

JCCS



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A MESSAGE FROM THE PRESIDENT

From Japan to the World

~ with a view towards the social implementation of CCS ~

There are high expectations for CCS as a measure against global warming, and according to the “Net Zero Roadmap” published by the IEA (International Energy Agency) in September 2023, the global CO₂ capture by CCUS required to achieve net zero in 2050 is projected to be approximately 6 billion tons per year.

In Japan, the Ministry of Economy, Trade and Industry published the “Final Summary of the CCS Long Term Roadmap” in March 2023. In June of the same year, seven projects envisioned to begin storing CO₂ emitted in Japan by JFY2030 were adopted as potential model projects by a national agency as “Advanced CCS Projects”. Furthermore, with the enactment of the CCS Business Act in May 2024, steps are steadily being taken toward the social implementation of CCS by 2030.



Established in 2008 for the purpose of investigation, research and development of CCS technology, Japan CCS Co., Ltd. has been commissioned by the Japanese government and other entities to conduct four projects: “Tomakomai CCS Demonstration Project”, “Investigation of Potential CO₂ Storage Sites”, “Research, Development and Demonstration Projects on CO₂ Ship Transportation”, and “Project to Promote the Creation of Circular Carbon Society Model through CO₂ Recycling”.

The Tomakomai CCS Demonstration Project was commenced in JFY2012, and with the understanding and cooperation of the local community, the project successfully achieved the target of 300,000 tonnes cumulative sub-seabed CO₂ injection in November 2019, confirming that “CCS is a safe and secure system”. In the investigation of potential CO₂ storage sites which was started in JFY2014 (contract was concluded in JFY2023), it was estimated that there are geological formations (reservoirs) suitable for storing a total of 16 billion tons of CO₂ at 11 sites, and the results have been reflected in the CCS Long Term Roadmap. Furthermore, in the CO₂ ship transportation demonstration project from JFY2021, we have commenced construction of facilities that will enable bi-directional transportation of liquefied CO₂ between the Maizuru and Tomakomai offices, and plan to complete construction this fall and conduct CO₂ ship transportation demonstration between Maizuru and Tomakomai.

Aiming for carbon neutrality in 2050, we view as our mission the contribution towards the realization of the national policy to establish the social foundation for CCUS by 2030. To this end, harnessing the technology and know-how that we have nurtured on CCS, we will unite our efforts to continue our role in reaching out to the international community.

We ask for your continued understanding and support.

June 2024

Toshiaki Nakajima

President

Japan CCS Co., Ltd.

COMPANY PROFILE

Company Name:	Japan CCS Co., Ltd.
Address:	SAPIA TOWER 21F, 1-7-12 Marunouchi, Chiyoda-ku, Tokyo 100-0005 Japan
URL:	https://www.japanccs.com
Date of Incorporation:	May 26, 2008
Business Description:	Implementation of investigations, research and development, feasibility studies and demonstration projects pertaining to carbon dioxide capture, utilization, transportation and storage (CCUS) technologies.
Capital:	JPY242,500,000
Capital Reserves:	JPY242,500,000

Shareholders:

Hokkaido Electric Power Co., Inc. Tohoku Electric Power Co., Inc.
Tokyo Electric Power Company Holdings, Inc. Chubu Electric Power Co., Inc.
Hokuriku Electric Power Company The Kansai Electric Power Co., Inc.
The Chugoku Electric Power Co., Inc. Shikoku Electric Power Co., Ltd.
Kyushu Electric Power Co., Inc. The Okinawa Electric Power Co., Ltd.
Electric Power Development Co., Ltd. JFE Engineering Corporation
NIPPON STEEL ENGINEERING CO., LTD. CHIYODA CORPORATION Toyo Engineering Corporation
JGC Holdings Corporation INPEX CORPORATION Japan Petroleum Exploration Co., Ltd.
Mitsui Oil Exploration Co., Ltd. Idemitsu Kosan Co., Ltd. COSMO OIL Co., Ltd. ENEOS Corporation
ITOCHU Corporation Sumitomo Corporation Marubeni Corporation Mitsubishi Corporation
JFE Steel Corporation NIPPON STEEL CORPORATION
Osaka Gas Co., Ltd. Tokyo Gas Co., Ltd. MITSUBISHI GAS CHEMICAL COMPANY, INC.
Mitsubishi Materials Corporation Marubeni-Itochu Steel Inc.
(33 companies, as of November 15, 2022)

■ FOUNDATION OF JAPAN CCS CO., LTD.

