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## Carbon capture and storage and the London Protocol: recent efforts to enable transboundary CO<sub>2</sub> transfer

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### Abstract

In the absence of new energy policies or supply constraints, the International Energy Agency (IEA) estimates that energy-related carbon dioxide (CO<sub>2</sub>) emissions in 2050 will be twice 2007 levels. However, the ETP 2012 2DG Scenario provides a technically achievable, low-cost strategy to reduce greenhouse gas emissions to a level consistent with a 2°C temperature increase. Under the 2DG Scenario, carbon capture and storage (CCS) would contribute just under one-fifth of total emissions reductions by 2050.

To enable CCS to contribute at the levels in the 2DG Scenario, rapid growth in the number CCS projects is needed between today and 2020, and then the number of projects must grow steadily through 2050. As well as being a major financial, technical and logistical challenge, this is a significant regulatory challenge. Legal obstacles associated with global CCS deployment must be removed today – including the prohibition on transboundary CO<sub>2</sub> transfer under the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Protocol).

This paper reviews recent international actions to remove this prohibition; undertakes a legal analysis to identify possible options available to contracting parties under international law to allow transborder movement, pending entry into force of a formal, 2009 amendment enabling cross-border transportation of CO<sub>2</sub>; and makes clear recommendations on the next best approach. It then looks at efforts undertaken by contracting parties and other organisations in 2011 and 2012 to update the 2007 Specific Guidelines for Assessment of Carbon Dioxide Streams for Disposal into Sub-seabed Geological Formations (2007 CO<sub>2</sub> Storage Guidelines) in light of the 2009 amendment.

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## 1. Introduction

If current trends persist, the International Energy Agency (IEA) estimates that energy-related carbon dioxide (CO<sub>2</sub>) emissions in 2050 will be almost twice 2009 levels [1]. However, the 2°C Scenario (2DS) set out in the IEA publication *Energy Technology Perspectives 2012: Pathways to a Clean Energy System* provides a technically achievable, low-cost strategy to reduce greenhouse gas emissions to a level that would limit global temperature increase to 2°C. In the 2DS, carbon capture and storage (CCS) contributes just under one-fifth of total emissions reductions by 2050.

To enable CCS to contribute at the levels in the 2DS, rapid growth in the number CCS projects is needed today, primarily in OECD countries, followed by steady growth globally through 2050, including in China, India, and other non-OECD countries. As well as being a major financial, technical and logistical challenge, this requires development of regulations that ensure CCS is undertaken in a way that is safe and effective, and regulatory capacity to enforce these regulations. Great strides have been made in the last few years in establishing frameworks to regulate CCS; however, the absence or incomplete implementation of laws and regulations still present barriers to development of storage projects [2]. For CCS to reach its emissions reduction potential in future, legal obstacles associated with global CCS deployment must be removed today [3] – including, at the international level, the prohibition on transboundary CO<sub>2</sub> transfer under the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Protocol).

The London Protocol was adopted on 7 November 1996 to update and eventually supersede the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention), one of the first international conventions controlling marine pollution and dumping of wastes and other matter in the sea. The London Protocol is intended to create a more modern and stringent waste management system for the seas than that established by the London Convention, with greater emphasis on protection of the marine environment. It entered into force on 24 March 2006.

Article 6 of the London Protocol prohibits contracting parties from allowing the export of wastes or other matter to other countries for dumping or incineration at sea. The article has been interpreted by contracting parties as prohibiting the export of CO<sub>2</sub> from a contracting party for injection into sub-seabed geological formations [4]. This constrains contracting parties wanting to co-operate on offshore storage, and may restrict the options available to land-locked countries or countries that would like to develop international offshore storage hubs (e.g. some European countries).

