



Advanced Technologies and Support Measures for Achieving Carbon Neutrality

Energy Conservation Training Program for ASEAN countries

Japan Organization for Metals and Energy Security

November, 2025

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1 Introduction of JOGMEC

JOGMEC - Who We Are

Japan **O**rganization For **M**etals and **E**nergy Security (**JOGMEC**)



Our Mission: Secure stable and affordable supply of natural resources

Area of Business



Area of Services

Financial Support	Technology Support	Intelligence Support
<ul style="list-style-type: none"> Equity Finance Liability Guarantee Grant Subsidy, etc. 	<ul style="list-style-type: none"> Geological Survey Technology Development Marine Resources Development Environmental Safety, etc. 	<ul style="list-style-type: none"> Resource Diplomacy International Cooperation Information Analysis, etc.

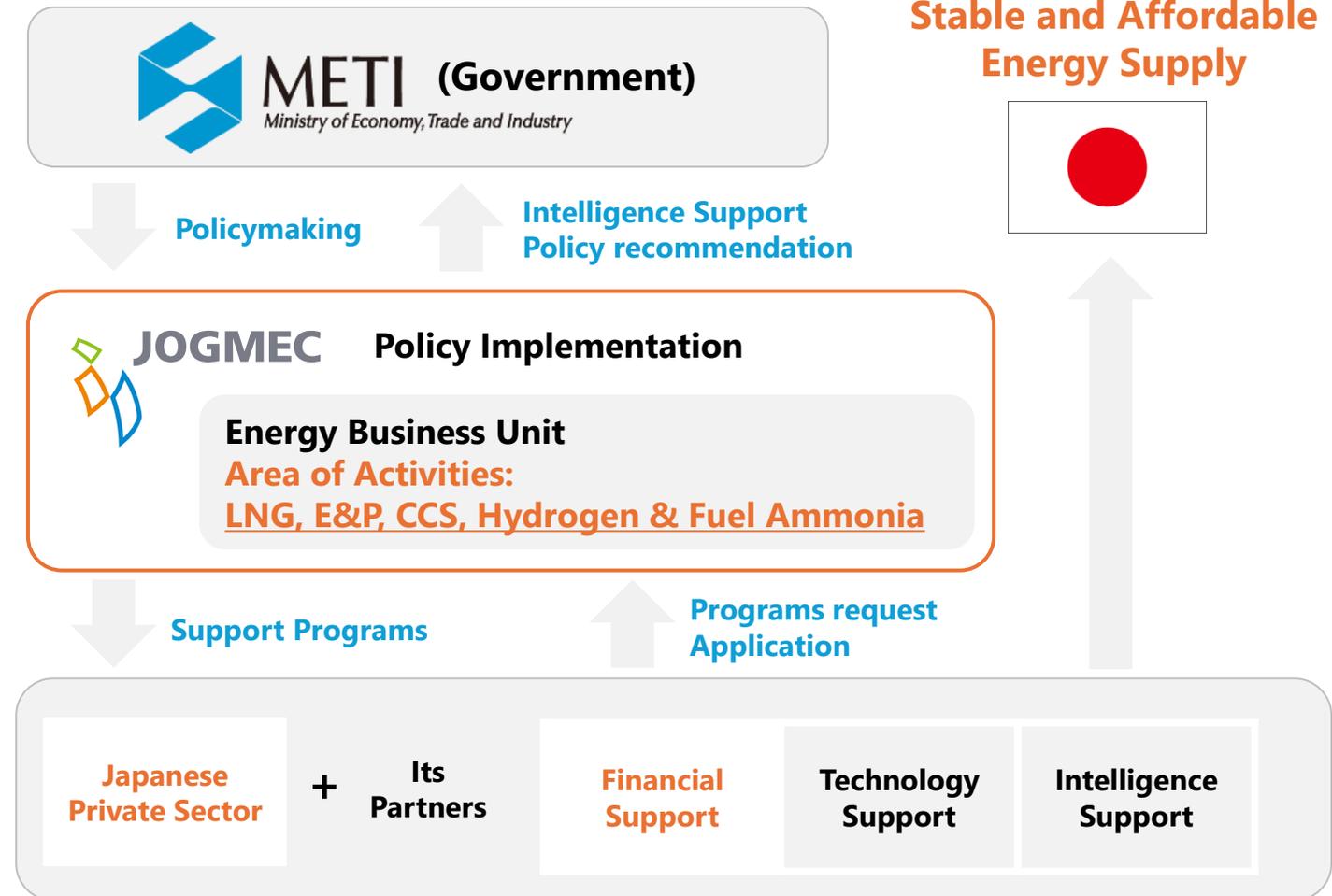
JOGMEC - Interface between Policy and Business -

JOGMEC, as the executing agency of Japan's energy policy led by METI

- Solving issues related to the energy trilemma by providing
 - financial support services
 - technical support services
 - intelligence support services
- Providing services not only to Japanese companies but also to overseas partner organizations

S+3E (Safety Plus Three Es) :

A concept that aims to simultaneously achieve safety (Safety) as a prerequisite, stable supply (Energy Security), economic efficiency (Economic Efficiency), and environmental compatibility (Environment).



