



London Protocol and Carbon Capture and Storage (CCS) at Sea

LC-SG 47 Science Day

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IMO Headquarters, London

Ju Hyun Park
Office for the London Convention/Protocol and Ocean Affairs
Marine Environment Division

London Convention and Protocol

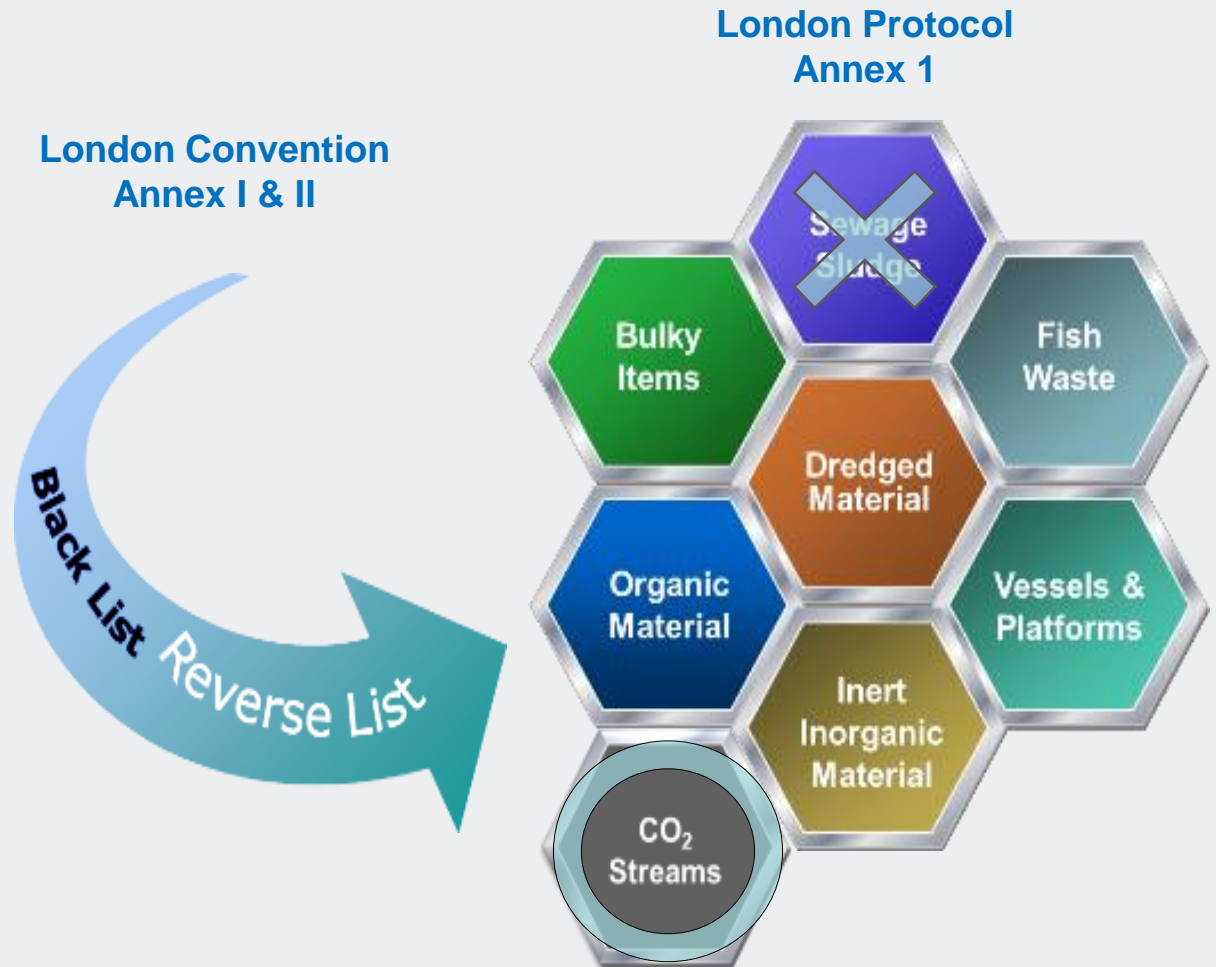
- **Dumping of wastes at sea: Towards a precautionary regulatory environment**
- **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (87 Contracting Parties) – permissive**
 - Adopted 1972 and came into effect 1975.
 - One of the first global conventions to protect the marine environment from human activities.
 - Regulates dumping into the sea of wastes through the “black and grey list approach”
- **London Protocol 1996 (54 Member States) – precautionary**
 - Adopted 1996 to modernize and replace the Convention, and entered into force 2006.
 - A “reverse list approach” (Precautionary framework): All dumping is prohibited unless explicitly permitted.
 - Has been responding new threats to the oceans by regulating CO₂ Sequestration (amended in 2006/2009/2019) in sub-seabed geological formations and marine geoengineering including ocean fertilization (amended in 2013).
 - Polluter-pay principle.