Article 6 was amended by contracting parties in 2009 to allow cross-border transportation of CO<sub>2</sub> for sub-seabed storage [5], but the amendment must be ratified by two-thirds of contracting parties to enter into force under the London Protocol's amendment provisions. This is in contrast to an amendment made to Annex 1 of the protocol in 2006 to add CO<sub>2</sub> streams from CO<sub>2</sub> capture processes for storage to the list of wastes or other matter that may be considered for dumping. The 2006 amendment automatically entered into force on 10 February 2007 under the protocol's amendment provisions, as an amendment to an annex, and enables contracting parties to store domestically-sourced CO<sub>2</sub> offshore.<sup>†</sup> Therefore, pending ratification of the 2009 amendment, the London Protocol enables storage of domestic, but not internationally-sourced CO<sub>2</sub> in sub-seabed formations.

It is unlikely that two-thirds of contracting parties will ratify the 2009 amendment in the near term, for a number of reasons [6]. As at October 2012, there are 42 contracting parties to the London Protocol, meaning that 28 contracting parties must accept the 2009 amendment for it to enter into force [7]. In the three years since the 2009 amendment, however, only two countries have ratified - Norway and the United

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<sup>†</sup> For Canada, the amendment entered into force on 29 January 2007.

Kingdom, Australia, Canada and the Netherlands have taken steps to ratify the amendment, but they have yet to do so and it is unclear whether any further contracting parties are considering ratification or taking action to ratify at this stage.

Of the 42 contracting parties, only around half are involved in the principal international CCS initiatives (*i.e.* the Carbon Sequestration Leadership Forum, Clean Energy Ministerial Carbon Capture, Storage and Use Action Group, Global CCS Institute, IEA Greenhouse Gas R&D Programme and IEA CCS legal and regulatory initiatives). Those parties that are not actively considering CCS or engaged in international CCS dialogue are unlikely to see ratifying the Article 6 amendment as a high priority.

Finally, ratification of marine treaty amendments may fall outside the direct remit of energy ministers – the ministers who are most likely to be interested in facilitating CCS deployment – meaning that cross-government co-operation will probably be required for ratification to occur. In certain countries, ratification may also be contingent on laws and regulations governing export of wastes having first been amended for CCS purposes.

It took around four years for similar amendments made to the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) in 2007 to enter into force, even though only seven contracting parties were required to ratify [8]. This precedent is instructive, particularly given that many more contracting parties are required to ratify the 2009 London Protocol amendments.

Thus, it seems clear that the 2009 amendment is unlikely to enter into force unless a concerted, international effort is made towards ratification. In the interim, it appears the London Protocol will continue to inhibit contracting parties wanting to co-operate on offshore storage in the near term. This is despite contracting parties having given a clear political signal that the London Protocol should not constitute a barrier to transboundary movement of CO<sub>2</sub> streams at their third meeting in October 2008 [4].

## **2. Recent international actions to facilitate enabling of transboundary CO<sub>2</sub> transfer for storage**

The barrier to transboundary CO<sub>2</sub> transfer posed by Article 6 of the London Protocol is an issue that has been considered by energy ministers in the context of the Clean Energy Ministerial (CEM) Carbon Capture, Use and Storage Action Group (CCUS AG). The CCUS AG was established at the first CEM in Washington, DC in July 2010 to advise energy ministers on concrete, near-term actions to accelerate global CCS deployment. Seven substantive recommendations were delivered to energy ministers at the second CEM (CEM 2, Abu Dhabi, April 2011), aimed at bridging the gap between current efforts and actions required to ensure CCS can effectively contribute to climate change mitigation. These included a recommendation that energy ministers commit to raising awareness, within relevant government ministries, of the importance to global CCS deployment of ratifying key international marine treaty amendments: including the 2009 London Protocol amendment to allow transboundary movement of CO<sub>2</sub> for the purposes of sub-seabed storage. At that time, only one contracting party – Norway – had ratified the amendment.

