

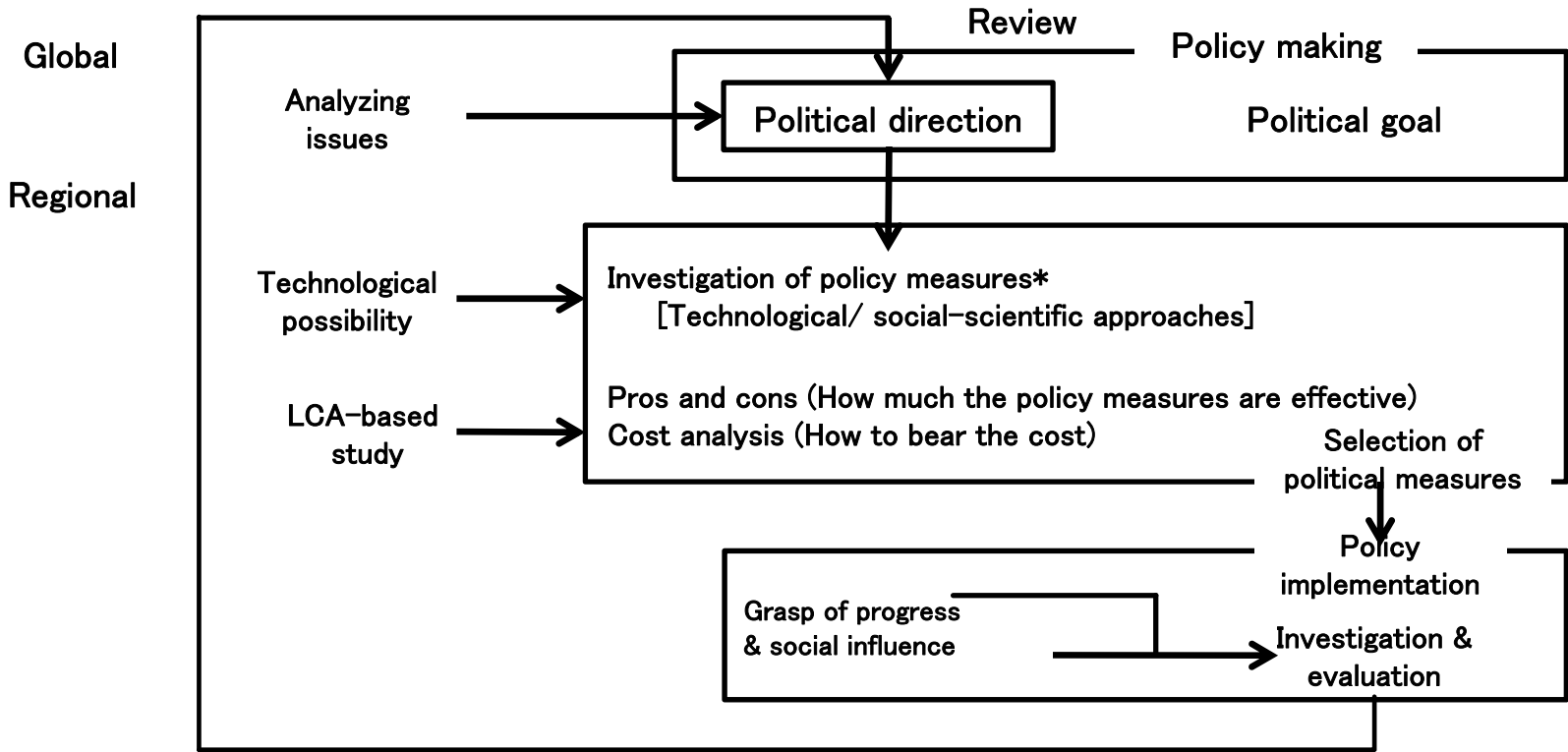
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# **Relevant regulation for CO2 sub-seabed storage in Japan**

