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Transboundary carbon capture and storage project activities

Technical paper

Summary

This document was prepared in order to support the consideration by the Subsidiary Body for Scientific and Technological Advice (SBSTA) under the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol of the eligibility of carbon dioxide capture and storage (CCS) project activities which involve the transport of carbon dioxide from one country to another or which involve geological storage sites that are located in more than one country, in accordance with paragraph 106 of the report of the SBSTA on its thirty-sixth session (FCCC/SBSTA/2012/2). The document takes into account the relevant international conventions, protocols, treaties and technical literature related to transboundary CCS project activities. While it does not attempt to provide an overview or synthesis of the views expressed by Parties and intergovernmental organizations contained in document FCCC/SBSTA/2012/MISC.12 and Add.1 or the views of admitted observer organizations posted on the UNFCCC website,[1] the issues identified thereby have been taken into account in its preparation.

[1] <http://unfccc.int/parties_observers/ngo/submissions/items/3689.php>.

Contents

I. Introduction

A. Background

1. History of the consideration of transboundary carbon dioxide capture and storage project activities by the Subsidiary Body for Scientific and Technological Advice

1. The clean development mechanism (CDM), defined in Article 12 of the Kyoto Protocol, allows for the registration of project activities in Parties not included in Annex I to the Convention (non-Annex I Parties) for the abatement of emissions of greenhouse gases (GHGs). Further rules relating to the CDM have been elaborated by the Parties to the Kyoto Protocol, in particular in decision 3/CMP.1.

2. By decision 10/CMP.7, the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) adopted the modalities and procedures for carbon dioxide capture and storage in geological formations (CCS) as CDM project activities.[2]

3. In the same decision, the CMP requested the Subsidiary Body for Scientific and Technological Advice (SBSTA) to consider, at its thirty-sixth session, provisions for the following:

(a) CCS project activities which involve the transport of carbon dioxide (CO_2) from one country to another or which involve geological storage sites that are located in more than one country;

(b) A global reserve of certified emission reductions (CERs) for CCS project activities, in addition to the 5 per cent reserve referred to in decision 10/CMP.7, annex, paragraph 21(b).[3]

4. In addition, the CMP invited Parties and admitted observer organizations to submit to the secretariat, by 5 March 2012, their views on the issues referred to in paragraph 3(a) and (b) above.[4] The submissions received were compiled into document FCCC/SBSTA/2012/MISC.8 and Add.1 and 2.

5. At its thirty-sixth session, the SBSTA began its consideration of the matter of CCS as CDM project activities. It invited Parties, intergovernmental organizations and admitted observer organizations to submit to the secretariat, by 13 August 2012, their views on the issues referred to in paragraph 3(a) and (b) above.[5] The submissions received were compiled into document FCCC/SBSTA/2012/MISC.12 and Add.1.

2. Mandate

6. At its thirty-sixth session, the SBSTA requested[6] the secretariat to prepare a technical paper on the eligibility of CCS project activities which involve the transport of CO_2 from one country to another or which involve geological storage sites that are located in more than one country, drawing upon, inter alia, the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines), the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (hereinafter referred to as the London Protocol), the IPCC *Special Report on Carbon Capture and*

[2] Decision 10/CMP.7, paragraph 1.
[3] Decision 10/CMP.7, paragraph 5.
[4] Decision 10/CMP.7, paragraph 6.
[5] FCCC/SBSTA/2012/2, paragraph 105.
[6] FCCC/SBSTA/2012/2, paragraph 106.

Storage, scientific research and the submissions referred to in paragraphs 4 and 5 above. The SBSTA requested that the technical paper address the following issues:

(a) International law and frameworks relevant to CCS project activities which involve the transport of CO_2 from one country to another or which involve geological storage sites that are located in more than one country;

(b) Possible options for transboundary CCS project activities, and obligations arising therefrom, including the following:

(i) The assignment of liability, as defined in decision 10/CMP.7, annex, paragraph 1(j);

(ii) Options for sharing the obligation to address a net reversal of storage;

(iii) Environmental and socioeconomic impacts and remedial measures to address them;

(iv) Monitoring requirements in the context of transboundary CCS project activities;

(c) Possible resolution mechanisms for any disputes, including with regard to liability, that may arise between host Parties.

B. Scope of the technical paper

7. This document was prepared in response to the mandate described in paragraph 6 above. In addition to this introduction, it consists of four chapters, as outlined below.

8. Chapter II addresses international legal frameworks that either directly address CCS or regulate matters which could be relevant, for instance, to CCS in the transboundary context. In addition, it provides a brief overview of existing international agreements for the management of shared natural resources, which, in addition to possibly being relevant from a regulatory point of view, could to some extent serve as model approaches to regulating specific issues with regard to transboundary CCS.

9. Chapter III outlines possible scenarios involving transboundary CCS. It considers, among other things, the implications of the various legal frameworks described in chapter II under the scenarios considered, including in relation to the treatment of the various stages of the CCS project cycle, the characterization of CO_2, transportation and storage requirements, the assignment of liability and the obligation to address a net reversal of storage, requirements related to environmental and socioeconomic impact assessments, and monitoring requirements. The following four main scenarios are considered in chapter III (although various combinations of these four scenarios are also possible, as noted in chapter III E):

(a) Scenario 1: Capture in Party A and storage in Party B;

(b) Scenario 2: Capture in Party A and storage in Parties A and B;

(c) Scenario 3: Capture in more than one Party and storage in more than one Party;

(d) Scenario 4: Capture in Party A, transport through Party C and storage in Party B.

10. Chapter IV considers possible governance options for managing the scenarios outlined in paragraph 9 above and associated issues, including the role of national legislation and authorities and approaches to the joint management of transboundary projects.

11. Chapter V briefly discusses possible mechanisms for resolving disputes that may arise between Parties as a result of transboundary CCS project activities under the CDM.

12. In the light of Article 12, paragraph 3, of the Kyoto Protocol, which establishes that non-Annex I Parties will benefit from project activities resulting in CERs, the scenarios outlined in chapter III below are premised on the assumption that the Parties in which the capture and storage of CO_2 occur (Party A and Party B) are non-Annex I Parties to the Kyoto Protocol. In this regard, paragraph 12 of the annex to decision 10/CMP.7 requires the project boundary of a CCS project activity to be defined to include all stages of the CCS project cycle. Since it is doubtful that a project activity whereby either capture or storage of CO_2 occurs in a Party included in Annex I to the Convention (Annex I Party) would meet the eligibility criteria for the CDM under the existing modalities and procedures, such a scenario is not considered in chapter III below. However, to some extent, the analysis of multilateral treaties set out in chapter II below does take into consideration the scenario of either capture or storage of CO_2 occurring in an Annex I Party.

C. Possible action by the Subsidiary Body for Scientific and Technological Advice

13. The SBSTA may wish to review the information contained in this document as part of its consideration of agenda sub-item 12(a), "Carbon dioxide capture and storage in geological formations as clean development mechanism project activities".

II. Relevant international frameworks

A. Carbon dioxide capture and storage in international law

14. There are a number of international and regional legal frameworks, including treaties, which are relevant to CCS project activities that are undertaken in two or more national jurisdictions. However, only a small number of those frameworks specifically address CCS. The most relevant legal frameworks are those that address: (a) the responsibility for GHG emissions; (b) the transboundary movement of substances; (c) offshore storage; or (d) potential transboundary environmental impacts.

1. Intergovernmental Panel on Climate Change guidelines in the context of the Convention

15. The 2006 IPCC Guidelines are used by Parties to calculate emission estimates and prepare their national GHG inventories under the Convention and the Kyoto Protocol. The 2006 IPCC Guidelines provide guidance on estimating and reporting annual emissions by gas and by sector. They would also be applied to estimating and reporting on emissions at the capture, transport and injection stages of CCS, including for transboundary CCS project activities.

16. In accordance with the 2006 IPCC Guidelines, fugitive emission losses at the stages of CO_2 capture and transport are estimated largely by means of established approaches used for estimating emissions from energy production and oil and gas transportation activities.[7] With respect to the storage stage, the 2006 IPCC Guidelines provide for fugitive emission losses to be estimated using a combination of modelling and measurement techniques. Where CCS project activities are transboundary, national GHG inventory compilers from a number of States are required to report on and document different parts of the CCS project cycle. The relevant requirements are set out in detail in chapter III below.

[7] 2006 IPCC Guidelines, volume 2, chapter 5, sections 5.3 and 5.4, pages 5.8 and 5.9.

2. 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and the 1996 Protocol to it

17. The 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (hereinafter referred to as the London Convention) covers the deliberate disposal at sea of waste or other matter from vessels, aircraft and platforms. It does not cover discharge from land-based sources such as pipes and outfalls, waste generated incidental to the normal operation of vessels, or the placement of materials for purposes other than mere disposal, where such disposal is not contrary to the aims of the Convention. It has 87 contracting parties[8] (46 of which are also non-Annex I Parties to the Kyoto Protocol).[9]

18. CO_2 is not specifically mentioned in the London Convention. However, the London Convention's Scientific Group has concluded that, by virtue of its properties, CO_2 may fall within the London Convention's annex I definition of 'industrial waste', which is absolutely prohibited to be dumped in the sea. No consensus has been reached by the parties to the London Convention on this matter as yet.[10]

19. In 1996 the London Protocol was agreed, with a view to further modernizing the London Convention and, eventually, replacing it.[11] Under the London Protocol all dumping of waste is prohibited, except for the possibly acceptable wastes on the so-called 'reverse list' contained in its annex I. The London Protocol entered into force on 24 March 2006 and currently has 42 parties (of which 14 are non-Annex I Parties to the Kyoto Protocol).[12]

20. Annex I to the London Protocol was amended in 2006[13] to include CO_2 streams from CCS, which could be considered eligible for dumping provided that they meet three criteria: (a) disposal is into a sub-seabed geological formation (i.e. not into the water column); (b) the CO_2 stream is of high purity, containing only incidental amounts of associated substances; and (c) no waste or other matter has been added for the purpose of disposal.[14]

21. The transboundary movement of CO_2 is currently prohibited under the London Protocol by virtue of its Article 6, which does not allow the export of waste or other matter by the parties to the London Protocol to any other countries for dumping or incineration at sea. At its 1st meeting, the Legal and Technical Working Group on Transboundary CO_2 Sequestration of the International Maritime Organization (IMO) (IMO Working Group) considered that 'export' would include any movement of CO_2 from a contracting party to

[8] International Maritime Organization. *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 and 1996 Protocol Thereto*. Available at <http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx>.

