Newsletter

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Latest CCS Commercialization Trends in Japan

1. Recent CCS trends in Japan

In recent years, the Japanese Government has been promoting Carbon Dioxide Capture and Storage (**CCS**) projects as part of its stated aim to achieve carbon neutrality by 2050. So far there has only been one CCS project in Japan, a demonstration project located in Tomakomai, Hokkaido.

However, in March 2023, a council from within the Ministry of Economy, Trade and Industry (**METI**) officially released the "CCS Long-Term Roadmap Study Group - Final Summary" to promote CCS projects in Japan over the medium to long term, and in addition recommended certain actions that should be taken toward the full-scale implementation of CCS projects.

In June 2023, the Japan Organization for Metals and Energy Security (**JOGMEC**),[1] a government agency supporting energy and resource development, announced the selection of seven projects[2] (some in Japan and some overseas) as "Advanced CCS Projects" that are expected to scale up projects and reduce costs. The agency plans to provide support for the commercialization of these projects.

As can be seen from the above, there is now a growing movement in Japan towards the commercialization of CCS projects.

In the next section, we will take a brief look at the history of CCS trends in Japan, following which we will set out further details of the new trends described above.

2. History of CCS Trends in Japan

In October 2020, the Government declared its aim that Japan would "achieve carbon neutrality by 2050," together with an announcement April 2021 stating its policy that Japan would "aim to reduce greenhouse gas emissions by 46% over 2013 levels by 2030".

The Government has emphasized the promotion of CCS to help achieve these policy goals. For example, in its Sixth Strategic Energy Plan[3], finalized in March 2021, it states that "as for CCS, Japan will work to establish the technology, reduce the cost, develop suitable sites, and improve the environment for CCS commercialization, while formulating a long-term roadmap and sharing it with stakeholders". This is a clear expression of the Government's intention to support the development of CCS technology and suitable sites.

In Japan, there are various ongoing efforts to utilize CCS, including those listed below:

(1) The design, construction and commissioning of a large-scale CCS demonstration project in Tomakomai, Hokkaido commenced in 2012 (with the underground injection of CO_2 starting in FY2016). By November 2019, the project had successfully achieved its target of storing a total of 300,000 tons of carbon dioxide (CO_2) underground.

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[1] JOGMEC is an incorporated administrative agency that provides funds and other services necessary for the development of energy and natural resources.
[2] Please refer to the table at the end of this Article for further details.
[3] The Strategic Energy Plan is a plan formulated by the Government of Japan under the Basic Act on Energy Policy in order to set out the fundamental direction of its energy policy.

(2) Considering the practical realization of CCS will necessitate the long-distance shipping of large quantities of CO_2 from the emission source to a suitable storage site, a liquefied CO_2 shipping experiment has been under preparation since 2021, with the long-distance transportation of CO_2 from Maizuru, Kyoto to Tomakomai, Hokkaido (approximately 1,000 km) scheduled to commence in 2024.

3. Official Announcement of "CCS Long-Term Roadmap Study Group - Final Summary"

On March 10, 2023, the CCS Long-Term Roadmap Study Group (**Study Group**), a council formed within METI, officially announced the "CCS Long-Term Roadmap Study Group - Final Summary" (**Final Summary**).

Among other things, the Final Summary:

- summarizes the discussions held by the Study Group since January 2022, together with making recommendations regarding the medium-to-long-term promotion of CCS in Japan;
- sets the future goals of "improving the environment for commercialization of CCS by 2030 and commencement of full-scale operation of CCS businesses from 2030 onward, with the aim of enabling storage of approximately 120 to 240 million tons of CO_2 annually by 2050"; and
- states that certain specific actions (see below) should be taken to achieve these goals.

Specific action to be taken:

(1) Government support for CCS businesses

With the aim of achieving CCS commercialization by 2023, business operator-led "advanced CCS businesses" will be selected by the Government to receive targeted support. Commencing from FY2023, related Governmental agencies will conduct geological surveys to locate suitable sites for CCS.

(2) CCS cost reduction efforts

A goal has been set to reduce the costs of CCS by approximately 60% or more by 2050 when compared to 2023 levels.

(3) Promotion of public understanding of CCS

CCS businesses should be carried out based on the premise that they should gain the understanding of the public, particularly in regions where CO_2 storage sites will be located. The Government will also host information sessions for each region of Japan on CCS.

