



Ministry of the Environment
Government of Japan

International CCS Symposium
for Low-Carbon Society
12th February 2015
10:35-11:05

Towards a Low-Carbon Society - Climate Change Policy in Japan -

Hiroaki Takiguchi

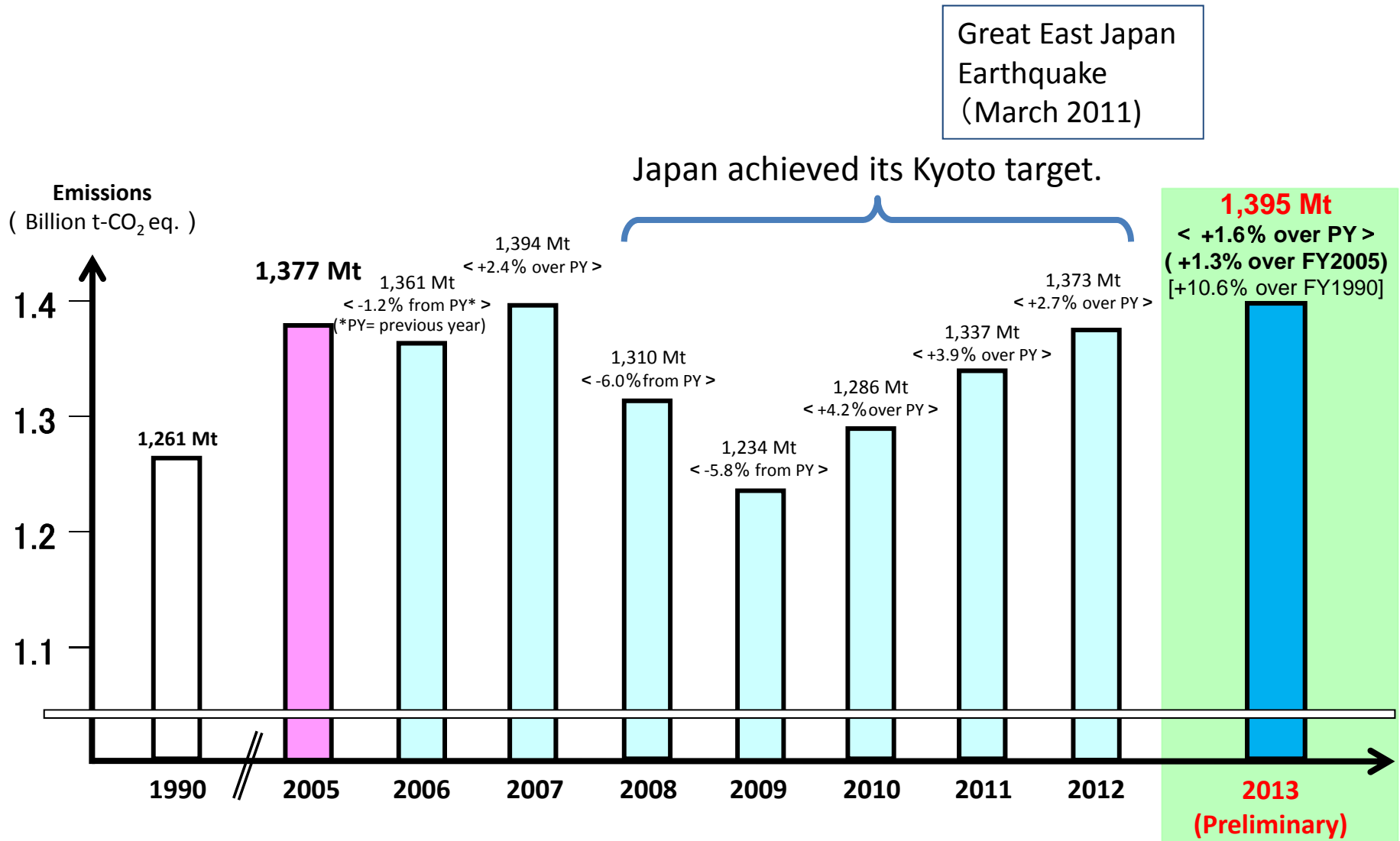
Director