Current Global Context and Energy Trilemma

Energy is crucial to societal development

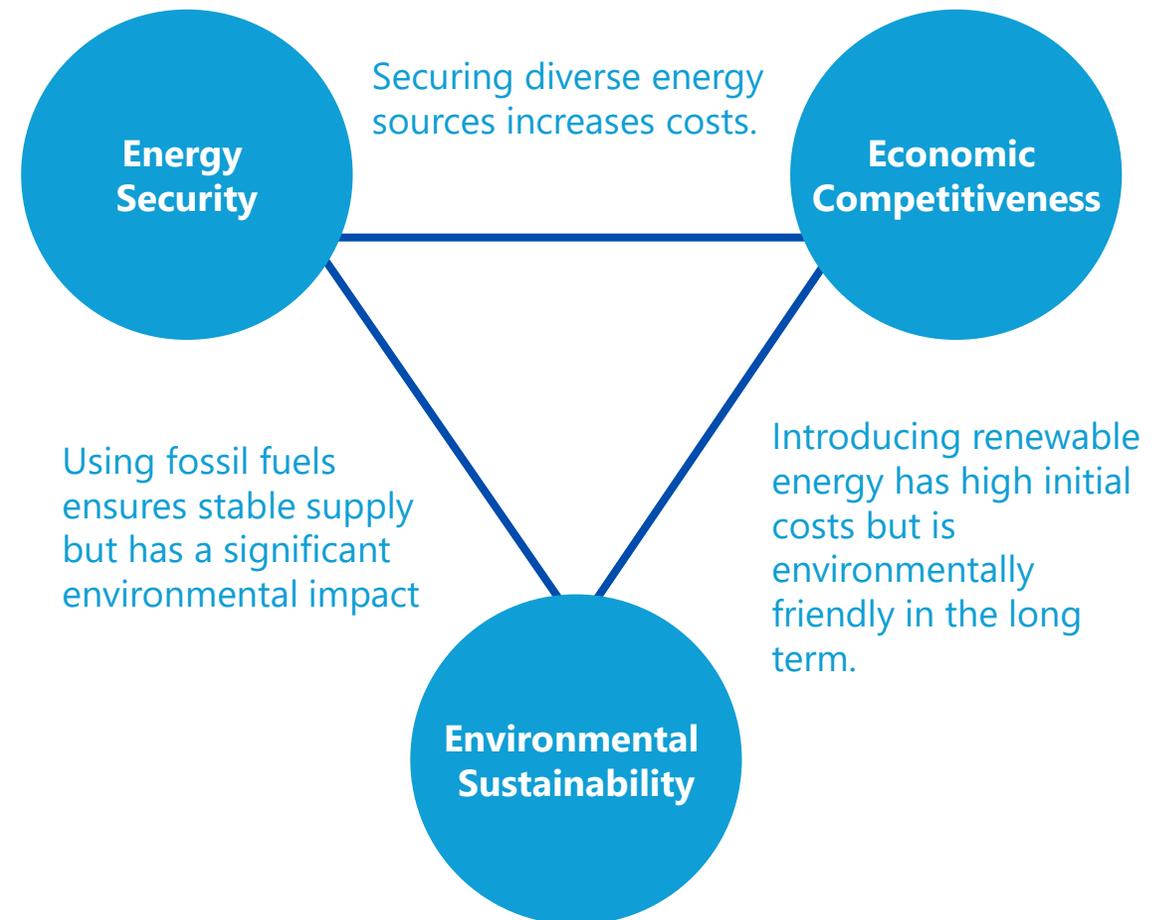
- Requires a stable and affordable supply
- Requires sustainable actions that respect the global environment

However...

Meeting all these requirements is challenging

- International politics and economics are full of uncertainties
- Considerations for the global environment often result in cost burdens for affordable supply

“Energy Trilemma”



Targeted Objectives of JOGMEC

Focus on Environment by Supporting Decarbonization

Examples Support for green-derived fuels such as E-fuel

Focus on Economic Efficiency by Supporting Low-carbonization

Examples

- Various initiatives for CCUS
- Support for launching hydrogen and its derivatives such as ammonia businesses

Focus on Energy Security by Supporting Existing Energy Supply

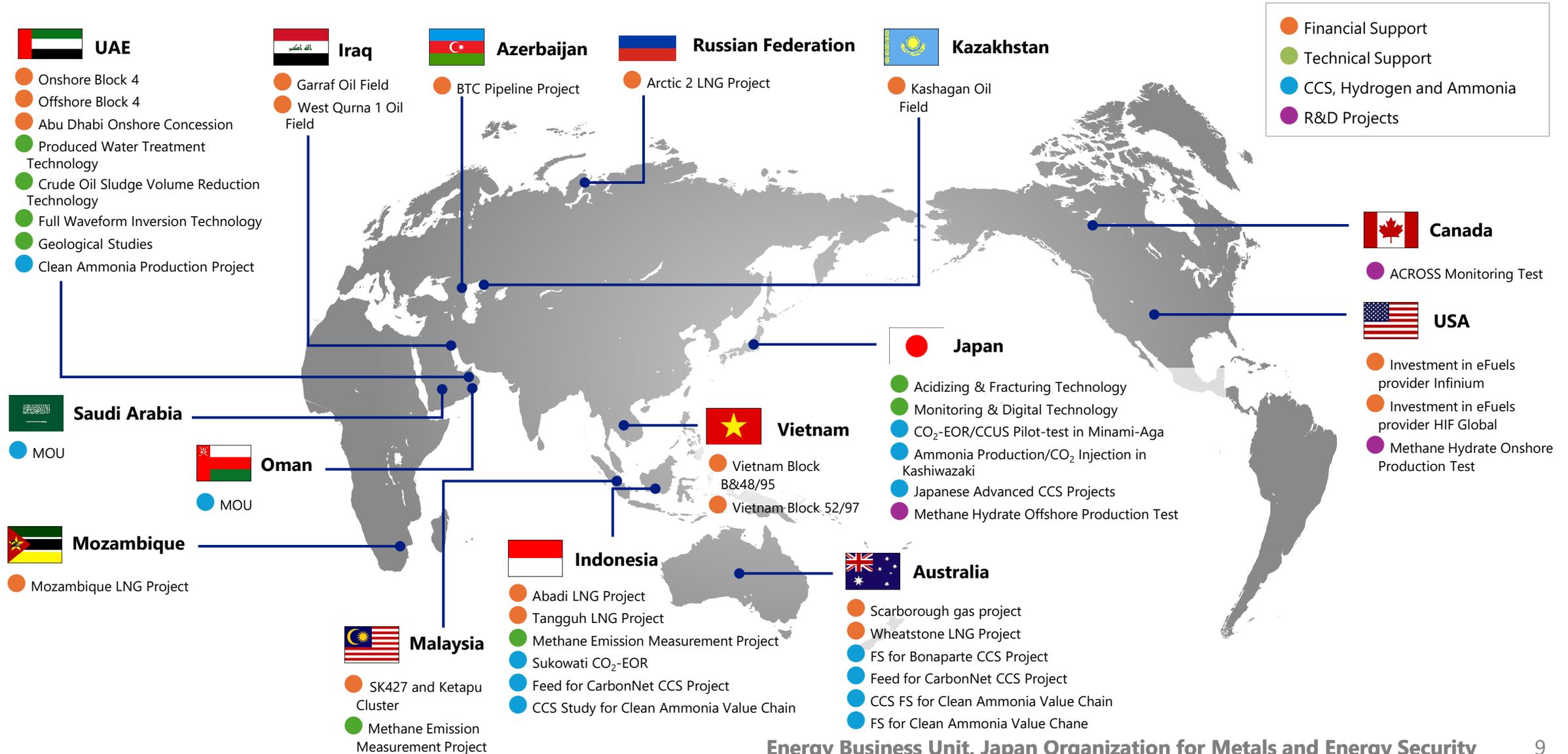
Examples

- Support for LNG through SBL (Strategic Buffered LNG) and equity finance / liability guarantees
- Support for methane emission reduction
- Support for domestic resource development



HIF Global LLC operates the world's first operational e-fuels plant from 2022, Haru Oni, Chile.