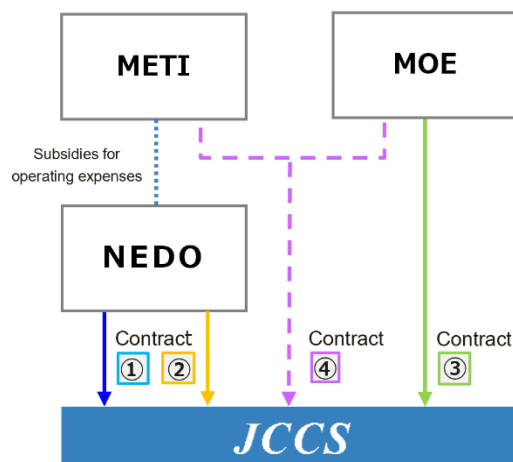
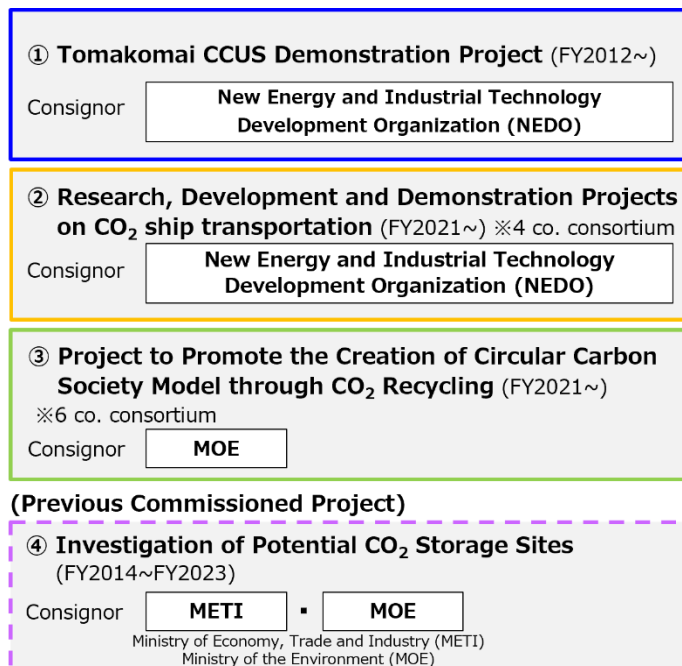
Japan CCS Co., Ltd (JCCS) was founded in May 2008 when a group of major companies with expertise in CCS-related fields, including electric power, petroleum, oil development, and plant engineering, joined forces to answer the Japanese government's policy to advance CCS as a countermeasure against global warming. JCCS is a special purpose company dedicated explicitly to developing integrated CCS technology.

■ KEY BUSINESS OBJECTIVES

1. Conduct comprehensive investigations and demonstrations of carbon dioxide capture, utilization, transportation and storage projects in Japan
2. Conduct investigation of potential CO₂ storage sites in Japan
3. Integrate opinions from the private sector for early establishment of laws, regulations and technical standards applicable to CCUS in Japan
4. Conduct promotional activities for CCUS deployment in Japan
5. Cooperate with foreign organizations for promotion of overseas CCUS demonstration projects
6. Collect the latest information on CCUS and collaborate with overseas CCUS research organizations

PROJECTS

■ Commissioned Projects/Project Framework



※Each project is conducted by establishing an expert committee comprised of experts in each field which provides advice and technical guidance.

■ Tomakomai CCS Demonstration Project (JFY2012~)

Commissioned by NEDO

As a result of various field surveys and studies, the project location was narrowed down from 115 candidate sites in Japan, and following a government review meeting, the decision was made to conduct the project in Tomakomai City, Hokkaido Prefecture in February, 2012.

During the four years between JFY2012-2015, the facilities to capture high purity CO₂ from gas containing CO₂ generated from a hydrogen production unit of a refinery and to inject the CO₂ into the subsurface were designed and constructed. Also, an existing investigation well was converted into an observation well, and two observation wells and two injection wells were drilled.