Total : 101 LC/LP Parties

Wastes and Other Matter That May Be Considered for Dumping

- Prohibited: All other than Annex 1 including
 - Industrial waste
 - Incineration of waste at sea
 - Radioactive waste
 - Sewage sludge
→ removed from Annex 1 as of 15 January 2023
- May be considered for dumping at sea (Annex 1): need to be permitted under conditions (Annex 2)
 - Dredged material
 - Fish waste
 - Vessels and platforms
 - Inert, inorganic geological material
 - Organic material
 - Bulky items
 - CO₂ streams from CO₂ capture process for sequestration (included in 2006)

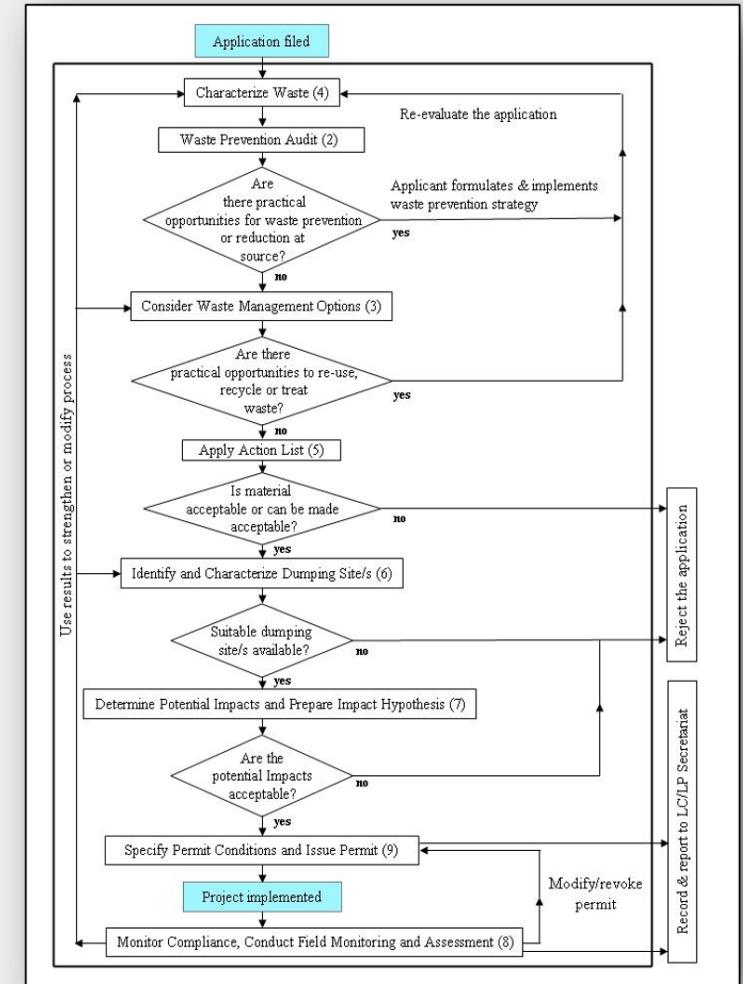


Waste Assessment Guidelines (WAGs)

- Guide implementation of the LP Annex 2 (Assessment of wastes or other matter that may be considered for dumping)
- Provide a process for assessing wastes, issuance of permits, and monitoring - eight steps with several decision points that are not necessarily taken in sequential order.

- ① Characterize Waste
- ② Waste Prevention Audit
- ③ Waste Management Options
- ④ Apply Action list
- ⑤ Identify and Characterize Dump-site(s)
- ⑥ Determine Potential Impacts and Develop Impact Hypothesis
- ⑦ Specify Permit Conditions and Issue Permit
- ⑧ Compliance Monitoring and Field Monitoring and Assessment

