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

5.1 The amendment *Annex 1 to the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972* (the London Protocol) will allow sequestration of carbon-dioxide (CO_2) in sub-seabed geological formations.

5.2 Australia is a Party to the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972* (London Convention) and the London Protocol. The London Protocol supersedes the London Convention for parties to both.[1]

> The protocol entered into force internationally in March 2006, having gained the required number of signatories. There are now 28 signatory parties. Australia has implemented the protocol domestically since 2000 under the *Environment Protection (Sea Dumping) Act 1981*. The objective of the protocol is to protect the marine environment from pollution related to sea dumping. The protocol is an advanced international agreement limiting the types of material that can be dumped to the seven categories listed in its annex 1.[2]

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1 Department of the Environment and Heritage, *Submission No. 1*, p. 1.

2 Mr Gerard Early, First Assistant Secretary, Approvals and Wildlife Division, Department of the Environment and Heritage, *Transcript of Evidence*, 9 October 2006, pp. 13-14.

5.3 CO_2 geo-sequestration was discussed at the 27th Consultative Meeting of the London Convention in October 2005 and it was agreed that CO_2 geo-sequestration should be allowed, noting that amendments to the Protocol may be required. The amendment to Annex 1 to the London Protocol was adopted unanimously on 2 November 2006 at the First Meeting of Contracting Parties to the London Protocol.[3] It came into force on 10 February 2007.[4]

Background

5.4 Prior to the adoption of the amendment there was uncertainty whether the geo-sequestration of CO_2 in the marine environment under certain scenarios, particularly capture onshore and injection under the seabed offshore, was consistent with Australia's international obligations under the London Protocol. The Protocol applies to "the seabed and subsoil thereof" and only permits the disposal of materials listed at Annex 1 to the London Protocol.[5]

> Carbon geo-sequestration was not contemplated when the protocol was being developed, and carbon dioxide was not included on the list at annex 1. Carbon geo-sequestration is therefore currently illegal in the marine environment. However, it is now agreed Australian government policy to explore geo-sequestration as one of a suite of potential climate change measures.[6]

5.5 While the Amendment changes Australia's obligations under the London Protocol to allow the sub-seabed sequestration of CO_2, it seeks to ensure the CO_2 gas 'stream' sequestered is overwhelmingly CO_2 and does not contain industrial wastes or other prohibited materials.[7]

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3 Department of the Environment and Heritage, *Submission No. 5*, (NIA with attachment on consultation), p. 2.

4 Parties that were not able to accept the amendment had until 10 February 2007 to lodge a declaration.

5 Department of the Environment and Heritage, *Submission No. 1*, p. 1.

6 Mr Gerard Early, First Assistant Secretary, Approvals and Wildlife Division, Department of the Environment and Heritage, *Transcript of Evidence*, 9 October 2006, p. 14.

7 Department of the Environment and Heritage, *Submission No. 1*, p. 2.

Geo-sequestration

5.6 Geo-sequestration involves injecting CO_2 directly into underground sedimentary basins which can be either onshore or offshore. Declining or depleted oil and gas fields, saline aquifers, and unminable coal seams are potential storage sites.[8]

5.7 CO_2 has been injected into declining oil fields in Texas since the early 1970s to enhance oil recovery (EOR). EOR is a commercial technology as currently practiced because the CO_2 storage costs are offset by recovery of the additional oil, the economic driver being enhanced oil recovery rather than CO_2 storage.[9] Similar technology could potentially increase the gas recovered from gas reserves.[10] Unminable coal seams can also be used for safe long-term storage of CO_2 (usually at a shallower depth than EOR), because CO_2 adsorbs[11] to the coal surface. Injecting CO_2 into the coal seam releases methane adsorbed to the coal surface and the methane may be recovered. The process is called Enhanced Coal Bed Methane recovery (ECBM) and potentially, as with EOR, the sale of the methane could be used to offset the cost of the CO_2 storage.[12]

5.8 Existing infrastructure and the geophysical and geological information about oil and gas fields from the exploration phase is relevant in evaluating the size and suitability of potential storage sites. At depth and under pressure (below 800 metres) CO_2 will be 50% to 80% of the density of water and tends to rise. Therefore a geological barrier preventing its upward migration is necessary but not usually a problem as oil and gas fields have such a barrier which prevents the upwards migration of hydrocarbons.[13]

5.9 Saline aquifers are common and could potentially provide large storage volumes. Compared to oil and gas reservoirs, a disadvantage

8 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Chapter 5, p. 200.