JOGMEC Activities



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2 JOGMEC's activities for Low Carbonization and Decarbonization

JOGMEC's Activities for Low Carbonization & Decarbonization (1)

In relation to the below Low-Carbonization options, JOGMEC is focusing on CCS, CO₂ utilization and reducing methane emissions.

(1) Advancement and efficiency improvement of thermal power generation technology

(e.g., co-firing of biomass and ammonia in coal-fired power generation)

(2) Advancement of manufacturing

(e.g., electric furnace steelmaking without coal, hydrogen reduction steelmaking)

(3) Use of renewable power to supply low carbon intensity of LNG

(e.g., Freeport LNG in the USA, LNG Canada)

(4) Reduction of methane gas emissions

(e.g., methane recovery technology from LNG ships and LNG production facilities)

■ JOGMEC provides technical and intelligence support;

- i) for reducing methane emissions with national energy companies in SE Asia, and
- ii) by engaging in international standardization discussions for calculating greenhouse gas emissions and carbon intensity.



Methane emission measurement
test facility in Japan

JGC Holdings Corp., Research &
Development Center

JOGMEC's Activities for Low Carbonization & Decarbonization (2)

(5) CO₂ capture, transport, and underground storage (CCS)

- **Finance support for "Advanced CCS Projects" started in 2023**

JOGMEC provide Support for study and data acquisition to Japanese companies.

- **Technical support in Indonesia**

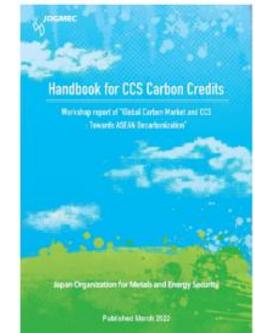
JOGMEC are conducting a joint study project with the state-owned company Pertamina with Indonesian and Japanese companies.

- **Intelligence support to promote CCS projects globally**

JOGMEC provide intelligence services in collaboration with the METI to support policy formulation in each country, create rules for cross-border transport, and standardize infrastructure and ships.



CCS Guidelines



Handbook for
CCS Carbon Credits



(6) Utilization of CO₂

- **Technical support in Indonesia**

JOGMEC are conducting a joint project with Pertamina for CO₂ EOR, providing technical services with Japanese companies.

- **Financial support for Tangguh LNG**

JOGMEC is participating in Tangguh LNG project in Indonesia where bp and its partners are working on an EGR/CCUS project aiming to decarbonize gas operations.



JOGMEC's Activities for Low Carbonization & Decarbonization (3)

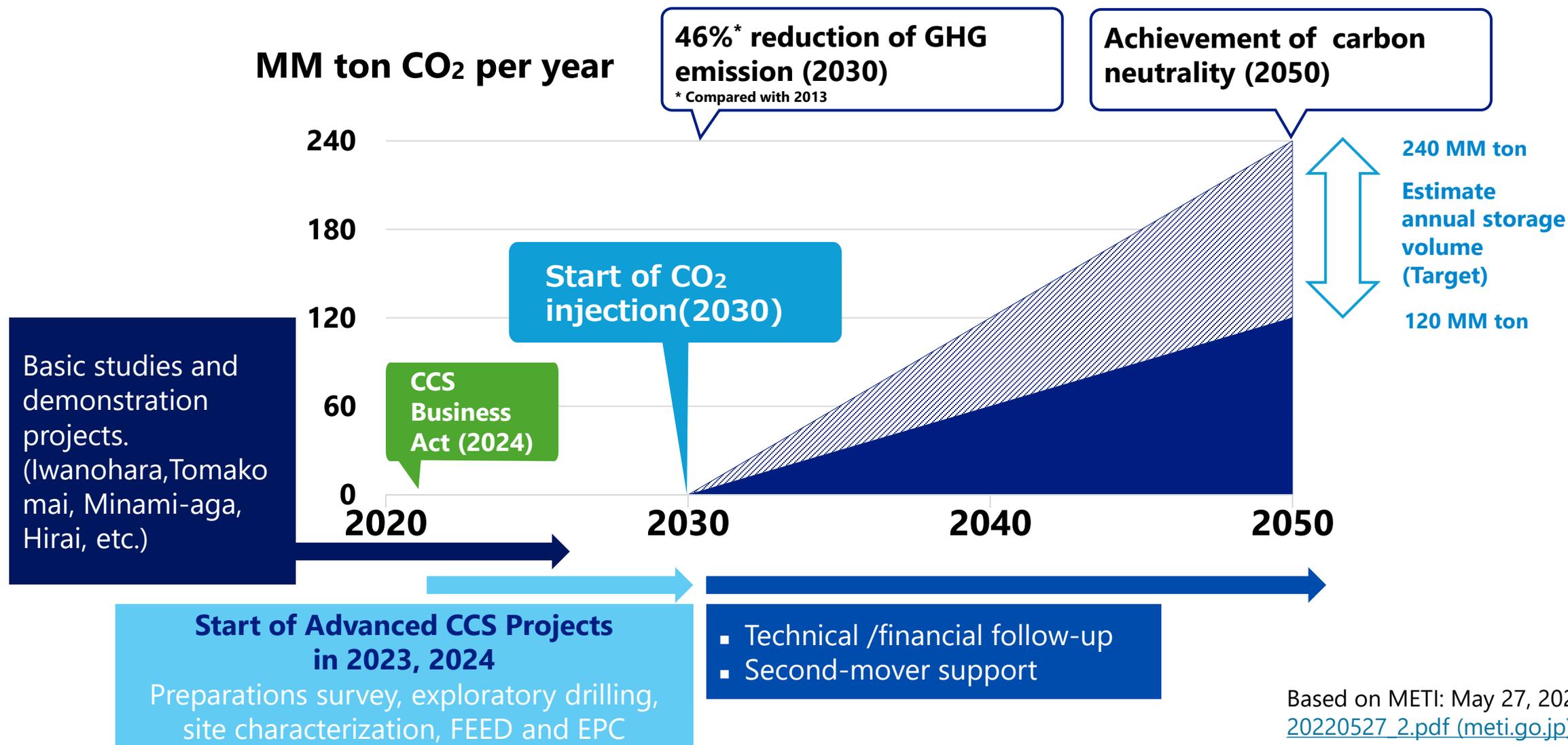
In relation to Decarbonization, JOGMEC is focusing on the below options.