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# Prologue: Flow for investigating environmental laws and policies



\* Approaches to be investigated:  
 Legal approaches, Economic approaches, Planning approaches, Other inductive approaches

The Fourth Basic Environment Plan

- ◆ Decided by the Cabinet in April, 2012
- ◆ Regarding the Climate Change Policy, the Plan
  - Sets a long-term target (Reduction of GHG emissions by 80% by 2050)

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# Contents

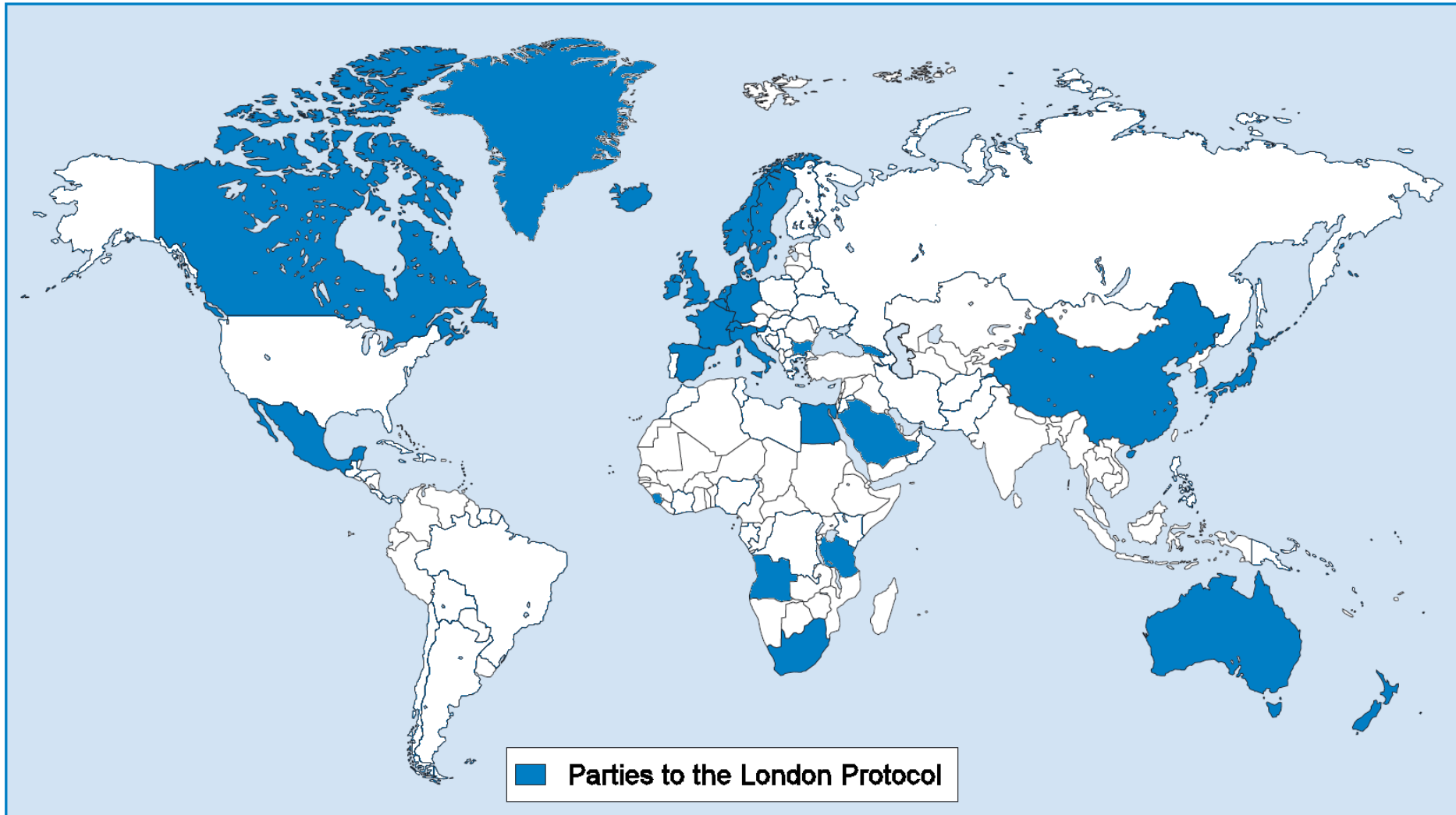
- 1. The regulatory framework of CO<sub>2</sub> sub-seabed storage under the London Protocol**
- 2. The regulatory framework of CO<sub>2</sub> sub-seabed storage under the *Marine Pollution Prevention Law***