[9] For the reasons outlined in paragraph 12 above, a comparison of the number of Parties to the Kyoto Protocol with the number of parties to the treaties reviewed in this technical paper is provided only with regard to non-Annex I Parties. A list of the non-Annex I Parties is available at <http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php>.

[10] University College London (UCL) Carbon Capture Legal Programme. *Offshore CO_2 Storage. International Marine Legislation. United Nations Convention on the Law of the Sea, 1982*. UCL Centre for Law and the Environment. Available at <http://www.ucl.ac.uk/cclp/ccsunclos.php>.

[11] See <http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx>.

[12] See <http://www.imo.org/blast/blastData.asp?doc_id=7541&type=body>.

[13] The amendment to annex I to the London Protocol entered into force for all contracting parties 100 days after its adoption in accordance with Article 22 of the London Protocol (i.e. on 10 February 2007). For the contracting parties that accepted the amendment before that time, the amendment entered into force immediately upon their notification of acceptance.

[14] London Protocol, annex I, paragraph 4.

any another country (whether the latter is a party to the London Protocol or not) for disposal in that country.[15]

22. With regard to the transboundary migration of CO_2 streams across boundaries within a sub-seabed geological formation, at its 1st meeting the IMO Working Group generally agreed that unintended migration is not covered by Article 6 of the London Protocol and, therefore, is not currently prohibited. However, no conclusions have been reached on whether the intentional migration of CO_2 streams across boundaries within a sub-seabed formation and the transport of CO_2 for storage in international waters fall under the prohibition of Article 6 of the London Protocol.[16]

23. In 2009 Article 6 of the London Protocol was amended by the contracting parties to allow the export of CO_2 streams for disposal, provided that the countries concerned enter into an agreement or arrangement which would include: (a) the allocation of permitting responsibilities between the exporting and receiving countries; and (b) in cases of export by a contracting party to a non-party to the London Protocol, a level of regulation which would ensure that the contract or arrangement does not derogate from the obligations of the contracting parties under the London Protocol.[17]

24. The provision of the amendment, when in force, would make it applicable to transboundary activities where only the exporting State is a party to the London Protocol. It could therefore potentially apply to CCS project activities involving a broad range of countries.

25. However, in accordance with Article 21 of the London Protocol, for the amendment to enter into force two thirds of the contracting parties to the London Protocol must accept the amendment (i.e. currently a minimum of 27 parties). Two parties to the London Protocol (Norway and the United Kingdom of Great Britain and Northern Ireland) have ratified the amendment to date. The analysis of the International Energy Agency (IEA) indicates that only 16 of the contracting parties to the London Protocol are currently pursuing the development of CCS.[18]

26. Notwithstanding the uncertainty regarding the entry into force of the amendment to Article 6, the contracting parties to the London Protocol are continuing to progress their consideration of CO_2 sequestration. In 2010 they adopted a workplan which includes a timeline for the London Protocol's Scientific Group to conduct a review of the "Specific guidelines for assessment of carbon dioxide streams for disposal into sub-seabed geological formations"[19] in the light of the 2009 amendment to Article 6 of the London Protocol.[20] The workplan also includes the provision of further specific guidance in cases of the export of CO_2 streams to other countries for disposal and guidance on the issues related to the management of the transboundary movement of CO_2 after injection. It is envisaged that a final report with the revised text of the guidelines will be presented at the 7th meeting of the contracting parties to the London Protocol in November 2012.

[15] IMO. 2008. *Report of the 1st meeting of the Legal and Technical Working Group on Transboundary CO_2 Sequestration Issues*, LP/CO2 1/8 at paragraph 3.9.

[16] IMO. 2008. *Report of the 1st meeting of the Legal and Technical Working Group on Transboundary CO_2 Sequestration Issues*, LP/CO2 1/8 at paragraph 3.18.

[17] Resolution LP.3(4) on the amendment to Article 6 of the London Protocol, adopted on 30 October 2009.

[18] IEA. 2011. *Carbon Capture and Storage Legal and Regulatory Review*. Second edition. p.15.

[19] Available at <http://www.imo.org/blast/blastDataHelper.asp?data_id=30645&filename=9-CO2SequestrationEnglish.pdf>.

[20] At the 32nd meeting of the contracting parties to the London Convention and the 5th meeting of the contracting parties to the London Protocol, held on 11–15 October 2010.

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

27. The 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)[21] regulates human activities which can have an adverse effect on the ecosystems and biodiversity in the North-East Atlantic. A number of Annex I Parties but no non-Annex I Parties are parties to the OSPAR Convention.[22]

28. In 2007, amendments to the OSPAR Convention, while not specifically addressing transboundary CCS, allowed the storage of CO_2 in geological formations under the seabed. The amendments entered into force in 2012.[23] In addition, by its decision 2007/2, the OSPAR Commission has addressed regulatory aspects of CCS, with the aim of ensuring that CO_2 streams are retained permanently in the geological formations in the subsoil of the OSPAR maritime area, including sub-seabed geological formations, and will not lead to significant adverse consequences for the marine environment, human health and other legitimate uses of the marine area.

29. If Parties to the Kyoto Protocol are also parties to the OSPAR Convention this is not likely to have a direct impact on any potential CCS project activities under the CDM. It does, however, create a legal framework for the Annex I Parties to the Kyoto Protocol that are also parties to the OSPAR Convention.

4. European Union directive on carbon dioxide capture and storage, and amendments to the European Union environmental liability directive

30. The European Union (EU) CCS directive[24] is considered to be the first comprehensive legal framework for the management of environmental risks related to CCS.[25] It aims to ensure that CCS technology is deployed in an environmentally safe way within the territory of the EU member States.[26] As such, it provides a number of CCS-specific requirements and amends other pieces of EU legislation to extend their application to CCS.

31. The EU CCS directive provides that, in cases of the transboundary transport of CO_2, transboundary storage sites or transboundary storage complexes, the competent authorities of the EU member States concerned shall jointly meet the requirements of the EU CCS directive and other relevant Community legislation.[27] As the directive does not provide any further guidance specifically relevant to transboundary CCS project activities, it appears that, at present, the specifics of any such project activities (e.g. with respect to how responsibility would be shared) would be a matter for the member States to agree on

[21] The OSPAR Convention was opened for signature on 22 September 1992 and entered into force on 25 March 1998.

[22] A list of the contracting parties to the OSPAR Convention is available at <http://www.ospar.org/content/content.asp?menu=01481200000000_000000_000000>.

[23] OSPAR Commission. 2011. *Ratification of OSPAR carbon capture and storage measures*. Available at <http://www.ospar.org/content/news_detail.asp?menu=00600725000000_000018_000000>.

[24] Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006. The directive applies only to the geological storage of CO_2 in the territories of the EU member States and their exclusive economic zones and on their continental shelves and not beyond that delimitation.

[25] Doppelhammer M. 2011. The CCS Directive, its Implementation and the Co-financing of CCS and RES Demonstration Projects under the Emissions Trading Scheme (NER 300 Process). *In*: I Havercroft, R Macrory and RB Stewart (eds.). *Carbon Capture and Storage. Emerging Legal and Regulatory Issues*. Oxford: Hart Publishing. p.93.

[26] Directive 2009/31/EC, Recital 9.

[27] Directive 2009/31/EC, Article 39.

between themselves. To date, no transboundary CCS project activities have been proposed under the directive.

32. While the EU CCS directive does not create any obligations for the host Parties of any potential CCS project activities under the CDM, it does create a number of obligations for the potential investor Parties and, therefore, might have some relevance in the context of such project activities.

B. International legal regimes which may be relevant to carbon dioxide capture and storage project activities

33. There are a number of international legal regimes that do not expressly address CCS but which may nevertheless be applicable to transboundary CCS project activities. The application of such regimes may arise if CO_2 is characterized in a particular manner (e.g. as a hazardous waste or pollutant) or by virtue of the potential environmental impacts of a CCS project activity (e.g. in relation to environmental impact assessment).

34. The consequences of CCS falling within the scope of such international agreements vary from the potential for certain activities (such as the export of CO_2) being prohibited, to a CCS project activity requiring the consent of the contracting parties and the need to undertake various steps related to environmental impact assessment and the monitoring of the project activity.

1. Conventions related to the movement of waste

35. Conventions regulating the movement of waste have not, to date, expressly considered the treatment of CO_2 in the context of CCS. Unless CO_2 is expressly stated to be a waste or pollutant, it will be a matter of interpretation, having regard to the ordinary meaning of the term as used in the relevant convention, as to whether a convention applies to transboundary CCS project activities.[28]

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

36. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (hereinafter referred to as the Basel Convention) establishes a global regime for the control of the international trade in hazardous and other waste.[29] With 179 parties, the number of parties to the Basel Convention is similar to the number of Parties to the Kyoto Protocol. The Basel Convention provides general obligations requiring its parties to ensure the transboundary movement of waste is reduced to a minimum, consistent with the principles of environmentally sound waste management. The substantive obligations under the Basel Convention apply to 'hazardous wastes' (categories of and criteria for this term are set out in the Basel Convention).

37. There is a debate as to whether CO_2 falls within the definition of a hazardous waste for the purposes of transboundary movement, with some noting that CO_2 in some forms may have characteristics that could bring it within the definition of a hazardous waste.[30]

[28] Raine A. 2008. Transboundary Transportation of CO_2 Associated with Carbon Capture and Storage Projects: An Analysis of Issues under International Law. *Carbon and Climate Law Review* 4: 353–365.

[29] The Basel Convention was adopted on 22 March 1989. It entered into force in 1992 and currently has 179 parties. A list of the contracting parties is available at <http://www.basel.int/Countries/StatusofRatifications/PartiesSignatories/tabid/1290/Default.aspx>.