Low-Carbon Society Promotion Office

Global Environment Bureau

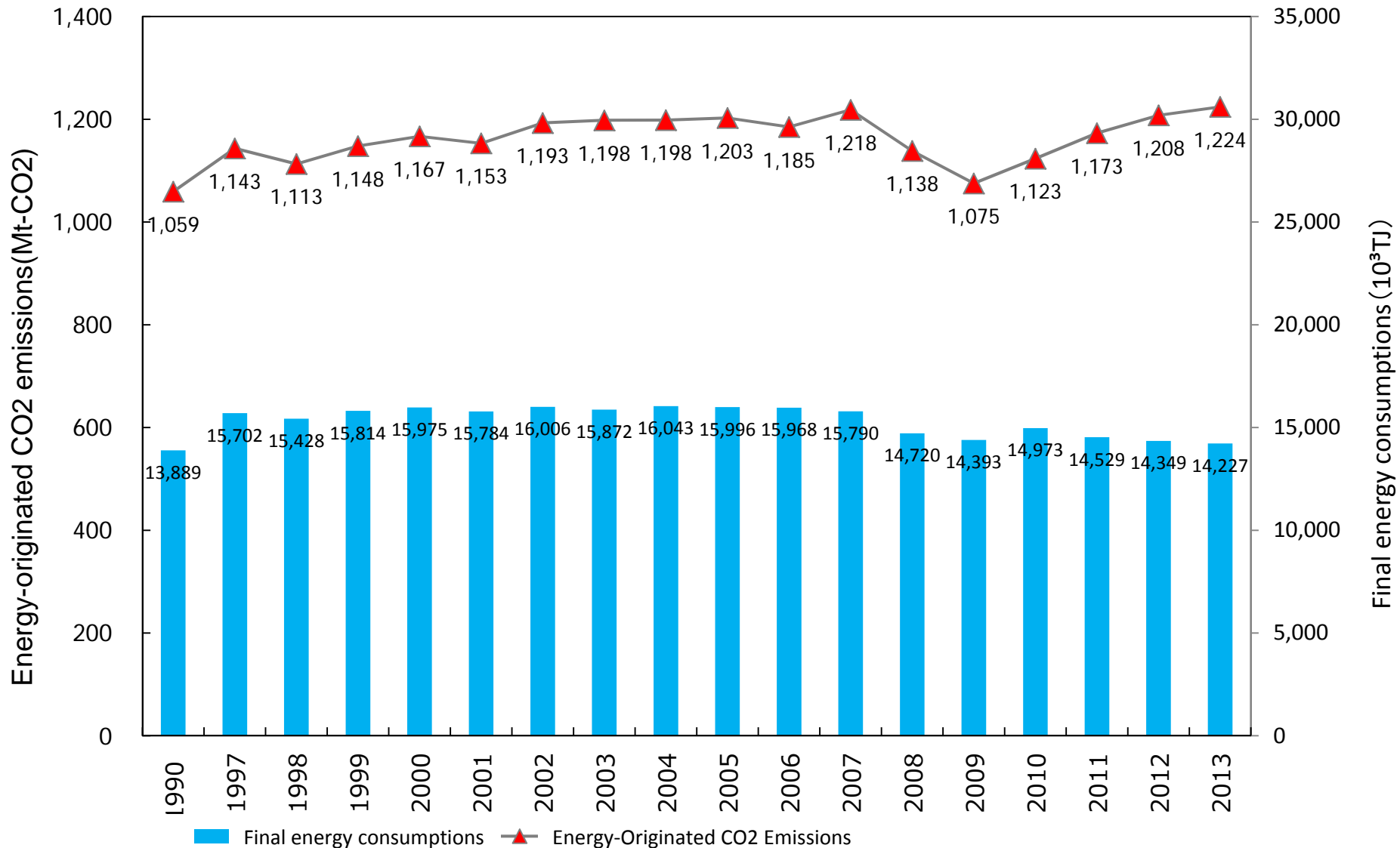
Ministry of the Environment, Japan (MOEJ)

Trend of GHG Emissions in Japan



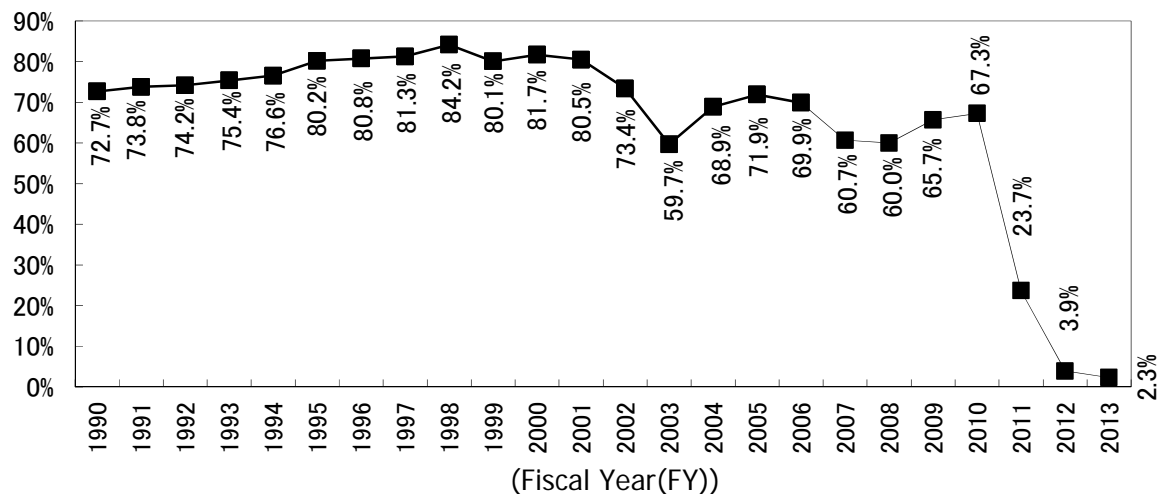
(Source) Ministry of the Environment, Japan

