

Slot8: JOGMEC Initiatives for CCS/Ammonia Projects

FEnEx CRC & JTSI CCS Workshop Schedule

Mar13,2023

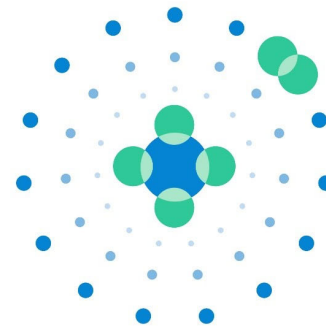
Japan Organization for Metals and Energy Security

Hydrogen and CCS Project Department

Global Coordination Division

Yoshifumi Suehiro, PhD

Masumi Takanashi



**FUTURE
ENERGY
EXPORTS**

Cooperative Research Centre

Japan's Policy for Carbon Neutrality -(CCS)

• CCS Long-Term Roadmap study meeting (METI)

- Interim report of the CCS Long-Term Roadmap in May 2022

- **Draft final report of the CCS Long-Term Roadmap** in January 2023

➤ Target

-Develop CCS business environment (cost reduction, public acceptance, CCS in overseas, domestic law for CCS) by 2030

-As a rough estimation of CO2 volume to be stored is 120-240MMton of CO2 per year in 2050.

-Establishing a CCS Business Model by 2030, full-scale development of CCS business by 2050.

➤ Specific Actions

(1) Government support for CCS projects

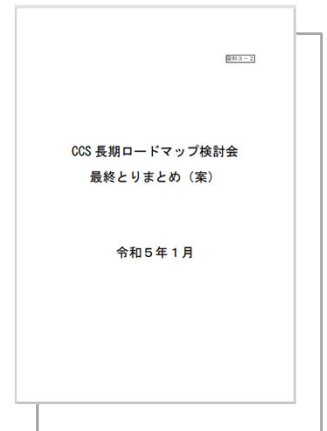
(2) Efforts to reduce CCS costs

(3) Promotion of public understanding for CCS projects

(4) Promotion of overseas CCS projects

(5) Preparation for the development of a law for CCS

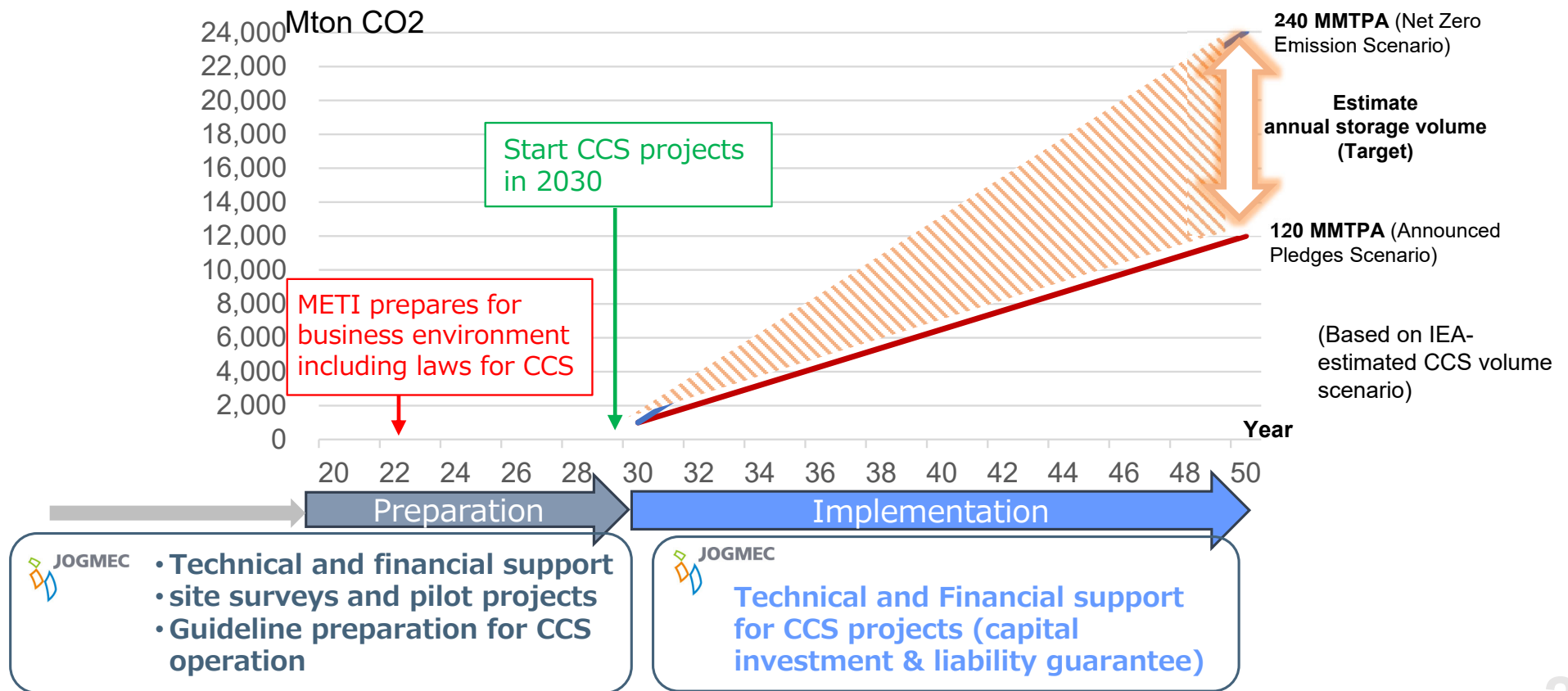
(6) Formulation of the CCS Action Plan and revision



