21; Birnie Patricia, Alan Boyle and Catherine Redgwell. *International law and the marine environment*. 3rd edn. New York, (Oxford University Press) 2009 Pg. 92

⁷⁵ N. de Sadeleer. *Environmental Principle: from political slogans to legal rules*. Oxford : Oxford University Press, 2002 Pg. 24

liability claim between the United States of America and Canada. It was a company causing the harm but the claim was inter state claim between states.

5. Conclusion

The conclusion endeavours to sum up the core finding of this thesis by the question set at the beginning.

There is no straight answer to the topic of this thesis, as there is no specific legal regime of stored CO₂ and state liability in the event of leakage. The analysed Conventions are the relevant applicable one. In establishing responsibility and liability, it's always preferable to have a specific framework that can guide the research. Garcia-Amdor observed that 'it would be difficult to find a topic beset with greater confusion and uncertainty' than state responsibility⁷⁶. For state liability of leakage of stored CO₂ causing transboundary harm, this remains true.

States and international organisations have prioritised in removing explicit legal barriers within international marine legislation that would prohibit CCS activities offshore, by amending OSPAR⁷⁷ and the London Protocol⁷⁸ rather than designing a long-term liability framework for storage. Despite the absence of specific liability rules for CCS under international law, in this thesis it has been shown that state liability could be invoked under UNCLOS, London Convention, London Protocol and OSPAR in the event of transboundary leakage causing harm.

Under OSPAR, London Convention and London Protocol the state ought to take all precautionary measures under the precautionary to

⁷⁶ Brian D. Smith, *State Responsibility and the Marine Environment: The Rules of Decision*. Clarendon Press. Oxford 1988. Pg 5.

⁷⁷ Annex II and III, 1992 Convention on the Protection of the Marine Environment of the North-East Atlantic, as amended in 2007. See: <http://www.globalccsinstitute.com/networks/cclp/legal-resources/offshore-co2-storage/europe/ospar#amendments> accessed 06.04.2014

⁷⁸ Annex 1 and Article 6, 1996 Protocol to the London Convention on the Prevention of Marine Pollution from Dumping at Sea (1972), as amended in 2006. See: <http://www.globalccsinstitute.com/networks/cclp/legal-resources/offshore-co2-storage/international-marine-legislation/london-protocol#Amendment-to-the-Protocol-to-cover-CCS> accessed 07.06.2014

ensure that CO₂ storage does not cause transboundary harm, regardless of whether there is no conclusive evidence proving link between the activity and the harm. In essence the state is obliged to exercise due diligence in monitoring, supervising and preventing activities. A failure to apply the precautionary principle and exercise due diligence opens state liability claim in the event of a leakage causing transboundary harm international. Due to relatively modern technology of CO₂ storage and regulation there has not been a specific procedure for dispute settlement and, hence, absence of final judicial decisions and teachings in the discussed sphere.

The issue that arise in offshore long term CCS is there is no separate body of international law with its own source and process of lawmaking that deals with that. None of the existing international environmental treaties were adopted with long term CO₂ storage liability in mind. Rather it is necessary to consider the application of rules and principles of international marine law and its sources, as well as the application of general international environmental law at different stages of the CO₂ storage project cycle. The Conventions that were analysed are being adapted to meet the circumstances of CO storage, but limited experience and institutional capacity at international level is causing hindrance in implementation of long term liability of stored CO₂ - specific requirements. In addition some environmental groups, notably Greenpeace International have claimed CO₂ storage is contrary to the aims of UNCLOS and the 1972 London Convention, which prohibit dumping from sea-based objects. Specifically, Greenpeace insists that CO₂ is an "industrial waste" defined by the Convention as "waste materials generated by manufacturing or processing operations"⁷⁹.

⁷⁹ Campbell, J. (1996) "Legal, Jurisdictional and Policy Issues – 1972 London Convention" in IEA Greenhouse Gas R&D Programme, Ocean Storage of CO₂, Workshop 3, International Links and Concerns

Another obstacle under the examined Conventions is that Sovereign right of States to exploit their natural resources, the duty to protect the marine environment and the no-harm rule overlap to the extent that the possibility of enforcement this rule through the law of State Responsibility is frustrated.

It has been shown that establishing state liability under UNCLOS is difficult because UNCLOS does not a threshold for damages and exact obligation and harm to be caused for damages to be sufficiently incurred. Furthermore UNCLOS provisions on marine pollution are general in their nature and are designed to balance the needs of different states. As such it is not possible to establish criteria in order to establish liability. There is becomes impossible to determine state liability and damages in the event of a leakage of stored CO₂ that causes transboundary harm.

It is noted that most of the law of the sea treaties have been drafted without specific consideration of CO₂ storage. The central argument in this thesis is that existing state responsibility and liability on environmental damage in relation to long term stored CO₂ can not succeed over time without firm foundation provided by the development of specific rules of state responsibility and liability that eliminate existing defences to state responsibility, gaps in the law and that create liability and penalty of actual leakage of stored CO₂ that causes damages. It is not unreasonable that potential CO storage project developers would delay the development of CO₂ storage projects until International legal frameworks the context of potential transboundary impacts, and state liability of offshore storage activities are put in place to make it possible for them to quantify and manage potential liabilities. An alternative is analogous to the case of the very long-term storage of nuclear waste, that state have taken on responsibility for managing storage, the companies that produce the waste, and make a profit from using the nuclear material, pay a fee to the government to take

responsibility. However it is nearly impossible to predict the long-term effects of underground storage under extreme conditions such as earthquakes and other geological upheavals, as well as unforeseen human interventions, such as a terrorist attack or sustained warfare.

There have been continuous calls to creating dedicated international legal framework of liability of long term stored CO₂ and procedure of compensation for damages to marine environment⁸⁰. In light of the long-term dimension of CO₂ storage, establishing a clear state liability scheme under international law could prove attractive, both from an operator and a state perspective. If such comprehensive international legal instrument is to be created, it would have to contain the requirement to prevent, control and inform transboundary pollution but also compensation mechanism to pay for the damages.

⁸⁰ See International Energy Agency: Carbon Capture and Storage Legal and Regulatory Review – Edition 2, Page 93 <http://www.iea.org/publications/freepublications/publication/name,3986,en.html> accessed 06/04/2014

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