At the same time, in order to confirm that the CO₂ injection into the reservoir does not affect the surrounding environment, a monitoring system for formation and earthquake data was installed, and baseline data prior to injection was obtained. In addition, since the formations where the CO₂ is stored are under the seabed, a preliminary survey of seawater and marine organisms was conducted in accordance with the Act on Prevention of Marine Pollution and Maritime Disaster.



Tomakomai CCS Demonstration Project Center

Having completed this preparatory work, from April 2016, Japan CCS commenced injection of CO₂ into a formation about 1,000 meters below the seabed in the port area of Tomakomai Port, with the aim of achieving 300,000 tonnes of cumulative injection. The monitoring work being

conducted includes monitoring the behavior of the injected CO₂ (migration, distribution), marine environmental surveys, etc., to confirm that there is no seepage of CO₂, as well as continuous monitoring of micro-seismicity and natural earthquakes. On November 22, 2019, the CO₂ injection reached the target of 300,000 tonnes, and injection was terminated the same day. Monitoring work is being continued after termination of injection.

In addition, obtaining the understanding and trust of the community where the project is being conducted is an important objective, and panel exhibitions, site tours of the demonstration plant, lectures for various organizations and students, and science experiment classes for children have been continued from the beginning of the project. Furthermore, domestic and international exhibitions and presentations, public relations activities through our website, YouTube and SNS are being conducted in order to enhance public acceptance of CCS.

■ SCHEDULE

Contract Period: JFY2012~JFY2026

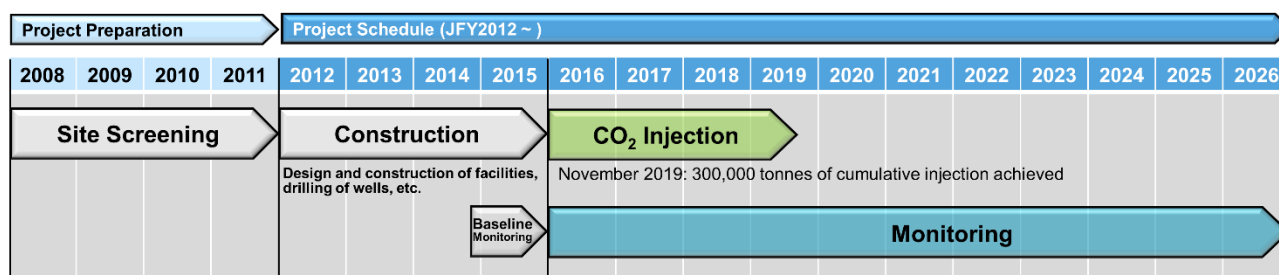
- From JFY2012 to JFY2015: Preparation

Activities including the design and construction of facilities, drilling of wells, and preparation for demonstration operation were carried out.

- From April 2016 to November 2019: CO₂ injection and monitoring of CO₂

On November 22, 2019, the target of 300 thousand tonnes of CO₂ injection was achieved, and injection was terminated.

- From November 2019: Post-injection monitoring, maintenance of facilities, improvement of capability, etc.
- From JFY2021: Study/preparation of the interoperation of CCS and CCU



※ Years are in Japanese Fiscal Years (JFY: April of calendar year to March of following year)

■ Research, Development and Demonstration Projects on CO₂ Ship Transportation (JFY2021~)

Commissioned by METI and MOE

In June 2021, a consortium^{*1} including Japan CCS was commissioned by the New Energy and Industrial Technology Development Organization (NEDO) to conduct the project “CCUS R&D and Demonstration Related Projects / Large Scale CCUS Demonstration at Tomakomai / Demonstration of CO₂ Transportation / Technology Development and Demonstration of CO₂ Ship Transportation”.

With a view towards the social implementation of CCUS around 2030, the project will conduct research and development and demonstration of CO₂ ship transportation which will lead to long-distance/mass transportation of CO₂ from emission sources to utilization/storage points at a scale of 1 million tonnes per year as well as cost reduction, and will aim to establish integrated liquefied CO₂ transportation technology.