Twelve out of a total thirteen CCUS AG governments agreed to take action in accordance with the recommendations by the third CEM (CEM 3) in London, April 2012. In April 2012, *Tracking Progress in Carbon Capture and Storage: International Energy Agency – Global CCS Institute report to the third Clean Energy Ministerial* [8] reported to CEM 3 on progress made by committed governments against the 2011 CCUS AG recommendations. On the recommendation regarding international marine treaty amendments, it noted positive news on the OSPAR Convention – that, in October 2011, the OSPAR Secretariat had advised that the 2007 amendment had formally entered into force as of 23 July 2011 for contracting parties to have ratified as of that date – but reported limited progress on the 2009 London Protocol amendment. The period between CEM 2 and CEM 3 saw the United Kingdom become the second country to ratify, providing formal notification of ratification to the International Maritime

Organisation on 29 November 2011; Australia initiate cross-government cooperation to move toward ratification; and Canada make progress on amendments to relevant domestic legislation to accommodate ratification. No other CCUS AG country had made progress against the recommendation. The report found that with the Netherlands being the only other contracting party understood to be taking steps to ratify the amendment, it was unlikely that the required number of ratifications would be reached in the near term. It urged committed governments to accelerate efforts to raise awareness on the need to make progress toward ratification of the 2009 amendment leading up to CEM 4 (New Delhi, April, 2013).

### **3. Options under international law for addressing the Article 6 barrier**

In October 2011, the IEA released a working paper on options under international law to enable transboundary movement of CO<sub>2</sub> for sub-seabed storage while ratification of the 2009 amendment progresses, to promote dialogue within London Protocol contracting parties and raise awareness of the ratification issue [6]. This reflects that, given the current rate of ratifications, consideration of interim options will be required to facilitate export of CO<sub>2</sub> for offshore storage in the near- to mid-term. The paper was presented in plenary at the sixth meeting of London Protocol contracting parties (London, 17-21 October 2011), to draw contracting party attention to the options outlined below.

The paper considers five options based on the international law of treaties, as set out in the 1969 Vienna Convention on the Law of Treaties (VCLT), as well as precedents and commentaries. The VCLT is the convention governing the law of agreements between states, of which the London Protocol is an example. The five options are:

- an interpretative resolution based on the general rule of interpretation;
- resolving to provisionally apply the 2009 amendment;
- subsequent agreement between contracting parties (bilateral or multilateral);
- modification of the operation of relevant aspects of the London Protocol as between two or more contracting parties; and
- suspension of the operation of relevant aspects of the London Protocol as between two or more contracting parties.<sup>1</sup>

A sixth option – conducting CCS through non-contracting parties – is also considered. The paper recognises that political, diplomatic or other considerations may affect contracting party willingness to invoke any particular option, and that these are ultimately a matter for contracting parties. It therefore focuses on the relevant principles of international law, with the aim of raising options for further discussion and analysis by contracting parties.

#### *3.1. Option 1: Interpretative resolution*

Parties to international treaties may use what is referred to as the “general rule of treaty interpretation” to modify the application of a treaty, without having to make a formal amendment. Under Article 31 of the VCLT, any subsequent agreement between parties to a treaty regarding interpretation of the treaty or the application of its provisions, or subsequent practice in the application of the treaty establishing the agreement of the parties regarding its interpretation, are relevant factors when interpreting the meaning of a treaty. If expressly intended by the parties, an agreement or instrument made in connection with a treaty may form a part of the treaty.

Therefore, a resolution made at a meeting of London Protocol contracting parties could potentially be an effective manner of clarifying the application of Article 6 of the London Protocol. However, given that London Protocol contracting parties have commenced the formal amendment process with respect to Article 6, this essentially amounts to a formal acknowledgement that the article could in fact be

interpreted to prohibit the transboundary export of CO<sub>2</sub> for CCS projects; this is likely to inhibit a subsequent resolution to the effect that Article 6 should not be interpreted as prohibiting such export. This option may also not be politically acceptable to contracting parties given their resolution to amend the article; contracting parties may not wish to derogate from the formal amendment process, given that it has already been commenced.

