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Japan Energy Newsletter

Japan Electric Power Information Center, U.S.A.

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1 Japan's Ministry of Economy, Trade and Industry Held the First Meeting of the CCS Long-Term Roadmap Committee

On January 28, 2022, the Ministry of Economy, Trade and Industry (METI) held the first meeting of the CCS (carbon capture and storage) Long-Term Roadmap Committee. The committee concluded that in order to realize carbon neutrality by 2050, Japan will need to store 240 million tons of CO2 per year, which will require deploying 480 injection wells by 2050. The meeting also noted the importance of expanding the commercial use of CCS and the need to improve the business environment for CCS.

1.1 Overview of Japan's efforts to develop and deploy CCS

The Sixth Strategic Energy Plan, issued by the Cabinet on October 22, 2021, sets goals to develop and deploy promising technologies for clean energy, including hydrogen, ammonia, and CCS, to achieve Japan's goal to be carbon neutral by 2050.

Based on the plan, Japan will seek to establish a long-term CCS roadmap to share with stakeholders. The roadmap will seek to address various aspects for developing a CCS ecosystem, including technical challenges, cost reductions, and CCS site development.

Japan will also carry out various research and development (R&D) demonstration projects to advance CCS-related technologies such as carbon separation and recovery and automated monitoring methods. Japan will also conduct liquefied CO2 shipping demonstration projects to verify the low-cost and efficient transportation methods and create new CCS hubs that will co-locate CO2 emission sites and recycling/storage sites to optimize a centralized network. Given that the economics and social acceptance of CCS are both crucial for implementing CO2 storage, Japan will conduct studies to identify and evaluate potential suitable CO2 storage sites and study international CCS business trends to identify possible approaches to speed up the commercialization of CCS technologies.[1]

METI has solicited opinions from industry members and experts in several meetings in Fiscal Year (FY) 2019 and FY 2020. With the help of stakeholders, METI estimated the cost of reducing CO2 via CCS by 2050 and analyzed possible approaches to introduce CCS at full scale by 2050, including the improvement of the regulatory and business environments. METI plans to create a roadmap for 2030 and 2050 respectively by holding four more meetings by May of this year.[2]

1.2 Overview of the First CCS Long-Term Roadmap Committee

The CCS Long-Term Roadmap Committee is composed of a total of 30 members. Hiroshi Ohashi, the Director of the Graduate School of Public Policy at the University of

[1] https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/001_04_00.pdf
[2] https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/001_04_00.pdf

Tokyo, serves as the chairman of the committee. Other members of the committee include:

- Industry groups, including the Japan Cement Association, Federation of Electric Power Companies, Japan Iron and Steel Federation, Japan Petroleum Development Association, Japan Paper Association, Japan Gas Association, Japan Natural Gas Association, and Japan Chemical Industry Association;
- Trading companies, including Itochu Corporation, Mitsubishi Corporation, and Mitsui & Co., Ltd.
- Research institutions, including the Central Research Institute of Electric Power Industry, Institute of Energy Economics, National Institute of Advanced Industrial Science and Technology, New Energy and Industrial Technology Development Organization (NEDO), Mitsui & Co. Strategic Studies Institute, Japan Oil, Gas and Metals National Corporation, and the Global CCS Institute;
- Other participating businesses include INPEX, JX Nippon Oil & Gas Exploration, J-Power, Mitsui O.S.K. Lines, Kawasaki Kisen Kaisha, and Japan Petroleum Exploration;
- Experts from law firms and academic institutions.[3]

Japan has implemented the following detailed measures as part of its goal to commercialize CCS technology by 2030:[4]

Table 1:CCS Development and Demonstration Projects by the Japanese Government

Item	Overview
(1) Large-scale CCS demonstration project at Tomakomai, Hokkaido	As of November 2019, Japan has achieved 300,000 tons of CO2 injections. Japan has also been verifying various monitoring methods, such as monitoring systems for elastic waves and micro-vibrations.
(2) Liquefied CO2 shipping demonstration	Japan seeks the capability to transport large volumes of liquefied CO2 from the Pacific Ocean side of Japan, which is the main source of nearby CO2 emissions, to the opposite coast on the side of the Sea of Japan, where there are more possibilities for storage. Japan has implemented a demonstration project in order to verify the transportation technology. This marks the first project in the world to transport liquefied CO2 by low temperature and low pressure (-50 ° C, 0.6MPa) vessels. From 2024, Japan will test and verify long-distance liquefied CO2 shipping.
(3) Carbon recycling development	Japan will conduct feasibility studies on carbon recycling and design procurement.
(4) Storage and monitoring	In order to establish CCS safety management programs, Japan will develop optical fiber measurement technologies, a reservoir

