JCCS

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A MESSAGE FROM THE PRESIDENT

From Japan to the World
- with a view towards the commercialization of CCS -

There are high expectations for CCS as a measure to combat global warming. According to the "World Energy Outlook 2024" published by the IEA (International Energy Agency) in October 2024, the amount of CO_2 that will need to be captured globally through CCUS to achieve net zero by 2050 is estimated to be approximately 6 billion tons per year at that time.

In Japan, the Act on Carbon Dioxide Storage Business (CCS Business Act) was enacted in May 2024, with some provisions coming into effect by November of the same year. Additionally, steps towards the commercialization of CCS are steadily being taken, including the re-selection of nine projects in June 2024 as candidates for "Advanced CCS Projects" to receive prioritized government support.

Japan CCS Co., Ltd. was established in 2008 for the purpose of conducting the investigation and research and development of CCS technology. The company has been commissioned by the government and other entities to conduct four projects: "Tomakomai CCS Demonstration Project", "Investigation of Potential CO_2 Storage Sites", "R&D and Demonstration of CO_2 Ship Transportation Project" and "Project to Promote the Creation of Circular Carbon Society Model through CO_2 Recycling", and has been implementing these projects.

The Tomakomai CCS Demonstration Project was commenced in FY2012, and with the understanding and cooperation of the local community, the project successfully achieved the target of 300,000 tonnes cumulative sub-seabed CO_2 injection in November 2019, confirming that "CCS is a safe and secure system". In the Investigation of Potential CO_2 Storage Sites, which was started in FY2014, it was estimated that there are geological formations suitable for storing a total of 16 billion tons of CO_2 at 11 sites, and the results have been reflected in Japan's CCS Long-Term Roadmap. Furthermore, in the CO_2 ship transportation demonstration project launched in FY2021, we are conducting two-way liquefied CO_2 transport between the Maizuru and Tomakomai terminals.

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 2025

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 ENGNEERING CO., LTD. CHIYODA CORPORATION Toyo Engineering Corporation
JGC Holdings Corporation INPEX CORPORATION Japan Petroleum Exploration Co., Ltd.
Mitsui Energy Development 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 January 1, 2025)

◎ 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 CO_2 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

① **Tomakomai CCUS Demonstration Project** (FY2012~)

Consignor: New Energy and Industrial Technology Development Organization (NEDO)

② **R&D and Demonstration of CO_2 Ship Transportation Project** (FY2021~) ※4 co. consortium

Consignor: New Energy and Industrial Technology Development Organization (NEDO)

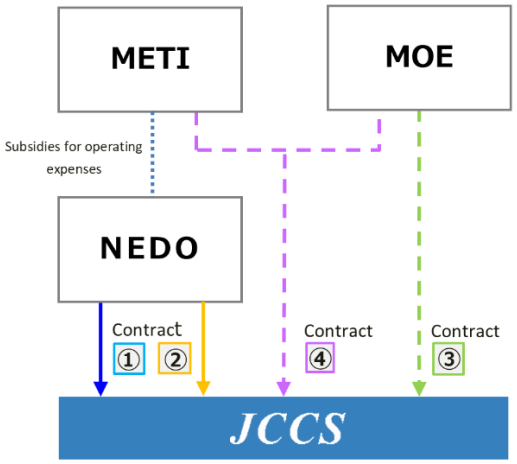
(Previous Commissioned Projects)

③ **Project to Promote the Creation of Circular Carbon Society Model through CO_2 Recycling** (FY2021~FY2024) ※6 co. consortium

Consignor: MOE (Ministry of the Environment)

④ **Investigation of Potential CO_2 Storage Sites** (FY2014~FY2023)

Consignors: METI (Ministry of Economy, Trade and Industry) ・ MOE (Ministry of the Environment)



※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 CO_2 from gas containing CO_2 generated from a hydrogen production unit of a refinery and to inject the CO_2 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 CO_2 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 CO_2 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 CO_2 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 CO_2 (migration, distribution), marine environmental

surveys, etc., to confirm that there is no seepage of CO_2, as well as continuous monitoring of micro-seismicity and natural earthquakes. On November 22, 2019, the CO_2 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.