CO₂ will be liquefied in a terminal in the Kansai Electric Power Co., Inc. Maizuru Power Plant and transported back

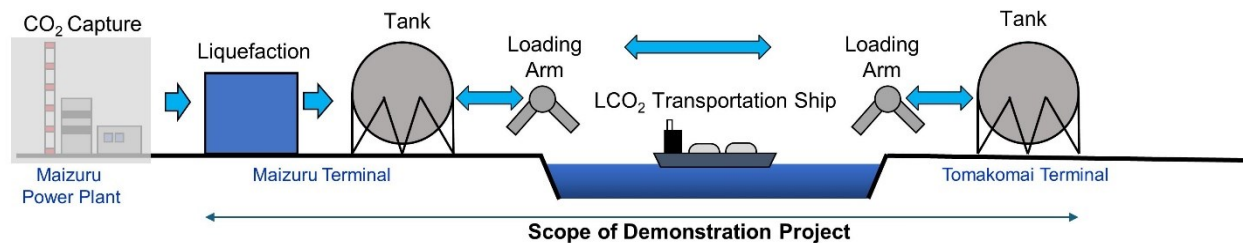
and forth mainly between a terminal in the Hokkaido Electric Power Co., Inc. Tomakomai Power Plant.

*1 Japan CCS Co., Ltd., Engineering Advancement Association of Japan, ITOCHU Corporation, Nippon Gas Line Co., Ltd.*2, NIPPON STEEL CORPORATION*3

*2 Nippon Gas Line Co., Ltd.: from Nov. 8, 2023~

*3 NIPPON STEEL CORPORATION: until Mar. 3, 2024

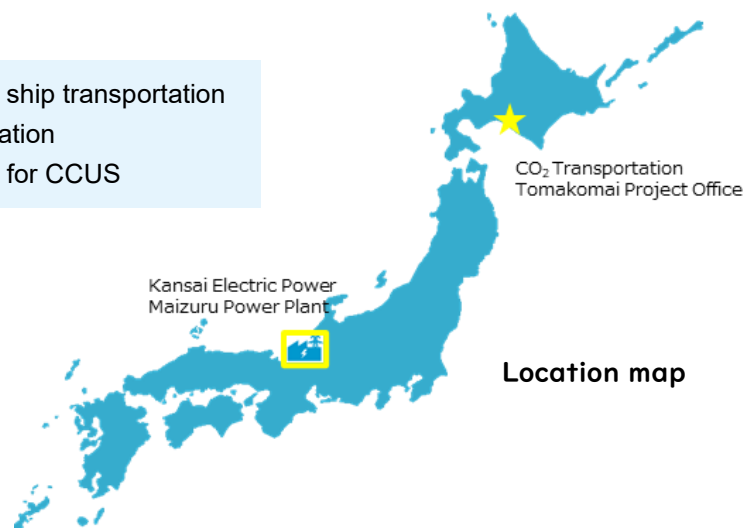
Conceptual Diagram



Note: Figure adapted from METI

Research and Development Topics

1. R&D to establish technology for LCO₂ ship transportation
2. Demonstration of LCO₂ ship transportation
3. Feasibility study of ship transportation for CCUS



■ “Project to Promote the Creation of Circular Carbon Society Model through CO₂ Recycling” by the Global Environment Bureau, Ministry of the Environment (JFY2021~JFY2024)

Commissioned by MOE

In August 2021, a consortium of 6 companies*¹ including Japan CCS was commissioned to conduct “Project to Promote the Creation of Circular Carbon Society Model through CO₂ Recycling” by the Global Environment Bureau, Ministry of the Environment.

In achieving the targets of the Paris Agreement, there are high expectations for environmental innovations including CO₂ capture, storage and recycling, making renewable energies into mainstream power sources, expanding the use of hydrogen, and decarbonization of fuels. Also, in the aviation industry, the International Civil Aviation Organization (ICAO) has defined CO₂ emissions reduction targets in CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) and aiming for the use of SAF*² in aviation as an effective means of reduction strongly urges its stable production and supply.

The P2C*³ plant being studied in this project will use artificial photosynthesis technology to reduce the CO₂

captured from emission sources into CO₂, which will then be reacted using the FT synthesis^{*4} process with hydrogen originating from renewable energy to produce liquid fuels such as jet fuel, light oil, etc.

