

# Transboundary Transportation of CO<sub>2</sub> Associated with Carbon Capture and Storage Projects:

## An Analysis of Issues under International Law

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*International legal issues raised by Carbon Capture and Storage (CCS) have received close attention in recent years, including important amendments being made to two international marine environment protection treaties – the global London Protocol<sup>1</sup> and the regional OSPAR Convention<sup>2</sup> – to resolve their uncertain legal treatment of CO<sub>2</sub> storage into the sub-seabed. To date, however, most published analysis on international legal issues raised by CCS has focused on those associated with the “third element” in the CCS project chain: long-term storage of the CO<sub>2</sub>. The focus of this paper is on key international legal issues raised by the “second element” in the CCS project chain: transport of the CO<sub>2</sub> from its capture point to its storage location. More specifically, it investigates legal issues raised under selected international treaty instruments when the CO<sub>2</sub> being transported has a cross-border element. This could arise in any CCS project, both onshore and offshore (or a mixture of both), where the CO<sub>2</sub> being transported leaves the territorial jurisdiction of one state and enters into the territorial jurisdiction of one or more other states.<sup>3</sup>*

### I. Introduction

The central proposition of this paper is that transboundary CO<sub>2</sub> transportation associated with Carbon Capture and Storage (CCS) projects is potentially regulated, or in some cases even prohibited, under certain international treaty instruments as they currently stand. This is a significant issue, as anecdotal evidence suggests there is the potential

for widespread cross-border transport scenarios, particularly in Europe. Drivers for this could be lack of suitable domestic storage capacity or simply the availability of more financially viable or attractive cross-border storage solutions. Any material international legal obstacles invoked by transboundary movement of CO<sub>2</sub> under these treaties will, therefore, need to be resolved before affected cross-border CCS projects can proceed.

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1 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

2 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic.

3 This paper is concerned with transboundary “transportation” of CO<sub>2</sub>. Another cross-border scenario which raises important international legal issues, but is unfortunately outside the scope of this paper, is transboundary ‘migration’ of CO<sub>2</sub> once injected or placed into the storage location. For further analysis of this issue see: Bode/Jung, “Carbon Dioxide Storage – Liability for Non-permanence Under the UNFCCC”, HWWA Discussion Paper, Hamburg (2006); IEA, Legal Aspects of Storing CO<sub>2</sub>: Update and Recommendations, Paris 2007; Philibert/Ellis/Podkanski, “Carbon Capture and Storage in the CDM”, Paris (2007); and Haver/Bugge, “Transboundary Chains for CCS: Allocation of Rights and Obligations between the State Parties within the Climate Regime”, JEEPL (2007), at p. 367.

In advancing this proposition, this paper is divided into three parts: Part One provides an overview of CCS and why transboundary transportation of CO<sub>2</sub> issues merit attention. It includes consideration of recent work by the UK's Health and Safety Executive, which considers transported CO<sub>2</sub> to be a potentially hazardous substance possibly in need of new regulation. Part Two investigates how transported CO<sub>2</sub> is potentially regulated, or even prohibited, under two key international treaty instruments on the transboundary movement of waste: the global Basel Convention<sup>4</sup> and the regional Bamako Convention.<sup>5</sup> Part Three considers the legal treatment of transported CO<sub>2</sub> under selected marine environmental protection instruments: UNCLOS,<sup>6</sup> the London Convention,<sup>7</sup> the London Protocol, and the OSPAR Convention. It includes specific analysis of a waste export prohibition in article 6 of the London Protocol and proposals for its possible amendment or an interpretative resolution.

## II. Overview of CCS and why Transboundary Transportation of CO<sub>2</sub> Issues Merit Attention

### 1. Overview of CCS

The Intergovernmental Panel on Climate Change (IPCC) describes CCS as a process consisting of three elements: (a) the separation of CO<sub>2</sub> from industrial and energy-related sources; (b) transport to

a storage location (most likely via pipeline or shipping); and (c) long-term isolation from the atmosphere.<sup>8</sup> "Long-term isolation from the atmosphere" is by way of injection into suitable formations such as deep saline aquifers, depleted oil and gas reservoirs or un-minable coal seams.<sup>9</sup> There are storage options other than geological storage, such as storage in the water column, although this option is currently considered by many to present unacceptably high environmental risks. It will therefore not be considered in this paper.<sup>10</sup>

CCS is gaining increasing attention as a potentially viable climate change mitigation tool. In its most recent world energy outlook report, the International Energy Agency (IEA) concluded that dependency on fossil fuels will continue for several decades, and that both energy demand and greenhouse gas emissions will increase by approximately 55% by 2030 if no new climate change mitigation techniques are introduced.<sup>11</sup> It cites CCS as being one of the most promising mitigation technologies needed to combat this, submitting that large-scale deployment of CCS could reconcile continued coal-burning with the need to cut emissions in the longer term.<sup>12</sup> At the regional and domestic levels, regulatory frameworks are being implemented or proposed in several jurisdictions together with policy support for more CCS demonstration projects.<sup>13</sup> The Scottish Centre for Carbon Storage at the University of Edinburgh estimates there are approximately 45 commercially significant known CCS demonstration plants in the world currently in operation or in the pipeline.<sup>14</sup>

4 Convention on the Control of Transboundary Movements of Hazardous Waste, 28 I.L.M. 1989, at p. 657.

5 Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, 30 I.L.M. 1991, at p. 773.

6 United Nations Convention on the Law of the Sea (UNCLOS), 21 I.L.M. 1982, at p. 1261.

7 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 11 I.L.M. 1972, at p. 1291.

8 IPCC, Special Report on Carbon Dioxide Capture and Storage by Working Group III of the Intergovernmental Panel on Climate Change, Cambridge 2005, at p. 3.

9 Ibid.

10 For example, the European Commission's proposed Directive on the geological storage of CO<sub>2</sub> bans storage in the water column, as it is considered to present high environmental risk: see European Commission, Questions and Answers on the Proposal for a Directive on the Geological Storage of Carbon Dioxide, Memo/08/36 of

23 January 2008. See also OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed made under the OSPAR Convention; it rules out water column storage because of "potential negative effects".

11 IEA, World Energy Outlook, Paris 2007, at pp. 42 and 49.

12 Ibid., at p. 51.

13 In January 2008, the European Commission published a proposal for a Directive that would provide a legal framework in the European Union (EU) for the geological storage of carbon dioxide, and has also put forward proposals to stimulate construction and operation of 12 CCS plants in Member States by 2015. At the domestic level, Australia, Norway and the UK have taken an early lead in developing supportive national regulatory and/or policy frameworks, and have commissioned or are in the process of commissioning CCS demonstration plants.

