



JCCS



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A MESSAGE FROM THE PRESIDENT

From Japan to the World - with a view towards the practical use of CCS technology

The concentration of greenhouse gases such as CO₂ in the atmosphere is increasing year by year, and according to a report of the World Meteorological Organization (WMO), the concentration of CO₂ in the atmosphere in 2020 reached 149% of pre-industrial revolution levels, becoming the highest in recorded history. The impacts of extreme weather said to be caused by global warming are becoming increasingly serious in various parts of the earth, and the international call to strive for net zero emissions in 2050 is gaining momentum. The target of achieving a carbon neutral society in 2050 was declared in Japan as well, leading to the announcement in April 2021 that it would aim for a 46% reduction in greenhouse gas emissions (compared to 2013 levels) by 2030.



In order to realize a decarbonized society and achieve sustainable development goals (SDGs) such as “No Poverty”, “Affordable and Clean Energy”, and “Reduced Inequalities” at the same time, huge expectations have been placed not only on the advancement of energy conservation and expansion of renewables, but also the social implementation of CCS which captures and stores CO₂ emitted by economic activities as well as CCU/carbon recycling which utilizes CO₂ as a resource.

Japan CCS Co., Ltd. (hereinafter JCCS) was established in 2008 through investment by the private sector in response to the national policy to promote CCS. Currently, as projects commissioned by the Japanese government and public institutions, JCCS is engaged in four projects; large-scale CCS demonstration in Tomakomai, Hokkaido, nationwide surveys of potential offshore CO₂ storage sites, CO₂ ship transportation demonstration, and survey/demonstration regarding the production of sustainable aviation fuel.

The Tomakomai CCS Demonstration Project was commenced in 2012, and with the understanding and cooperation of the local community, the project safely achieved the target of 300,000 tonnes cumulative sub-seabed CO₂ injection in November 2019, confirming that “CCS is a safe and secure system”. The surveys of potential offshore CO₂ storage sites which were started in 2014 confirmed that there was significant storage potential in the offshore waters of Japan, and we are conducting further surveys. In addition, from FY2021, JCCS (as a consortium member) has been commissioned to conduct projects regarding the demonstration of CO₂ ship transportation and the survey/demonstration of the production of sustainable aviation fuel as a part of carbon recycling, and we have initiated new efforts.

Aiming for the realization of carbon neutrality in 2050, we view as our mission the contribution towards the establishment of 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 2022

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 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 JCCS

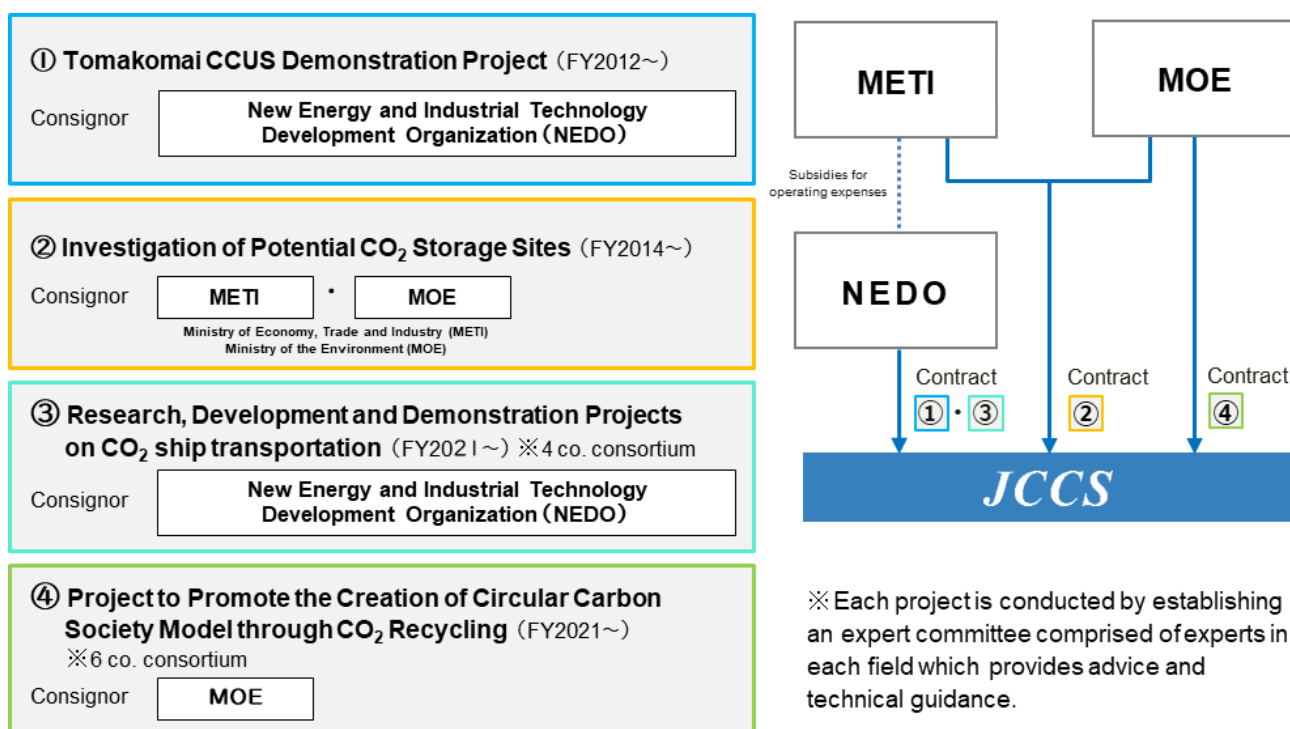
Japan CCS Co., Ltd (JCCS) was founded in May 2008 when a group of major companies with expertise in CCS-related fields, including electric power, petroleum, oil development, and plant engineering, joined forces to answer the Japanese government's policy to advance CCS as a countermeasure against global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



