

Marine environment conservation efforts CCS in Japan

March 26, 2025

Marine Environment Division Environmental Management Bureau Ministry of the Environment

The London Protocol



The London Protocol and Objective

- To protect and preserve the marine environment from all sources of pollution and take effective measures to prevent, reduce and eliminate pollution caused by dumping or incineration at sea of wastes or other matter.
- In the protocol, Contracting Parties shall prohibit the dumping of any wastes or other matter with the exception of those listed in Annex 1.

<u>Amendment of the Protocol (CCS)</u>					
2006	CO2 sequestration in sub-seabed geological formations is listed in Annex 1.				
2009	Amendment to article 6 The London Protocol was amended to allow for cross border transportation of CO2 for sub-seabed storage. (The amendment must be ratified by two thirds of contracting parties to enter into force.)				
Contracting Parties that have declared a provisional application can export CO2.					

About Amendment to article 6



The London Protocol was amended to allow for cross border transportation of CO2 for sub-seabed storage. The conditions are as follows.

%This amendment has not yet come into effect.

Conclude an agreement or arrangement including confirmation and allocation of permitting responsibilities by the countries concerned.

In the case that the receiving country is a Contracting Party

Confirm that the receiving country has a permitting system in accordance with the Protocol.

In the case that the receiving country is a non-Contracting Party

Establish a permitting system in accordance with the Protocol, or agree to apply the exporter's permitting system in accordance with the Protocol, etc. (Confirmation compliance with the protocol)

Provisional Application of the Amendment to Article 6

Parties that deposited a declaration of provisional application of the amendment to article 6 with the IMO became able to export CO2 for CCS in marine areas.



> Japan is preparing to accept the amendments and declare provisional application.

In the future, Japan plans to export CO2 for CCS, and we will be making preparations to conclude an agreement or arrangement with the countries concerned.

Gathering Experience on CCS of Contracting Parties



- Japan invited Contracting Parties under the London Protocol and established the Correspondence Group to share information on experiences with CCS activities for future CCS projects in March 2023.
- As a co-chair, Japan conducted two questionnaire surveys on CCS experiences and compiled the results.

Example Questionnaire

<u>How does each country set an appropriate permitting period and what items in the permits would each country review at regular intervals?</u>				
Germany	Storage permits are subject to conditions and can be reviewed every five years. Operators are required to submit annual monitoring reports to verify compliance. The monitoring plan must be updated every five years.			
Norway	Storage permits are normally granted for the entire period during which storage is planned, e.g. 25 years. Monitoring plans are reviewed every five years, and permits can be updated or revoked as necessary.			
UK	Storage permits are reviewed after five years and every ten years thereafter or sooner in certain circumstances, with updates to the monitoring plan approved every five years.			
US	The Area of Review for Class VI permits for onshore CO2 sequestration must be reevaluated at least every five years, and reports of testing and monitoring information must be submitted on a semi-annual basis.			



Act on Prevention of Marine Pollution and Maritime Disaster

1. Disposal of waste under the seabed is prohibited in principle

Disposal of waste under the seabed is prohibited, except with the permit issued by the Minister of the Environment.

2. Permitting system for subsea CCS

- Anyone who intends to store CO2 under the seabed must be required permitting issued by the Minister of the Environment.
- Anyone who seeks permitting issued by the Minister of the Environment must assess the environmental impact.
- Anyone who obtains permitting issued to store CO2 under the seabed must monitor the marine environment.



Tomakomai CCS demonstration project



Applicant	Ministry of Economy, Trade and Industry
Permitted period	(1) 2016.4 - 2021.3, (2) 2021.4 - 2026.3
Injection period	2016.4 - 2019.3 (3 years)
Total amount	300,000 tonne (100,000 tonne/year)
CO2 Source	Petroleum refining plant