14 For an interactive map of known CCS project sites, see: Scottish Centre for Carbon Storage, "Where are the Proposed CCS Projects?", 2008, available at <http://www.geos.ed.ac.uk/scs/storage/storageSites.html>.

Despite growing support for CCS, it currently remains unproven as a commercially viable climate change mitigation tool amenable to deployment on a sufficiently large scale.<sup>15</sup> The separate elements of capture, transport and storage of CO<sub>2</sub> are often argued to be “proven”, as they have all been used in other applications, but integrating them into a complete CCS process and bringing down costs sufficiently to make it economically viable remains a challenge.<sup>16</sup>

## 2. How Widespread are Cross-border CCS Projects Likely to Be?

Given the current developing state of CCS, it is hard to assess definitively how widespread transboundary CO<sub>2</sub> transport scenarios are likely to be. Nevertheless, there is strong anecdotal evidence to suggest that transboundary transport of CO<sub>2</sub> for cross-border storage could be common in certain parts of the globe, particularly Europe.<sup>17</sup> Drivers for this could be a lack of suitable domestic storage capacity or simply the availability of more financially viable or attractive cross-border storage solutions. Any international legal issues invoked by transboundary transportation of CO<sub>2</sub> will therefore need to be resolved before affected cross-border CCS projects can proceed.

In the European context, the European Commission recently investigated research on the availability of storage capacity and cross-border infrastructure possibilities in Europe.<sup>18</sup> A notable conclusion was that some states do not have known domestic storage capacity (e.g. Belgium and Slovenia), although the Commission did state that

more work needs to be done in investigating optimal storage solutions.<sup>19</sup> It is also instructive that the Commission’s recent proposal for a Directive on the Geological Storage of Carbon Dioxide (CCS Directive) contains provisions which contemplate transboundary transport of CO<sub>2</sub>.<sup>20</sup> The UK (with co-operation from Norway) has also investigated transboundary cooperation issues as part of a work programme of the North Sea Basin Task Force.<sup>21</sup> In a report published in December 2007, it concluded that significant cost reductions could be achieved via joint Norway and UK use of significant carbon sinks available in the North Sea, thus providing an incentive for CO<sub>2</sub> to be transferred across national boundaries.<sup>22</sup>

## 3. How is CO<sub>2</sub> Transported and What are the Principal Risks?

According to the IPCC, CO<sub>2</sub> can be transported as a gas, liquid or solid and the most viable modes of doing so would be via pipeline or ship.<sup>23</sup> For both ship and pipeline transport, the principal risks in CO<sub>2</sub> transportation are leakage and unintended release,<sup>24</sup> which could cause damage to human and animal health, property and ecosystems.<sup>25</sup> Depending on how the CO<sub>2</sub> is transported, there is also a potential climate change impact if CO<sub>2</sub> is released back into the atmosphere.<sup>26</sup>

According to the UK’s Health and Safety Executive (HSE), we do not yet have an accurate understanding of the scale of these hazards. Although its analysis is limited to pipeline transportation (i.e. not ships), in August 2008 it published interim guidelines on CO<sub>2</sub> transportation associated with

<sup>15</sup> European Commission *supra*, note 10, at p. 1.

<sup>16</sup> *Ibid.*

<sup>17</sup> Conversation with Jeff Chapman of the Carbon Capture and Storage Association on 4 August 2008.

<sup>18</sup> European Commission, Commission Staff Working Document: Accompanying document to the Proposal for a Directive of the European Parliament and of the Council on the Geological Storage of Carbon Dioxide, 23 January 2008, at p. 79.

<sup>19</sup> *Ibid.*, at p. 78.

<sup>20</sup> Commission Proposal of 23 January 2008 for a Directive of the European Parliament and of the Council on the Geological Storage of Carbon Dioxide, amending Council Directives 85/337/EEC and 96/61/EC, Directives 2000/60/EC, 2001/80/EC, 2004/35/EC and 2006/12/EC and Regulation (EC) No. 1013/2006, COM (2008) 18. Chapters 5 and 6 of the proposed Directive set out requirements for third-party access to CO<sub>2</sub> transport networks, including cross-border transport networks, together with a (cur-

rently somewhat vague) requirement for transboundary co-operation in cases of transboundary transport of CO<sub>2</sub>.

<sup>21</sup> UK Department for Business Enterprise and Regulatory Reform, Development of a CO<sub>2</sub> Transport and Storage Network in the North Sea: Report to the North Sea Basin Task Force, December 2007.

<sup>22</sup> *Ibid.* at p. 4.

<sup>23</sup> IPCC, *supra*, note 8, at p. 30. The IPCC also concluded that road and rail tankers are economically feasible options, but they are uneconomical compared to pipelines and ships, except on a very small scale, and are unlikely to be relevant to large-scale CCS.

<sup>24</sup> *Ibid.*, at p. 188.

<sup>25</sup> *Ibid.*

<sup>26</sup> IPCC, Guidelines for National Greenhouse Gas Inventories, Volume 2 (Energy), Cambridge 2006, Chapter 5 (Carbon Dioxide Transport Injection and Geological Storage), at p. 58.

CCS projects.<sup>27</sup> The Guidance observes that whilst future schemes may include proposals for conveying CO<sub>2</sub> as a gas, for economic and technical reasons it is more likely to be handled at high pressures as a “dense phase” or “supercritical fluid”. In these states, potential hazards through leakage or unintended release reportedly include: (a) asphyxiation; (b) cryogenic burns and other impact injuries from cold jets of gas and high-velocity projectiles; (c) toxicological effects through increased acidity to the blood triggering adverse effects on the respiratory, cardiovascular and central nervous systems; and (d) physical damage to pipeline and infrastructure through corrosion or projectiles. The HSE reports that it and industry are further investigating these risks and regulatory changes (e.g. to domestic pipeline laws) might be needed to accommodate them.<sup>28</sup>

Notably, the HSE rejects the commonly advanced argument that CO<sub>2</sub> transport should be regulated in the same way as that used for natural gas transportation as the issues are materially similar.<sup>29</sup> In its opinion, “the hazards are very different”.<sup>30</sup> It also believes that existing US experience in CO<sub>2</sub> pipeline transportation for Enhanced Oil Recovery (EOR) projects, whilst relevant, is “very limited” compared to hydrocarbon transportation – the implication being presumably that it is not yet sufficient to provide adequate knowledge about the hazards relating to the transportation of CO<sub>2</sub>.<sup>31</sup>

#### 4. Transboundary Transportation of CO<sub>2</sub> and International Legal Issues

It is outside the scope of this paper to analyse all international instruments that may be relevant to the regulation of transboundary CO<sub>2</sub> transportation. Nevertheless, it is submitted that there is a significant number of global and regional legal instruments which are potentially relevant to this issue, including those relating to: (a) transboundary movement of waste; (b) marine environmental protection; (c) general transport; (d) transboundary impacts; and (e) climate change. The scope of this paper is limited to analysis of selected treaty instruments in the first two categories: (a) transboundary movement of waste; and (b) marine environmental protection. Furthermore, only selected key instruments in these categories have been considered; it is acknowledged that there are likely to be a num-

ber of other regional instruments spanning these categories which may contain relevant obligations.