(4) Promotion of CCS business overseas

For Japan, utilization of suitable overseas storage sites provides a promising option for CO_2 storage. Planning is underway to commence negotiations with certain target countries that will undertake the import of CO_2 from Japan, and requests for financial support from potential host countries to develop CO_2 storage sites will be examined by relevant government agencies. In addition, project support (in the form of risk money, etc. from the "Asia CCUS Network" under the Asia Energy Transition Initiative (**AETI**) led by Japan, or from relevant governmental agencies) will be provided to Japanese companies when acquiring related rights and interests in appropriate sites and CCS projects in other countries. There could also be benefits for overseas companies by participating in the development of CCS sites utilized by Japanese companies.

(5) Discussions regarding the development of CCS legislation

In Japan, there is a move to develop a business law relating to CCS. Together with the publication of the Final Summary, the Study Group also published a document titled the "Ideal shape of the CCS Business Act (tentative)". This document discusses details of a proposed business law concerning CCS. Under the proposed CCS Business Act, "storage business rights" (consisting of prospecting rights (for a maximum of

eight years) and storage rights (for an indefinite period)) will be newly created by METI. The business operator will be selected through a public tender and must obtain the permission of the Minister of METI. The business operator must, as a rule, be a Japanese citizen or a Japanese corporation pursuant to the laws of Japan, meaning it will be possible for foreign companies to participate in CCS projects in Japan as shareholders in the Japanese corporation.

(6) Formulation and review of "CCS Action Plan"

Following more detailed deliberations on the CCS annual storage target, cost target, technical development policies and suitable site survey plans, METI will formulate a CCS Action Plan which will be made available to the public as well as updated at appropriate times in the future.

4. Selection of seven projects by JOGMEC for "Business Feasibility Study on Japanese Advanced CCS Projects"

Although there has been some progress with CCS in Japan, it still remains the case that there are currently no commercial projects in operation, with the only project making progress of any kind being the demonstration project in Tomakomai. Nevertheless, considering the Government's goal of commencing CCS projects in 2030, there is a need to select suitable sites for CCS projects and to further consider developments for commercialization at an early stage.

In light of the above, in June 2023, JOGMEC selected seven role model projects as "Japanese Advanced CCS Projects" that are expected to scale up operations and reduce costs in due course (see the table at the end of this article for further details).

The seven projects are expected to involve companies in a wide range of industries, including power generation, oil refinery, steel, chemicals, pulp/ paper, and cement. The projects are also anticipated to be located in a well-balanced geographical manner throughout Japan in order to capture the CO_2 emitted from various regions.

Furthermore, two of the seven projects will involve the transportation and storage of CO_2 from Japan to overseas locations (Malaysia and Oceania). The aim of this is to develop CCS projects for decarbonization not only in Japan but throughout the Asia-Pacific region.

5. Future Development of CCS

In Japan, therefore, the movement toward the launch of CCS in 2030 is gaining momentum. As a result, various investments and development work relating to CCS projects are expected to occur. Since CCS projects are also expected to be utilized overseas, related industries are expected to become more active in various areas in both Japan and abroad.

Overview of the projects selected for the "Business Feasibility Study on Japanese Advanced CCS Project" for FY2023[4]

	Location of CO_2 storage	Annual storage volume (Mtpa)	CO_2 emission source	Transportation method
1	Tomakomai area (oil and gas field or saline aquifer – not yet determined)	Approximately 1.5	Oil refinery and electric power plant in Tomakomai area	Pipeline
2	Tohoku region west coast, etc. (offshore saline aquifer)	Approximately 2.0	Wide-area of CO_2 emissions in Japan steel plant, cement plant and local emitter near CO_2 storage	Ship and Pipeline
3	Niigata Prefecture (Oil and gas field)	Approximately 1.5	Chemical plant, pulp mill and electric power plant in Niigata	Pipeline

[4] Reorganized by the authors based on the information on JOGMEC's website (https://www.jogmec.go.jp/english/news/release/news_10_00036.html)

	Location of CO_2 storage	Annual storage volume (Mtpa)	CO_2 emission source	Transportation method
4	Metropolitan area, etc. (offshore saline aquifer)	Approximately 1.0	Multiple industries including steel plant in metropolitan area	Pipeline
5	Off the northern to western shore of Kyushu (offshore saline aquifer)	Approximately 3.0	CO_2 emission in Setouchi/Kyushu region Oil refinery and electric power plant in west Japan	Ship and Pipeline
6	Offshore east coast of Malay peninsula in Malaysia (offshore depleted oil and gas field and saline aquifer)	Approximately 2.0	Multiple industries including chemical/oil refineries in Kinki/Kyushu region, etc.	Ship and Pipeline
7	Oceania (offshore depleted oil and gas field and saline aquifer)	Approximately 2.0	Multiple industries including steel plants in Chubu region (Nagoya and Yokkaichi)	Ship and Pipeline

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