[3] https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/001_02_00.pdf
[4] https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/001_04_00.pdf

technology development	management system, and a Social License to Operate (SLO) evaluation tool.
(5) Potential suitable storage sites study	It is estimated that Japan will be able to store approximately 240 billion tons of CO2 domestically. Since 2014, Japan has identified suitable carbon storage sites by conducting surveys (such as 3D elastic wave exploration). As of the end of January 2022, the estimated storage capacity at the ten locations that have been identified is approximately 16 billion tons.
(6) Promoting international cooperation	Japan seeks to establish an Asian CCUS (carbon capture, utilization and storage) Network through collaboration with industries, financial institutions, and CCS businesses. It is also partnering with the U.S. and Saudi Arabia to conduct joint CCS studies.

Source: METI[5]

Based on the results from past studies, the CCS Long-Term Roadmap Committee will proceed with the discussions to formulate a roadmap for widely available CCS technologies by 2050. According to the IEA's estimates, the annual carbon storage domestic capacity is expected to be 120 to 240 million tons in 2050. Assuming that the commercialization of CCS will begin in 2030, it will be necessary to increase the number of injection wells by 12 to 24 every year for the next 20 years until 2050. The storage capacity per injection well is estimated to be 500,000 tons per year.

To start CCS business operations by 2030, operators need to begin feasibility studies in FY 2023 and make their final investment decisions by FY 2026.[6] The exploration cost per injection well is about 43 million USD on land and about 70 million USD in the sea. [7]

In the future, the CCS Long-term Roadmap Committee will consider adopting guidelines for estimating the annual storage capacity and CCS costs and steps to improve the business environment, based on discussions with industry experts. An interim report on the 2030 and 2050 roadmaps will be issued by mid-May 2022. In the meantime, the discussion results will be reflected in METI's Clean Energy Strategy.

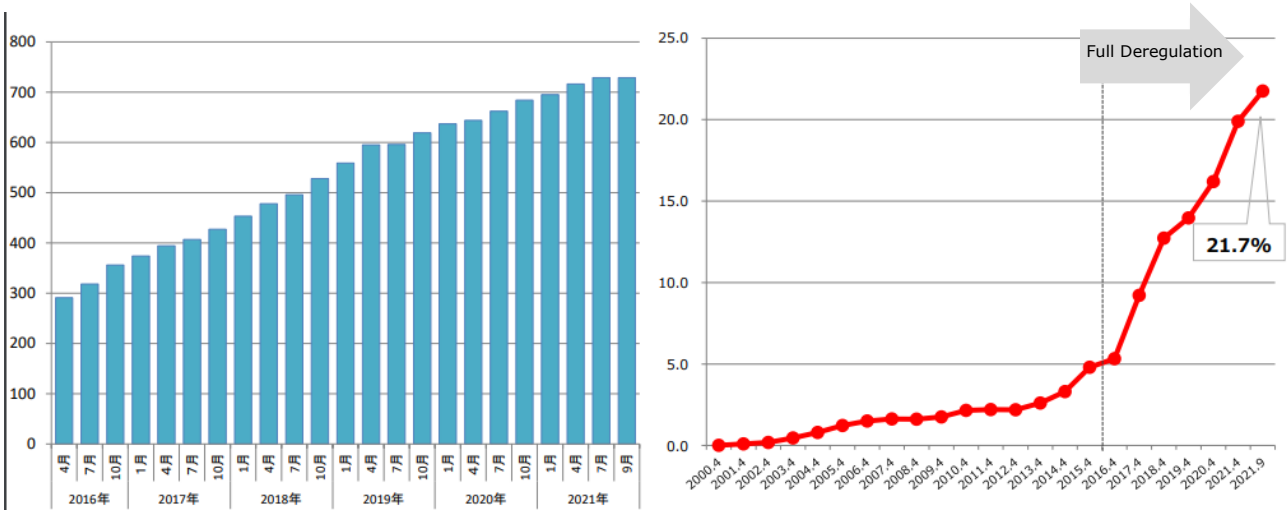
[5] https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/001_04_00.pdf
[6] https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/001_04_00.pdf
[7] https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/001_04_00.pdf

2 Agency for Natural Resources and Energy is Set to Reform Electricity Retail Policies

The Agency for Natural Resources and Energy (ANRE, an agency under the METI) announced on January 25, 2022 during a METI's advisory energy policy meeting, that it will actively reform its electric retail policies and will consider how to adjust the market's business environment. The decisions will be based on conclusions from a METI advisory group, the Basic Policy Subcommittee, which is part of the Comprehensive Resources and Energy Committee.