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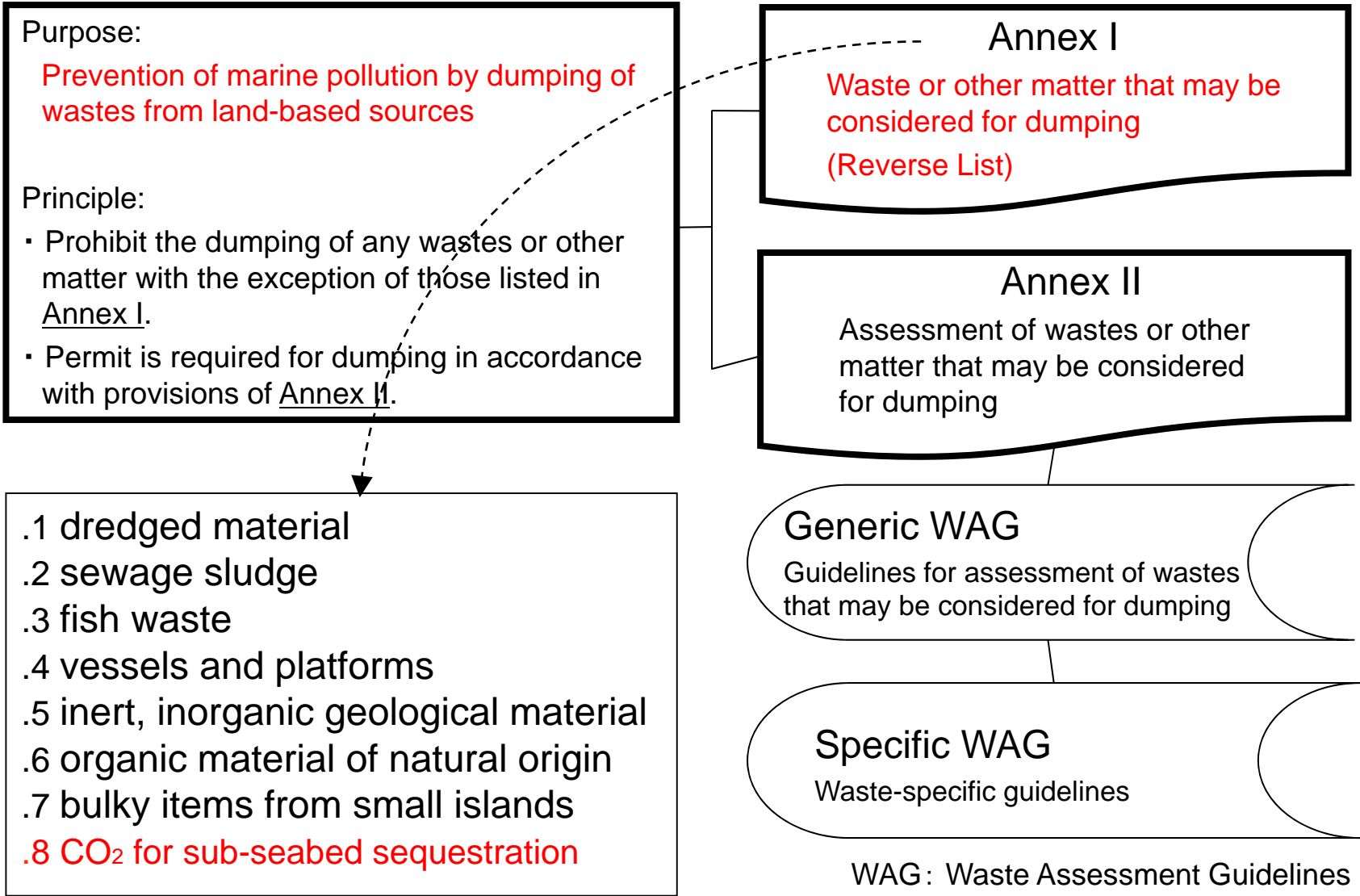
# **1. The regulatory framework of CO<sub>2</sub> sub-seabed storage under the London Protocol**