The applicability of the international treaties considered in this paper will in large part turn on how CO<sub>2</sub> is classified under those instruments, as most of the international Conventions reviewed use defined terms to delineate their scope of coverage. If CO<sub>2</sub> is classified as some form of “waste” product having “hazardous” properties, then transboundary transportation of it is likely to bring it within the scope of the instruments considered below.

While states, either individually or jointly, apply their own interpretations to treaty provisions, any determination of the “correct” interpretation will fall to the International Court of Justice or an arbitral tribunal in accordance with the dispute settlement mechanism under that treaty.<sup>32</sup> Such determinations should be guided by treaty interpretation rules under international law, which are largely represented in articles 31 to 33 of the 1969 Vienna Convention on the Law of Treaties.<sup>33</sup> A key provision is article 31(1), which reflects customary international law: it declares that a treaty should be interpreted “in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose”.<sup>34</sup> A particular challenge in interpreting how CO<sub>2</sub> should be classified under the international treaties considered in this paper is that all of them were drafted prior to the development of CCS technologies and therefore did not contemplate how CO<sub>2</sub> should be classified.<sup>35</sup>

27 UK Health and Safety Executive, “Interim Guidance on Conveying Carbon Dioxide in Pipelines”, <http://news.hse.gov.uk/2008/08/19/interim-guidance-on-conveying-co2-in-pipelines>.

28 Ibid.

29 Ibid.

30 Ibid.

31 Ibid.

32 IPCC, *supra*, note 8, at p. 252.

33 Shaw, *International Law*, 5th ed., (Cambridge 2006), at p. 839.

34 Ibid. article 32 deals with the use of supplementary information, and article 33 concerns the interpretation of treaties authenticated in two or more languages.

35 IEA/CSLF, Discussion Paper for 2nd IEA/CSLF Workshop on Legal Aspects of Carbon Capture and Storage on 17 October 2006, at p. 51.

### III. CO<sub>2</sub> and International Regulation of Transboundary Movement of Waste

Transboundary movement of hazardous and other waste has been regulated under international law since the 1980s.<sup>36</sup> The main international treaties in this field were developed in response to several incidents which occurred in the mid-80s involving the unlawful dumping in developing countries of hazardous wastes produced in industrialised countries.<sup>37</sup> Key treaties developed in the wake of these incidents are the global Basel Convention and the regional Bamako Convention.<sup>38</sup> Both seek to control (and in some cases prohibit) the transboundary movement of wastes.

As far as can be ascertained from publicly available material, the legal treatment of transboundary movement of CO<sub>2</sub> associated with CCS under these Conventions has not yet been formally considered by the parties to them. The issue presents a challenge for CCS, as transported CO<sub>2</sub>, if it is considered a “hazardous waste” within the meaning of those Conventions, *prima facie* offends one of their guiding principles: that waste should be dealt with at

source instead of transferred to another state for disposal.<sup>39</sup> Sands observes that this has come to be known as the “proximity principle”.<sup>40</sup> If CO<sub>2</sub> falls within the scope of the instruments, proposed export of CO<sub>2</sub> for storage in other states may technically attract regulatory obligations, and in some cases prohibition obligations.

#### 1. Basel Convention

The Basel Convention is intended to establish a global regime for the control of international trade in hazardous wastes. It entered into force in 1992 and currently has 170 parties.<sup>41</sup> The Convention does not create a blanket prohibition on the transboundary movement of hazardous wastes; instead it establishes guiding rules, and in some cases detailed conditions, for the regulation of it.<sup>42</sup> In 1994 the Parties agreed, however, to an immediate ban on the export from OECD to non-OECD countries of hazardous wastes intended for final disposal (Decision II/12). Because Decision II/12 was not incorporated in the text of the Convention itself, the question as to whether it was legally binding or not arose. Therefore, at COP-3 in 1995, it was proposed that the ban be formally incorporated in the Basel Convention as an amendment (Decision III/1).<sup>43</sup> The “Basel Ban Amendment”, as it came to be known, was adopted by the parties in 1995 but is yet to come into force.<sup>44</sup> When in force, the Basel Ban Amendment will ban hazardous waste exports for final disposal and recycling from Annex VII parties (members of the EU, OECD and Liechtenstein) to non-Annex VII parties.<sup>45</sup> It should be noted that in practice some countries have domestically implemented such a ban anyway, including those of the EU.<sup>46</sup>

##### a. Is CO<sub>2</sub> a “Hazardous Waste” under the Basel Convention?

Before analysing the particular obligations and regulatory implications of the Basel Convention, the threshold question to be considered is whether transported CO<sub>2</sub> is a “hazardous waste”. The IPCC, citing 2003 IEA GHG research, briefly cited the Basel Convention in its review of international Conventions relevant to CO<sub>2</sub> transport and concluded that: “there is no indication that CO<sub>2</sub> will be defined as a hazardous waste under the Convention

36 Sands, *Principles of International Environmental Law*, 2nd ed., (Cambridge 2003), at p. 690.

37 *Ibid.*

38 The issue was also addressed, and remains addressed, by binding and non-binding acts of various international organisations, including the EC, the OECD and the UN. For a catalogue of these see Sands, *supra*, note 36, at p. 691.

39 Formulations of this objective are contained in the preamble to both instruments.

40 Sands, *supra*, note 36, at p. 692.

41 Secretariat of the Basel Convention, “Parties to the Basel Convention”, available at <http://www.basel.int/ratif/convention.htm>.

42 Sands, *supra*, note 36, at p. 692.

43 Secretariat of the Basel Convention, “The Basel Convention Ban Amendment” available at <http://www.basel.int/pub/baselban.html>.