[30] For example, if CO_2 has hazardous characteristics, such as being of an explosive nature not subject to other legislation (Basel Convention, annex I, category Y 16, and annex III). See Raine A. 2008. Transboundary Transportation of CO_2 Associated with Carbon Capture and Storage Projects: An

The possible consequences for any transboundary CCS project activities under the CDM of CO_2 being considered a hazardous waste are considered in paragraph 85 below.

38. In 1995 the parties to the Basel Convention agreed to ban parties that are members of the Organisation for Economic Co-operation and Development (OECD) or the EU and Liechtenstein (34 countries, among which many are Annex I Parties to the Kyoto Protocol) from exporting hazardous waste to non-OECD countries for final disposal. This is known as the Ban Amendment. The Ban Amendment has been ratified by 73 parties to the Basel Convention, but has not entered into force as yet. Should CO_2 be characterized as a hazardous waste, its export from OECD to non-OECD countries for final disposal will be prohibited once the amendment enters into force. If any transboundary CCS project activities under the CDM are to be limited to CCS in non-Annex I Parties, the consequences of the Ban Amendment would be of a limited nature, as only a few OECD members are non-Annex I Parties to the Kyoto Protocol. If, however, Parties contemplate including under the CDM project activities whereby the capture of CO_2 takes place in Annex I Parties, the effect of the Ban Amendment could be significant.

The Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa

39. The Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (hereinafter referred to as the Bamako Convention) is an agreement between the countries of the African Union[31] (non-Annex I Parties to the Kyoto Protocol), which establishes a regime for the control of the trade in hazardous and other waste within Africa.[32] It expressly prohibits the import into the territory of contracting parties of hazardous waste from non-contracting parties.[33] CO_2 is not specifically listed as a hazardous waste in the annexes to the Bamako Convention but could be covered by it, in accordance with the provisions of Article 2 of the Bamako Convention, depending on its form and characteristics.[34]

40. Should CO_2 be considered as falling within the Bamako Convention's definition of a hazardous waste, it could only be imported from contracting parties to the Bamako Convention (i.e. member States of the African Union). This means, in effect, that the obligations of the Bamako Convention would prevent CCS project activities whereby the CO_2 to be stored comes from a non-contracting party to the Bamako Convention. Where the CO_2 is imported from a contracting party to the Bamako Convention, CCS project activities would not be prevented but rather subject to certain conditions being met regarding notification, State consent, sharing of information, compliance with guidelines and the lodgement of guarantees or bonds.[35]

2. Marine protection and pollution

The United Nations Convention on the Law of the Sea

41. The United Nations Convention on the Law of the Sea (UNCLOS)[36] establishes an overarching framework for the governance, management and protection of the world's

Analysis of Issues under International Law. *Carbon and Climate Law Review* 4: 353–365.

[31] See <http://www.africa-union.org/root/au/Documents/Treaties/List/Bamako%20Convention.pdf>.

[32] The Bamako Convention has been signed by 30 parties, ratified by 23 parties and effective since April 1998.

[33] Bamako Convention, Article 4, paragraph 1.

[34] See Raine A. 2008. Transboundary Transportation of CO_2 Associated with Carbon Capture and Storage Projects: An Analysis of Issues under International Law. *Carbon and Climate Law Review* 4: 353–365.

[35] Bamako Convention, Article 4.

[36] UNCLOS was opened for signature on 10 December 1982. It has 162 parties and entered into force in 1994.

oceans and the marine environment, including the seabed and subsoil. UNCLOS separates the sea into a number of jurisdictional zones and grants coastal States various rights with respect to those zones.[37]

42. A coastal State has exclusive sovereign rights over its territorial sea and its continental shelf and exclusive economic zone (EEZ) for the purposes of exploration and the exploitation of its natural resources (which include the non-living resources of the seabed and subsoil, such as geological formations). The express consent of the coastal State would be required for another State or its citizens to undertake CCS project activities such as CO_2 injection and storage in the jurisdictional zone of that coastal State (which would include entities such as project participants).[38]

43. All States are entitled to lay submarine cables and pipelines on the continental shelf. This is subject to the coastal State's right to take reasonable measures for the exploration of the continental shelf, the exploitation of its natural resources and the prevention, reduction and control of pollution from pipelines. The coastal State must also consent to the course for the laying of such cables but may not impede them.[39] In relation to transboundary CCS, this gives States a relatively wide discretion to lay pipelines to transport CO_2 over the continental shelf of a coastal State.

44. The seabed, ocean floor and subsoil beyond the limits of national jurisdiction form a different geographical zone under UNCLOS, defined as the "Area". As the global commons, the Area and its resources are regarded as "the common heritage of mankind" and no State may claim or exercise sovereignty or sovereign rights over any part of the Area or its resources.[40]

45. Whilst it is arguable that exploration and research may take place in the Area on a temporary basis, States cannot assert sovereignty over the Area through the permanent occupation of its territory (including geological storage spaces). This framework may limit the ability to explore for sub-seabed geological storage sites and, more importantly, prevents the injection of CO_2 into the Area and its permanent storage therein by a State or States, thereby generally precluding CCS project activities involving storage in international waters.

46. Articles 205 and 206 of UNCLOS set out the basic obligations of parties to UNCLOS to monitor activities and undertake environmental impact assessment of activities. Although the provisions are somewhat general, it is arguable that there is an obligation on the Parties to the Kyoto Protocol that are also parties to UNCLOS to consider the environmental impacts of CCS project activities on the marine environment, generally and of other States, where a Party has reasonable grounds to believe a planned activity may cause substantial pollution or significant and harmful changes to the marine environment.[41]

1973 International Convention for the Prevention of Pollution from Ships, as modified by the Protocol of 1978

47. The 1973 International Convention for the Prevention of Pollution from Ships and its Protocol of 1978 (MARPOL), developed under the auspices of IMO, is the primary agreement for regulating the prevention of pollution by ships.[42] It has 152 parties.

[37] UNCLOS, Article 5.
[38] UNCLOS, Article 81.
[39] UNCLOS, Article 79.
[40] UNCLOS, Article 1, paragraph 1, and Part X.
[41] UNCLOS, Article 206; Hendricks C, Mace MJ and Coenraads R. 2005. *Impacts of EU and International Law on the Implementation of Carbon Capture and Geological Storage in the European Union*. Foundation for International Environmental Law and Development (FIELD) and Ecofys BV. p.86.
[42] The combined instrument entered into force on 2 October 1983 and it has over 136 signatories.

48. MARPOL seeks to prevent intentional pollution and otherwise regulate the accidental discharge of oil and other harmful substances resulting from routine shipping operations. Its definition of a harmful substance could potentially apply to CO_2 that leaks or escapes whilst being shipped between jurisdictions. Its definition of a ship could potentially apply to the structure from which the injection of CO_2 into offshore sub-seabed geological formations is undertaken.

49. Annex III to MARPOL sets out regulations for the prevention of pollution by harmful substances carried by sea in packaged form. The regulations provide standards for packaging, documentation, stowage, quantitative limitation, and notifications of substances listed in the International Maritime Dangerous Goods Code. In the context of CCS, the transboundary shipment of CO_2 in gas cylinders or in liquefied form may be subject to the requirements set out in annex III to MARPOL.[43]

3. Regional conventions

Environmental impact assessment

50. The Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)[44] is a regional treaty with 45 parties, including the EU member States and the countries with economies in transition.[45] It requires its parties to assess the environmental impacts of their transboundary activities during the early stages of planning.[46] Under Article 2, paragraph 1, of the Espoo Convention, parties must take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impacts.

51. While CO_2-related activities are not on the explicit list of activities requiring environmental impact assessment contained in appendix I to the Espoo Convention, appendix III contains general criteria to assist in the determination of whether an activity not listed in appendix I could potentially have a significant transboundary environmental impact and would require an impact assessment. The criteria relate to the size of the project, its location (i.e. close to environmentally sensitive areas) and the potential effects of the proposed activity.

52. Transboundary CCS project activities conducted within the territory of, or by, parties to the Espoo Convention may trigger its requirements for environmental impact assessment, and any party to the Espoo Convention involved in such a CCS project activity would be under an obligation to determine whether the criteria set out in appendix III to the Espoo Convention apply to that CCS project activity and, if so, to initiate transboundary environmental impact assessment and consultations with the potential affected States.

Public participation in decision-making

53. The Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) requires public authorities to make environmental information accessible.[47] Like the Espoo Convention, the

[43] Hendricks C, Mace MJ and Coenraads R. 2005. *Impacts of EU and International Law on the Implementation of Carbon Capture and Geological Storage in the European Union.* FIELD and Ecofys BV. p.86.

[44] The Espoo Convention was opened for signature on 25 February 1991 and entered into force on 10 September 1997.

[45] A list of the signatories to the Espoo Convention is available at <http://www.unece.org/env/eia/eia.html>.

[46] Hendricks C, Mace MJ and Coenraads R. 2005. *Impacts of EU and International Law on the Implementation of Carbon Capture and Geological Storage in the European Union*. FIELD and Ecofys BV. p.125.

[47] The Aarhus Convention was opened for signature on 25 June 1998 and entered into force on 30 October 2001. It has 46 parties, primarily from across Europe. A list of the contracting parties is

territorial scope of the Aarhus Convention extends to the area of Europe, the Caucasus and Central Asia. Under Article 6 of the Aarhus Convention, public participation requirements are triggered if the activity in question may have a significant effect on the environment. Such requirements include the provision of public information regarding proposed activities which could have a significant environmental impact and the requirement to consult with the members of the public concerned. The requirements may extend to transboundary environmental impact assessment procedures.

54. In addition, parties to the Aarhus Convention are required to provide an opportunity for public participation during the preparation of plans, programmes and policies relating to the environment.[48]

55. Obligations under the Aarhus Convention could trigger the requirements referred to in paragraphs 53 and 54 above for CCS or transboundary CCS project activities implemented by parties to it. The public participation requirements under the Aarhus Convention are akin to, but more stringent and detailed than, those provided for in the current CDM modalities and procedures.[49] However, it is worth noting that most of the parties to the Aarhus Convention are Annex I Parties to the Kyoto Protocol and its potential relevance could be subject to the approach which the CMP takes with regard to the potential role of Annex I Parties in transboundary CCS project activities under the CDM (see para. 12 above).