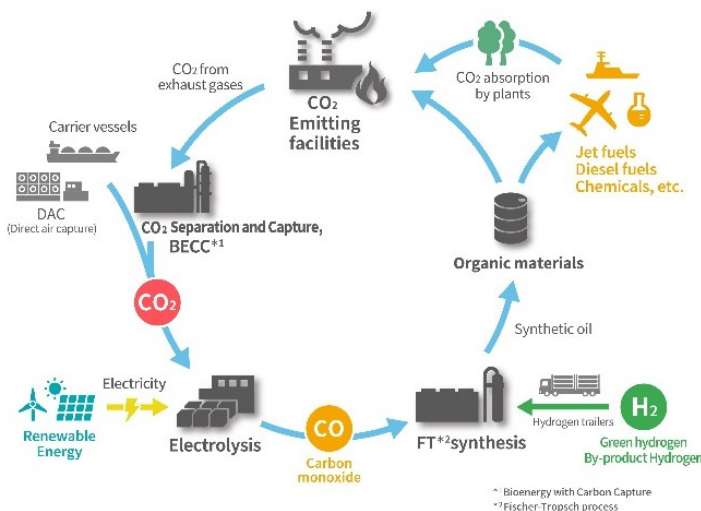
P2C is expected to significantly reduce the amount of CO₂ emissions and greatly contribute to achieving carbon neutrality.

*1 6 companies: Toshiba Energy Systems & Solutions Corporation, Toyo Engineering Corporation, Toshiba Corporation, Idemitsu Kosan Co., Ltd., Japan CCS Co., Ltd., All Nippon Airways Co., Ltd.

*2 SAF: Sustainable Aviation Fuel (jet fuel produced from sustainable supply sources with low-CO₂ emissions in the process from the production and collection of raw materials to combustion)

*3 P2C: Power-to-Chemicals (a CCU/carbon recycling technology that uses renewable energy, renewable hydrogen, etc. to convert CO₂ into products with high environmental value. P2C significantly contributes not only to the reduction of CO₂ emissions but also the dissemination of renewable energy.

*4 FT synthesis: Fischer-Tropsch synthesis (a series of technologies that synthesize liquid hydrocarbons from CO and hydrogen by utilizing a catalytic reaction)



Regional Circular Carbon Society Model (Illustration)

■ Investigation of Potential CO₂ Storage Sites (JFY2014~JFY2023)

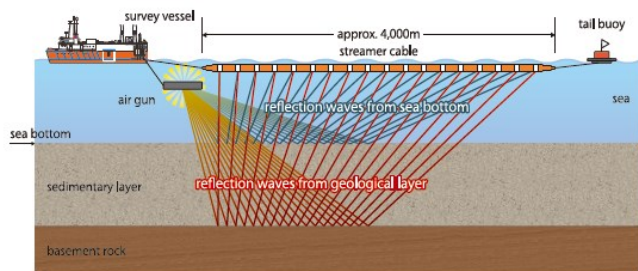
Commissioned by NEDO

In order to conduct CCS, geological formations that can stably store large amounts of CO₂ are required. According to surveys conducted between JFY2005-2012, the geological formations in Japan are estimated to have a total storage potential of about 240 billion tons of CO₂. Although the total storage potential is considered to be sufficient, more detailed investigation is required to determine how suitable individual candidate sites are for storage.

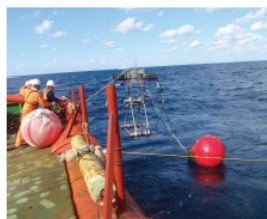
For this reason, the Ministry of Economy, Trade and Industry and the Ministry of the Environment jointly conducted the "Investigation of Potential CO₂ Storage Sites" from JFY2014 to 2023, commissioning the project to Japan CCS.

In this project, at candidate sites with expectations for large storage potential, seismic surveys and analysis of existing well data were conducted, and evaluation of the geological structure, reservoirs and cap rocks was implemented.

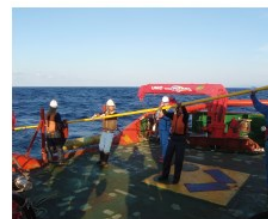
The main achievements of this project are: (1) Detailed evaluation utilizing 3D seismic data completed at 11 sites estimated the total storage potential (volumetric method) to be approximately 16 billion tonnes (as of March 2023); (2) The results of the project including annual reports, technical manuals, acquired data and evaluation results were transferred to JOGMEC. A framework has been prepared in order that private CCS companies may utilize the data and results obtained in this project.



Conceptual diagram of seismic survey



Lowering airgun into the sea



Lowering streamer cable into the sea

Japan CCS Co., Ltd.