- 1. Power generation** using renewable energy
(solar, wind, hydro, geothermal, biomass power generation, etc.)
- 2. Green hydrogen**
(technology to produce hydrogen by electrolysis of water, used as power generation fuel and in fuel cells)
- 3. Green ammonia**
(ammonia produced by green hydrogen and nitrogen, used as a power generation fuel or ship fuel to replace or complement coal, and/or heavy oil and as a means of transporting hydrogen)
- 4. E-fuel**
(technology to produce liquid fuel by synthesizing green hydrogen and CO₂)
- 5. Methanation**
(technology to produce methane gas by chemical reaction of green hydrogen and CO₂)
- 6. RNG**
(Renewable Natural Gas: methane gas recovered from waste oil, food waste, etc.)

A dark blue banner with a lighter blue gradient on the left and right sides, containing the text "CCS" in white.

CCS

Japan's CCS Implementation Target



Challenges for CCS to Become a Viable Business

1. Supply Chain Challenges

- Is the supply of necessary technology and equipment stable?
- Costs associated with infrastructure development and maintenance.

2. Policy and Regulatory Challenges

- To what extent do national policies support the implementation of CCS?

3. Operational Risk

- Risk of CO₂ leakage from storage.
- Ensuring long-term safety through monitoring.

4. Public Awareness and Acceptance

- Concerns about environmental impact.

5. Economic Challenges

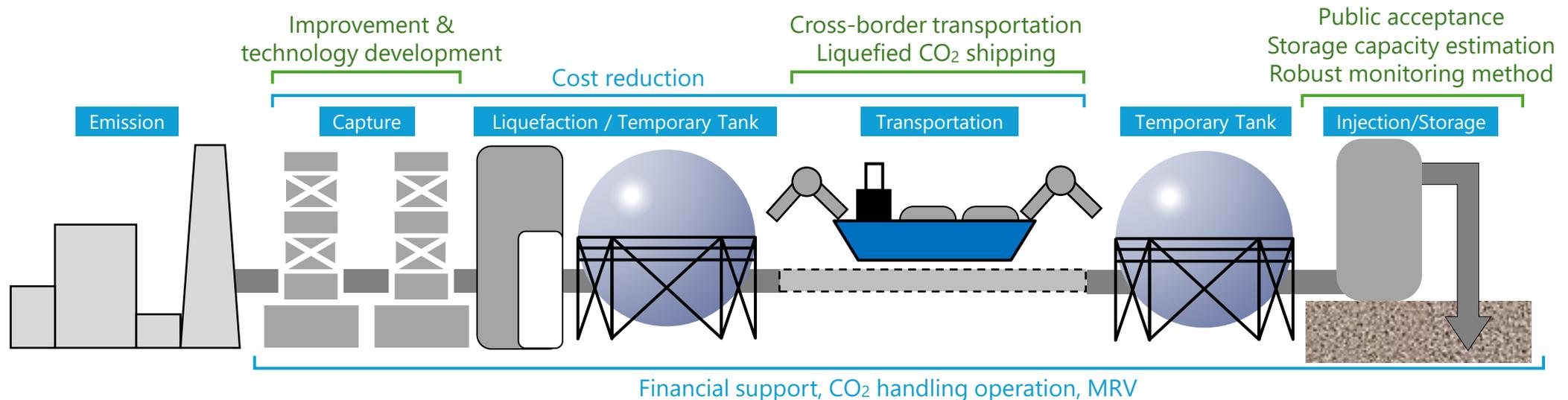
- Cost-effectiveness of CCS projects.
- Economic incentives necessary.

6. Technical Challenges

- Improvement of CO₂ capture efficiency and storage technology.
- Development and commercialization of new technologies like liquefaction.

7. International Cooperation

- Cooperation on cross-border CO₂ transport and storage.
- Establishment of international standards and guidelines.



Examples of JOGMEC's Initiative (1) "Advanced CCS Projects"

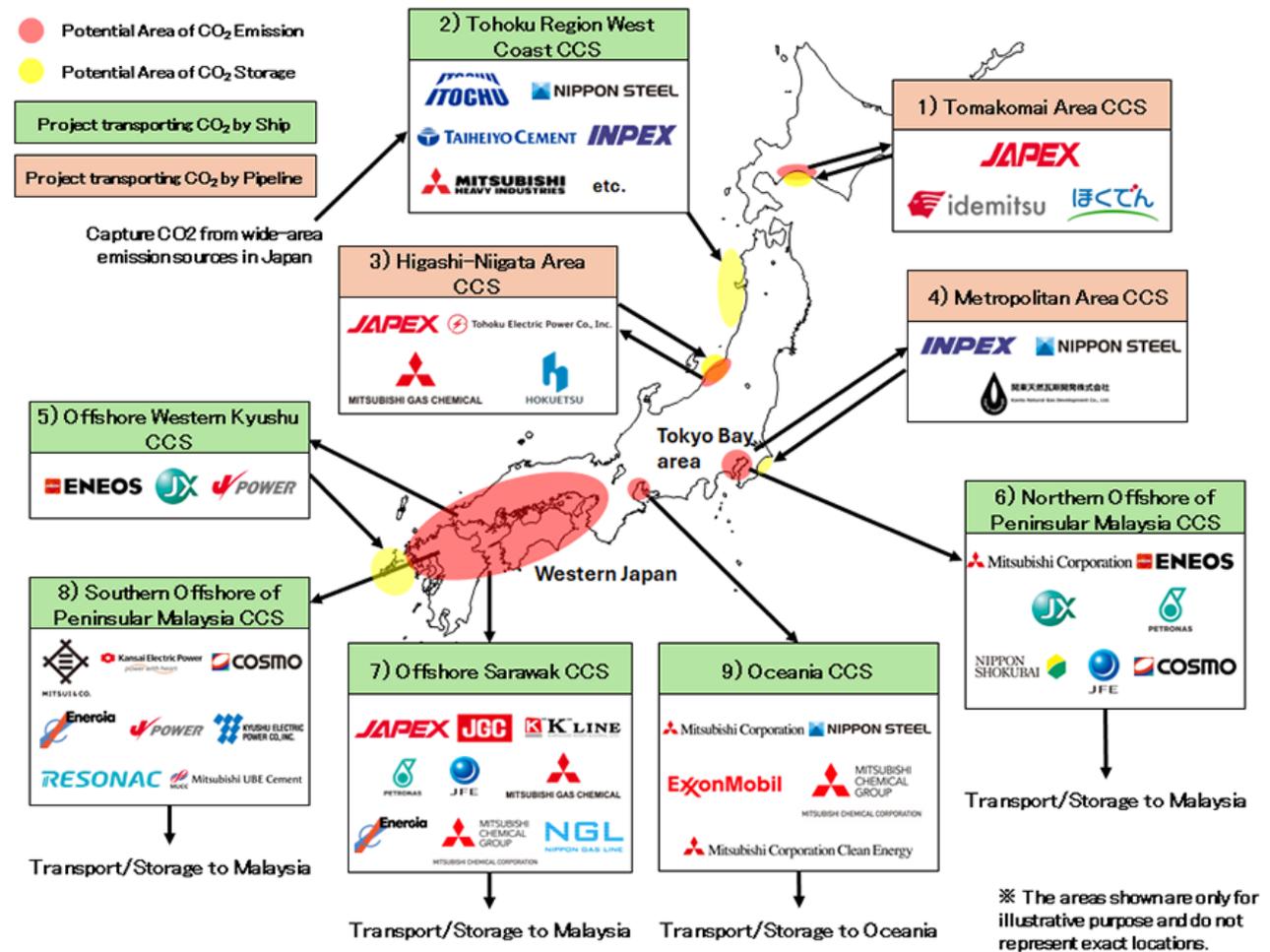


Selected 9 CCS projects (2024)