44 Entry into force shall take place upon ratification by at least three-fourths of the parties who accepted it. According to the website of the Secretariat of the Basel Convention, 63 parties have done so. See <http://www.basel.int/ratif/ban-alpha.htm>. This number should theoretically trigger entry into force, as 62 ratifications represent three-fourths of the parties present (82) in 1995. According to the Basel Action Network, what remains at issue is resolution of the ambiguity discovered in article 17 as to which group of parties the number of 62 can be drawn from: can they be drawn from the current list of 170 parties or must they be drawn from the list of 82 present in 1995? The current parties to the Convention are reportedly yet to agree this. See Basel Action Network, Briefing Paper 4, June 2008.

45 Article 4A and Annex VII, Basel Ban Amendment.

46 See Council and Parliament Regulation (EC) No. 1013/2006 of 14 June 2006 on shipments of waste, OJ 2006 L 190/1.

except in relation to the presence of impurities such as heavy metals and some organic compounds that may be entrained during the capture of CO<sub>2</sub>... Accordingly, the Basel Convention does not appear to directly impose any restriction on the transportation of CO<sub>2</sub>.<sup>47</sup>

As outlined in the previous section of this paper, however, more research (at least according to the UK Government) is needed before we sufficiently understand the potential hazards relating to transported CO<sub>2</sub>. It is therefore conceivable that transported CO<sub>2</sub> may actually have characteristics which bring it within the definition of "hazardous waste" under the Basel Convention. "Hazardous waste" is defined in article 1. It states, inter alia, that the following "wastes"<sup>48</sup> that are subject to transboundary movement shall be "hazardous wastes": (a) wastes that belong to any category contained in Annex I (categories of wastes to be controlled), unless they do not possess any of the characteristics contained in Annex III (list of hazardous characteristics); and (b) wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the party of export, import or transit.

As to the first category, there is no obvious waste stream category in Annex I that transported CO<sub>2</sub> would clearly fall under. A potential category, however, is category Y16 in Annex I: "wastes of an explosive nature not subject to other legislation". Annex III expands on the meaning of "explosive", describing an explosive substance as a "solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to its surroundings."<sup>49</sup> According to the UK's HSE, a CO<sub>2</sub> pipeline rupture or containment failure could result in escaped fluid which would rapidly expand, boil and become a gas. This rapid expansion would allegedly cause the temperature of such escaping CO<sub>2</sub> to fall rapidly, with particles of solid CO<sub>2</sub> forming as dry ice and being expelled at dangerously high velocities.<sup>50</sup> If this is so, then an argument can be made that CO<sub>2</sub> could be considered a "waste of an explosive nature", and if it is not subject to other legislation, it would therefore be a "hazardous waste" under the Convention. Other Annex III hazardous characteristics of potential relevance are: category H8 (Corrosives); category H11 (Toxic – delayed or chronic); and category H12 (Ecotoxic).

Even if CO<sub>2</sub> is not considered to fall within a waste stream category in Annex I, it may still be classified as "hazardous waste" under the Convention if it is defined as, or considered to be, hazardous waste by the domestic legislation of the party of export, import or transit (article 1(b)). This is significant, as at least according to the UK's HSE research cited above, transported CO<sub>2</sub> is potentially hazardous so it is conceivable that some states may legislate to define it as such under their domestic laws. In the EU context, relevant legislation includes the Hazardous Waste Directive.<sup>51</sup> The University College London (UCL) Carbon Capture Legal Programme observes that while CO<sub>2</sub> is not currently considered to be a hazardous waste within the meaning of that Directive, it has the potential to be one.<sup>52</sup> It further notes, however, that the EU's proposed CCS Directive includes an amendment to the Waste Framework Directive.<sup>53</sup> This amendment will remove CO<sub>2</sub> that is captured and transported, for the purposes of storage, from the scope of that Directive. The Hazardous Waste Directive's utilisation of the Waste Framework Directive's definition of waste may therefore have an impact upon whether captured CO<sub>2</sub> is in fact covered by the Hazardous Waste Directive.<sup>54</sup>

#### b. Regulatory Implications if CO<sub>2</sub> is a Hazardous Waste under the Basel Convention

If CO<sub>2</sub> is considered to be a "hazardous waste" under the Basel Convention, the Convention's regula-

47 IPCC, *supra*, note 8, at p. 189.

48 "Wastes" are defined in article 2 by reference to their end use: they are "substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law". Stored CO<sub>2</sub> associated with CCS is clearly "intended to be disposed of" (unless it is being used in EOR operations) so would therefore be likely to be considered a "waste" under the Convention.

49 This corresponds to UN Class 1, Code H1 in the hazard classification system included in the United Nations Recommendations on the Transport of Dangerous Goods, 1988.

50 UK Health and Safety Executive, "General Hazards of Carbon Dioxide", available at <http://www.hse.gov.uk/carboncapture/carbon-dioxide.htm>.

51 Council Directive 91/689/EEC of 12 December 1991 on hazardous waste, OJ 1991 L 377/20.

52 UCL Centre for Law and the Environment, "Onshore Carbon Capture and Storage: European Waste Legislation", available at <http://www.ucl.ac.uk/cclp/ccsoneuropewaste-3.php>.

53 Parliament and Council Directive 2006/12/EC of 5 April 2006 on waste, OJ 2006 L 114/9.

54 UCL Centre for Law and the Environment, *supra*, note 52.

tory rules and constraints regarding transboundary movement of waste would potentially require compliance from both contracting parties wishing to export the CO<sub>2</sub> and contracting parties wishing to receive it. These are wide-ranging and could include: (a) a requirement not to permit exports and imports of CO<sub>2</sub> to and from non-parties;<sup>55</sup> (b) a requirement only to export the CO<sub>2</sub> if the state of export does not have the necessary disposal capacity itself;<sup>56</sup> (c) potential non-consent from transit states who have the right to prohibit transit passage;<sup>57</sup> (d) a prohibition on exports to parties where the exporting party has reason to believe that the CO<sub>2</sub> will not be managed in an environmentally sound manner;<sup>58</sup> (e) an obligation to cooperate with parties to improve and achieve environmentally sound management of the stored CO<sub>2</sub>;<sup>59</sup> (f) documentation, notification and consent requirements; and (g) importing states and transit states which are parties may require the CO<sub>2</sub> to be covered by insurance or other guarantee.<sup>60</sup> In relation to this last requirement, it is the author's understanding that possible insurance products for CCS are being considered by the insurance industry.