Trend of Final energy consumptions and Energy-Originated CO₂ Emissions



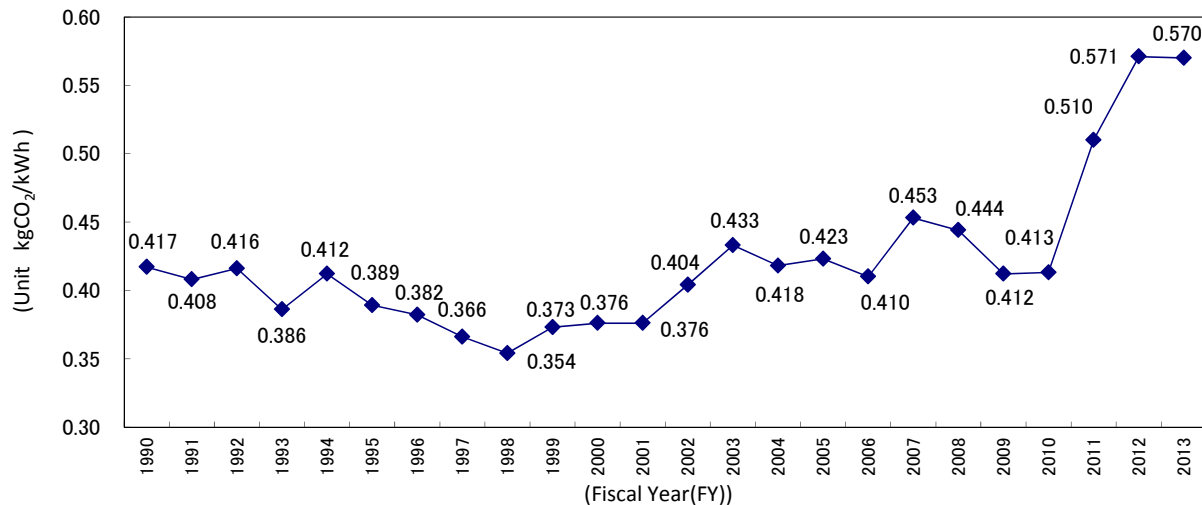
Trend of CO₂ Emissions Intensity in the Electricity Sector

Table Trend of the capacity factor of nuclear power



(Source) The Federation of Electric Power Companies of Japan

Table Trend of CO₂ Emissions Intensity in the Electricity Sector



(Source) Agency of Natural Resources and Energy, METI

Policy on Fossil Fuel Fired Power Plants

- ◆ To request the power sector to develop a sector-wide framework for CO₂ emissions reduction
- ◆ To check the following points in environmental impact assessment:
 1. Adoption of Best Available Technologies (BATs)
 - The national government has released a list of BATs.
 2. Consistency with national target and plans:
 - To take actions under the sector-wide framework or plans, including mitigation in abroad to offset the net increase emission over a natural gas power plant
- ◆ To accelerate technology development of CCS and conduct survey on potential CO₂ storage sites for commercialization of CCS by around 2020
- ◆ To consider introduction of CCS at coal-fired power plants by 2030 and identify requirements for CCS Ready

~Toward Zero Carbon Emission Thermal Power Plants~ Carbon dioxide Capture and Storage (CCS)

Objective:

- To lay groundwork for introducing CCS at coal-fired power plants;
- To take into consideration Japan-specific factors in introducing CCS