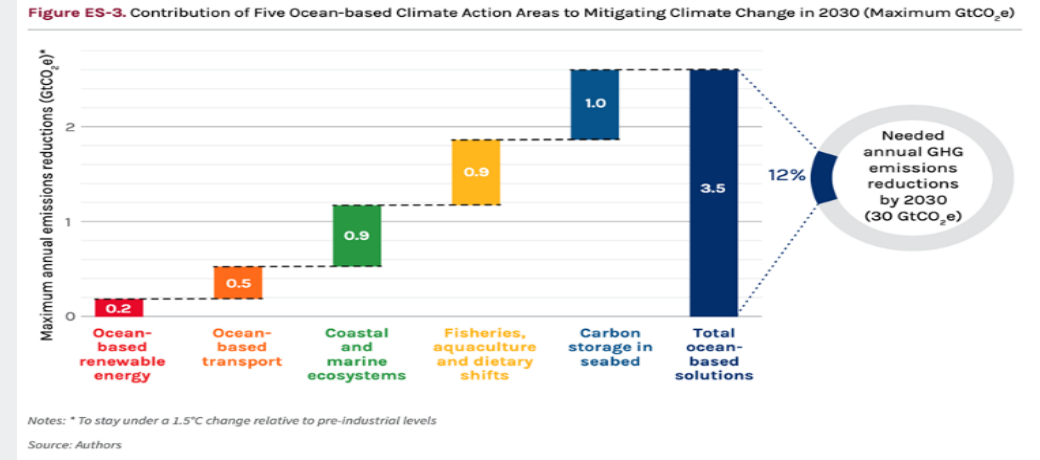
- Not a linear process – many feedback loops.
- Options other than ocean disposal may be identified.
- Application may be rejected at several stages.
- Specific Guidelines for Assessment



Expanding remit of the London Protocol and CCS

• CCS and climate change mitigation

- Include CCS within the list of activities under the Clean Development Mechanism (CDM) (COP17, 2011).
- With electrification, hydrogen and sustainable bioenergy, CCUS will play a major role to achieve net zero goals (IEA, 2020).
- 29 operating facilities with a cumulative capture capacity of nearly 40 million tonnes per annum, another 100 plus facilities are in development in the world (GCCSI, 2022).

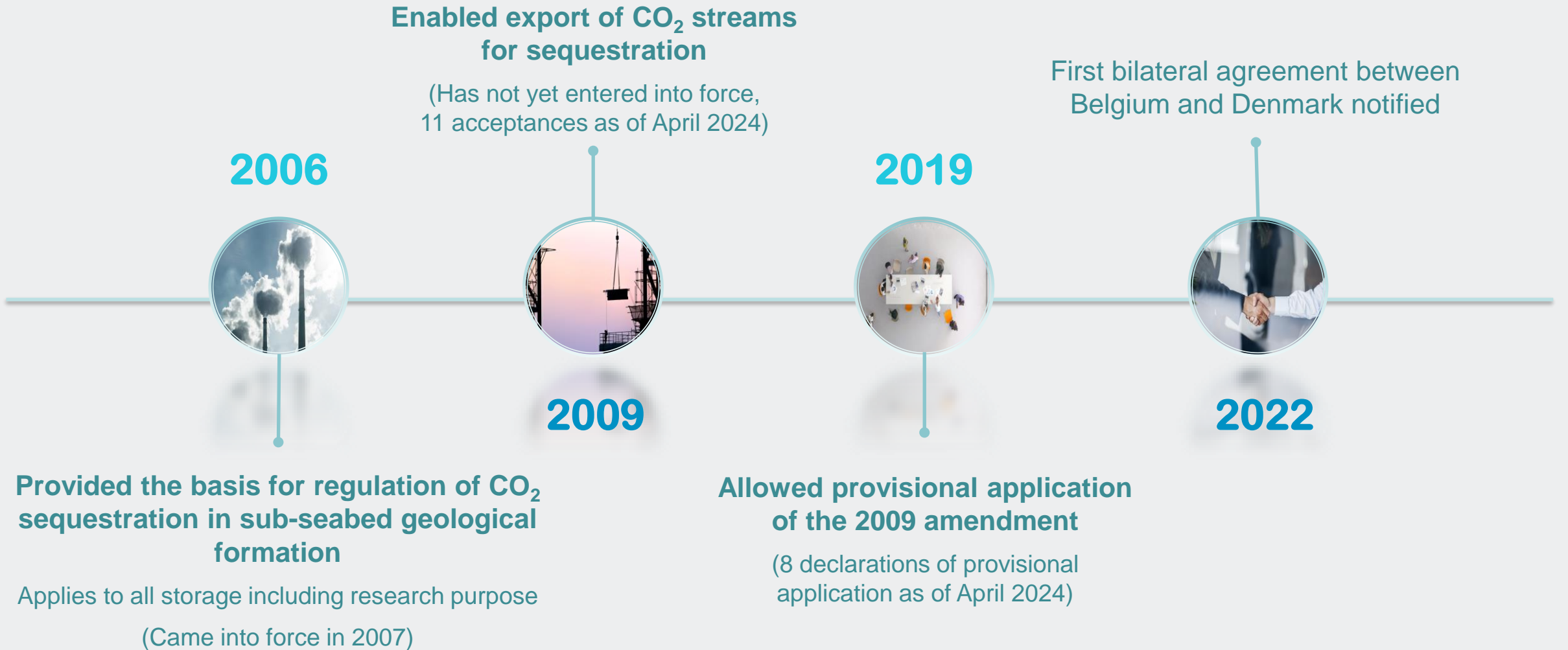


• London Protocol and CCS

- Treaties Objectives: Contracting Parties shall individually and collectively protect and preserve the marine environment from all sources of pollution.
- Since 2006, Parties responded to new threats to the oceans by regulation new climate change mitigation technologies including carbon capture and storage (CCS) in sub-seabed geological formations.