Since the deregulation of the retail electricity business in April 2016, more than 700 new retail electricity providers have entered the retail electricity market, and the share of electricity supplied by new entities has exceeded 20%. The electric power industry market size in 2020 was about 135 billion USD. The power generation sector was about 87.9 billion USD, and the power transmission and distribution sector was 42.7 billion USD. However, the retail sector has remained very small and is only about 870.6 million USD. [8] ANRE will consider how to improve the business environment for the electricity retail market, not only from the perspective of expanding the market but also considering business risks and how to improve consumer protections.

Figure 1: Changes in the number of retail electric power companies (left figure) and changes in the share of new electric power (right figure)



Source: METI[9]

One of the purposes of the reforms to the electric power system was to increase business opportunities and consumer options. Some of the measures that were discussed during the meeting are described below. [10]

[8] https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/pdf/044_05_02.pdf
[9] https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/pdf/044_05_02.pdf
[10] https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/pdf/044_05_02.pdf

- JR Kyushu has begun an initiative to purchase electricity from renewable energy power generation facilities in Saga Prefecture that are owned by the Daigas Group. It has used the purchased electricity at 10 stations in the prefecture, as reported by Yomiuri Newspaper on January 12, 2021.[11]
- AEON Mall switched to 100% renewable energy at its large commercial facilities by using solar power generation installed at its own facilities, according to Nikkei Newspaper on January 10, 2022.[12]
- Nissan Motor has started an initiative to sell 100% renewable electricity to employees, according to Nissan Motor's press release issued on December 22, 2021.[13]
- According to a press release on December 7, 2021, Loop, an energy services business, has implemented a DR (Demand Response) program called the Midwinter Power Saving Daisakusen (Great Strategy) that notifies users by e-mail about the times when the power supply is expected to be tight. Customers who make efforts to save power after being notified are awarded with points that can be redeemed for Amazon gift cards.[14]
- Cosmo Oil is promoting sales by combining its car leasing program, Cosmo My Car Lease, which can use the Clean Energy Vehicle (CEV) subsidies, with the renewable electricity retail service Cosmo Denki Green, according to Cosmo Oil Marketing's press release on October 4, 2021.[15] [16]

Some retail electricity providers (REPs) have withdrawn from the market due to the rise in international fuel prices and the wide availability of renewable energy in the market. To deal with this situation, the Japanese government has implemented a safety net for customers whose chosen REP is unable to constitute service. For instance, conventional utilities (which have become part of the power transmission and distribution companies after deregulation) still play a major role in maintaining a stable electricity supply when a REP leaves the market.

In light of the changes to the business environment and the increasing risks for businesses, the committee has confirmed the need to re-examine the role of retail electricity businesses and the ideal ways to protect consumers.[17] Japan is seeking to improve the retail electricity business environment through ensuring fair competition between retailers; diversifying electricity plans for customers; advancing demand response and market electricity trading via digital technologies; minimizing the retail

[11] https://www.yomiuri.co.jp/local/kyushu/news/20220112-OYTNT50019/
[12] https://www.nikkei.com/article/DGXZQOUC074WJ0X00C22A1000000/
[13] https://global.nissannews.com/ja-JP/releases/release-45822a26abbf59dfdcc394eac9030681-211222-00-j
[14] https://looop.co.jp/info/3322_20211207
[15] Clean Energy Vehicle (CEV) subsidy is a government system in which subsidies are provided to purchasers as an incentive to purchase automobiles with a low environmental impact. http://www.cev-pc.or.jp/hojo/cev.html#r03-guide
[16] https://com.cosmo-oil.co.jp/press/p_211004/index.html
[17] https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/pdf/044_05_02.pdf

costs; and offering new added value that has been integrated with other services, based on the power supply service. [18]

[18] https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/pdf/044_05_02.pdf