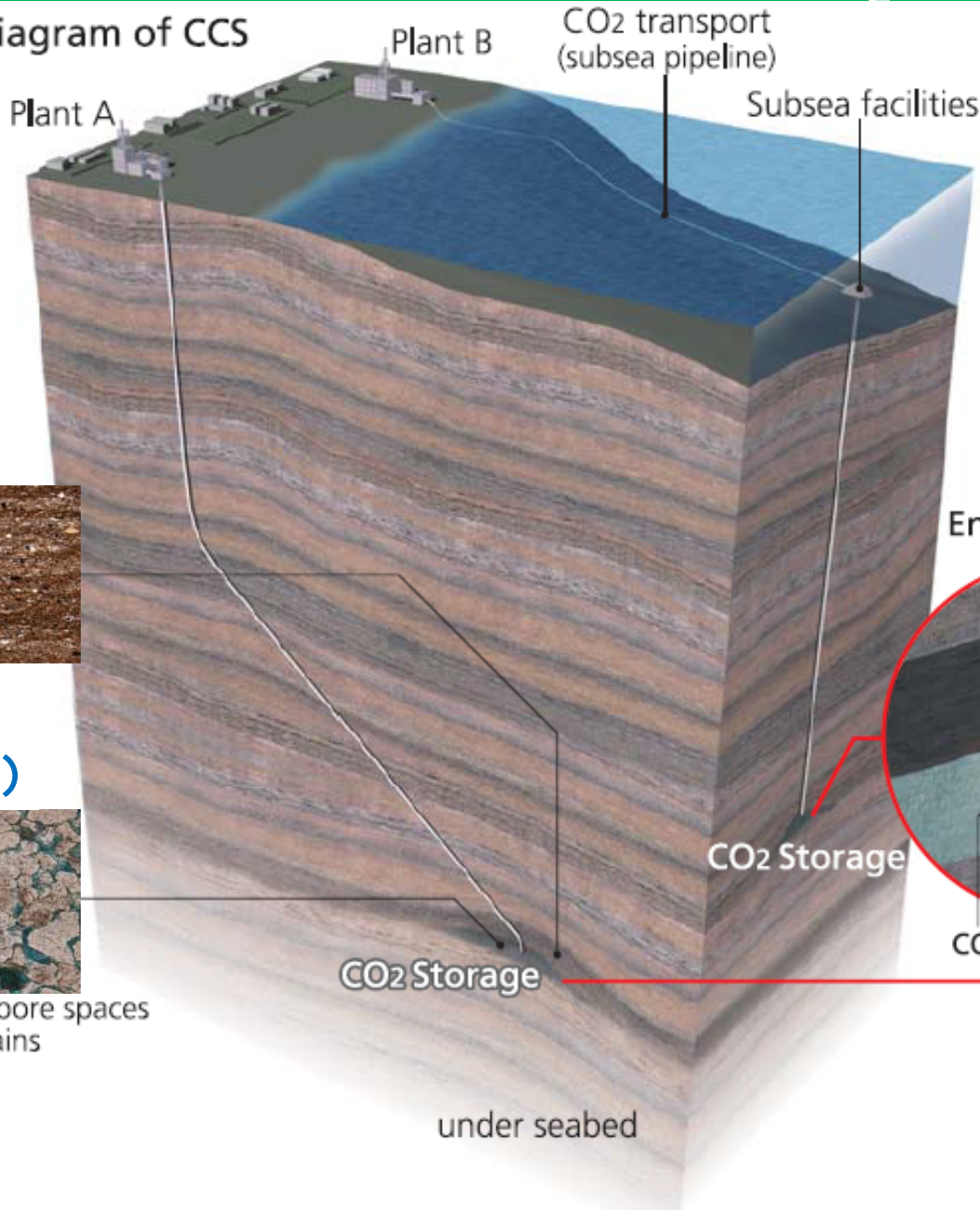


Projects under the MOEJ Initiative

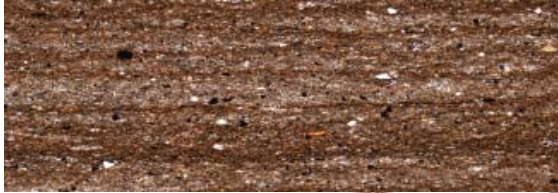
1. Investigation of potential CO₂ storage site
(A joint project with Ministry of Economy, Trade and Industry)
2. Feasibility Study for the Introduction of Sustainable CCS Technology
3. Demonstration of carbon dioxide capture facility equipped to a waste incineration plant (proposed)

Geological Structures Suitable for CO₂ Storage

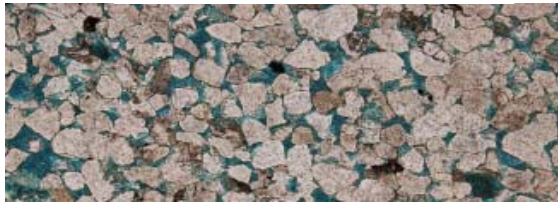
Conceptual Diagram of CCS



**Cap rock layer
(mudstone)**



**Reservoir layer
(sandstone etc.)**



CO₂ is stored in the pore spaces between grains

Enlarged view

Caprock

CO₂

Reservoir

CO₂ Storage

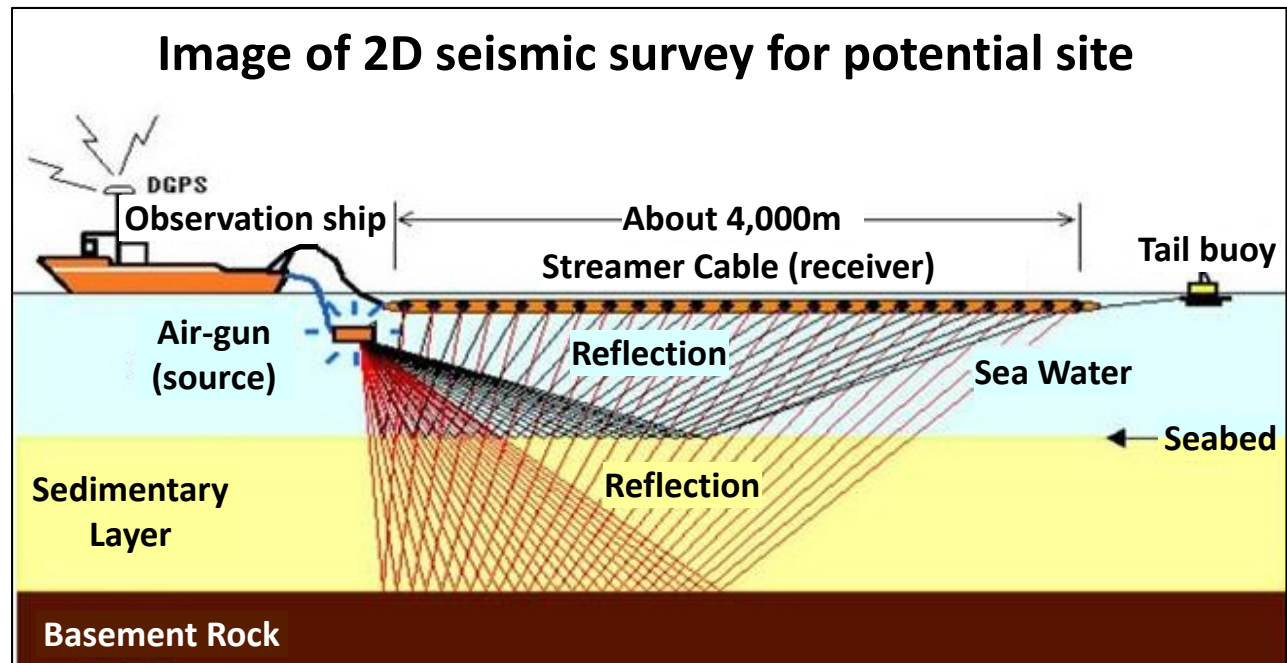
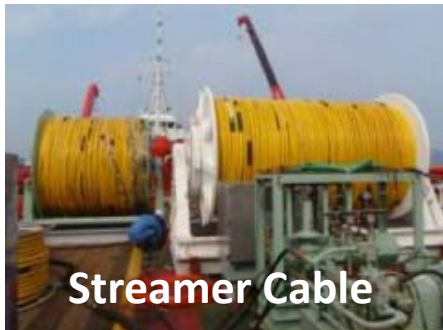
CO₂ Storage