## 2. Bamako Convention

The Bamako Convention establishes a regional regime to prohibit trade in waste into Africa and to control it within Africa.<sup>61</sup> The Convention entered into force in April 1998 and has 29 parties, with 23 ratifications.<sup>62</sup> Whilst the Convention is largely modelled on the obligations contained in the Basel Convention, by actually banning the import of hazardous waste into Africa from non-contracting parties, the Bamako Convention goes further than the Basel Convention as currently drafted.<sup>63</sup>

### a. Is CO<sub>2</sub> a "Hazardous Waste" under the Bamako Convention?

Another key difference is that the definition of "hazardous wastes" under the Bamako Convention is wider than that under the Basel Convention. Article 1 defines "hazardous waste" to mean "wastes"<sup>64</sup> as specified in article 2 of the Convention. Under article 2 the following substances will, amongst others, be considered "hazardous wastes": (a) wastes that belong to any category contained in Annex I (categories of wastes which are hazardous wastes); (b) wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the state of export, import or transit; and (c) wastes which possess any of the characteristics contained in Annex II (list of hazardous characteristics).

Under this broad definition, there are reasonable grounds for an argument that CO<sub>2</sub> could be considered to be a "hazardous waste". The category most likely to trigger classification of CO<sub>2</sub> as a hazardous waste would be article 2(c): wastes which possess any of the characteristics contained in Annex II.<sup>65</sup> Based on the potential risk profile of CO<sub>2</sub> outlined in Part One of this paper, potentially relevant categories would be: H1 Explosive (a solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction or producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings); H6.1 Poisonous (Acute) (substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact); H8 Corrosives (substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the event of leakage, will materially damage, or

55 Article 4(5).

56 Article 4(9).

57 Article 6(4).

58 Article 4(2)(e).

59 Article 4(2)(h). An interesting issue regarding protection of intellectual property rights (IPR) surrounding CCS technology of the exporting state is arguably raised by this requirement. For further discussion of IPRs and CCS more broadly see IEA, *supra*, note 3, at p. 77.

60 Article 6(11).

61 Sands, *supra*, note 36, at p. 696.

62 African Union, "List of countries which have signed, ratified/acceded to the African Union Convention on the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes in Africa", available at <http://www.africanunion.org/root/AU/Documents/Treaties/List/Bamako%20Convention.pdf>.

63 Sands, *supra*, note 36, at p. 696.

64 "Wastes" are given the same definition as that contained in article 2(1) of the Basel Convention.

65 These correspond with the hazardous classification system included in the United Nations Recommendations on the transport of Dangerous Goods 1988 and are the same as those set out in Annex III of the Basel Convention.

even destroy, other goods or the means of transport; they may also cause other hazards); H11 Toxic (substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity); and H12 Ecotoxic (substances or wastes that if released present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems).

On substantially the same grounds identified above with respect to classification of CO<sub>2</sub> under the Basel Convention, CO<sub>2</sub> might also be considered a “hazardous waste” under article 2(a) if it is a “waste of an explosive nature not subject to other legislation”<sup>66</sup> and article 2(b) if CO<sub>2</sub> is considered to be a hazardous waste by the domestic legislation of the state of export, import or transit.

#### b. Regulatory Implications if CO<sub>2</sub> is a Hazardous Waste under the Bamako Convention

The potentially applicable regulatory rules and constraints regarding transboundary movement of hazardous waste are materially similar to those identified above in analysis of the Basel Convention.<sup>67</sup> As already mentioned, a key difference, however, is that the Bamako Convention prohibits outright the import of waste into Africa from non-contracting parties, deeming such imports illegal and criminal.<sup>68</sup> Since articles 22 and 23 provide that only member states of the Organisation for African Unity (OAU) may become parties, the Convention would effectively prohibit imports of CO<sub>2</sub> from outside Africa. As far as can be ascertained, there are currently no proposals to export CO<sub>2</sub> into the jurisdiction of contracting parties to the Bamako Convention for disposal. CCS more generally is, however, receiving increasing attention as a potentially viable technology to be used in Africa, so assuming such disposal solutions are cost effective such a scenario is not outside the realms of possibility.<sup>69</sup>

## IV. CO<sub>2</sub> and International Marine Environment Protection

Marine environmental protection treaties fit into two broad categories: global treaties (such as UNC-

LOS, the London Convention and its London Protocol), and regional treaties (such as the OSPAR Convention).<sup>70</sup> These rules were adopted before CCS technology was properly contemplated, thus rendering legal uncertainty upon CCS activities within their jurisdiction. Recent amendments to the London Protocol and the OSPAR Convention have brought much-needed legal clarity (at least for parties to those Conventions) by bringing CCS activities within their remit.<sup>71</sup> Prior to these amendments there was significant debate as to whether storage of CO<sub>2</sub> in the seabed was legally allowed under these Conventions.<sup>72</sup> The legal treatment of transboundary transport of CO<sub>2</sub> associated with CCS, however, remains an issue which needs investigation under these instruments.

### 1. UNCLOS

UNCLOS is a framework Convention which establishes a comprehensive legal regime to govern activities in and in relation to the world’s seas and oceans.<sup>73</sup> It entered into force in 1994 and, as at 7 November 2008, had 157 parties.<sup>74</sup> Being a framework Convention, UNCLOS provides little in the way of substantive regulation itself; it leaves pre-

66 Category Y15 of Annex I.

67 There are some important differences. For an overview of some of these see Sunkin, Ong and Wight, *Sourcebook on Environmental Law*, 2nd ed., (London 2002), at p. 349.

68 Article 4(1).

69 Energy Research Centre of the Netherlands, *Advancing CCS and CDM in Africa: Outcomes of Two Workshops in Africa*, Summary Report, Petten 2007, at pp. 10-12.

70 Sands, *supra*, note 36, at p. 395.

71 For an overview of these amendments and their significance see Redgwell, “International Legal Responses to the Challenges of a Lower-Carbon Future: Climate Change, Carbon Capture and Storage, and Biofuels”, in Zillman/Redgwell/Omorogbe/Barrera-Hernandez (eds.), *Beyond the Carbon Economy: Energy Law in Transition*, (Oxford 2008), at p. 104.

72 *Ibid.* Notably, both the Basel Convention and the Bamako Convention also place restrictions on the dumping of hazardous wastes at sea. See article 4(2) of the Bamako Convention and effect of para. D7 in Annex IV of the Basel Convention.

73 Sands, *supra*, note 36, at p. 396.

74 United Nations, “Status of the United Nations Convention on the Law of the Sea, of the Agreement relating to the implementation of Part XI of the Convention and of the Agreement for the implementation of the provisions of the Convention relating to the conservation and management of straddling fish stocks and highly migratory fish stocks: Table recapitulating the status of the Convention and of the related Agreements, as at 16 July 2008”, available at [http://www.un.org/Depts/los/reference\\_files/status2008.pdf](http://www.un.org/Depts/los/reference_files/status2008.pdf).

cise rules to be elaborated further in other more specific international Conventions such as the London Convention and its 1996 Protocol.<sup>75</sup> Such instruments are therefore practically more significant to the topic of this paper and will receive closer attention. Nevertheless, there are marine environmental protection provisions in UNCLOS which are potentially relevant to CCS, so a brief analysis of potential regulation of transboundary transportation of CO<sub>2</sub> is provided.