■ Tomakomai CCS Demonstration Project

With a view towards implementing a CCS demonstration project, Japan CCS conducted geological surveys to confirm that the Tomakomai site was suitable for CO₂ storage. Although there was a large body of subsurface geological data amassed from oil and gas exploration in this area over many years, marine 3D seismic surveys were conducted in 2009 and 2010, and two survey wells were drilled in 2010 and 2011 for further confirmation.

As a result of detailed analysis and evaluation of the newly acquired data, Japan CCS confirmed that the geological structure of the Tomakomai site was suitable for CO₂ geological storage and that the demonstration project could be conducted safely.

Japan CCS summarized the results in the report "Comprehensive Reservoir Evaluation at the Tomakomai Site", and submitted the report together with the "Demonstration Test Plan at the Tomakomai Site (Draft)" to METI in October 2011. An expert evaluation committee was held by METI, and in February 2012, METI conducted a public tender of the "FY2012 CO₂ Reduction Technology Demonstration Test Project (pertaining to obligatory assurance of national subsidization for a multiyear construction project)" for the four years until FY2015, which resulted in Japan CCS being selected as the contractor.

During the four years from FY2012 to FY2015, Japan CCS designed and constructed facilities for capturing high-purity CO₂ from gas containing CO₂ generated from a hydrogen production unit of a refinery and injecting the CO₂ into the subsurface. In addition, one existing survey well was converted to 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, Japan CCS installed a monitoring system for formation and earthquake data and obtained baseline data prior to injection. In addition, since the formations where CO₂ is stored are under the seabed, Japan CCS conducted a preliminary survey of seawater and marine life in accordance with the Act for the Prevention of Marine Pollution and Maritime Disasters.



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 as well as monitoring during injection, with the aim of achieving 300,000 tonnes cumulative injection. Monitoring work includes confirming that there is no CO₂ seepage through monitoring the behavior of the injected CO₂, constant monitoring of micro-seismicity and natural earthquakes, and conducting marine environmental surveys. 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, the latest information on the Tomakomai project is disseminated through panel exhibitions and presentations, as well as a monitor screen in the Tomakomai City Hall and the Japan CCS website.

The Japanese government has set out a policy to utilize Tomakomai as a demonstration base for carbon recycling and is advancing studies aiming towards the interoperation of CCS and CCUS.