under seabed

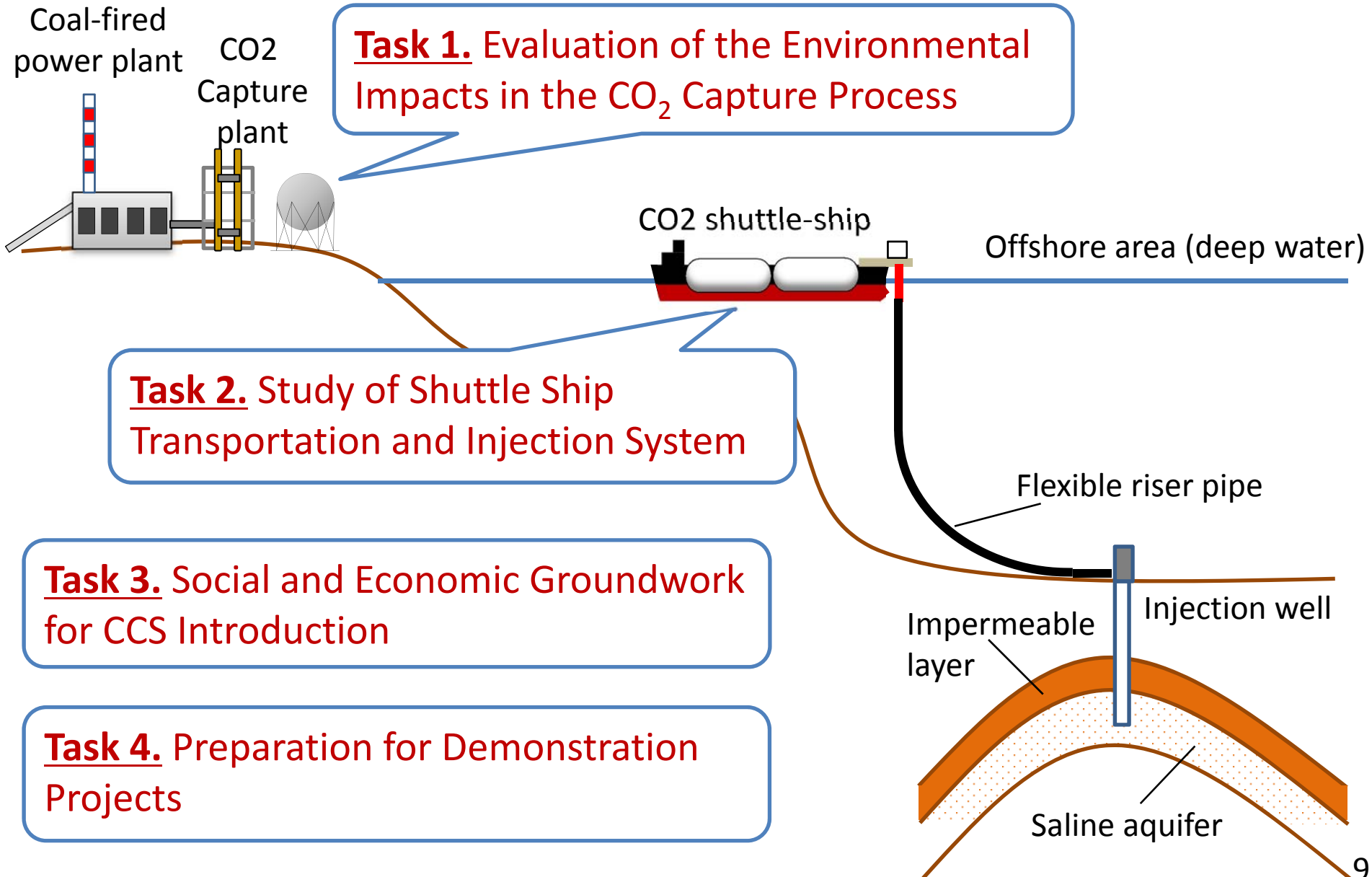
1. Investigation of potential CO₂ storage site (A joint project by MOEJ and METI)

- To identify potential CO₂ storage sites in waters surrounding Japan, as well as considering deep sea areas
- To conduct two or three-dimensional seismic surveys and boring surveys for identifying the extent and structure of the reservoir and the cap rock

In FY2014, Japan CCS Co., Ltd. was commissioned to conduct the investigation project and is currently conducting the survey and analysis of existing data.