# The 1996 London Protocol

The 1996 London Protocol to the London Convention 1972 - 40 contracting parties  
(as of July 5, 2011)



# Structure of the 1996 Protocol



# Annex I amendments (2006.11)

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“Carbon dioxide streams from carbon dioxide capture processes for sequestration”  
may only be considered for dumping, if

- (1) disposal is into a sub-seabed geological formations
- (2) wastes consist overwhelmingly of CO<sub>2</sub> (may contain incidental associated substances derived from the source material, and the capture and sequestration processes used)
- (3) no wastes or other matter are added for the purpose of disposing of those wastes or other matter.

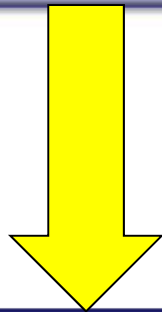
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## **2. The regulatory framework of CO2 sub-seabed storage under the Marine Pollution Prevention Law**



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## LP Annex I Amendment



Implementation of LP  
within country

## Marine Pollution Prevention Law Amendment

- Regulatory framework aimed to “protect marine environment”
- Does NOT intend to “promote CCS”

# Objective of Marine Pollution Prevention Law

## ➤ Objective (Article 1)

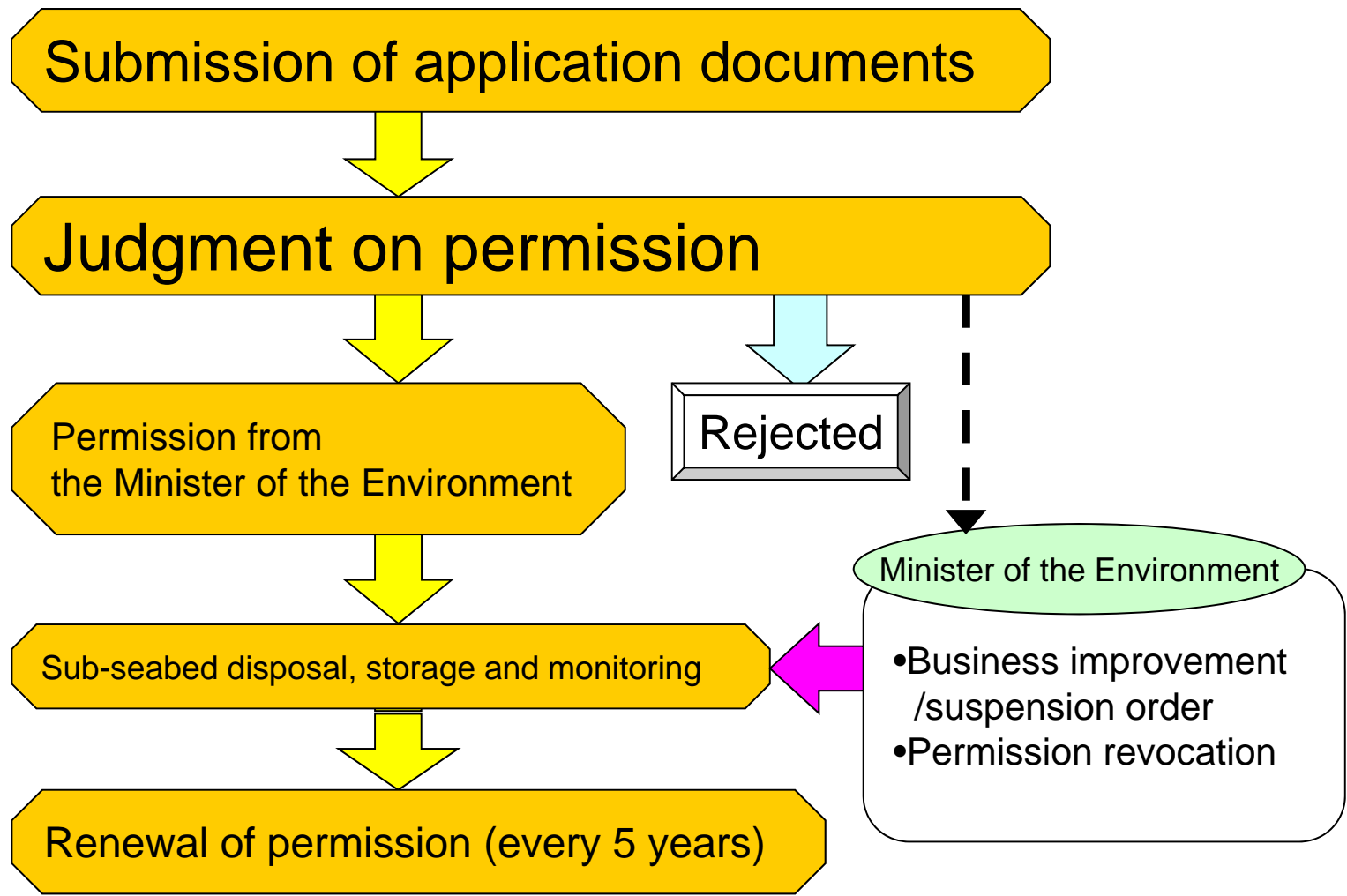
- Regulating discharge of oil, hazardous liquid substances and waste from vessels, platforms and aircrafts into ocean
- **Regulating disposal of oil, hazardous liquid substances and waste under seabed**
- Regulating emission of exhaust gas from vessels into air
- Regulating incineration of oil, hazardous liquid substances and waste on vessels and platforms
- Ensuring appropriate treatment of waste oil
- Removing any discharged oil, hazardous liquid substances, waste and others
- Preventing offshore fire and its spread
- Taking measures to prevent hazard to vessel traffics caused by offshore fire and others.

**Control, treatment,  
prevention, measures**

**Protection of marine environment**

**Protection of people's lives, bodies and property**

# General flow of permission issuance for CO2 sub-seabed disposal

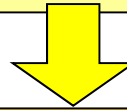


# Flow of permission issuance for CO2 sub-seabed disposal (1/2)

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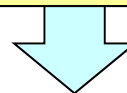
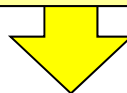
## Submission of application documents

- Application form for specific CO2 sub-sea disposal (Implementation plan, Monitoring plan)
- Pre-assessment report on CO2 sub-sea disposal (including potential environmental assessment items)
- Documents on site selection
- Plans for the overall project, financing, technology, etc.