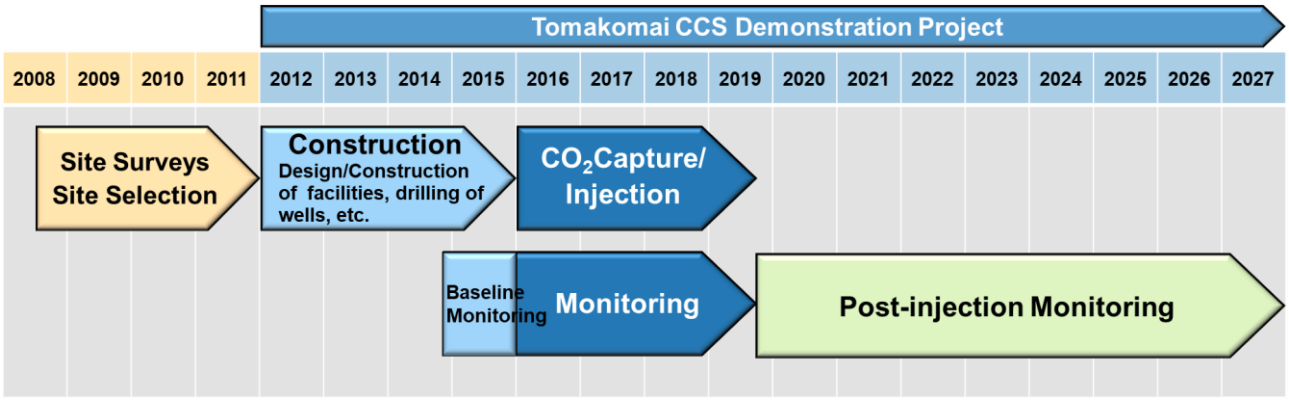
*JFY2012-2017 (commissioned by METI)、JFY2018- (commissioned by NEDO)

◎ SCHEDULE

Contract Period: JFY2012~JFY2027

- From JFY2012 to JFY2015: Construction
  Activities including the design and construction of facilities, drilling of wells, baseline monitoring, and preparation for demonstration operation were carried out.
- From April 2016 to November 2019: CO_2 capture/injection (On November 22, 2019, the target of 300 thousand tonnes of CO_2 injection was achieved, and injection was terminated.)
- From JFY2016: Monitoring of CO_2 (*), being continued after termination of injection
- From JFY2021 to JFY2024: Study/preparation of the interoperation of CCS and CCU

(*) Monitoring the behavior (migration, distribution) of the injected CO_2, continuous monitoring of micro-seismicity and natural earthquakes, marine environmental monitoring to detect for possible CO_2 leakage/seepage are being conducted.



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

■ R&D and Development of CO_2 Ship Transportation Project (JFY2021-)

Commissioned by NEDO

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 CO_2 Transportation / R&D and Demonstration of CO_2 Ship Transportation Project".

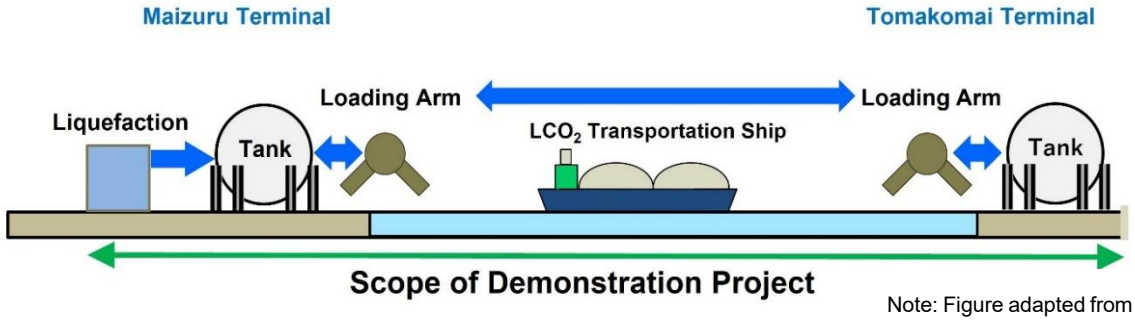
With a view towards the social implementation of CCUS around 2030, the project will conduct research and development and demonstration of CO_2 ship transportation which will lead to long-distance/mass transportation of CO_2 from emission sources to utilization/storage points at a scale of 1 million tonnes per year as well as cost

reduction, and will aim to establish integrated liquified CO_2 transportation technology.