The above is translated and modified by JOGMEC. Please check the original, the Draft Final report of METI.
(Source, METI: https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/006_03_01.pdf in Japanese)

Japan's CO2 volume for storage in 2050

•As a rough indication, METI stated that **Japan's CO2 volume need to be captured and stored would be 120~240 million tons per annum (mtpa) in 2050.**



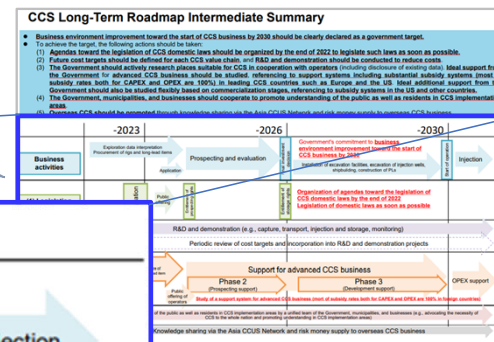
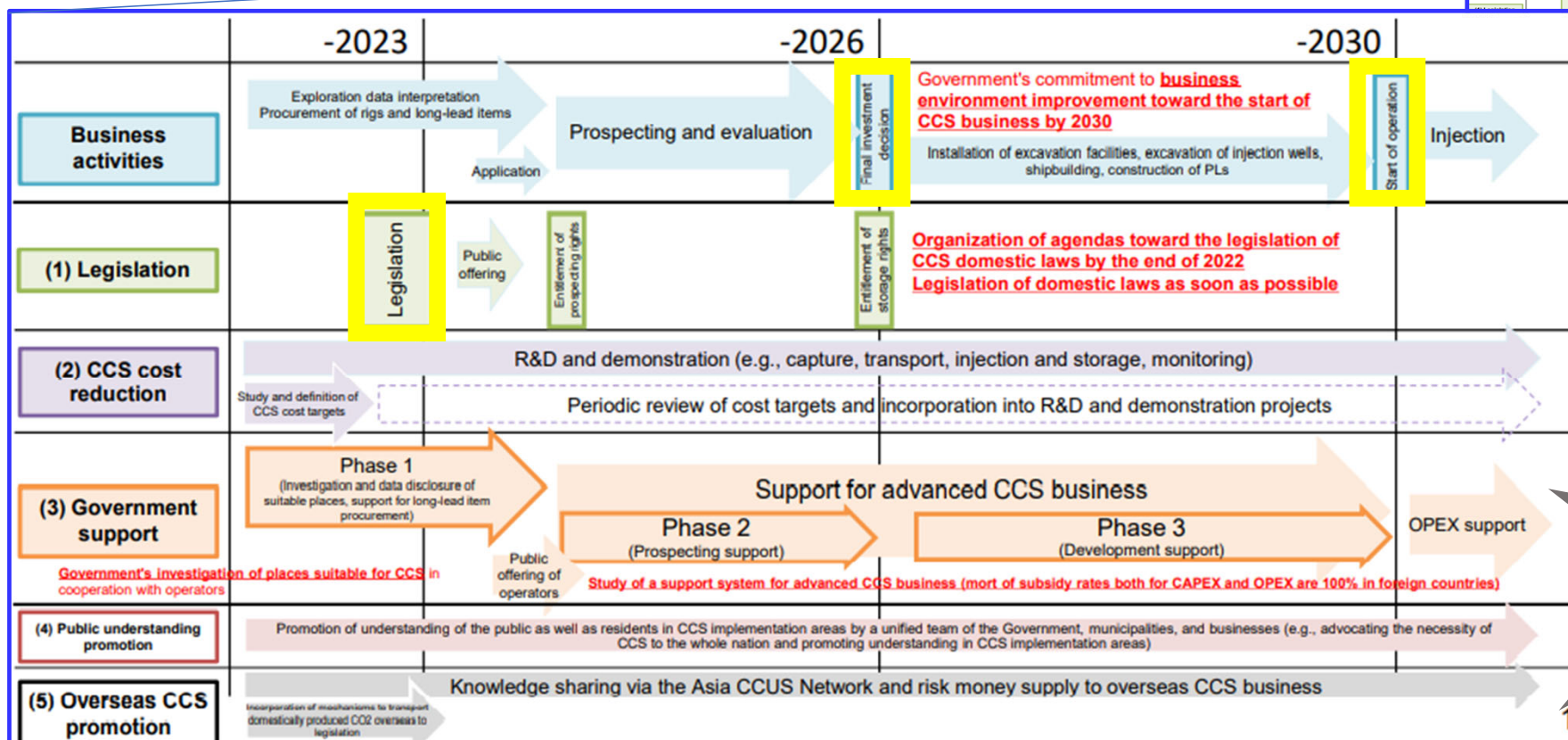
(Source, METI: https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/20220527_2.pdf, in Japanese) The above is translated and modified by JOGMEC

Japan's CCS Long-Term Roadmap by METI

METI published a draft of the CCS Long-Term Roadmap FINAL report in January 2023 (Japanese only).

[Please check the Final Roadmap of METI.](#)

Roadmap from Interim report 2022



JOGMEC
supports here!

11

(Source, METI: https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/20220527_2.pdf in Japanese/ The second Asia CCUS Network Forum on Sept.30, 2022 in English), modified by JOGMEC

JOGMEC's financial & technical supports for CCS 1

New tool : Support of Japanese leading CCS

JOGMEC will support **Japanese leading CCS projects** in FY2023 to establish expandable business models for promoting future CCS projects.

■ Support of Japanese leading CCS projects (FY2023)

Budget : 3.5 billion JPY (27 million \$)

Target works : **Feasibility study**

(engineering study and field survey for CO₂ storage)

Pre-study for drilling

- As the first step, JOGMEC supports three to five types of CCS projects including CO₂ capture, transportation, and storage.
- Aiming to ensure 6~1.2 MMt/year CO₂ injection by FY2030.



Source: METI homepage

https://www.meti.go.jp/shingikai/energy_environment/ccs_choki_roadmap/pdf/006_04_00.pdf

Evaluation criteria : Support of Japanese leading CCS projects

Japanese leading CCS projects tackle their scale-up and drastic cost reduction through developing CCS hub and cluster networks.