### *3.2. Option 2: Provisional application*

Article 25 of the VCLT sets out a procedure by which treaties can be applied provisionally before entering into force if the treaty so provides, or there is agreement between contracting parties. There is no explicit provisional application clause in the amendment to Article 6 of the London Protocol, or in the London Protocol itself. However, contracting parties could resolve to provisionally apply the Article 6 amendment, pending ratification by a sufficient number of contracting parties, by voting on a resolution to that effect. Any party that did not vote would not be under such an obligation. This would be a prompt way of addressing the Article 6 barrier to deployment, and is more consistent with the 2009 amendment than an interpretative resolution.

There is no guidance in the VCLT or the international commentaries as to a minimum vote or other requirements for provisional application under Article 25. However, international precedent suggests that if the contracting parties to the London Protocol resolve to implement the amendment on a provisional basis at a meeting of the parties in the usual way that a resolution is made, this would arguably be sufficient to allow interested contracting parties to engage in transboundary export of CO<sub>2</sub> under the London Protocol. Of course, the basis on which any resolution is made would ultimately need to be determined by London Protocol contracting parties.

### *3.3. Option 3: Subsequent agreement through an additional treaty*

Article 30 of the VCLT deals with the application of successive treaties relating to the same subject matter. Contracting parties to the London Protocol that wish to engage in the transboundary export of CO<sub>2</sub> could potentially conclude a subsequent treaty allowing them to do so and making provisions regulating CCS projects. The benefit of this option is that contracting parties seeking to engage in transboundary export of CO<sub>2</sub> for storage could negotiate terms suitable to them, as between themselves; international commentary on Article 30 emphasises, it should be noted, that any later treaty cannot deprive a state that is not a party thereto of its rights under the earlier treaty.

It difficult to see how a subsequent agreement enabling export of CO<sub>2</sub> streams for disposal in accordance with Annex 1 and consistent with the 2009 amendment could be perceived as depriving a contracting party of its rights under the London Protocol. The rights of other contracting parties are unlikely to be affected, except perhaps if CO<sub>2</sub> streams are transported through their territory (in which case an agreement would need to be reached with that particular state). This option would require more time and effort than options 1 and 2.

### *3.4. Option 4: Modification of the relevant aspects of the London Protocol as between two or more contracting parties*

Article 41 of the VCLT enables two or more parties to a multilateral treaty to conclude an agreement to modify the treaty as between themselves alone if: (a) the possibility of such a modification is provided for by the treaty; or (b) the modification in question is not prohibited by the treaty and: does not affect the enjoyment by the other parties of their rights under the treaty or the performance of their obligations; and

does not relate to a provision, derogation from which is incompatible with the effective execution of the object and purpose of the treaty as a whole.

The London Protocol itself does not contain any modification provisions. This means that while modification by agreement of certain parties is not specifically provided for, it is not prohibited. Two or more contracting parties to the London Protocol could potentially conclude an agreement to modify Article 6 as between themselves to enable transboundary movement of CO<sub>2</sub> under the London Protocol, provided the remaining requirements of Article 41(b) are met. In terms of these requirements, modification of the London Protocol between two or more contracting parties so as to allow for transboundary export of CO<sub>2</sub> is unlikely to be perceived as incompatible with the object and purpose of the London Protocol as a whole, as it is consistent with the amendment that has already been made to Annex 1, the 2009 amendment, the views of the contracting parties and the overarching purpose of protecting the marine environment. Further, if two contracting parties enter into an arrangement for the export of CO<sub>2</sub> streams for disposal in accordance with Annex 1, the rights of other contracting parties are unlikely to be affected, except perhaps if CO<sub>2</sub> streams are transported through their territory (in which case an agreement would need to be reached with that particular state).

This option would enable contracting parties seeking to engage in transboundary export of CO<sub>2</sub> for storage to negotiate to do so between themselves; but is likely to require more time and effort than options 1 and 2. In addition, other contracting parties may argue that such a modification would be incompatible with the object and purpose of the London Protocol or constitutes an adverse impact on the enjoyment of their rights.