JOGMEC selected **9 role model projects**
5 for domestic storage
4 for overseas storage
 for **Japanese Advanced CCS Projects in 2024.**

JOGMEC provides support for the first time in Japan toward the initiation of CCS that is to capture and store CO₂ underground, which would greatly advance Japan's efforts to achieve a carbon-neutral society.

https://www.jogmec.go.jp/english/news/release/news_10_00036.html



Advantages of CCS & the role of JOGMEC

Advantages of CCS

- A large-scale CO₂ in a short period of time can be achieved
- Existing technologies such as CO₂ separation & capture, and CO₂ injection can be utilized
- Support for domestic hard-to-abate industries

JOGMEC initiatives in collaboration with METI

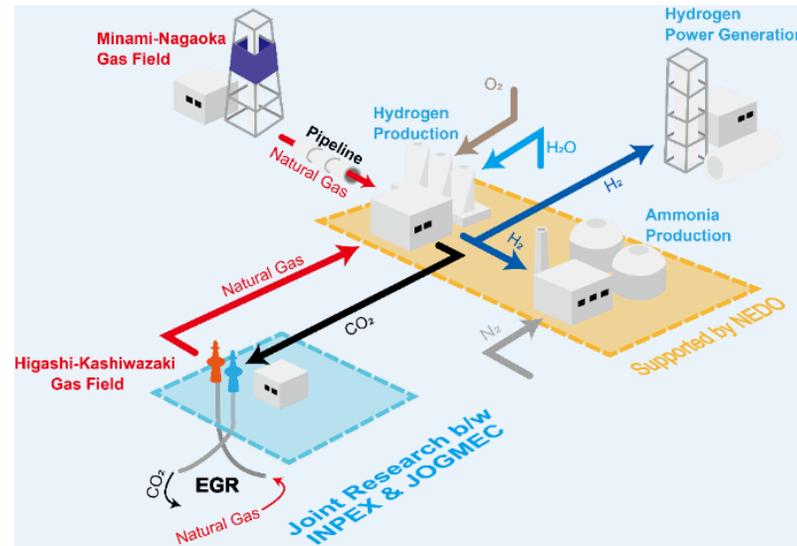
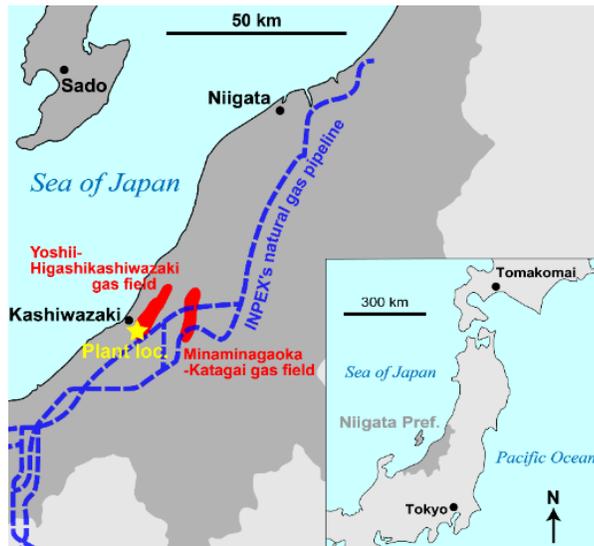
- Consideration of policy support for CCS projects based on the CCS Business Act
- Promotion of “Advanced CCS Projects”
- Cross-border CO₂ transportation.
- Joint research domestically and internationally based on MoUs
- Council to discuss common understandings of liquefied CO₂ value chain.
- Geological Survey for suitable CCS sites domestically and internationally
- Discussions with financial institutions

Through these activities, JOGMEC would like to contribute to the start-up of CCS business.

Examples of JOGMEC's Initiative (2) "Hirai CCUS Project"

Hirai CCUS Project

- INPEX, as an operator, plans to produce hydrogen and ammonia using natural gas produced from the Minami-Nagaoka gas field with the support of NEDO.
- INPEX and JOGMEC are conducting a joint research to inject associated CO₂ of hydrogen production into the depleted reservoir of the Higashi-Kashiwazaki gas field.
- Monitoring will be conducted to confirm the injected CO₂ behavior.
 - This activity can be helpful to reduce concerns about environmental impact and establish deeper understanding by society on CCS project.



[JOGMEC and INPEX commence a demonstration project for the production of clean hydrogen and ammonia combined with CO₂ storage and utilization in Kashiwazaki-city, Niigata Prefecture, Japan : News Releases | Japan Organization for Metals and Energy Security \(JOGMEC\)](#)

Examples of JOGMEC's Initiative (3) "CarbonNet CCS Project"