Regional sea conventions

56. There are a number of regional sea conventions that implement various aspects of UNCLOS, MARPOL and the London Convention.[50]

57. By way of an example, the Amended Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean (hereinafter referred to as the Amended Nairobi Convention),[51] which applies to the Indian Ocean and East Africa,[52] has the objective of preventing and reducing pollution and ensuring the sound environmental management of natural resources.[53] Article 9 of the Amended Nairobi Convention specifically addresses the transboundary movement of hazardous waste and obliges its parties, to the fullest extent possible, to eliminate pollution within the area of the Amended Nairobi Convention from the transboundary movement and disposal of hazardous waste.

58. Depending on the characterization of CO_2 and the likelihood of significant environmental impacts resulting from CCS project activities, the Amended Nairobi Convention, and similar regional sea conventions, may be applicable to transboundary CCS project activities where a party to the Amended Nairobi Convention is involved.[54]

Regional conservation conventions

available at <http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-13&chapter=27&lang=en>.

[48] Aarhus Convention, Article 7.

[49] Decision 3/CMP.1, annex, paragraphs 37(b) and 40(c).

[50] These include the OSPAR Convention (North Atlantic); the 1992 Helsinki Convention (Baltic); the 1976 Barcelona Convention (Mediterranean); the 1978 Kuwait Convention (Arabian Gulf); the 1981 Lima Convention (South-East Pacific); the 1982 Jeddah Convention (Red Sea and Gulf of Aden); the 1983 Cartagena Convention (Caribbean); and the 1986 Noumea Convention (South Pacific).

[51] The Amended Nairobi Convention was adopted on 31 March 2010.

[52] The contracting parties to the Amended Nairobi Convention are Comoros, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa and United Republic of Tanzania.

[53] Amended Nairobi Convention, Article 4, paragraph 1.

[54] E.g. Amended Nairobi Convention, Article 14.

59. There are also a number of regional conservation agreements which include provisions requiring the environmental impact assessment of projects that may have a transboundary effect. These include the Agreement of the Association of Southeast Asian Nations on the Conservation of Nature and Natural Resources (its six parties are among the non-Annex I Parties to the Kyoto Protocol) and the African Convention on the Conservation of Nature and Natural Resources (the Maputo Convention), whose 46 parties are also non-Annex I Parties to the Kyoto Protocol.

60. The Maputo Convention, for example, recognizes that States have the sovereign right to exploit their own natural resources pursuant to their environmental and developmental policies, but also have a responsibility to ensure that activities within their jurisdiction do not cause damage to the environment of other States or areas beyond their national jurisdiction.[55] It includes requirements for environmental impact assessment, public participation[56] and regular environmental monitoring and audits[57] for policies, plans, programmes and activities that are likely to affect natural resources, ecosystems and the environment.

61. Where any national measure is likely to affect the environment or natural resources of any other State or area beyond national jurisdiction, parties to the Maputo Convention are under an obligation to cooperate and share information. Cooperation is also required with respect to the conservation, development and management of transboundary resources and ecosystems.[58]

62. In the context of CCS project activities undertaken in States that are parties to the Maputo Convention or similar regional agreements, there is likely to be an existing obligation, independent of the CCS modalities and procedures, to undertake environmental impact assessment and to consult with neighbouring States regarding potential transboundary impacts. The interrelationships between such rules and the requirements of the CCS modalities and procedures may need to be considered in relation to specific CCS project activities.

C. International regimes for the management of shared natural resources

63. The types of legal issue that may arise in the context of transboundary CCS project activities may bear some similarities to issues that arise with respect to the utilization of shared or transboundary natural resources, in particular water resources[59] and oil and gas reserves. With the exception of framework agreements, such as the Convention on the Law of the Non-navigational Uses of International Watercourses, agreements on the management of shared natural resources are usually entered into between the resource-sharing States. In the context of their discussions on transboundary CCS project activities, Parties may therefore wish to consider the cooperative and regulatory approaches adopted in relation to the management of water resources and oil and gas reserves.

1. Transboundary watercourses and aquifers

64. The International Law Commission (ILC) has undertaken a work programme on the topic of shared natural resources and in 2008 published the *Draft articles on the Law of*

[55] Maputo Convention, preamble.
[56] Maputo Convention, Article XVI.
[57] Maputo Convention, Article XIV, paragraph 2.
[58] Maputo Convention, Article XXII.
[59] For a comprehensive list, see Burchi S and Mechlem K. 1995. *Groundwater in international law. Compilation of treaties and other legal instruments*. Food and Agriculture Organization of the United Nations and United Nations Educational, Scientific and Cultural Organization.

Transboundary Aquifers (ILC draft articles), which build upon existing aquifer agreements and operate as a guide for developing new multilateral agreements.

65. The ILC draft articles recognize that each "aquifer State" has sovereignty over its portion of the transboundary aquifer or aquifer system located within its territory.[60] Aquifer States are required to utilize transboundary aquifers according to the principle of equitable and reasonable utilization.[61]Aquifer States are under an obligation to take all appropriate measures to prevent, eliminate or mitigate the causing of significant harm to other aquifer States.[62] They are also under obligations to cooperate and to regularly exchange data and information.[63] Joint monitoring and management approaches are encouraged,[64] as are coordinated approaches to environmental impact assessment.[65]

66. The ILC draft articles and specific aquifer agreements could be relevant to transboundary CCS project activities in two primary respects. Firstly, in some CDM project activities CO_2 will be injected into aquifers (ordinarily saline aquifers). To the extent that the definition of the aquifer or aquifer system includes the strata into which the CO_2 is injected, the provisions of the relevant aquifer agreement regarding environmental impact assessment and pollution control may apply, in addition to any CDM rules.[66] Secondly, the principles and obligations that have been developed with respect to the shared utilization of aquifers by certain States could serve as the basis for multilateral or bilateral agreements for the management and utilization of shared geological storage reservoirs under the CDM.

2. Bilateral agreements related to oil and gas reservoirs and pipelines

67. There have been a number of bilateral treaties entered into between States that share transboundary oil and gas reservoirs. These include the Timor Sea Treaty between the Government of East Timor and the Government of Australia (Timor Sea Treaty);[67] agreements between the United Kingdom and Norway to manage resources in the North Sea;[68] joint development agreements between Malaysia, Thailand and Viet Nam;[69] and the 2012 framework agreement between the United States of America and Mexico for the

[60] ILC draft articles, Article 3.
[61] ILC draft articles, Articles 4 and 5.
[62] ILC draft articles, Article 6.
[63] ILC draft articles, Articles 7 and 8.
[64] ILC draft articles, Article 14.
[65] ILC draft articles, Article 15.
[66] Report of the International Law Commission on the work of its fifty-third session. United Nations International Law Commission. United Nations document A/56/10, chapter IV, pp.37 and 41.
[67] The Timor Sea Treaty entered into force in 2003.
[68] See: the agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Norway relating to the delimitation of the continental shelf between the two countries (10 March 1965); the framework agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Norway (4 April 2005); the framework agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Norway relating to the laying, operation and jurisdiction of the inter-connecting submarine pipelines (25 August 1998), together with the 2006 supplement updating the memorandum of understanding; and the memorandum of understanding between the United Kingdom Health and Safety Executive and the Petroleum Safety Authority Norway concerning health and safety supervision related to pipelines and installations governed by agreements between the United Kingdom and Norway (September 2005).
[69] Malaysia has entered into two joint development agreements with Thailand and Viet Nam, respectively, regarding the Gulf of Thailand. Ratification of the memorandum of understanding was exchanged on 30 May 1990 between Malaysia and Thailand. On 5 June 1992, Malaysia and Viet Nam applied similar principles and established a joint exploitation regime for a defined area in the Gulf of Thailand.

cooperative exploration and exploitation of hydrocarbon resources that cross the delimitation line in the Gulf of Mexico.[70]

68. Each of the above-mentioned bilateral or multilateral agreements has been developed having regard to the particular characteristics of the reservoir in question and the political and economic considerations of the reservoir States. Some agreements are solely between States, whereas others also involve national oil and gas companies. The form and content of the agreements vary, ranging from short agreements that relate to discrete activities (e.g. joint surveying in a particular location)[71] to more comprehensive agreements that address boundary-setting and joint resource development.[72]

69. What can be observed from the agreements and from the States' practice is that there are a number of options for the management of transboundary oil and gas resources. One of the most common approaches is what is known as the unitization model, whereby a single operator is appointed to manage the common deposit on behalf of all of the parties. The unitization approach is said to have the benefit of making the exploitation process more efficient, by avoiding duplication of effort and uncoordinated competitive or wasteful drilling practices.[73] At the other end of the spectrum is the approach that would prevail in the absence of any cooperative agreement between States, whereby each State would exercise its sovereignty over the subsoil and undertake its own exploration and resource-recovery programme.[74] In between those two approaches there are a number of different cooperative solutions which involve different methods of sharing jurisdiction over the common resources, either through proportionate allocations of rights or through the adoption of a joint approach to management.

70. Where a cooperation agreement is entered into, it seems that there are some common principles that consistently appear, including providing for: the exchange of information; effective exploitation; equitable sharing of the resources; and the protection of the environment. In addition, of the agreements reviewed, the more comprehensive agreements will also provide for: joint management structures; the appointment of contractors and operators; financial provision; and dispute resolution. Where there are competing territorial claims to the continental shelf between the parties to the agreement, it is not uncommon to see a 'without prejudice' clause, enabling the short-term exploitation of a shared resource but protecting the long-term rights of parties to negotiate a permanent maritime boundary in the future.[75] With respect to transboundary CCS project activities under the CDM, this will have an impact on the long-term liability for net reversal of storage.

71. Similar to the aquifer agreements referred to in paragraphs 65 and 66 above, oil and gas agreements may be directly relevant to transboundary CCS project activities where depleted oil and gas reservoirs are to be used for CO_2 sequestration. They also provide useful guidance to States on approaches to cooperation and the joint management of exploration, activity approvals, monitoring and well closure.