### *3.5. Option 5: Suspension of the operation of relevant aspects of the London Protocol as between two or more contracting parties*

Article 58 of the VCLT enables two or more parties to a multilateral treaty to conclude an agreement to suspend the operation of provisions of the treaty, temporarily and as between themselves alone, if: (a) the possibility of such a suspension is provided for by the treaty; or (b) the suspension in question is not prohibited by the treaty and: does not affect the enjoyment by the other parties of their rights under the treaty or the performance of their obligations; and is not incompatible with the object and purpose of the treaty.

Suspension is not contemplated by the London Protocol, and is therefore not prohibited. This means that two or more contracting parties could suspend Article 6 as between themselves, insofar as the Article prohibits the transboundary export of CO<sub>2</sub> and until the amendment comes into force, if they fulfill the requirements of Article 58(b). Partial suspension in this manner is unlikely to be considered incompatible with the object and purpose of the treaty as a whole, or affect the rights of any other contracting party, for the same reasons as those outlined in respect of modification. Therefore it appears that it would be possible for two or more contracting parties to suspend the operation of Article 6 to the extent that Article prohibits the export of CO<sub>2</sub> streams for injection into the sub-seabed, pending sufficient numbers of parties ratifying the 2009 amendment.

Again, the advantage of this option is that contracting parties seeking to engage in transboundary export of CO<sub>2</sub> for storage could negotiate to do so between themselves. However, the other approaches (particularly options 1 and 2) may be preferable from a political perspective and, similar to option 4, other contracting parties may argue that such suspension would be incompatible with the object and purpose of the London Protocol or constitute an adverse impact on the enjoyment of their rights.

### *3.6. Option 6: Conducting CCS through non-contracting parties*

The London Protocol paper also raises the option of exporting CO<sub>2</sub> to or with non-contracting parties to the London Protocol, but dismisses this option, as the third meeting of contracting parties determined that the export of CO<sub>2</sub> by a contracting party to another country for the purposes of sub-seabed injection would be prohibited by Article 6, regardless of whether the other country was a contracting party to the London Protocol.

### 3.7. Summary of options

Based on the above, the quickest and potentially most straightforward option to address the Article 6 barrier would be for the contracting parties to pass a resolution at a meeting of contracting parties recommending provisional application of the 2009 amendment, pending ratification of the amendment by a sufficient number of contracting parties. This reflects that contracting parties agreed at their third meeting that Article 6 should not operate as a barrier to CCS; it therefore seems unlikely that they would object to provisional application of the 2009 amendment (in turn agreed to at a meeting of the contracting parties). In addition, this option may be appealing to contracting parties as consistent with the 2009 amendment.

A clarifying resolution at a meeting of contracting parties to the effect that Article 6 of the London Protocol should not be interpreted as operating to prevent the transboundary movement of CO<sub>2</sub> from contracting parties would potentially also be a prompt way of clarifying the application of Article 6. However, given that the contracting parties have agreed that Article 6 could be interpreted to prohibit export of CO<sub>2</sub> and have initiated a formal amendment process on this basis, they may be reluctant to derogate from the formal process and agree to such a resolution.

If the contracting parties cannot reach agreement, those contracting parties wishing to engage in transboundary export could enter into a subsequent agreement (bilateral or multilateral). They could also modify or suspend Article 6 to the extent that it can be seen to prohibit transboundary export of CO<sub>2</sub>. However, these options would be likely to require more time and effort than a resolution of contracting parties. In addition, from a political perspective, contracting parties may see suspension in particular as less desirable.

Ultimately, contracting party willingness to invoke any particular option is likely to depend on political, diplomatic or other considerations, in addition to the relevant principles of international law.

## 4. Progress in reviewing the 2007 CO<sub>2</sub> Sequestration Guidelines to include export of CO<sub>2</sub> for sub-seabed storage

Following the 2009 amendment to Article 6, the London Protocol Governing Bodies invited the Scientific Group of the London Protocol (LP SG) to: consider any amendments that might be required to the London Protocol's 2007 *Specific Guidelines for Assessment of Carbon Dioxide Streams for Disposal into Sub-seabed Geological Formations* (2007 CO<sub>2</sub> Sequestration Guidelines) in view of the 2009 amendment; and provide further specific guidance in cases of export [5].