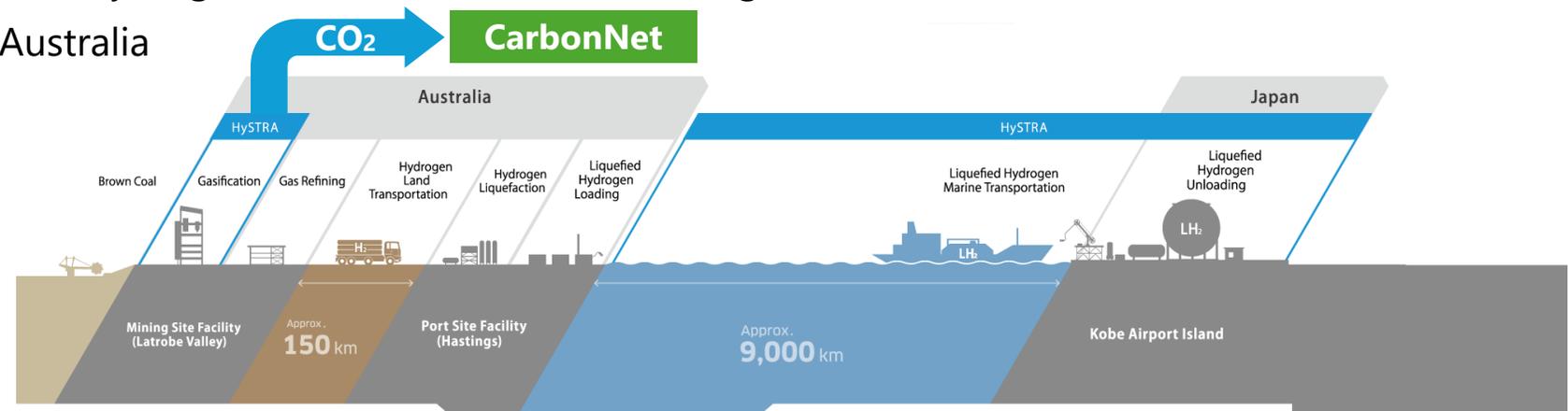


CarbonNet CCS Project

- JOGMEC signed an agreement for our engagement with the CarbonNet CCS planned for the Victorian Government in Jan, 2022.
- We will contribute to the FEED of the CCS project being conducted by the Government, and will work with the Government to proceed with the commercialization of the project.
- The project is
 - to store 6 mtpa of CO₂ (Total at least 168 MM tons).
 - the world's first international blue hydrogen value chain derived from lignite coal.
 - Attained jointly by Japan and Australia



Location of the CarbonNet project in the Gippsland Basin, Victoria



Concept of the Blue Hydrogen Value Chain <http://www.hystra.or.jp>

Examples of JOGMEC's Initiative (4) "Cross Border CO₂ Transportation"

Cross-border CO₂ Transportation MOCs



MOC on cross border CO₂ transportation [Sep.2023]




PETRONAS (MALAYSIA)




MOC on CCS partnership (including cross border CO₂ transportation) [Aug.2024]




THE MINISTRY OF TRADE AND INDUSTRY OF THE REPUBLIC (SINGAPORE)



JOGMEC's activities

Collaboration with ACE (ASEAN Center for Energy)

Joint report on cross-border CO₂ transportation [May 2024]




https://www.jogmec.go.jp/english/news/release/news_10_00067.html

METI/JOGMEC/Asia CCUS Network's International Workshop on CO₂ Cross-border Transport and Storage in the Asia-Pacific Region [Feb.2024]




Workshop Report

https://www.jogmec.go.jp/english/news/release/news_08_00014.html

AZEC: Asia Zero Emission Community
ACN: Asia CCUS Network

Examples of JOGMEC's Initiative (5) "Establishing Supply Chain"

Supply Chain /Economic /Technical Challenges

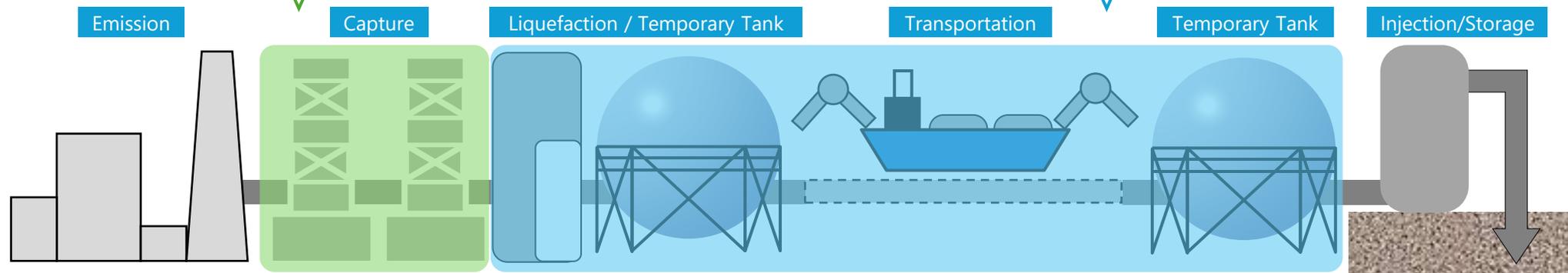
JOGMEC's Initiative: Survey of CO₂ capture fundamental technology for cost reduction

- To select CO₂ capture methods for mid/small domestic CO₂ emitters and to estimate cost of those CO₂ capture methods
- To analyze a cost structure of CO₂ capture systems including pretreatment, aftertreatment and liquefaction in consideration of recent cost increases

Supply Chain/ Economic/ Regulatory Challenges

JOGMEC's Initiative: To establish Liquefied CO₂ value chain council

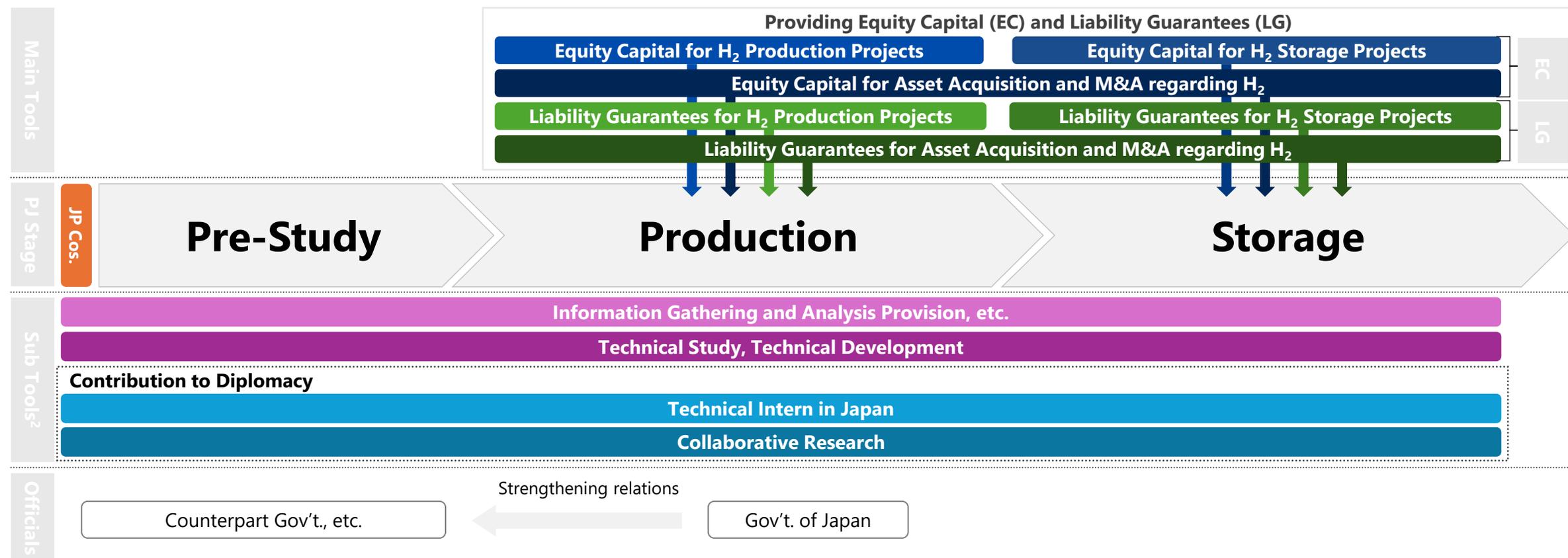
- To establish the council and discuss various specifications in CO₂ value chain with domestic companies with related to CO₂ marine transportation to reduce cost