9 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Chapter 5, p. 262.

10 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Chapter 5, p. 216.

11 Adsorb: to gather (a gas, liquid, or dissolved substance) on a surface in a condensed layer, as is the case when charcoal adsorbs gases, The Macquarie Dictionary.

12 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Chapter 5, p. 216.

13 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Technical Summary, p. 28.

of saline aquifers is that less is known about them and there may be more uncertainty about their structure. Therefore, leakage of CO_2 into the atmosphere may be more of a problem in saline-aquifer storage. Also, unlike EOR or ECBM processes, there is no by-product to offset the storage cost.[14]

5.10 Three commercial geological sequestration projects are currently underway. EOR is used at an oil field at Weyburn in southeastern Saskatchewan, Canada. Norway's Statoil natural gas platform *Sleipner* in the North Sea strips CO_2 from natural gas with amine solvents and disposes of it in an offshore saline formation. At the In Salah Gas Field in Algeria, Sonatrack, BP and Statoil strip CO_2 from natural gas and inject it into the gas reservoir outside the boundaries of the gas field.[15] At the Gorgon offshore gas field in Western Australia, Chevron is proposing to strip CO_2 from the natural gas it recovers and inject it into the Dupuy Formation 2,000 metres below Barrow Island.[16]

Ocean Sequestration

5.11 Sub-seabed geo-sequestration of CO_2 is not the same as ocean sequestration. In ocean sequestration, CO_2 would be pumped directly into the water at depths greater than 1,000 metres where a high proportion of it would be isolated from the atmosphere for several hundred years. At depths greater than 3,000 metres CO_2 is denser than seawater and, using different methods of release, could be dispersed into the deep ocean or deposited to form 'lakes' of liquid CO_2 on the ocean floor.[17] Ocean sequestration is **not** currently under consideration by Australia or the Consultative Meeting[18] and is **not** permitted by the amendment to Annex 1 to the London Protocol.

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14 http://en.wikipedia.org/wiki/Carbon_sequestration#Geological_sequestration (accessed 19 September 2006)

15 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Chapter 5, pp. 201-4.

16 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Chapter 5, pp. 201-4, and *see* www.doir.wa.gov.au/documents/investment/000111lornafitzgerald.pdf. (accessed 19 September 2006)

17 Intergovernmental Panel on Climate Change, *IPCC Special report on Carbon dioxide capture and Storage*, Chapter 6, pp 282-283.

18 Department of the Environment and Heritage, *Submission No. 1*, p. 1.

Obligations

5.12 Under the London Protocol the types of material that may be dumped at sea is limited to the seven categories listed in its Annex 1.

The list at Annex 1 is:

- dredged material;
- sewage sludge;
- fish waste, or material resulting from industrial fish processing operations;
- vessels and platforms or other man-made structures at sea;
- inert, inorganic geological material;
- organic material of natural origin; and
- bulky items primarily comprising iron, steel, concrete and similarly unharmful materials for which the concern is physical impact, and limited to those circumstances where such wastes are generated at locations, such as small islands with isolated communities, having no practicable access to disposal options other than dumping.[19]

5.13 The amendment to the Protocol adds "Carbon dioxide streams from carbon dioxide capture processes for sequestration" to the list at Annex 1 and further provisions to ensure that the CO_2 streams may only be considered for dumping if:

- disposal is into a sub-seabed geological formation; and
- they consist overwhelmingly of carbon dioxide. They may contain incidental associated substances derived from the source material and the capture and sequestration processes used; and
- no wastes or other matter are added for the purpose of disposing of those wastes or other matter.[20]

5.14 Australia's other obligations under the Protocol will not change. However, under the amendment "sequestration in sub-seabed geological formations would be an option available to Australia and would facilitate Australia in remaining at the forefront of geo-

19 Protocol, done at London on 7 November 1996, to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter of 29 December 1972, NIA, http://www.austlii.edu.au/au/other/dfat/nia/1997/39.html (accessed 9 November 2006)

20 Text of amendment to Annex 1; Department of the Environment and Heritage, *Submission No. 5*, (NIA with attachment on consultation), page 6.

sequestration technology while also continuing to provide leadership in marine environment protection through the London Protocol".[21]

5.15 Also, geo-sequestration projects will still require rigorous assessment and approval in accordance with the articles of the Protocol, the *Environment Protection (Sea Dumping) Act 1981* and the *Environment Protection and Biodiversity Conservation Act 1999*.[22]