Contracting parties have been advancing this process since 2010, initially under the lead of the United Kingdom, and subsequently the Republic of Korea. The sixth meeting of London Protocol contracting parties (October 2011) reviewed progress made by an intersessional correspondence group established at the fifth meeting of contracting parties in October 2010. This group had prepared a preliminary draft revision of the 2007 CO<sub>2</sub> Sequestration Guidelines, but identified a number of policy and legal issues for further consideration. The sixth meeting therefore re-established the correspondence group, to prepare further advice for the 2012 meeting of contracting parties, and draft text for insertion in the 2007

guidelines [9].

At the sixth meeting of the Scientific Group of the London Protocol (May 2012), the re-established correspondence group submitted an interim report outlining:

- That it considered that a distinction should be made between export prior to injection and transboundary movement within sub-seabed geological formations post injection;
- That it had developed draft *Development and Implementation of Arrangements or Agreements for the Export of CO<sub>2</sub> Streams for Storage in Sub-seabed Geological Formations* guidelines, that it recommended be annexed to the 2007 CO<sub>2</sub> Sequestration Guidelines;
- A further draft of revisions to the 2007 CO<sub>2</sub> Sequestration Guidelines, which in view of the proposed guidelines above treated revisions related to transboundary movement of CO<sub>2</sub> within sub-seabed geological formations post-injection only.

It recommended that the Scientific Group forward these documents to the 2012 Governing Bodies for review [10].

The proposed *Development and Implementation of Arrangements or Agreements for the Export of CO<sub>2</sub> Streams for Storage in Sub-seabed Geological Formations* guidelines are, at the time of writing, due to be considered at the seventh meeting of contracting parties to the London Protocol (29 October – 2 November 2012). The current draft provides guidance on allocation of permitting responsibilities between exporting and receiving countries, as required by the London Protocol and other applicable international law, and on additional requirements where export is to a non-contracting party. The latter reflects that, where contracting parties export CO<sub>2</sub> to a non-contracting party, they are required to impose provisions at a minimum equivalent to those contained in the London Protocol, to ensure that they do not derogate from their obligations under the London Protocol. The draft covers characterisation of the CO<sub>2</sub> stream, site characterisation, monitoring and mitigation, etc.

Once in place, the guidelines will provide a clear framework for export of CO<sub>2</sub> for storage to occur under the London Protocol. They would in theory enable contracting parties to undertake transboundary transfer of CO<sub>2</sub> for storage within the formal framework of the London Protocol, even as the formal ratification process for the article 6 amendment progresses, should contracting parties wish to invoke any of the options outlined above.

## 5. Conclusion

At the current time, the London Protocol enables sub-seabed storage of domestically-sourced CO<sub>2</sub>, but not internationally-sourced CO<sub>2</sub>. The amendment to article 6 of the London Protocol, intended to enable transboundary transfer of CO<sub>2</sub> for sub-seabed storage, is unlikely to enter into force in the near-term. While this is the case, the London Protocol will constrain contracting parties wanting to co-operate on offshore storage. Contracting parties have, however, previously given a clear political signal that the London Protocol should not constitute a barrier to transboundary movement of CO<sub>2</sub> streams.

In recent years, there have been international attempts to gain traction around the ratification process, including in the context of the CEM. While this process continues, there are a number of options open to London Protocol contracting parties to enable export of CO<sub>2</sub> under international law. The quickest and potentially most straightforward option would be for the contracting parties to pass a resolution at a meeting of the contracting parties recommending provisional application of the 2009 amendment, pending ratification of the amendment by a sufficient number of contracting parties. Political, diplomatic or other considerations may affect contracting party willingness to invoke any particular option. Should contracting parties wish to invoke any option while the formal ratification process progresses, the work being undertaken by contracting parties to update the 2007 CO<sub>2</sub> Storage Guidelines should ensure that



there is a clear and formalised framework for export of CO<sub>2</sub> for storage to occur under the London Protocol pending ratification.

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<sup>i</sup> See the working paper itself for full legal analysis on the respective options.