[70] Report of the International Law Commission on the work of its fifty-third session. United Nations International Law Commission. United Nations document A/56/10, paragraph 382.

[71] Agreement for Joint Marine Seismic Undertaking between China National Offshore Oil Corporation, Philippine National Oil Company and Vietnam Oil and Gas Corporation (14 March 2005), referred to in Lyons Y. 2012. Transboundary Pollution from Offshore Oil and Gas Activities in the Seas of Southeast Asia. *In*: R Warner and S Marsden (eds.). *Transboundary Environmental Governance: Inland, Coastal and Marine Perspectives*. Farnham: Ashgate Publishing.

[72] E.g. the Timor Sea Treaty.

[73] Rodin D. 2011. *Offshore transboundary petroleum deposits: cooperation as a customary obligation*. Small Master's Thesis, University of Tromsø. pp.23–25.

[74] Rodin D. 2011. *Offshore transboundary petroleum deposits: cooperation as a customary obligation*. Small Master's Thesis, University of Tromsø. p.21.

[75] E.g. the Timor Sea Treaty, Article 2.

72. The direct impact of such conventions and agreements on any transboundary CCS project activities would depend on whether the States participating in the CCS project activity, in particular in the context of CO_2 storage in shared geological formations, are parties to such conventions and agreements.

73. In practical terms, in the context of any proposed transboundary CCS project activity under the CDM, such agreements are likely to either limit how the activity may be implemented (e.g. no CCS beyond the EEZ) or add additional layers to the CCS process under the CDM, such as additional requirements for environmental impact assessment or stakeholder consultation.

General considerations arising from international legal frameworks

74. There is currently little regulation of transboundary CCS project activities under international law, as well as limited practice in this regard.

75. On the other hand, numerous multilateral and bilateral treaties and agreements addressing environmental protection, governance, resource-sharing and management, and territorial issues create a very complex framework within which any transboundary CCS project activities would operate. Parties may wish to consider whether and how any modalities for transboundary CCS project activities would accommodate the potential applicability of such agreements to CCS project activities and any limitations that such pre-existing treaties and agreements might create.

76. Some examples of and models for regulating specific aspects of transboundary activities can be derived from existing international legal regimes. For example, in relation to paragraphs 10–12 of the annex to decision 10/CMP.7, Parties may wish to consider whether and how the environmental impact assessment of each element of the transboundary CCS project cycle would need to be undertaken in the context of the relevant national legal systems and any international obligations arising from the relevant bilateral or multilateral treaties. The approaches adopted under the Espoo Convention, the Aarhus Convention and other regional conventions that address transboundary impacts may be instructive in this regard. Furthermore, Parties may wish to consider the need to extend the obligations to comply with host Party laws set out in appendix B to decision 10/CMP.7 to any relevant bilateral or multilateral treaties and laws as well as to the legislation and consent of third parties through which CO_2 is transported. Requirements in relation to arrangements for attributing or agreeing on liability in relation to transit across multiple jurisdictions might also be considered (e.g. in the context of obtaining letters of approval from all of the Parties involved in the CCS project cycle – the Party responsible for CO_2 capture, all of the Parties involved in the transboundary transport of CO_2, the Party responsible for CO_2 injection and the Party responsible for CO_2 storage).

III. Possible scenarios involving transboundary carbon dioxide capture and storage, including international transportation and storage within the territory of two or more Parties

77. As a general rule, the 2006 IPCC Guidelines require the country in which an activity that forms part of the CCS project cycle is taking place to accept responsibility for monitoring and reporting the emissions from that activity and liability for leakage of CO_2. However, where activities are clearly anticipated to have a transboundary impact, where an activity is undertaken jointly or where a number of States may have overlapping jurisdiction over an installation (e.g. capture plant, pipeline or injection rig) or storage site, attributing jurisdiction and liability between the States concerned may become an issue.[76]

78. Attribution of jurisdiction to one particular State might arise by virtue of the State having jurisdiction over the territory in which the CCS activity is taking place, or as a result of the person or entity carrying out the activity being a national of or registered in a particular State.[77]

79. The 2006 IPCC Guidelines contemplate a range of options for addressing reporting on cross-border CCS operations, which have been considered in the following analysis of possible scenarios.[78]

80. As outlined in paragraph 12 above, the scenarios considered below are based on the premise that the participating host Parties are non-Annex I Parties.

81. In addition, in the light of paragraphs 30 and 31 of the annex to decision 3/CMP.1, the scenarios outlined below are also based on the premise that all of the participating countries are Parties to the Kyoto Protocol.

A. Scenario 1: Capture in Party A and storage in Party B

1. Treatment of each stage of the project cycle

82. The first scenario reflects the first example provided in the 2006 IPCC Guidelines.[79] In this scenario, Party A would be responsible for the regulation of the CO_2 capture and at least part of the transportation activities associated with the CCS project activity. Party B may also be responsible for regulating transportation in its jurisdiction and would be responsible for regulating the injection and storage of the CO_2 and accept both responsibility for any net reversal of storage and long-term liability[80] for the stored CO_2 in its jurisdiction.

83. Some of the legal issues which may arise in connection with this scenario relate to the international transportation of CO_2. Transportation may involve either onshore or offshore components or both, may be by pipeline, ship, road or rail and may involve the CO_2 in a liquefied or gaseous state.

[76] 2006 IPCC Guidelines, volume 2, chapter 5, section 5.10, pages 5.20 and 5.21.

[77] Bugge HC. 2011. Transboundary Chains for Carbon Capture and Storage: Allocation under the Climate Change Regime between States Parties of Emissions due to Leakage. *In*: I Havercroft, R Macrory and RB Stewart (eds.). *Carbon Capture and Storage: Emerging Legal and Regulatory Issues*. Oxford: Hart Publishing.

[78] 2006 IPCC Guidelines, volume 2, chapter 5, section 5.10, pages 5.20 and 5.21.

[79] 2006 IPCC Guidelines, volume 2, chapter 5, section 5.10, page 5.20.

[80] In the context of the scenarios outlined in chapter III, the term "liability" refers to the definition set out in paragraph 1(j) of the annex to decision 10/CMP.7.

84. The mode and form in which the CO_2 is transported and how CO_2 is characterized would determine whether the transboundary legal issues identified in paragraphs 85–92 below would be triggered. For example, different legal regimes apply to the transport of waste and hazardous waste distinct from other commodities.

2. Legal considerations related to the scenario

Characterization of CO_2

85. If CO_2 is characterized as a hazardous waste under either the Basel Convention or the Bamako Convention (see paras. 36–40 above), then its export from Party A to Party B may be prohibited.[81]

86. Where the export of CO_2 is not prohibited and Party A and Party B are both parties to the same waste-related Convention (e.g. the Basel Convention), it remains open for Party B to refuse to consent to the import of the CO_2.[82] If consent is given, the export may still need to be carried out in accordance with appropriate technical guidelines or codes of practice[83] and may be subject to a number of conditions, related to, for example, labelling, notice and tracking. Furthermore, insurance, bonds or other guarantees may need to be in place.[84] Consequently, a layer of international rules in addition to the CDM rules may apply if CO_2 is characterized as a hazardous waste.

Transportation

87. Where the export is undertaken by ship and is intended for offshore storage, the provisions of the London Protocol would be relevant, provided that Party A or Party B is a party to the London Protocol. Although, subject to compliance with procedures and guidelines, CO_2 storage in sub-seabed geological formations is allowed under the amendment to the London Protocol, that amendment has not yet entered into force (see paras. 23–25 above). Until the amendment enters into force or steps are taken to clarify its applicability, it would not be possible for such a combination of Parties to carry out a sub-seabed CCS project activity.

88. Transboundary pipelines trigger a variety of other legal issues. In an onshore context, establishing jurisdiction might be relatively straightforward by referring to geographical boundaries. Bilateral or multilateral agreements or memorandums of understanding may be in place between States to coordinate the orderly construction and operation of pipelines and to apportion responsibility for safety and environmental matters and liability for leakage. However, national laws rather than international ones govern permitting requirements and jurisdiction over leakage.

89. In the offshore context, the consent of the coastal State may be required in relation to the pipeline's route (see para. 43 above).

90. In addition, there is the possibility that the approach taken in accordance with the national legislation of one State with respect to legal responsibility may conflict with the approach taken by other pipeline States. An example found in the literature points to some possible overlaps in relation to jurisdiction over and responsibility for pipelines between States (e.g. one State claims jurisdiction over a pipeline that traverses its territorial waters and continental shelf until it reaches the territorial waters of the second State, while the second State takes the view that the pipeline is under its jurisdiction when it enters its

[81] Basel Convention, Article 4, paragraph 5.
[82] Basel Convention, Article 6, paragraph 4.
[83] Basel Convention, Article 4, paragraph 2.
[84] Basel Convention, Article 6, paragraph 11.

continental shelf, resulting in overlapping jurisdiction where the pipeline is traversing the continental shelf of the second State).[85]

91. Furthermore, the Parties involved would need to agree on the ownership of the CO_2 whilst it is in the pipeline and on any related apportionment of liability in cases of the transportation of CO_2 via the pipeline, particularly where the pipeline is used to transport CO_2 from a number of sources. Commercial contracts for the toiling of oil could provide some guidance in this regard.

Transboundary storage

92. No specific issues have been identified with regard to transboundary storage under scenario 1.

3. Obligations

Assignment of liability

93. In scenario 1, the apportionment of liability for the capture (Party A) and storage (Party B) components of the CCS project cycle could be relatively straightforward, with liability being apportioned to the Parties responsible for said components.

94. Liability for leakage of emissions occurring during transport is less clear, particularly in the case of offshore transportation. Regulatory responsibility and liability could lie with the jurisdiction (Party) in which the leakage from the pipeline or ship occurs or with the flag State of the ship or pipeline, depending on which maritime zone the leakage occurs in.[86]

95. Similarly, if the injection is undertaken offshore, the jurisdiction over the installation being used for the injection will need to be determined. For example, Parties may wish to consider whether, for installations in the EEZ or on the continental shelf, the Party which is the coastal State would retain jurisdiction. Similarly, if the storage is being undertaken offshore, jurisdiction over the storage area will need to be determined.