■ Requirements

- Starting the injection of CO₂ before FY2030 with the injection of 0.5 MMt/year or more.
- Including CO₂ capture, transportation and storage processes, each of which is required to have at least any of following characteristics.

Required CO₂ source, transportation methods and storage field.

CO ₂ source of capture process	transportation	storage
Capture from multiple industries* or Capture at the production plant of decarbonized fuels (Blue NH ₄ or Blue H ₂)	Pipeline or Shipping	Underground or Undersea (Coastal/Deep sea)

* Power generation, oil refining, steel, chemical, pulp and paper and cement industries etc.

■ Evaluation

1.Delivalability	Organization structure, validity of work plan and schedule, and stakeholder engagement at CCS site and its neighborhoods.
2.Scalability	Plan on expanding the amount of CO ₂ capture, transportation and storage, and reducing the cost.
3.Profitability	Estimated cost of CO ₂ per ton and profitability outlook
4.Ripple effect	PR, knowledge sharing and local contribution

Discuss further plan for existing collaboration between Pertamina and Jogmec

【CO2 Injection at the Jatibarang field in West Jawa】

- JOGMEC, Pertamina(Persero), and Pertamina EP conducted CO2 injection as the initial stage of CO2 enhanced oil recovery (EOR) and carbon capture and storage (CCS) .
- First time that Pertamina and PEP will implement CO2 injection into an oil and gas field in Indonesia
- Important step for the country to increase oil production and reduce carbon dioxide emissions by implementing CO2 EOR as part of carbon capture, utilization and storage ("CCUS") technology.

JOGMEC Pertamina, and Pertamina EP will proactively engage in energy transition towards a net zero carbon society, while fulfilling their responsibility for the development, and stable supply of energy over the long-term.

Source: JOGMEC

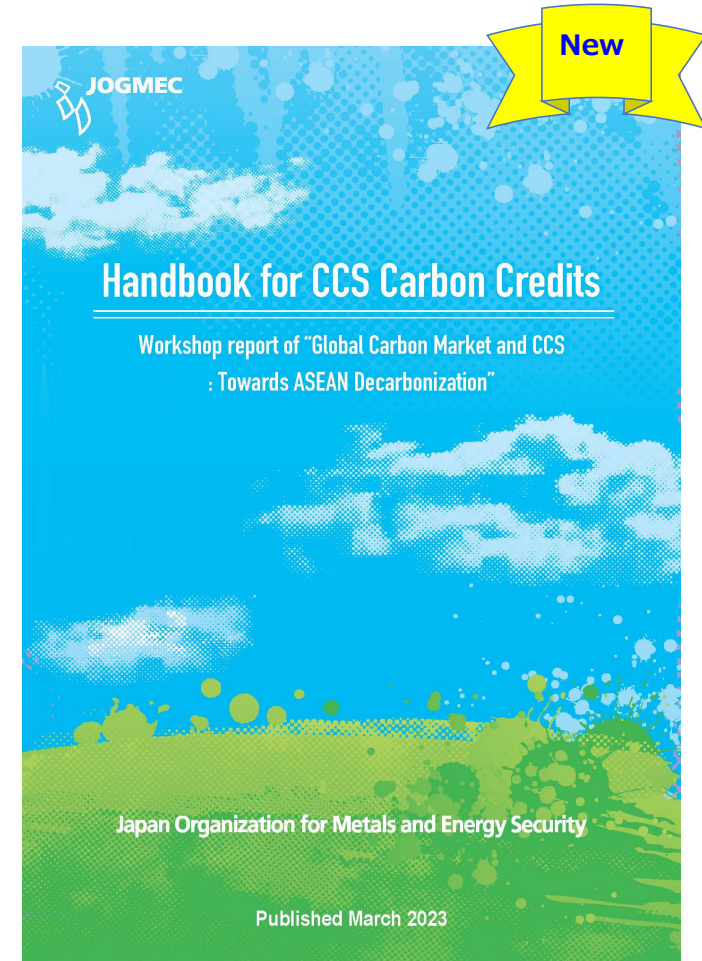
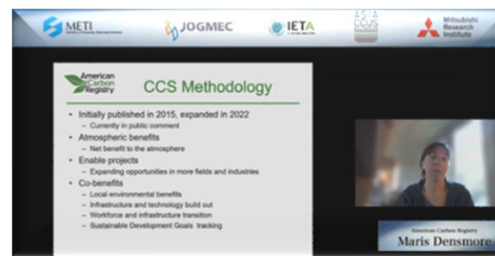