#### *Article 195 Duty Not to Transfer Hazards*

Part XII of UNCLOS sets out provisions relating to the protection and preservation of the marine environment. The provision which is most potentially relevant to transboundary transportation of CO<sub>2</sub> is article 195. It states: "In taking measures to prevent, reduce and control pollution of the marine environment, states shall act so as not to transfer, directly or indirectly, damage or hazards from one area to another or transform one type of pollution into another." Although the article does not specifically refer to "transboundary" transportation (referring more broadly to movement from "one area to another"), Guruswamy notes that the article institutionalises a prohibition on transfers or exports of hazardous materials – the underlying rationale being that the producer of waste should deal with and neutralise it at the source rather than transporting it to other areas.<sup>76</sup> This is an early reflection of the proximity principle which was further developed in transboundary movement of waste instruments.

There is no clear answer as to whether transboundary transportation of CO<sub>2</sub> in the marine envi-

ronment would amount to a transfer of "hazards" from one area to another under article 195 of UNCLOS. There is no definition of "hazards" in UNCLOS, so the applicability of this article is open to interpretation and arguments can be made either way. One argument could be that CO<sub>2</sub> is a potentially hazardous substance (as outlined in Part One of this paper), and when interpreted in light of one of the key objectives of UNCLOS – to prevent, reduce and control marine pollution – it could be considered a "hazard" under the Convention.

Despite this uncertainty, it is unlikely any clarification through amendment or otherwise of UNCLOS would be sought. As noted by Purdy and Havercroft, UNCLOS remains a framework law which leaves the elaboration of precise rules to be made in other more specific laws such as the London Convention and its 1996 Protocol.<sup>77</sup> Purdy and Macrory further note that, in practice, if a state seeking to dispose of CO<sub>2</sub> is a contracting party to UNCLOS and the London Convention (and/or its Protocol), for example, it will be responsible for following the London Convention (or its Protocol) first as the more stringent treaty, and will in practice not refer to the general requirements imposed by UNCLOS.<sup>78</sup>

## 2. London Convention and the London Protocol

The London Convention is an instrument of global application to all marine waters other than internal waters. It is one of the first global Conventions to protect the marine environment from human activities and has been in force since 1975. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter.<sup>79</sup> As at 16 November 2008, 85 states were parties to the Convention.<sup>80</sup>

In 1996, the London Protocol was agreed to modernise the London Convention and, eventually, replace it. The purpose of the Protocol is similar to that of the London Convention, but the Protocol is more restrictive.<sup>81</sup> The geographical area of the Protocol is expanded to include the seabed and the subsoil of all marine waters, other than the internal waters of states. The Protocol entered into force on 24 March 2006 and as at 16 November 2008 it had 36 parties.<sup>82</sup>

75 Purdy/Macrory, "Geological Carbon Sequestration: Critical Legal Issues", Tyndall Centre Working Paper No. 45, Norwich (2004), at p. 17.

76 Guruswamy, "Environment and Trade: Competing Paradigms in International Law", in Weeramantry/Anghie/Sturgess, *Legal Visions of the 21st Century: Essays in Honour of Judge Christopher Weeramantry*, (The Hague 1998), at p. 568.

77 Purdy/Havercroft, "Carbon Capture and Storage: Developments under European Union and International Law", *JEEPL* (2007), at p. 353-354.

78 Purdy/Macrory, *supra*, note 75, at p. 18.

79 Articles I and VIII.

80 IMO, "London Convention 1972", available at [http://www.imo.org/home.asp?topic\\_lbid=1488](http://www.imo.org/home.asp?topic_lbid=1488).

81 For an overview of the London Protocol and how it is more restrictive than the London Convention, see Sands, *supra*, note 36, at pp. 422-423.

82 Available at [http://www.imo.org/home.asp?topic\\_lbid=1488](http://www.imo.org/home.asp?topic_lbid=1488).

### a. London Protocol's Prohibition on Export of Waste

Whilst recent amendment to the London Protocol rectifies legal uncertainty surrounding CO<sub>2</sub> storage, it does not address the issue of transboundary transportation of CO<sub>2</sub> for CCS activities. Article 6 of the London Protocol states: "Contracting Parties shall not allow the export of wastes or other matter to other countries for dumping or incineration at sea." The provision was reportedly inserted into the Protocol in view of adoption of the Basel Convention which, as discussed above, is underpinned by the "proximity principle".<sup>83</sup> "Wastes or other matter" is defined broadly in article 1 to mean "material and substance of any kind, form or description". On the plain meaning of those words it is hard to see how CO<sub>2</sub> transported for CCS in the sub-seabed would not be considered to fall within the definition of "wastes or other matter" for the purposes of article 6.<sup>84</sup>

Article 6 was specifically considered by the IMO's Legal and Technical Working Group on Transboundary CO<sub>2</sub> Sequestration (the "Working Group") at its first meeting in Bonn, Germany in February 2008.<sup>85</sup> At that meeting, delegations from nine contracting parties to the London Protocol, and Greenpeace International as an observer, considered whether and how the transboundary movement of CO<sub>2</sub>, for and during sub-seabed sequestration in geological formations, relates to article 6, and whether any amendment of article 6 is necessary.<sup>86</sup>

Most delegations were reportedly of the view that export of CO<sub>2</sub> to another country intended for CO<sub>2</sub> sequestration into the sub-seabed fell within article 6 and would therefore be prohibited. It is hard to see, on the plain meaning of the words in article 6, how other conclusions could objectively be reached; CO<sub>2</sub> would clearly amount to "wastes or other matter", and CCS into the sea-bed would very likely amount to "dumping" at sea.<sup>87</sup> "Export" is not defined in the Protocol, although its plain meaning would suggest it is akin to sending something to another country.<sup>88</sup> The Working Group reportedly agreed that "export" would include any cross-border movement, regardless of any commercial basis for that transfer.

The Working Group also debated whether the export prohibition under article 6 is to "Contracting Parties" only or whether it is a wider prohibition on

export to "any countries". Again, the wording in article 6 is arguably clear that the export prohibition is a prohibition on exporting to "other countries" – not to other contracting parties only. The Working Group reached the same conclusion.