Monitoring by business operators in the Tomakomai project



Monitoring plan for the initi (April 2016 to March 2021) (with	al permit CO2 injection)	Monitoring plan for current permit (April 2021 to March 2026) (no CO2 injection)					
① Status of stored CO2 gas							
 Quantity of CO2 gas: 	1 time / year	 Quantity of CO2 gas: 	Not implemented				
\cdot Concentration of CO2 and harmful substa	ance: 1 time / year	 Concentration of CO2 and harmful substance: Not implemented 					
 Injection pressure, speed and temperature 	re: 1 time / year	 Injection pressure, speed and temperatu 	re: Not implemented				
② Status of the sea area							
A. Pressure and temperature in the formation, etc.							
\cdot Pressure and temperature in the strata: 1 time / year [*]		 Pressure and temperature in the strata: Monitoring is continuous, and reports ar 	1 time / year [%] e made 1 time a year.				
The state of the strata and geology, the location and range of CO2 gas, etc.							
 Elastic wave exploration: 	1 time / year	 Elastic wave exploration: 	2 times / 5 years				
B. Seawater chemistry							
 Water quality survey: 	4 times / year	 Water quality survey: 	4 times / year				
 Sediment survey: 	4 times / year	 Sediment survey: 	Not implemented				
C. Marine ecosystems, etc.							
Benthos:	4 times / year	• Surf clam:	1 time / year				
		Plankton:	4 times / year				

MOE survey on Tomakomai project



In the Tomakomai project, in addition to monitoring the business operators, the Ministry of the Environment also conducted its own monitoring to confirm environmental conservation.

Outline of the MOE's marine monitoring

Since the start of the project, MOE has conducted marine monitoring in addition to monitoring of the business operators and confirmed that there is no risk of impeding marine environmental conservation.

- > Offshore Tomakomai, approximately 10km x 8km area.
- Four-season survey.
- 1 Seawater chemistry survey
- > Water sampling was conducted at 9 points.
- ② Sediment survey
 - In addition to the 9 seawater chemistry surveyed points, sampling was conducted at 3 points around the end of the injection well.
- ③ Marine ecosystem survey
 - Surf clam habitat and underwater camera surveys of benthic organisms were conducted at 12 points.

Marine surveys were also conducted for five years from 2011 to 2015 prior to the implementation of this project.



Examination of the monitoring method by MOE



Examination of the monitoring method for the sub-seabed CCS project

- Currently, monitoring of CO2 stored under the seabed is carried out by elastic wave exploration, which uses air guns to artificially generate elastic waves (seismic waves) and estimates the geological structure. However, there are concerns about the impact of the loud sound of the air gun on marine ecosystems.
- Therefore, in order to develop the monitoring method with less environmental impact for grasping the CO2 stored under the seabed, we will conduct actual sea trials for practical use of the electromagnetic exploration system and aim to establish an evaluation method.



Electromagnetic exploration system image

Overview of the Act on Carbon Dioxide Storage Businesses

- Japan has created <u>a business environment for private businesses to start CCS business by 2030</u>, <u>establishing a permit system for storage projects</u> while <u>maintaining public safety and conserving</u> <u>marine environment</u>.
- The current permission system under the Act on Prevention of Marine Pollution and Maritime Disaster will be integrated into the new Act.
- The Minister of the Environment will jointly manage necessary measures with the Minister of the Economy, Trade and Industry from the viewpoint of marine environment conservation.
- 1. Permit system for storage business, and business regulations related to storage business

(1) Permit system for exploratory excavation and storage business

The Minister of Economy, Trade and Industry

- Designates the area where the reservoir may exist as a "specific area".
- Announce an open call for exploratory excavation and CO2 storage projects in the specific area,
- Grants permission to the most appropriate applicants.
- Need agreement with the Minister of the Environment in designation of specific area and permit of a storage.

(2) Regulations for storage business operators

The Minister of Economy, Trade and Industry

- Approves the specific "implementation plan" for exploratory excavation and storage projects.
- In the case that storage is in the sea area, approval by the Minister of the Environment is required.
- Impose the obligation to monitor the temperature and pressure of the storage reservoir so that leakage of stored CO2 can be identified.

2. Authorization of closure plan, post-closure management by JOGMEC

> After business abolition is permitted, projects will be taken over and managed by JOGMEC.

Conservation of the marine environment under a new act on CCS



The Act on Carbon Dioxide Storage Businesses was enacted in May 2024. The Minister of the Environment will be jointly responsible for taking necessary measures for conservation of the marine environment under this Act.