CO2 injection site at the Jatibarang oil field in West Jawa, Indonesia. White CO2 tanks are connected to the injection well shown on the left.

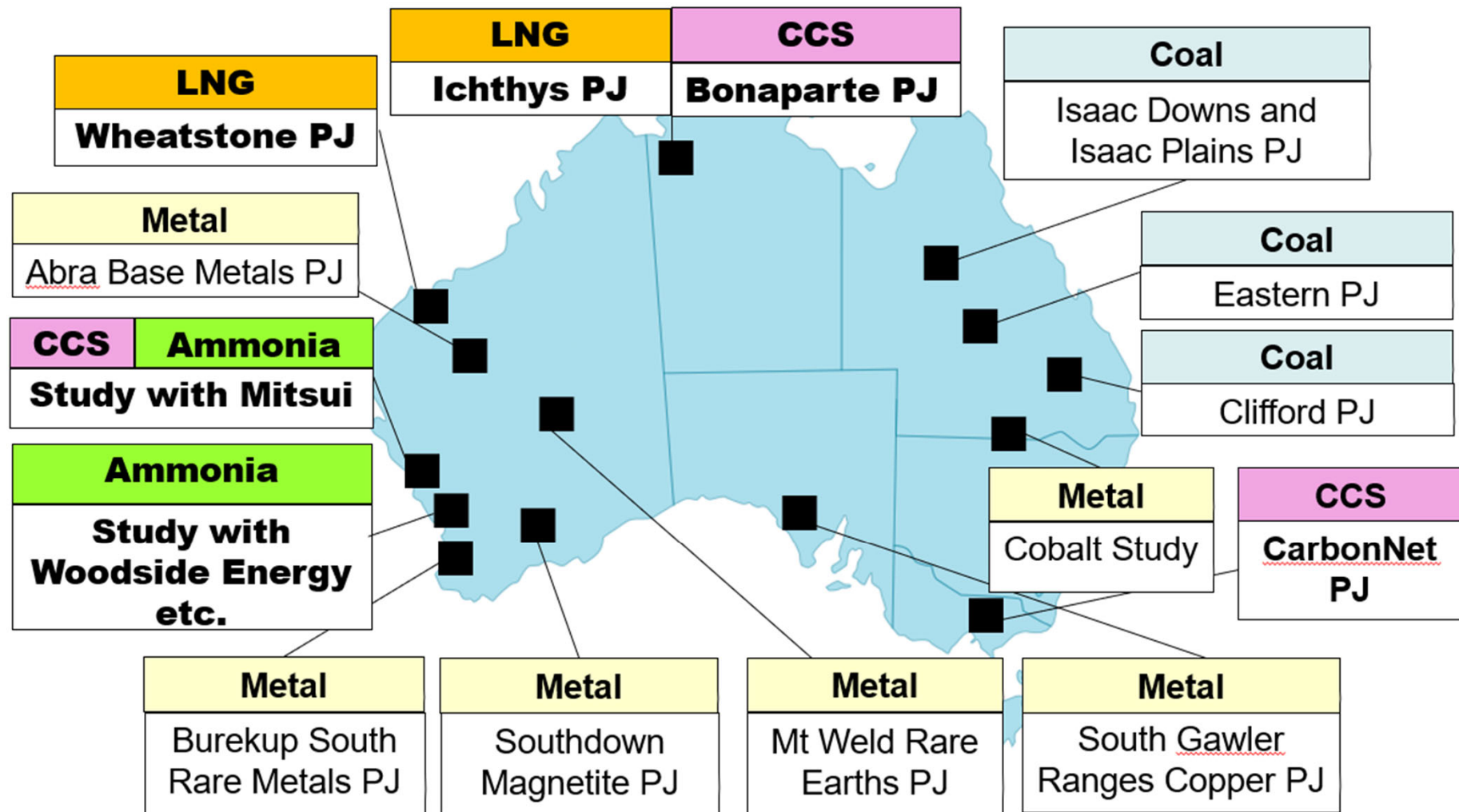
Unlocking the potential of carbon market for CCS deployment