### b. Amendment to article 6 of the London Protocol

In light of the legal difficulties raised by the article 6 export prohibition, the Working Group considered, although did not formally propose, an amendment to it. The effect of the amendment would be to exempt transboundary movements of CO<sub>2</sub> from the article 6 export prohibition provided that: (a) the receiving state gives its prior informed consent; (b) disposal of CO<sub>2</sub> streams is in compliance with various site-selection and impact assessment requirements; and (c) if the transboundary movement is from a contracting party to a non-contracting party, a bilateral, multinational or regional agreement or arrangement on the transboundary movement of CO<sub>2</sub> is in place. Such agreement or arrangement must not, according to the Working Group, derogate from the environmental protection requirements in the Protocol.

The German delegation, supported by Italy and the observer from Greenpeace, also proposed inclusion of a requirement that transboundary movement of CO<sub>2</sub> only be allowed in accordance with the Working Group's suggested amendment if "dis-

<sup>83</sup> Coenen, "Dumping of Wastes at Sea: Adoption of the 1996 Protocol to the London Convention 1972", RECIEL 1997, at p. 54-57.

<sup>84</sup> A separate issue is whether CO<sub>2</sub> transported for enhanced oil recovery operations would fall within the scope of article 6. Issue was raised by Tim Dixon of the IEA Greenhouse Gas R&D Programme in a conversation on 15 August 2008.

<sup>85</sup> IMO, Report of the 1st Meeting of the Legal and Technical Working Group on Transboundary CO<sub>2</sub> Sequestration Issues on 25-27 February 2008, London 2008.

<sup>86</sup> The Working Group divided the issue into two scenarios; case 1 – transboundary movement of CO<sub>2</sub> prior to injection in the sub-seabed geological formation; and case 2 – transboundary migration of CO<sub>2</sub> streams within the sub-seabed after dumping, including deliberate migration and unintended migration. Only case 1 is considered in this scope of this paper.

<sup>87</sup> This line of argument largely underpinned reasons for the recent amendment to Annex 1 to accommodate CO<sub>2</sub> storage into the sub-seabed.

<sup>88</sup> The 2006 Concise Oxford English Dictionary defines "export" to mean: "verb: 1. Send (goods or services) to another country for sale. Spread or introduce (ideas or customs) to another country... noun: 2. The action of exporting goods or services."

posal of CO<sub>2</sub> streams from a particular source is not feasible within the state of origin.” Their reason for this qualification was based on, *inter alia*, the argument that since article 6 had been developed to complement the Basel Convention, in line with that Convention’s spirit, “a country should try to solve its waste management problems primarily within its own boundaries” and, therefore, export to other countries should remain as limited as possible (i.e. reflection of the “Proximity Principle”).<sup>89</sup> This argument was reportedly rejected by the majority of delegations, however, as it was considered too restrictive. The UK delegation also reportedly felt it was too idealistic and practically unrealistic given the likely need for cross-border CO<sub>2</sub> transportation solutions.<sup>90</sup> It is submitted that the proposed qualification is of limited practical meaning in any case, as what amounts to being “feasible within the state of origin” is an overly vague concept; is it financial feasibility, physical feasibility, political feasibility? The proposed qualification, if agreed, would arguably need further delimitation for it to be of any real effect.

Given the limited number of delegates to the Working Group (only nine countries) it was felt that the amendment would not be formally proposed at the time of the meeting (February 2008).<sup>91</sup> The issue was, however, further considered at the 3rd meeting of the Contracting Parties to the Protocol held in London from 27 to 31 October 2008. As at the date of this paper, official outcome reports for that meeting were not available so it is not clear specifically what the parties have agreed regarding article 6. An IMO press briefing on outcomes of the meeting published on 11 November 2008, however, reported that: “Parties agreed that the London Protocol should not constitute a barrier to the transborder movement of CO<sub>2</sub> streams and agreed to continue this discussion by correspondence, and consider the option of developing an

amendment to article 6 of the Protocol, which prohibits the export of wastes for dumping purposes, or an interpretative resolution, or a combination of the two.”

Therefore, whilst it appears parties to the Protocol are minded to remove the legal barrier posed by article 6 (either through amendment or interpretative resolution), they still have not done so and it technically remains an issue for cross-border CCS projects. In accordance with the amendment procedures in the London Protocol, any proposal for an amendment would have to be submitted six months in advance of its next meeting of contracting parties or a special meeting of contracting parties.<sup>92</sup> Consideration of any article 6 amendment proposal at, say, an October 2009 meeting of contracting parties (if it happens then) would mean that such proposal would need to be formally proposed by April 2009 at the latest.<sup>93</sup> Adoption of an amendment requires a two-thirds majority vote of the contracting parties which are present and voting.<sup>94</sup> If adopted, the amendment would enter into force 60 days after two-thirds of the contracting parties had deposited an instrument of acceptance of the amendment with the IMO.<sup>95</sup>

One dimension to article 6 that the Working Group did not appear to directly consider (at least from the report of the meeting) is the effect of the prohibition being only on the export of wastes or other matter. As currently drafted, article 6 does not place any direct prohibition on the “import” of wastes and other matter for dumping or incineration at sea. Thus a contracting party with CO<sub>2</sub> storage capacity could feasibly import the CO<sub>2</sub> from a non-contracting party for sequestration into the sub-seabed and not be in breach of article 6.<sup>96</sup> Such a scenario is surely not what was intended; it would defeat the purpose of the Protocol to allow contracting parties to allow the import of waste for dumping but prohibit them from exporting it. In any case, the Working Group’s suggested amendment appears indirectly to address this scenario as the suggested new article 6(2) refers to “transboundary movements” generally and not only exports. Maintaining this approach is important to ensure consistent treatment of importing and exporting of CO<sub>2</sub> across borders. In the absence of any publicly available further information relating to the October meeting of the contracting parties it is not known whether this particular issue was acknowledged.

89 Paras. 6 and 7 of the preamble to the Basel Convention.

90 Conversation with Andy Greaves of DEFRA on 6 August 2008.

91 *Ibid.*

92 Article 21.

93 Conversation with Andy Greaves of DEFRA on 6 August 2008.

94 Article 21(2).

95 Article 21(3).

96 This issue was raised by Jeff Chapman of the Carbon Capture and Storage Association in a conversation on 4 August 2008.