■ SCHEDULE

Contract Period: From JFY2012 to JFY2023

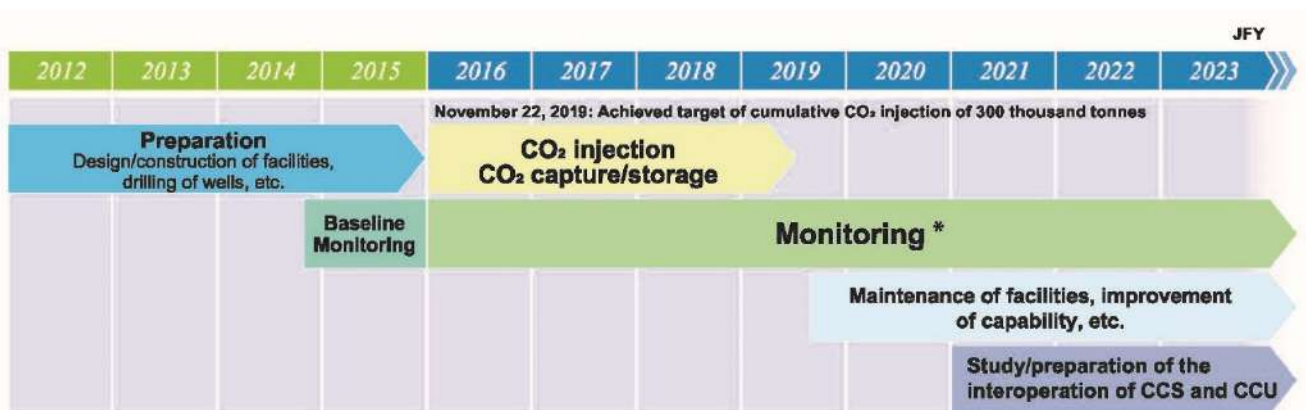
- From JFY2012 to JFY2015: Preparation

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



(*) Monitoring the behavior (migration, distribution) of the injected CO₂, continuous monitoring of micro-seismicity and natural earthquakes, marine environmental monitoring to detect for possible CO₂ seepage are being conducted.

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

■ Investigation of Potential CO₂ Storage Sites

In order to conduct CCS, a geological formation that can stably store a large amount of CO₂ is required. According to surveys conducted between FY2005-2012, 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.

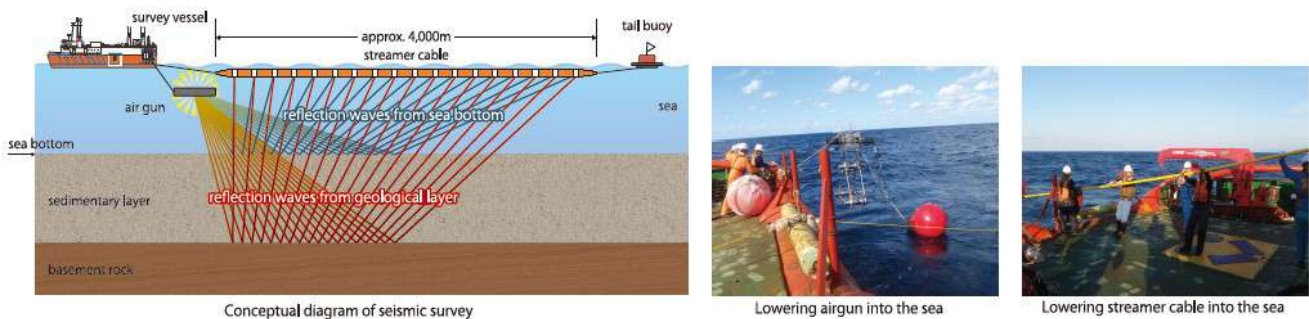
For this reason, the Ministry of Economy, Trade and Industry and the Ministry of the Environment jointly launched the "Investigation of Potential CO₂ Storage Sites" in FY2014, and Japan CCS has been entrusted with and has continuously implemented this project.

In this project, we will select the more prospective areas by investigating in detail the amount of storage possible, the possibility of CO₂ leakage, the stability of the geological structures, etc. at candidate sites where a large amount of storage is expected.

■ Geological formations that can stably store large amounts of CO₂ will be selected through investigation and examination

We start investigating candidate sites using existing data and documents. Next, the geological structure is delineated by seismic surveys, etc., and the range suitable for storage are narrowed down based on the data. Survey wells are drilled within this range, geological samples are collected, and measurements are taken in the wells to investigate the formations in more detail.

Through such investigation, a comprehensive evaluation will be conducted, and prospective reservoirs will be selected.