- Handbook for CCS Carbon Credits

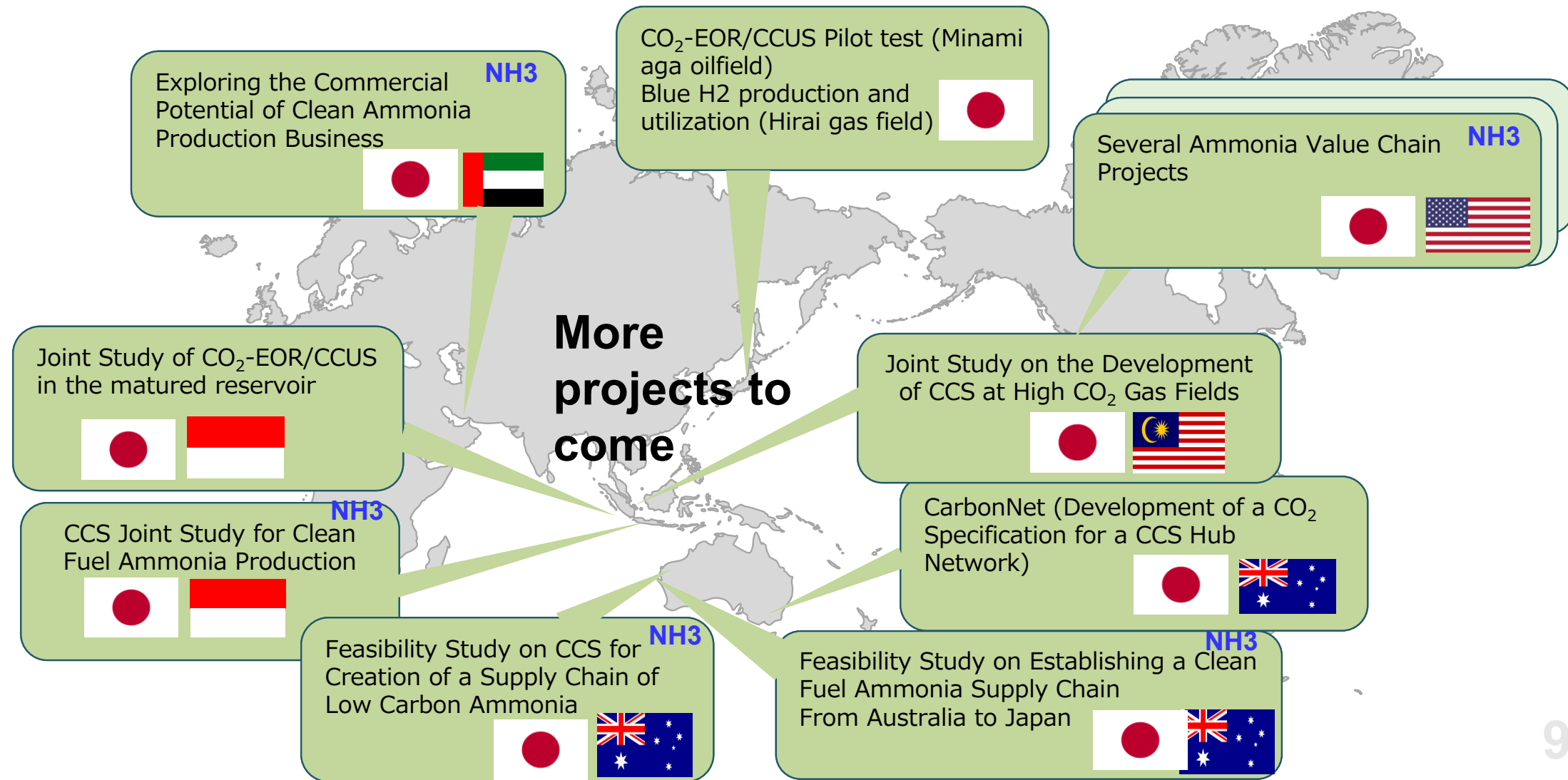
- Carbon markets can lead the way to effective CCS deployment.
- JOGMEC's activities to unlock the potential carbon market for CCS deployment;
 - Held successful International workshop with METI and IETA.
 - Published first ever handbook on CCS Carbon Credits.