Sharing the obligation to address a net reversal of storage

96. The 2006 IPCC Guidelines provide that the country in which the CO_2 is stored remains responsible for any leakage from the geological storage site. This principle is applied under the CDM in accordance with the annex to decision 10/CMP.7, whereby the Party in which the geological storage site is located would automatically assume liability for leakage resulting from any CCS project activity under the CDM. Parties may wish to consider how the existing provisions related to net reversal of storage as set out in decision 10/CMP.7 would apply in the context of scenario 1.

Environmental and socioeconomic impacts and remedial measures to address them

97. In the offshore context, the provisions of UNCLOS guide who is responsible for the assessment and monitoring of the environmental impacts of activities that may cause substantial pollution, in particular if CO_2 leaks and causes environmental harm. Where transport is through a country's EEZ or is in the high seas, the flag State of the vessel in which the CO_2 is being transported remains responsible for the conduct of the vessel,

[85] Bugge HC. 2011. Transboundary Chains for Carbon Capture and Storage: Allocation under the Climate Change Regime between States Parties of Emissions due to Leakage. *In*: I Havercroft, R Macrory and RB Stewart (eds.). *Carbon Capture and Storage. Emerging Legal and Regulatory Issues.* Oxford: Hart Publishing.

[86] It is worth noting that, where emissions arise as a result of leakage during shipping in international waters, such emissions would not currently be included in the national inventory reports of the flag State of the vessel and there is a risk that they may not be captured.

including if pollution occurs. For Parties participating in other treaties (e.g. MARPOL), the provisions of those treaties might also create obligations in relation to impact assessment.

98. To the extent that transboundary impacts are known or anticipated, there may be additional requirements on Party A or Party B to consult with other affected States as a result of obligations arising from regional treaties (see paras. 50–62 above).

Monitoring requirements

99. The 2006 IPCC Guidelines provide that the Party in which the CO_2 is stored remains responsible for monitoring and accounting for the CO_2. If CO_2 unexpectedly migrates from a storage site and leakage occurs in neighbouring States, it remains the responsibility of Party A to report on those emissions. However, cooperation would be required in order to access data regarding the extent of the leakage and the rules might need to ensure the availability of such information.

100. Decision 10/CMP.7 sets out a number of CCS-specific monitoring requirements for project participants, which are principally related to the monitoring of the storage site. Monitoring must not be terminated earlier than 20 years after the end of the last crediting period of the CCS project activity or after the issuance of CERs has ceased, whichever occurs first. Furthermore, monitoring can only be terminated once all of the evidence indicates that the CO_2 will be stored permanently and no seepage has been recorded in the past 10 years.[87]

101. Parties may wish to consider whether additional monitoring requirements may be appropriate in relation to the operation of transboundary pipelines.

B. Scenario 2: Capture in Party A and storage in Party A and Party B

1. Treatment of each stage of the project cycle

102. This scenario contemplates storage in a shared geological formation, which may involve a saline aquifer, a depleted oil or gas reservoir or interconnected pore space that lies beneath two countries.

103. Similar to in scenario 1, Party A is likely to be responsible for all of the activities associated with the CCS project activity and for CO_2 injection and storage. Party B may have responsibility for storage and long-term liability for the stored CO_2 in its jurisdiction. However, if Party B is not itself capturing and injecting CO_2, then its primary role is likely to be cooperating with Party A to monitor the performance of the storage site. In this regard, when contemplating modalities for transboundary CCS where storage takes place in more than one host Party, Parties may wish to consider whether letters of approval would have to be received from all of the relevant host Parties.

104. The main issues that arise in relation to scenario 2 relate to shared storage sites.

2. Legal considerations related to the scenario

Characterization of CO_2

105. The considerations set out in paragraphs 85 and 86 above are likely to be relevant to scenario 2.

Transportation

106. No transboundary transportation of CO_2 prior to storage would take place in this scenario.

[87] Decision 10/CMP.7, appendix B, paragraph 16.

Transboundary storage

107. Where the geological formation is in a sub-seabed formation, provided that transportation to the injection site does not involve export, the current restrictions arising from the London Protocol would not apply to CCS project activities (assuming Party A and Party B are parties to the London Protocol).

108. In the case of both offshore and onshore storage, the principle of State responsibility applies (i.e. a Party has absolute sovereignty over its territory and the natural resources contained therein). To that end, any resources extending across a national boundary could be divided into physical areas, each falling under the jurisdiction of the super-adjacent State. This approach is potentially problematic in the case of interconnected geographical areas, where substances in liquid or gaseous forms may migrate freely within and between the common areas, as is the case for CO_2.

109. There is the potential for the actions of Party A to affect the resources of Party B in the CO_2 injection and storage process, with the CO_2 migrating into Party B and displacing or utilizing Party B's sovereign storage capacity. Further complications may arise as a result of the environmental impacts of any CO_2 leaks within the jurisdiction of Party B, or as a result of economic impacts associated with liability. In circumstances in which transboundary impacts are anticipated, Party A may be under an obligation, for example by virtue of its obligations arising from regional treaties (see paras. 50–62 above), to notify Party B of the project during the environmental impact assessment process and seek to respond to any concerns that Party B may have. However, such obligations might differ from project to project depending on which regional agreements apply to the Parties involved.

110. As a result of this challenge, cooperative approaches to management could be of particular importance, such as bilateral agreements to manage access to the shared resource, for example through an aquifer agreement or an agreement for the joint management of an oil or gas reservoir. Existing agreements for the management of shared natural resources (e.g. on the use of the aquifer or reservoir) might apply even if they do not expressly contemplate CCS. Furthermore, States that are seeking to jointly manage a reservoir for CCS may need to enter into a specific agreement that sets out the basis for cooperation and sharing responsibility and liability. Parties may wish to consider whether and how the requirement for such arrangements would need to be reflected in any modalities for transboundary CCS under the CDM.

3. Obligations

Assignment of liability

111. In scenario 2, liability for the CO_2 capture, transport and injection stages of the CCS project cycle would rest with Party A. The approach detailed in the 2006 IPCC Guidelines recognizes that Party B may not be directly involved in the CCS project activity, which limits its liability. Taking this into account, Parties may wish to consider whether, if injection of CO_2 only takes place in Party A, it would be reasonable for Party A to remain responsible for the regulation of the storage of the CO_2 and liable for any leakage, notwithstanding that leakage may occur in Party B. Alternatively, Parties may wish to consider excluding, for the purposes of the CDM, any CCS project activities in which at least one of the Parties sharing the relevant geological formation is not participating in the project or in which one of the States participating in the project is not an eligible Party in the sense of Article 12 of the Kyoto Protocol. In this regard, it is worth noting that, according to the CCS modalities and procedures, the project boundary of a CCS project activity includes all above-ground components and encompasses the vertical and lateral

limits of the CO_2 geological storage site that are expected when the CO_2 plume stabilizes over the long term during the closure phase and the post-closure phase.[88]

112. Paragraph 5 of appendix B to decision 10/CMP.7 sets out the data and information to be used when performing the characterization of a geological storage site. Where multijurisdictional storage sites are being characterized, Parties may wish to consider whether additional information should be provided, in particular information and data that map the extent of the storage site in each country, information on the share of the storage capacity technically available to each country and information on the right that each country has to the available storage capacity.

Sharing the obligation to address a net reversal of storage

113. Parties may wish to consider whether, in the scenario in which injection of CO_2 takes place only in Party A, only Party A would be required to take steps to address a net reversal of storage, regardless of whether that net reversal is as a result of leakage in Party A or Party B. On the other hand, under the emission accounting and reporting rules, emissions arising in Party B may need to be reported by Party B.[89] This would potentially create difficulties.

114. Where it is clearly known that storage will be taking place in both Parties and the risk of leakage from Party B has been contemplated through modelling, then systems would need to be in place to monitor and account for emissions. Moreover, Parties may wish to take into account that, owing to lack of jurisdiction, Party A is likely not to have control over or, possibly, access to the part of the geological formation located in Party B for monitoring and mitigation purposes.

Environmental and socioeconomic impacts and remedial measures to address them

115. The requirements for environmental and socioeconomic impact assessments set out in appendix B to decision 10/CMP.7 are equally applicable to transboundary CCS project activities. In addition, if multiple host Parties sharing a geological storage site were being considered in the context of transboundary CCS, such requirements might need to be extended to the transboundary aspects of the CCS project activity. If a project involves two or more host Parties, their environmental impact assessment processes could be coordinated to fully assess the impacts of the project rather than just the impacts in each country. In developing any modalities for transboundary CCS project activities under the CDM, Parties may wish to consider whether and how any specific requirements related to potential transboundary environmental and socioeconomic impacts would need to be reflected. Parties may also wish to consider whether and how the relevant requirements of any existing bilateral agreements related to the shared storage space (e.g. aquifer agreements) or regional treaties would have to be addressed in the course of the validation of the CCS project activity.

Monitoring requirements

116. The 2006 IPCC Guidelines provide that Party A will remain responsible for reporting, even if emissions occur outside its territory.[90]

117. In addition to the matters outlined in paragraphs 99–101 above, decision 10/CMP.7 states that during the verification process the designated operational entity is required to determine whether seepage has occurred from the geological storage site of the CCS project activity during the verification period.[91] Any recorded seepage is deducted from the

[88] Decision 10/CMP.7, annex, paragraphs 12 and 13.
[89] 2006 IPCC Guidelines, volume 1, chapter 8, section 8.2.1, page 8.4
[90] 2006 IPCC Guidelines, volume 2, chapter 5, section 5.10, pages 5.20 and 5.21.
[91] Decision 10/CMP.7, annex, paragraph 16(d).

monitored CO_2 reductions that have occurred whilst the crediting period is ongoing.[92] Monitoring is to be undertaken by the entity or Party that is liable for the geological storage site or by a person contracted by the liable entity or Party.[93] If CCS project activities involving shared geological storage sites were to be contemplated under the CDM, Parties may wish to consider developing specific rules to coordinate monitoring functions (e.g. by requiring that one entity or Party be appointed to take responsibility for all monitoring), or consider how the responsibility for monitoring may be shared.