> …[A]part from just the technology of injecting the carbon dioxide, for any sea-dumping application that is currently assessed under Australian law, we assess all the impacts. So they would be all of the actual mechanisms and the operating requirements in order to bring CO_2 from a source, have it injected and stored safely. Each of those projects is assessed on their merits and would also go through a period of public consultation.[23]

Consultation

5.16 Public consultation on the amendment has occurred mainly through the development of the Council of Australian Governments (COAG) Regulatory Impact Statement (RIS) and *Guiding Regulatory Principles* which were endorsed by the Ministerial Council on Mineral and Petroleum Resources on 25 November 2005.[24]

5.17 In addition to direct consultation with the State and Territory Governments, comments were received from the following parties:

- Anna Tredwell (Eco Property Pty Ltd)
- Australian Coal Association
- Australian Conservation Foundation
- Australia Petroleum Production and Exploration Association
- Australian Power and Energy Limited

21 Mr Gerard Early, First Assistant Secretary, Approvals and Wildlife Division, Department of the Environment and Heritage, *Transcript of Evidence*, 9 October 2006, p. 14.

22 Mr Gerard Early, First Assistant Secretary, Approvals and Wildlife Division, Department of the Environment and Heritage, *Transcript of Evidence*, 9 October 2006, p. 14.

23 Ms Vicki Dickman, Assistant Secretary, Environment Assessment Branch, Department of the Environment and Heritage, *Transcript of Evidence*, 9 October 2006, p. 17.

24 Department of the Environment and Heritage, *Submission No. 5*, (NIA with attachment on consultation), page 5.

- BHP Billiton
- Baker McKenzie
- Conservation Council of Western Australia
- Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC)
- Cooperative Research Centre for Coal in Sustainable Development
- Climate Action Network Australia
- EWN Publishing
- Friends of the Earth
- National Generators Forum
- New South Wales Minerals Council
- Origin Energy
- PricewaterhouseCoopers Legal
- Rising Tide
- Stanwell Corporation
- Western Australian Government
- Woodside
- Xstrata Coal[25]

5.18 Comments received during consultation addressed issues including issues in relation to the natural environment, the need to adequately address environmental risks and the need to consider the use of alternative technologies.[26]

Costs

5.19 While there are costs associated with assessing permit applications and the ongoing regulation of approved permits under the *Environment Protection (Sea Dumping) Act 1981* and the *Environment Protection (Sea Dumping) Regulations 1983* this is currently undertaken on a cost recovery basis. The permit process is expected to be similar for geo-sequestration proposals and the amendment will not result in

25 Department of the Environment and Heritage, *Submission No. 5*, (NIA with attachment on consultation), page 5.

26 Department of the Environment and Heritage, *Submission No. 5*, (NIA with attachment on consultation), page 5.

additional costs to the Commonwealth or State and Territory governments.[27]

Implementation

5.20 No legislation is required to implement the amendment to the London Protocol. Australia's obligations under the London Protocol are met by the *Environment Protection (Sea Dumping) Act 1981*. The Act limits the granting of permits to dump material at sea to materials listed at Annex 1 to the Protocol and permits may be granted only in accordance with processes set out in Annex 2 to the Protocol. The amendment to Annex 1 ensures that parties to the Protocol may permit offshore sub-seabed geo-sequestration in accordance with requirements set out in Annex 2.[28]

5.21 The amendment to Annex 1 to the London Protocol was adopted unanimously by the First Meeting of Contracting Parties to the London Protocol on 2 November 2006. The amendment came into force for Australia and other Parties to the agreement on 10 February 2007 after no objections were received within the 100 days-period from contracting parties to the London Protocol. However, the committee acknowledges the efforts of the former Minister for the Environment and Heritage and his Department to bring the agreement before it in time for the Committee to hold hearings and consider the proposed amendment before it came into force.

Conclusion

5.22 The Committee supports the sub-seabed geo-sequestration of CO_2 streams as one of a suite of measures to mitigate climate change and ocean acidification and recognises that the amendment to Annex 1 of the London Protocol will allow Australia and other countries to pursue this option. Therefore the Committee supports the amendment to *Annex 1 to the 1996 Protocol to the Convention on the*

27 Department of the Environment and Heritage, *Submission No. 5*, (NIA with attachment on consultation), pages 3-4.

28 Department of the Environment and Heritage, *Submission No. 5*, (NIA with attachment on consultation), page 3.

Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972.

Dr Andrew Southcott MP

Committee Chair