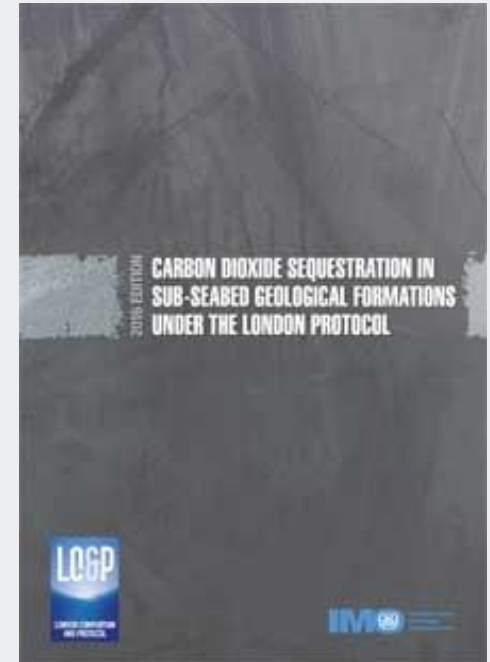


London Protocol Amendments for CCS and CO₂ Export



CCS guidance documents

- Risk Assessment and Management Framework(RAMP) for CO₂ Sequestration in Sub-seabed Geological Formations (2006)
 - Provide generic guidance to (a) characterize the risk to the marine environment from CO₂ Sequestration in Sub-Seabed on a site-specific basis and (b) collect the necessary information
- Specific Guidelines for Assessment of CO₂ Sequestration in Sub-seabed Geological Formations (2007, amended in 2012):
In order to receive a permit, must process/demonstrate;
 - Waste prevention audit
 - Consideration of waste management options
 - Chemical and physical properties – incidental associated substances: origin, amount, toxicity, etc.
 - Action list
 - Site selection and characterization
 - ✓ Sub-seabed geological formation: storage capacity, injectivity, potential migration/leakage pathway, etc.
 - ✓ Marine area under consideration: environmental, scientific, cultural, historical importance
 - ✓ Evaluation of potential exposure
 - Assessment of potential effects: Evaluation of potential effects, risk assessment, impact hypothesis
 - Monitoring and risk management:
 - ✓ Injection rates, injection and formation pressure, properties and composition of the CO₂ streams
 - ✓ Mitigation or remediation plan
 - Permit and permit conditions



Transboundary CCS and LP Guidance (2013)

- Guidance on the Implementation of Article 6.2 on the Export of CO₂ Streams for Disposal in Sub-seabed Geological Formations for the Purpose of Sequestration (LC 35/15 Annex 6, 2013)
- Under the 2009 amendment to LP, carbon dioxide can be exported for permanent storage, but only under certain conditions, and according to the transboundary CCS guidance.
- The export of CO₂ streams for disposal at sub-seabed may occur, provided that an agreement or arrangement has been entered into by the countries concerned.
- Agreement or arrangement shall include confirmation and allocation of permitting responsibilities between the exporting and receiving countries.
- Parties entering into agreement/arrangement must notify the IMO.
 - So far, an agreement has been notified to the IMO, between Belgium and Denmark. (Project Greensand, September 2022).



What happens next? Further Discussions

- Rapidly increasing interest in CCS and the role of London Protocol.
- More LP Parties and ratifications of the amendment to the LP are needed.
- Since the CCS guidelines were developed 17 years ago, we now have more experiences in CCS project and implementation of LP/guidelines.
 - Need an update of guidelines? Work in progress in LC/LP.
- Have been sharing experiences and questions at the meetings of governing bodies and Scientific Group.
- Established Correspondence Group on Experiences with the Carbon Dioxide Streams Assessment Guidelines co-led by Japan and Australia (LP-SG 46 meeting, 2023).
 - Conducted a survey on CCS experiences and issues or challenges
- **Sharing more experiences and questions at today's symposium matters as well!**

Thank you for listening!

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Ju Hyun Park

SPO at the Office for the London Convention/Protocol and Ocean Affairs
Marine Environment Division, IMO
Email: jupark@imo.org