C. Scenario 3: Capture in more than one Party (Party A and Party B) and storage in more than one Party (Party A and Party B)

1. Treatment of each stage of the project cycle

118. In this scenario, Party A and Party B would each be responsible for regulating the capture, transportation, injection and storage of CO_2 in their respective jurisdictions. This is consistent with the general principles of State responsibility for activities within their territory. However, responsibility for storage and liability for the shared geological formation would need to be agreed upon collectively, in order to ensure, inter alia, accurate accounting.

119. Many of the considerations arising in relation to scenario 2 would be of relevance to scenario 3, in particular the basis on which Party A and Party B agree to allocate rights to access and use the storage site and to share responsibility and liability for emissions and leakage.

2. Legal considerations related to the scenario

Characterization of CO_2

120. The issues outlined in paragraph 85 above would also be applicable to scenario 3.

Transportation

121. No transboundary transportation of CO_2 prior to storage would take place in this scenario.

Transboundary storage

122. The issues outlined for scenario 2 in paragraphs 107–110 above are equally applicable to scenario 3.

3. Obligations

Assignment of liability

123. There are a number of options for allocating responsibility for the management of the shared storage site. These include: (a) leaving each State to regulate only the storage area and the emissions that occur within its territory; or (b) managing the storage site as a shared or common resource and adopting a unitization model or joint development model for site management and the assignment of liability.

124. The bilateral oil and gas agreements described in paragraphs 67–71 above may be informative in any consideration of how liability could be assigned. In the context of the CDM, Parties may wish to consider whether and how any allocation of long-term liability between the Parties involved would need to be set out in the CCS modalities and procedures, taking into account paragraphs 24 and 25 of appendix B to decision 10/CMP.7.

[92] Decision 10/CMP.7, appendix B, paragraph 15.
[93] Decision 10/CMP.7, appendix B, paragraph 17.

Issues such as sovereign authority over territory and the possible need for cooperative agreements between the Parties involved, clearly apportioning any potential liability, would be of relevance in any such consideration.

125. Decision 10/CMP.7 requires host Parties to demonstrate that they have laws in place to regulate and monitor CCS project activities and to manage long-term liability for possible leakage. Specifically, such laws must cover:

(a) The selection of geological storage sites and rights to access subsurface spaces;

(b) The availability of redress for entities affected by any environmental damage or personal injury arising from CCS project activities;

(c) Remedial measures to stop or control any accidental seepage of CO_2 from storage sites;

(d) Means for addressing liability arrangements for CO_2 storage sites;

(e) The obligation of host Parties to address a net reversal of CO_2 storage.[94]

126. Paragraph 23 of appendix B to decision 10/CMP.7 clarifies that matters related to liability are governed by the host Party's legislation. Parties may wish to consider the implications of the provisions in paragraph 23 of appendix B to decision 10/CMP.7 in the context of a transboundary CCS project activity involving two Parties whose domestic regulation of liability might be significantly different.

Sharing the obligation to address a net reversal of storage

127. Similar to the approach to apportioning liability for leakage, the obligation to address a net reversal of storage would also need to be agreed between the Parties concerned.

128. Paragraph 26(a) of decision 10/CMP.7 currently requires the host Party, if it has accepted the obligation to address a net reversal of storage, to transfer the equivalent to the outstanding amount of units to the cancellation account. If the storage site where the net reversal of storage occurred is under the jurisdiction of two or more host Parties, a procedure for apportioning between the host Parties the responsibility for any net reversal of storage might be required.

129. The different approaches to addressing such net reversals of storage include placing the final obligation to surrender emission units on the Party from within whose jurisdiction such emissions arose, or sharing the obligation between the reservoir States, having regard to an agreed metric (e.g. their unitary share of the reservoir or the volume of CO_2 injected). Such approaches could address circumstances in which one but not the other Party has accepted the obligation to address a net reversal of storage and could determine the limit of each host Party's liability. This could be a matter to be specified at the outset in each host Party's letter of approval or in any agreement between the host Parties that might be required under the modalities for transboundary CCS under the CDM.

130. In this regard, Parties may wish to consider whether specific provisions would need to be added to section K of decision 10/CMP.7 to address non-permanence associated with storage sites that span multiple jurisdictions.

131. In addition, decision 10/CMP.7 addresses the issue of the potential non-permanence of CCS project activities. It requires 5 per cent of the CERs generated by CCS project activities to be issued into a special CCS reserve account designed to provide for any net reversal of CO_2 stored.[95] Where a verification report determines that a net reversal of

[94] Decision 10/CMP.7, annex, paragraph 8.
[95] Decision 10/CMP.7, annex, paragraph 21(b).

storage has occurred, the CDM Registry Administrator is required to cancel an equivalent number of CERs held, first from the reserve account established for the project, then, if still required, from the pending account, and finally from the accounts of the project participants.[96] Parties may wish to consider how the cancellation of CERs could be apportioned where several host Parties are involved.

Sharing obligations in relation to financial provision

132. In addition, CCS project participants are required to establish financial provision to address the risks set out in paragraph 18 of appendix B to decision 10/CMP.7. The financial provision is transferable to the host Party upon fulfilment of all obligations of the project participants under the CCS modalities and procedures and host Party laws. Parties may wish to consider whether the requirements for financial provision in appendix B to decision 10/CMP.7 would need to be amended to reflect circumstances in which the entity providing financial provision is doing so in accordance with the laws and regulations of more than one host Party.

Environmental and socioeconomic impacts and remedial measures to address them

133. The considerations in relation to environmental and socioeconomic impacts are likely to be similar to those outlined for scenario 2 (see para. 115 above).

Monitoring requirements

134. The responsibility for the monitoring of emissions and liability for leakage from the storage reservoir might need to be agreed between all host Parties, in order to avoid accounting problems.

D. Scenario 4: Capture in Party A, transport through Party C and storage in Party B

1. Treatment of each stage of the project cycle

135. This scenario is similar to scenario 1, with only the transportation stage likely to trigger additional considerations. The primary difference from scenario 1 is the involvement of a third State through which the CO_2 is transported but in which neither capture nor storage of CO_2 takes place.

136. Parties may wish to consider whether transboundary CCS project activities would be acceptable under the CDM in which Party C does not participate or is not eligible to participate in the project activity.

2. Legal considerations related to the scenario

Characterization of CO_2

137. The considerations raised in relation to scenario 1 are likely to be relevant also to scenario 4 (see para. 85 above).

Transportation

138. To the extent that transboundary transportation is permissible, exporting Party A may have an obligation to obtain permission from Party C for the transport of CO_2 through its territory. In addition, consideration of transit State liability for leakage of CO_2 might be called for.

139. In the case of offshore transportation by pipeline, under UNCLOS the right to lay a pipeline across the continental shelf rests with all States, provided that the coastal State

[96] Decision 10/CMP.7, annex, paragraph 24.

consents to the delineation (see para. 43 above). A coastal State cannot impede the laying of a pipeline, but may take reasonable measures to ensure that the delineation does not impinge on its rights to explore and exploit the natural resources within its territory and take steps to prevent pollution from the pipeline.[97] Parties may wish to consider, therefore, whether, should transboundary CCS project activities be considered under the CDM, there needs to be a requirement for the coastal transit State to formally participate in any relevant CCS project activity under the CDM and what such participation would entail.

Storage

140. No specific issues have been identified with regard to transboundary storage in scenario 4.

3. Obligations

Assignment of liability

141. As in scenario 1, liability for any damage occurring resulting from CO_2 capture could rest with Party A and for any damage resulting from CO_2 injection and storage with Party B.

142. Liability for damage arising during the transport stage may be attributed to either the participating Party in which the damage occurred or the Party in which the pipeline starts (CO_2 capture and transport).

143. Issues might arise if CCS project activities are considered in which the transit Party or State (Party C) is not a formal participant in the CDM. In some instances, transboundary pipeline agreements entered into in the context of the oil and gas sectors might contain some guidance as to the allocation of liability. Such agreements could cover the allocation of liability for CO_2 in transit and include indemnities to the transit States for leakage, accidents or other environmental impacts.

144. A number of considerations with regard to the apportionment of liability for damage between several Parties involved could be relevant (see para. 124 above).

145. Parties may wish to consider whether the considerations detailed in paragraphs 141–144 above, including any potential involvement of non-participating transit States, would have implications for the current liability provisions contained in appendix B to decision 10/CMP.7.

Sharing the obligation to address a net reversal of storage

146. Parties may wish to consider whether the obligation to address a net reversal of storage would rest with the Party in which the storage is taking place.

Environmental and socioeconomic impacts and remedial measures to address them

147. The processes outlined for scenario 2 for transboundary environmental impact assessment would also be relevant to scenario 4 (see para. 115 above). Parties may wish to consider whether the requirement for any transit State to have the opportunity to comment on proposals for transportation would need to be included in the CCS modalities and procedures.

Monitoring requirements

148. The 2006 IPCC Guidelines do not specifically address liability for emissions associated with the transboundary transportation of CO_2. Monitoring will depend on the

[97] Bugge HC. 2011. Transboundary Chains for Carbon Capture and Storage: Allocation under the Climate Change Regime between States Parties of Emissions due to Leakage. *In*: I Havercroft, R Macrory and RB Stewart (eds.). *Carbon Capture and Storage. Emerging Legal and Regulatory Issues.* Oxford: Hart Publishing. p.129.

mode of transportation and, except in the maritime context where shipping is highly regulated, may fall to a variety of persons depending on which State claims jurisdiction over the mode of transport and when the CO_2 is deemed to have entered into the territory of another State. Parties may wish to consider whether additional monitoring requirements may be appropriate in relation to the operation of transboundary pipelines.