JOGMEC's Activities in Australia

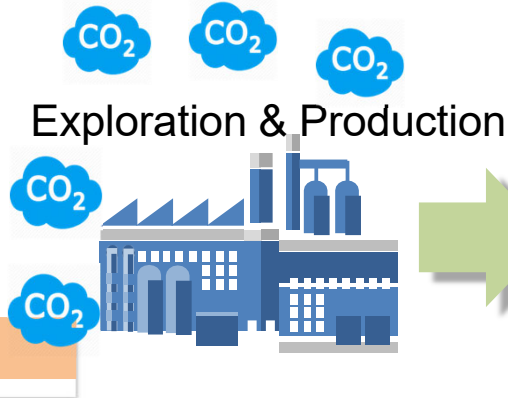
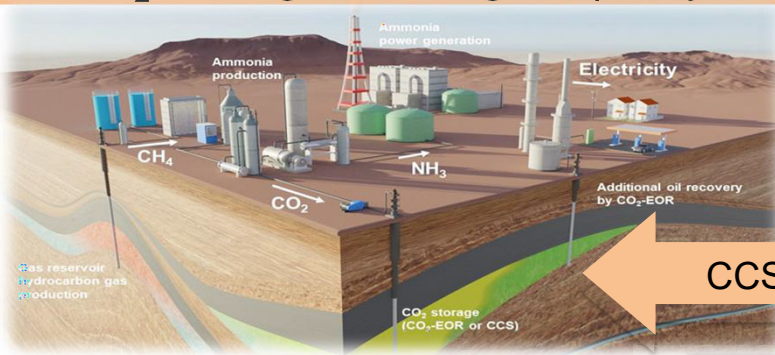


JOGMEC's Project Map of CCS and Clean Ammonia



JOGMEC's Guidelines for CCS, EOR as Storage, and Carbon Intensity

CO₂ Geological Storage Capacity



Carbon Intensity (CI)

LNG, Ammonia
Hydrogen, E-fuel*

How to select a storage site and evaluate the reduction of GHG emissions?

For ° ° °
CO2-EOR

How to design an EOR project that contribute to the reduction of GHG emissions?

How to calculate CI?

(1) Guideline for the implementation of carbon dioxide capture and storage projects (CCS guideline)

*Published May 2022

(2) Guidelines for the Implementation of CO2-EOR for Safe and Long-Term Containment of CO2 (CO2-EOR guideline)

New

*Coming soon

(3) Guideline for greenhouse gas and carbon intensity calculation framework for LNG/Hydrogen/Ammonia project (CI guideline)

New

*Published May 2022

*2nd edition coming soon

* E-methane is added on 2nd edition

Summary

There is a need to reduce the risks that exist in the establishment of the CCS and ammonia/hydrogen value chain.

- ✓ Establishment of a market that companies can foresee.
- ✓ Technology that leads to cost reduction.
- ✓ Incentives to increase project feasibility.
- ✓ Achieve both low environmental impact and economic efficiency.



Thank you for your attention.

C L E A N
F U T U R E
E N E R G Y

**Leading the Way for
Next-Generation Technologies for
a Carbon-Neutral Society**

<https://mirai.jogmec.go.jp/en/>