2. Feasibility Study for the introduction of Sustainable CCS technology



Institutional Arrangement of the Project



contract |

Consortium

Project leader

Dr. Makoto Akai (AIST)

Mizuho Information & Research
Institute, Inc. (organizer)

MIZUHO

National Institute of Advanced
Industrial science and Technology

AIST

Toshiba Corporation

TOSHIBA

Chiyoda Corporation

**CHIYODA
CORPORATION**

JGC Corporation

JGC
日揮株式会社

Quintessa Japan

Quintessa
Quintessa Japan

Advisory committee for
introducing sustainable CCS

Report



Advice

Subcommittee for
environmental
impact of CO2
separation and
capture absorbent

Subcommittee for
shuttle ship
transportation and
injection
technologies

Task 1. Evaluation of the Environmental Impacts in the CO₂ Capture Process

Background:

- CO₂ absorbents (amine solvents) may affect the environment when released to the atmosphere.
- Nitrosamine, which is one of the amine derivatives, may have risks to human health.

The project aims to

- Study: the impact of emissions from amine solutions on the environment; flue gas composition; and emission reduction technologies
- Conduct risk assessment of the CO₂ capture process.



Post Combustion CO₂ Capture Pilot Plant (Toshiba)

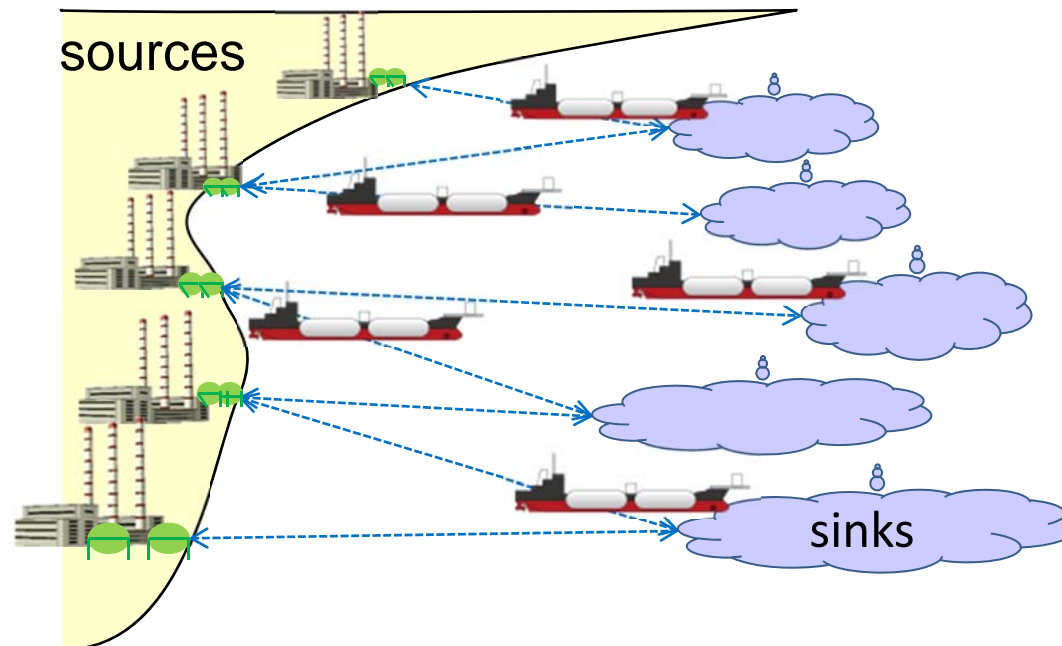
Task 2. Study of Shuttle Ship Transportation and Injection System

◆ Why we need offshore CO₂ storage ?

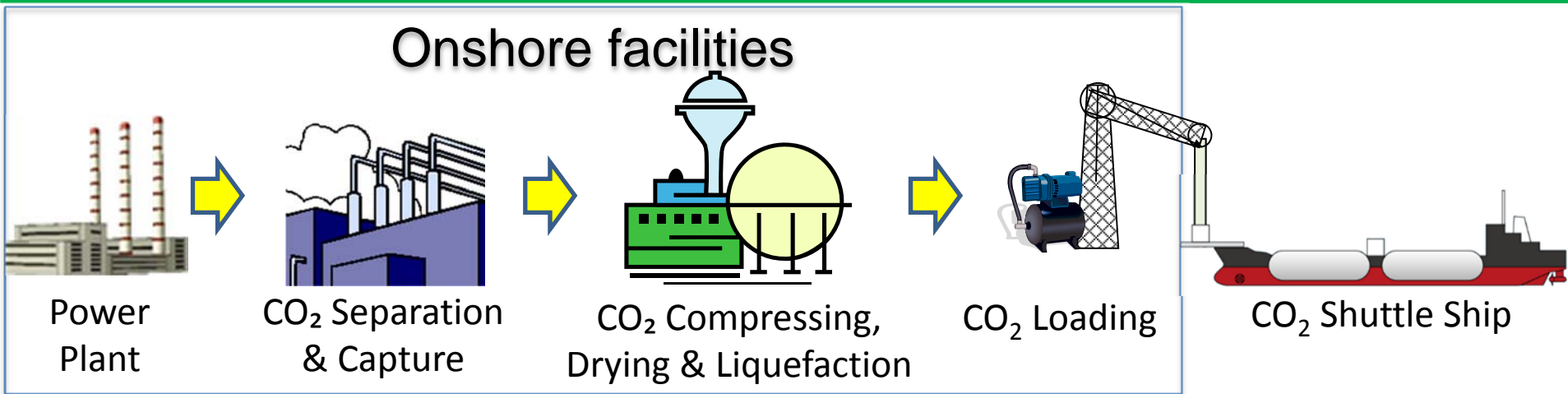
1. Most of CO₂ emission sources exist along the coasts.
2. Offshore areas are less used compared to coastal waters.