E. Variations to scenarios

149. There are a number of possible variations to the scenarios outlined in paragraphs 82–148 above. Firstly, there is the possibility that multiple countries could be involved in a CCS project activity, for example: capture and transport take place in Parties A, B and C for storage in Party D; the project activity involves a storage site that sits beneath more than two countries; or capture takes place in Parties A and D and transport is through Party C for storage in Parties B and E. Where there are additional Parties involved, the same issues and considerations as described above for the individual scenarios would apply. At the same time, regulation will potentially be more complex, with the need to consider different combinations of legal and operational issues, including the applicability of treaties to more than two States, and to seek State consent and negotiate cooperative approaches to management and apportioning liability.

150. In the context of any modalities and procedures addressing CCS project activities involving multiple countries, requirements might have to be considered for bilateral or multilateral agreements between all relevant Parties, addressing liability for damage and responsibility for net reversal of storage, financial provision and the sharing of CERs. The implications of such project activities extending to any Parties that are not formally participating in the activity or to States which are not Parties to the Kyoto Protocol might also need to be considered.

IV. Potential governance structures for managing scenarios of transboundary carbon dioxide capture and storage

A. Domestic legal frameworks and institutional bodies

151. The discussion in chapter III above highlights that any potential transboundary CCS project activities would require considerable cooperation and coordination between the participating Parties and other Parties or States affected in different stages of the CCS project cycle.

152. The IEA CCS Model Regulatory Framework recommends harmonization of regulatory approaches related to transboundary CCS. It suggests either selecting one competent authority to manage the two permitting regimes for a project, or, preferably, implementing joint regulatory responsibilities for transboundary operations.

153. In circumstances in which there may be more than one Party involved, coordinating the management of the CCS project cycle and the emissions resulting from the CCS project activity and providing clear guidelines on attributing responsibility and liability could be useful.

154. At the moment the EU appears to be the only regional area which has sought to regulate transboundary CCS project activities to a limited extent (see paras. 30–32 above). It remains unclear how its procedure would operate in practice.

155. There are also several countries, including Australia, Canada and the United States, that operate under a federal model, whereby individual states or provinces have adopted specific legislation to regulate CCS project activities within their respective territories. To

date, although national guidelines have been prepared that outline best practice and some efforts have been made to coordinate regulatory approaches within each country, interstate and interprovince differences that are yet to be reconciled seem to remain (e.g. regarding permitting requirements, site closure, financial contributions and transfer of long-term liability to the regulator). In one case, where a potential overlap between federal and state jurisdiction has arisen in Australia, the long-term liability for storage has been shared between the federal and state governments.[98]

B. Joint management approaches, bilateral agreements and coordination functions

156. No examples could be identified of the joint management of transboundary CCS project activities between Parties. However, the approaches taken with respect to the management of other shared natural resources might be useful when considering a future framework for transboundary CCS project activities.

157. There are various examples of bilateral and multilateral agreements to manage shared natural resources. Approaches taken in joint development agreements for oil and gas resources include:

(a) Appointing one State to have primary responsibility for the management and utilization of a transboundary resource;

(b) Attributing different functions to the regulatory agencies of each State and providing for the sharing of information between them;[99]

(c) Establishing joint agencies of authorities to oversee the most efficient management of the resource, which may involve different tiers of coordination.[100]

158. Joint development agreements are often more integrated than bilateral and multilateral agreements and provide for the equal sharing of all costs, expenses, liabilities and benefits resulting from the exploitation of shared petroleum resources.[101] Joint development agreements will often establish special institutional arrangements for overseeing the management of the resources, such as joint commissions and ministerial councils. Such agreements often require the parties to settle any disputes arising from the implementation or interpretation of the provisions peacefully, with consultation and negotiation between the parties.

159. An important aspect of bilateral and multilateral agreements is that they only bind the countries and entities (in the case of oil and gas agreements that authorize particular State-owned or private companies to undertake the development of oil and gas) that are parties to the agreement. This means that other third countries affected by the conduct of the parties to an agreement do not have direct recourse to the dispute resolution

[98] See Australia's submission in document FCCC/SBSTA/2012/MISC.12.

[99] See United Kingdom Department of Energy & Climate Change and Norwegian Petroleum Directorate. *UK–Norway. Trans-boundary oil & gas fields. Guidelines for development of trans-boundary oil and gas fields*. Available at <og.decc.gov.uk/assets/og/ep/fields/nor-guide.pdf>.

[100] E.g. the Timor Sea Treaty sets out a three-tiered management structure to carry out the day-to-day regulation and management of the petroleum activities. This includes the establishment of a Designated Authority, which is responsible for the day-to-day management and regulation of the petroleum activities and which has the authority to issue regulations on all matters related to the supervision and control of petroleum activities pursuant to the Petroleum Mining Code. The Joint Commission directs the Designated Authority on the discharge of its powers and functions and develops and approves the Petroleum Mining Code and rules, regulations and procedures for the effective functioning of the Designated Authority, and there is an overarching Ministerial Council, which can consider any matter relating to the operation of the Treaty.

[101] Article 9, paragraph 1, of the joint development agreement between Malaysia and Thailand.

mechanisms under that agreement. If transboundary CCS project activities are considered in the context of the CDM, arrangements to ensure cooperative or other arrangements between all host Parties and other affected States might have to be addressed.

160. In some instances, bilateral agreements or memoranda of understanding might be supplemented with more detailed guidelines that provide for the coordination of functions between agencies. For example, the coordination of access to the North Sea oil and gas reserves between the United Kingdom and Norway is assisted by guidelines which set out the role of licensees and operators and their relationship with the regulatory agencies of the two countries.[102] The guidelines were designed to aid companies in the process of seeking governmental approval for undertaking the development of transboundary reservoirs. They identify when an operator should seek approval from either the United Kingdom or Norwegian regulatory authorities (i.e. depending on the direction of the drilling or the location of a platform) and provide for the agencies to share information and, where appropriate, seek each other's approval of certain activities.[103]

161. In summary, it may be left open for Parties contemplating the transboundary storage of CO_2 to adopt any of the joint management approaches set out in paragraphs 156–160 above or to seek to unilaterally regulate activities within their territory. Experience in the oil and gas sector appears to indicate that no one particular management approach is preferred and the choice, for example of establishing joint commissions or relying on cooperation between existing regulators, will depend on the circumstances in each case. The extent to which such arrangements would need to be indicated in the letter of approval and assessed in the course of the validation of the CCS project activity might need to be considered further.

V. Possible mechanisms for resolving any disputes arising between Parties as a result of transboundary carbon dioxide capture and storage project activities under the clean development mechanism

162. The types of dispute between Parties that could potentially arise as a result of transboundary CCS project activities include:

(a) Disputes regarding the application of other treaties and agreements or breaches thereof (e.g. regarding the permissibility of the export of CO_2 under the London Protocol or the waste treaties discussed in chapter II above, or regarding transboundary environmental impact assessment and public participation);

(b) Disputes regarding access to, and utilization of, transboundary storage sites and the basis for sharing rights and responsibilities and attributing liability for leakage;

(c) Actions brought if transboundary pollution or environmental harm occurs;

(d) Disputes relating to non-permanence;

(e) Disputes arising in relation to liability.

[102] United Kingdom Department of Energy & Climate Change and Norwegian Petroleum Directorate. *UK–Norway. Trans-boundary oil & gas fields. Guidelines for development of trans-boundary oil and gas fields.* Available at <og.decc.gov.uk/assets/og/ep/fields/nor-guide.pdf>.

[103] E.g. exploration drilling that is to start on the United Kingdom's continental shelf, but with bottom-hole location on the Norwegian continental shelf, will require a drilling permit from the Norwegian Petroleum Directorate, consent from the United Kingdom Department of Energy & Climate Change and a notification to the United Kingdom Health and Safety Executive. The Norwegian Petroleum Act will apply and the Norwegian jurisdiction will be exercised (however, the Petroleum Safety Authority Norway will need to be notified).

163. In the event of dispute resolution, any dispute resolution mechanisms under the treaties that govern the subject matter of the dispute would be given primary consideration. Any relevant principles of customary international law would also be of relevance, particularly where the matter is not addressed or not fully addressed in the provisions of the relevant treaties.

164. Under international law, States may bring actions in the International Court of Justice (ICJ) based upon breaches of custom, treaties or general principles of international law or bring actions in ICJ seeking advisory opinions. Treaties usually include a range of dispute resolution mechanisms, such as arbitration. The submission of disputes to ICJ or other international courts or tribunals is normally provided for as a last resort.

165. Similar provisions have been set out in Article 19 of the Kyoto Protocol in conjunction with Article 14 of the Convention. These provide that, in the event of a dispute between two or more Parties concerning the interpretation or application of the Kyoto Protocol, the Parties concerned shall seek a settlement of the dispute through negotiation or peaceful means of their own choice. If such negotiation fails, they may refer the dispute to ICJ or to arbitration.

166. Where a dispute arises between the Parties participating in a transboundary CCS project activity and third parties or States (e.g. in relation to any damage caused by the project activity to third countries), the parties to the dispute could rely on the dispute resolution provisions of any other relevant treaties and applicable agreements (e.g. any agreements concluded in connection with the issuance of consent by the coastal State for the laying of a pipeline (see para. 43 above)). A number of the international agreements reviewed, including many of the aquifer management and oil and gas agreements, usually provide clear procedures for arbitration, including time frames for notices, the means of appointing arbitrators (often one from each side of the dispute and a third arbitrator from an independent State), convening the arbitration, costs and the timing for making an award. These procedures often also specify whether the award is intended to be binding upon the parties, which is usually the case.[104]

167. Parties may wish to consider whether a provision should be included in the CCS modalities and procedures requiring dispute resolution mechanisms to be specified in any cooperative agreements between Parties participating in a transboundary CCS project activity. In such agreements, the Parties involved would be able to determine themselves the most appropriate means of dispute resolution.

168. Where no relevant treaties or agreements are available, matters can also be referred to ICJ on the grounds of principles of international law, such as, for example, the principle that no State has the right to use or permit the use of territory in such a manner as to cause injury in or to the territory of another State or the property of persons therein.[105]

[104] See, for example, annex B to the Timor Sea Treaty.

[105] Reports of International Arbitral Awards, 1941, volume II, p.1965.