■ Research, Development and Demonstration Projects on CO₂ Ship Transportation

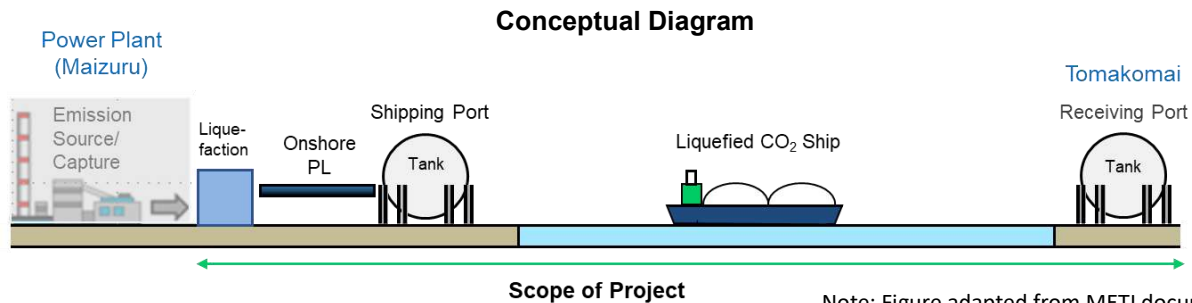
In June 2021, a consortium of 4 companies*¹ including Japan CCS was jointly commissioned by the New Energy and Industrial Technology Development Organization (NEDO) to conduct “CCUS R&D and Demonstration Related Projects / Large Scale CCUS Demonstration at Tomakomai / Demonstration of CO₂ Transportation / Technology Development and Demonstration of CO₂ Ship Transportation”.

With a view towards the social implementation of CCUS around 2030, which envisages the long-distance/mass transportation of CO₂ from emission sources to utilization/storage points at a scale of 1 million tonnes per year, the consortium will conduct research and development of liquified CO₂ transportation technology that will lead to cost reduction.

In addition, demonstration of CO₂ ship transportation at a scale of 10,000 tonnes per year will be conducted. The

consortium plans to operate about 10 voyages per year a demonstration vessel capable of transporting about 1,000 tons of liquefied CO₂ from a liquefaction/shipping facility to be constructed in Maizuru (premises of Kansai Electric Power Co., Inc. Maizuru Power Plant) and a receiving facility in Tomakomai (premises of Hokkaido Electric Power Co., Inc. Tomakomai Power Plant). Japan CCS will construct and operate the onshore facilities.

*1 4 companies: Japan CCS Co., Ltd., Engineering Advancement Association of Japan, ITOCHU Corporation, NIPPON STEEL CORPORATION



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

In August 2021, a consortium of 6 companies*¹ including Japan CCS was jointly 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 CO, which will then be reacted in the FT*⁴ synthesis process with hydrogen obtained from renewable energy to produce liquid fuels, such as jet fuel, light oil, etc.

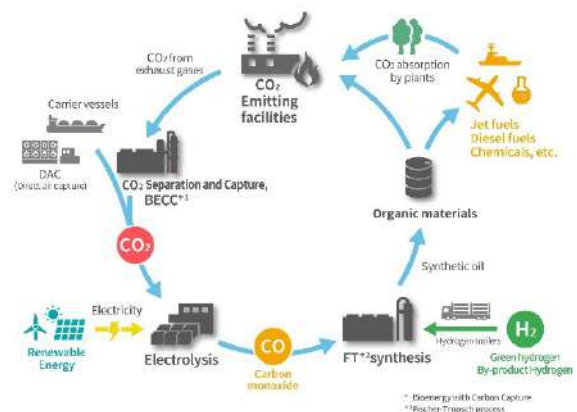
P2C is expected to significantly reduce the amount of CO₂ emissions and greatly contribute to achieving carbon neutrality.

*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 is a carbon capture and utilization (CCU) and carbon recycling technology that uses renewable energy and renewable hydrogen energy, etc. to recycle CO₂ by converting it into resources with high environmental value. P2C significantly contributes to the spread of renewable energy in addition to reducing CO₂ emissions.

*4 Fischer-Tropsch (FT) process: A process for synthesizing liquid hydrocarbons from CO and hydrogen by using a catalytic reaction



Regional Circular Carbon Society Model (Illustration)