CO_2 will be liquefied in a terminal in the Kansai Electric Power Co., Inc. Maizuru Power Station and transported back and forth 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

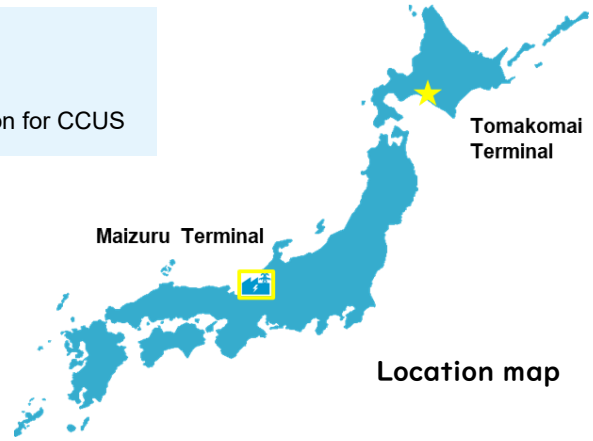
Conceptual Diagram



Note: Figure adapted from METI

Research and Development Topics

1. R&D to establish technology for LCO_2 ship transportation
2. Demonstration of LCO_2 ship transportation
3. Feasibility study for commercialization of ship transportation for CCUS



■ "Project to Promote the Creation of Circular Carbon Society Model through CO_2 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 CO_2 Recycling" by the Global Environment Bureau, Ministry of the Environment.

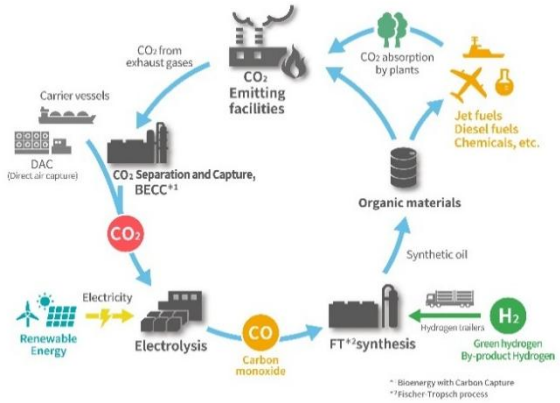
In achieving the targets of the Paris Agreement, there are high expectations for environmental innovations including CO_2 capture, storage and recycling, making renewable energies into mainstream power sources, expanding the use of hydrogen, and decarbonization of fuels. Also, in the aviation industry, the International Civil Aviation Organization (ICAO) has defined CO_2 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 CO_2 captured from emission sources into CO, 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 CO_2 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-CO_2 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 CO_2 into products with high environmental value. P2C significantly contributes not only to the reduction of CO_2 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 CO_2 Storage Sites (JFY2014-JFY2023)

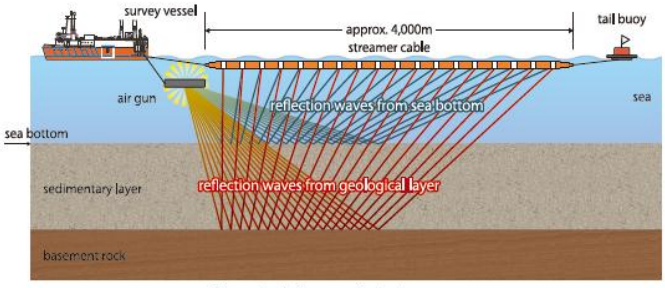
Commissioned by MOE and METI

In order to conduct CCS, geological formations that can stably store large amounts of CO_2 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 CO_2. 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.

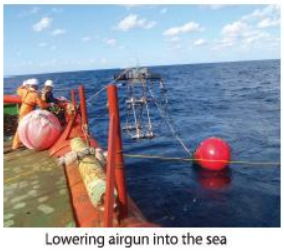
For this reason, the Ministry of Economy, Trade and Industry and the Ministry of the Environment jointly conducted the "Investigation of Potential CO_2 Storage Sites" from JFY2014 to 2023, commissioning the project to Japan CCS.

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.

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