### c. London Convention and Transboundary Movement of CO<sub>2</sub>

As the London Protocol has entered into force, it supersedes the London Convention for those parties to the Protocol. There are, however, currently 49 parties to the London Convention who are not parties to the London Protocol. This is significant, as there is continuing doubt whether the London Convention would allow for offshore CO<sub>2</sub> sequestration and storage to take place.<sup>97</sup>

As to the specific issue of transboundary movement of CO<sub>2</sub>, the London Convention does not contain any explicit prohibition or regulation of it. Notably, however, there have been several resolutions of the London Convention concerning the export and transboundary movement of wastes.<sup>98</sup> For example, resolution LDC 42(13) called upon contracting parties to, as much as possible, prevent the export of wastes for dumping at sea, and to prohibit or not permit the export of wastes for dumping at sea to states not party to the Convention (particularly those wastes contained in Annexes I and II of the London Convention).<sup>99</sup> It also recommended that standards compatible with those imposed by the Basel Convention should be developed and considered for inclusion by amendment to the London Convention for transboundary movement of waste between contracting parties. The standards never were developed and, as per the next resolution of the London Convention on the transboundary movement of wastes for disposal at sea, it was considered that there was no need to do so given the transboundary movement of hazardous waste, within the meaning of the Basel Convention, for the dumping at sea was not frequent enough in practice to merit them.<sup>100</sup>

Although resolutions made under the London Convention do not create binding legal obligations on contracting parties, they were passed before CCS was contemplated as a potentially viable climate change mitigation technology and may therefore need reconsidering or clarification so as to facilitate the transboundary transportation of CO<sub>2</sub>.

### 3. OSPAR Convention

The OSPAR Convention is a regional treaty which addresses marine pollution in the North-East Atlantic and the North Sea. It entered into force in 1998, and has 16 parties, including the European

Union and 12 of its Member States.<sup>101</sup> The Convention contains a main treaty text which sets out treaty definitions, legal obligations, and the managerial aspects in implementing the Convention. More detailed provisions are then elaborated within five separate annexes.<sup>102</sup>

In June 2007 the OSPAR Commission adopted two decisions clarifying the extent of permitted CCS activities under the Convention.<sup>103</sup> Both took effect from 15 January 2008 and were implemented through amendment to Annex II (pollution by dumping or incineration) and Annex III (pollution from offshore installations and structures). The amendments do not directly consider transboundary transportation of CO<sub>2</sub>, but it is submitted that there is nothing in the Convention, as it currently stands, which would prohibit or materially regulate the actual transportation stage of CO<sub>2</sub> to the point of injection for storage.

Nevertheless, it should be noted that a non-binding recommendation was passed by the OSCOM Commission on 24 June 1988 concerning the export of wastes for disposal at sea.<sup>104</sup> The "OSCOM Com-

97 For an overview of relevant provisions in the London Convention and the legal ambiguity surrounding CO<sub>2</sub> storage, see Purdy/Havercroft, *supra*, note 77, at p. 355.

98 See resolutions LDC.11(v) (undated) (Export of wastes for incineration at sea); LDC.29(1) (Export of wastes for disposal at sea); LDC.42(13) (undated) (Matters related to the Basel Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal); and LDC.45(14) (undated) (Control of transboundary movements of wastes for disposal at sea).

99 Para. 4 of resolution LDC.42(13) (undated) (Matters related to the Basel Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal).

100 United Nations Atlas of the Oceans, "Ocean Dumping and Ship Wastes: Dumping at Sea", available at <http://www.oceansatlas.org/servlet/CDServlet?status=ND0xMjU3MiY2PWVujjMzPSomMzc9a29z>.

101 OSPAR Commission, "Contracting Parties", available at [http://www.ospar.org/content/content.asp?menu=00380108110000\\_000000\\_000000](http://www.ospar.org/content/content.asp?menu=00380108110000_000000_000000) visited on 16 November 2008.

102 These are: pollution from land-based sources (Annex I); pollution by dumping and incineration at sea (Annex II); pollution from offshore installations and structures (Annex III); monitoring and assessment (Annex IV); and the protection of ecosystems and biological diversity (Annex V).

103 OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed and OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations.

104 The recommendation was made under the 1972 Oslo Convention. Under article 31(2) of the OSPAR Convention, Decisions, Recommendations and all other agreements adopted under the 1972 Oslo Convention or the 1974 Paris Convention shall continue to be applicable, unaltered in their legal nature, to the extent that they are compatible with, or not explicitly terminated by, the OSPAR Convention, and Decisions or, in the case of recommendations, any recommendations adopted under the OSPAR Convention.

mission” was formed under the 1972 Oslo Convention and was a predecessor to the OSPAR Commission. Recommendation 88/1 recommended to contracting parties a number of guidance measures for the control of the export of waste for the dumping at sea. These included requirements not to export wastes for sea disposal to non-contracting parties unless there are compelling reasons for such export, and not to export wastes for incineration or dumping at sea outside the Convention area. Recommendation 88/1 is still applicable to parties today, but again it is noted that its provisions are not legally binding.<sup>105</sup> In any case, more substantive legally binding controls on the transboundary movement of waste are contained in the later Basel Convention – an instrument to which all contracting parties to the OSPAR Convention are also parties. The preamble to Recommendation 88/1 specifically acknowledges that it was being made pending the development of global rules on the transboundary movement of waste (i.e. which occurred one year later through adoption of the 1989 Basel Convention).

## V. Conclusion

This paper has identified potential regulatory obligations and, in some cases, possible legal prohibitions on the transboundary transportation of CO<sub>2</sub> under selected international treaties relating to the transboundary movement of waste and to

marine environmental protection. This is a significant issue, as anecdotal evidence suggests there is the potential for widespread cross-border transport scenarios, particularly in Europe. If CCS continues to develop as a potentially viable climate change mitigation tool, it is conceivable that transboundary CO<sub>2</sub> storage solutions will need to be explored in other parts of the world as well.

Depending on how CO<sub>2</sub> is classified and interpreted by contracting parties to relevant treaties, the most significant legal issues that have been identified are those under the Basel Convention, the Bamako Convention, and the London Protocol. If CO<sub>2</sub> is a “hazardous waste” under the first two Conventions, CCS projects that involve transboundary transport of CO<sub>2</sub> potentially face a number of material regulatory constraints. These are broad-ranging, and include (but are not limited to) actual prohibitions on the export and import of CO<sub>2</sub>, possibility of non-consent from transit states, and possible insurance requirements. The third significant international instrument – the London Protocol – arguably places, by way of its article 6, a clear prohibition on contracting parties on the export of CO<sub>2</sub> to any country (i.e. includes non-contracting parties).

These identified legal issues will need resolution before cross-border CCS projects can proceed, at least if such projects are to be in accordance with the relevant international treaties. It is submitted that further investigation is also needed into other potentially relevant international treaties to determine international legal treatment of the transboundary movement of CO<sub>2</sub> associated with CCS projects.

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<sup>105</sup> Article 13(5) OSPAR Convention.