◆ What are key benefits of shuttle ship transportation system ?

1. Easy to match source and sink
2. Flexible to change transportation/storage plans

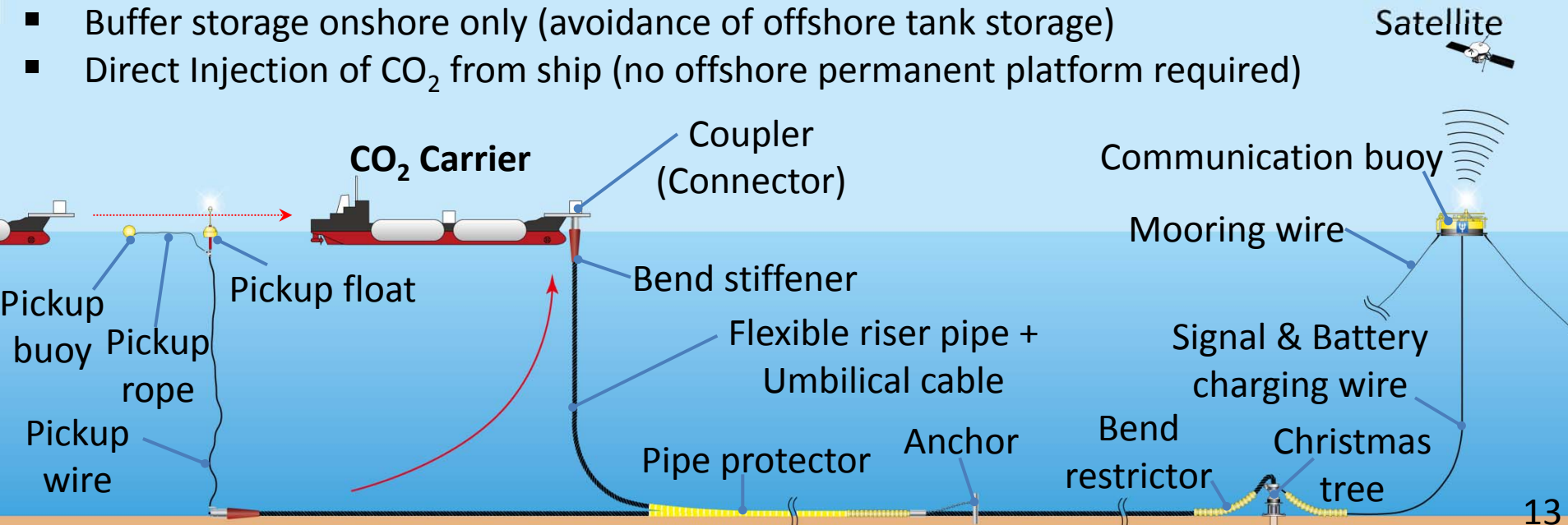


Task 2. Study of Shuttle Ship Transportation and Injection System(cont'd)



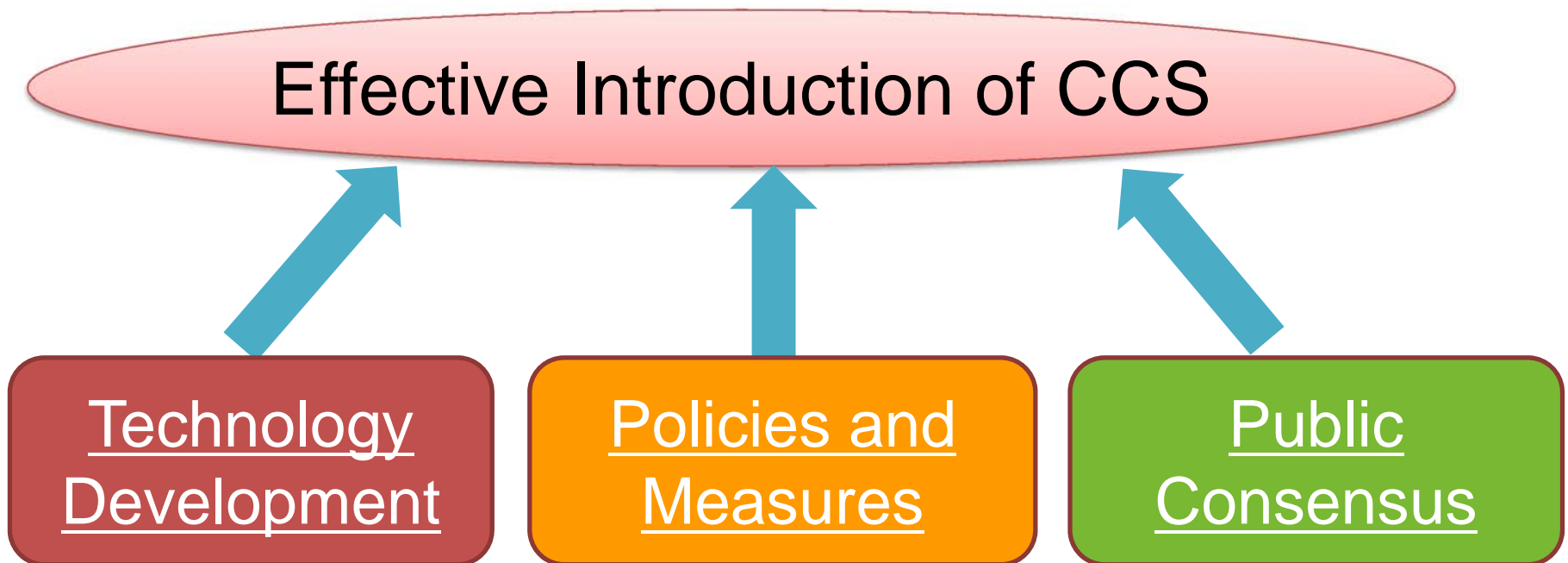
CO₂ Shuttle Ship Transportation & Onboard Injection System