Hydrogen & Ammonia

JOGMEC's Business Tools for Hydrogen & Fuel Ammonia

JOGMEC supports both domestic and overseas projects by Japanese companies for hydrogen¹ production and storage for the stable supply of hydrogen to Japan by providing assistance outlined below.



¹ Hydrogen of all origins is subject to JOGMEC support.

² Ancillary business tools to each tool categorized as Main Tools

Examples of JOGMEC's Initiative (1) eFuels Production Project



Gaining of equity share of HIF Global LLC

- JOGMEC announced that it would provide equity financing with Idemitsu Kosan Co., Ltd. to HIF Global LLC based in Texas, USA, one of the leading e-Fuels companies that is developing projects in several areas.
- This investment is the very first time for JOGMEC to provide equity investment for e-Fuels projects, a form of hydrogen.
- Starting with this investment, JOGMEC supports to accelerate the establishment of supply chains of hydrogen including e-Fuels (such as e-Methanol) and to drive our country's decarbonization and energy transition.

Project image in the US



https://www.jogmec.go.jp/english/news/release/news_10_00073.html

Examples of JOGMEC's Initiative (2) eFuels Production Project



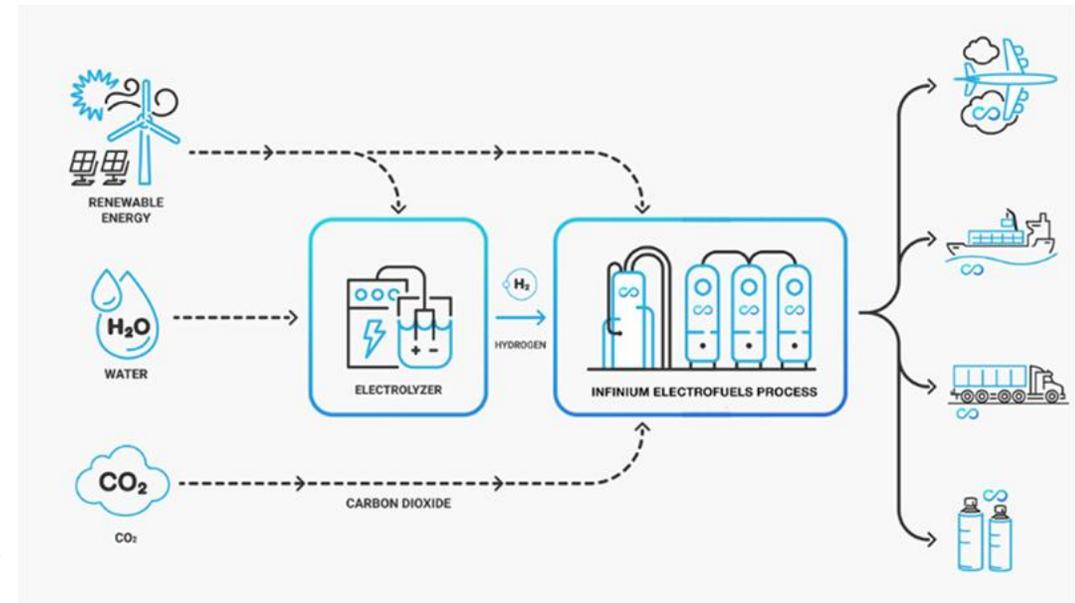
Investment in eFuels provider Infinium

- JOGMEC and Mitsubishi Corporation have participated in the Series C round of Infinium Holdings, Inc.
- Following the success of its first commercial-scale project, known as Pathfinder located in Corpus Christi, Texas, Infinium plans to set up its second commercial-scale eFuels project, also known as Roadrunner, which is expected to be the world's largest eSAF production facility when operational, located in Texas, USA.
- JOGMEC will support these efforts through this investment, contributing to establishing the eFuels supply chain and the earliest social implementation of eFuels in Japan.