- Buffer storage onshore only (avoidance of offshore tank storage)
- Direct Injection of CO₂ from ship (no offshore permanent platform required)



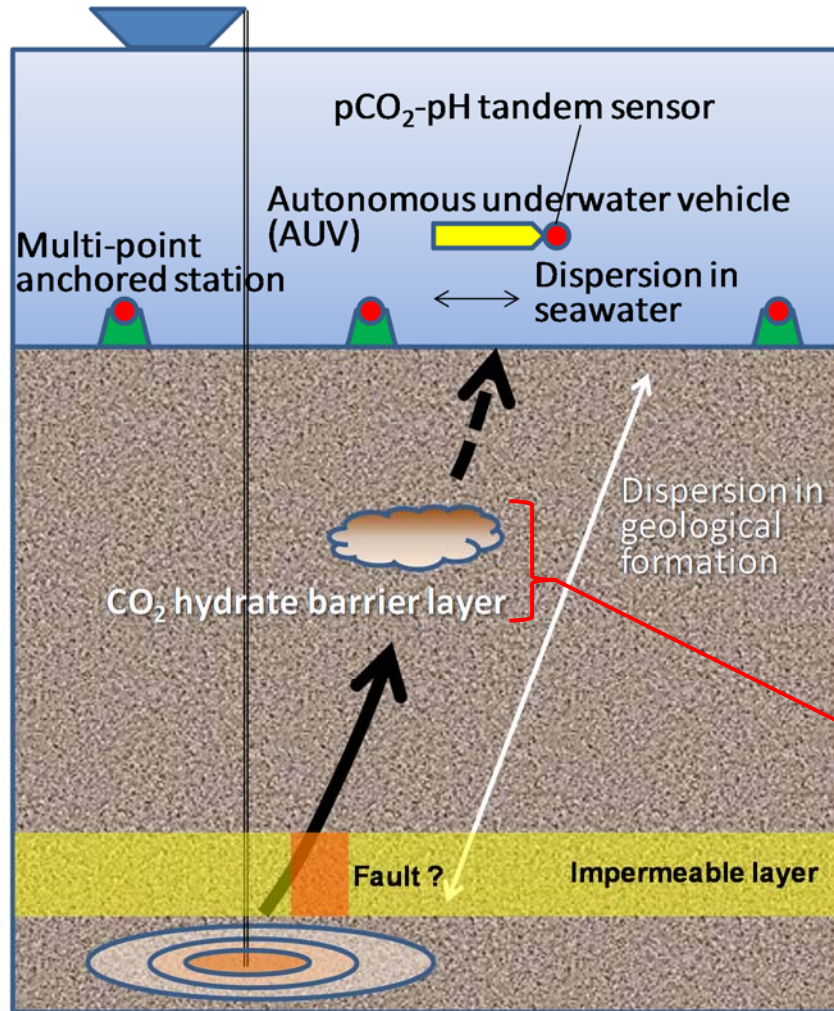
Task 3. Social and Economic Groundwork for CCS Introduction

- Economic analysis of CCS
- Lifecycle CO₂ assessment
- Considering policies and measures
- Analysis of side effects of CCS
- Awareness raising of CCS for public acceptance
- Exploration of overseas deployment potential



Task 4. Preparation for Demonstration Projects

- Review of demonstration sites
- Study of monitoring methods for deep water sea area
- Design of integrated CCS demonstration projects



- Optimizing a continuous monitoring system to detect CO₂ leakage

- Simulation of CO₂ leakage and dispersion into water

- Study of basic properties of CO₂ hydrate barrier layer under seafloor

Study of monitoring methods

Objectives of the Symposium

- To promote understanding of CCS by sharing current policies and activities of CCS in the world. *(Keynote address)*
- To share problems on effective introduction of CCS and explore measures to solve them. *(Session I: Arrangement for effective introduction of CCS)*
- To share status of public understanding of CCS domestic and overseas and explore method of knowledge sharing and communication design, considering CCS-specific characteristics. *(Session II: Public understanding of CCS)*
- To introduce on-going activities of the CCS project commissioned by MOEJ. *(Poster Session)*

Summary

- ◆ CO₂ emissions in Japan are increasing after the nuclear power plant accident.
- ◆ Reduction of CO₂ emissions from coal-fired power plants is critical to climate change mitigation.
- ◆ The Japanese Government is responsible for:
 - Accelerating CCS technology development;
 - Conducting survey on potential CO₂ storage sites for commercialization of CCS by around 2020; and
 - Considering introduction of CCS at coal-fired power plants by 2030 and identifying requirements for CCS Ready
- ◆ MOEJ is implementing projects regarding:
 - Investigation of potential CO₂ storage site
 - Feasibility Study for the Introduction of Sustainable CCS Technology