Pathfinder plant located in Corpus Christi, Texas

eFuels Producing Process

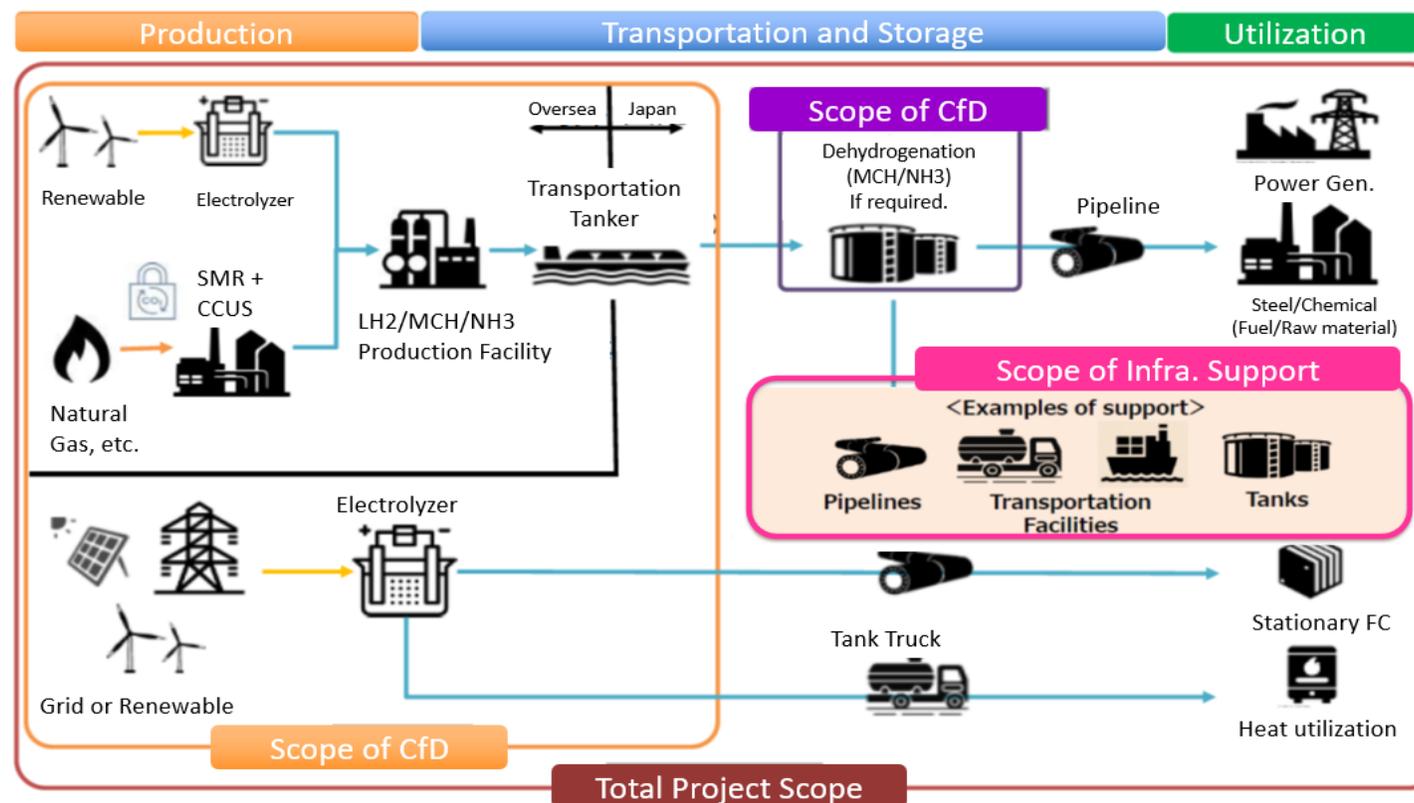


https://www.jogmec.go.jp/english/news/release/news_08_00030.html

Government Support for Hydrogen and Ammonia

Hydrogen Society Promotion Act

Japanese Government is working to promote the supply and utilization of low-carbon hydrogen and its derivatives. The **Hydrogen Society Promotion Act** includes **Contract for Difference** and **Infrastructure Construction Support** to support the value chain.



Examples of JOGMEC's Initiative (3) cfd program

METI's announcement of approval of two domestic projects

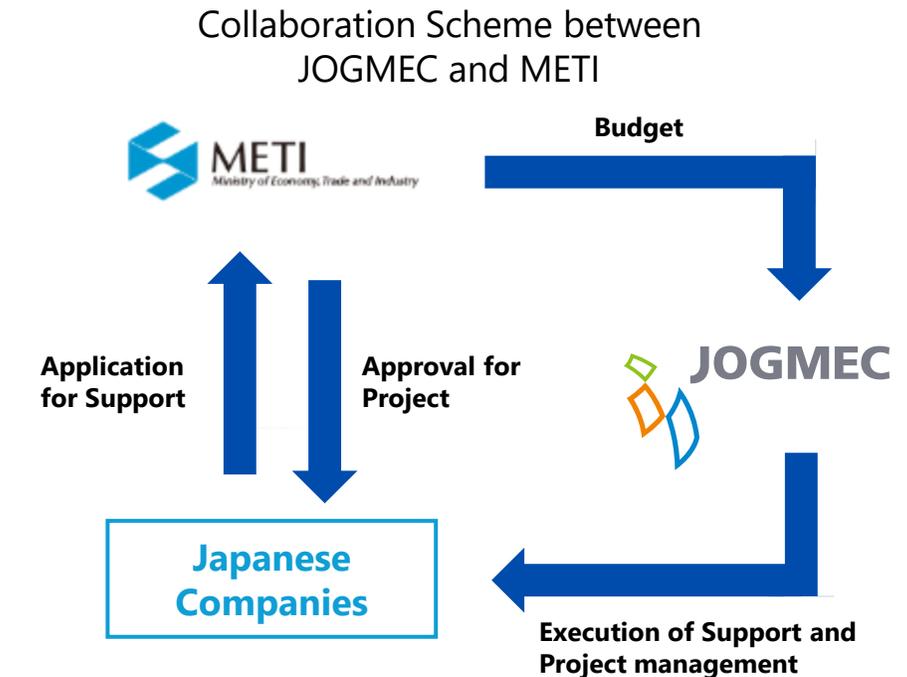
- METI approved two projects for its cfd program.
- In respect of providing support measures for approved business plans as one of the measures, JOGMEC will provide subsidies to finance the supply of low-carbon hydrogen and the development of hubs for low-carbon hydrogen.

#1.

- Operators: Toyota Tsusho Corporation, Euras Energy Holdings Co., Ltd., Iwatani Corporation, Aichi Steel Corporation
- Products: hydrogen
- Period: August 2030 to July 2055

#2.

- Operators: Resonac Corporation, Nippon Shokubai Co., Ltd.
- Products: ammonia
- Period: April 2030 to March 2055



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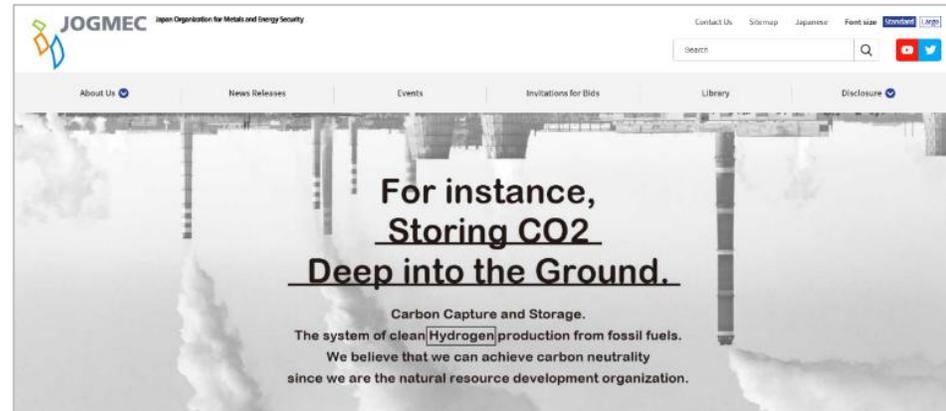
Way Forward

Our role

- JOGMEC's role is to respond to future uncertainties as much as possible
- JOGMEC strives to provide diversified and comprehensive services

In the field of low-carbonization and decarbonization

- JOGMEC provides comprehensive support (finance, technology & intelligence) specially,
 1. Methane Emission Reduction
 2. Carbon Capture, Utilization Storage (CCUS) technologies
 3. Promotion of hydrogen and its derivatives for energy use



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