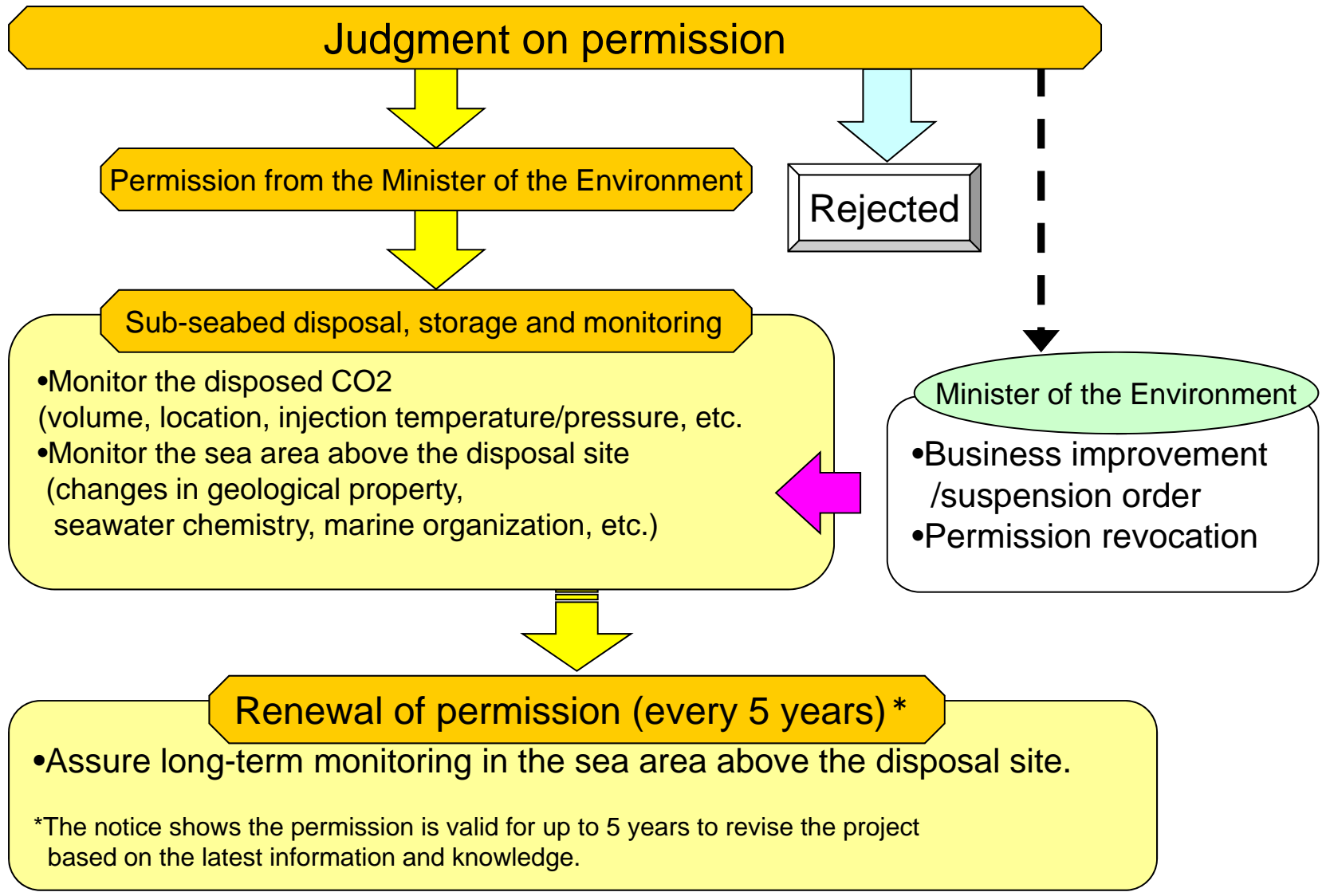
## Judgment on permission

- Judge whether ....
  - (1) CO2 to be stored meets the requirements?
  - (2) the pre-assessment adequately shows only minor influence and changes will happen within the limited sea area if CO2 leaks?
  - (3) a monitoring plan for adequate leakage detection and a recovery plan for minimizing the influence on marine environments if CO2 leaks are included?



(continued on the next slide)

# Flow of permission issuance for CO2 sub-seabed disposal (2/2)



# CO2 property to be disposed into sub-seabed (current law)

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- Marine Pollution Prevention Law

Disposal into sub-seabed means disposing or **storing** waste under the seafloor.

This Law prohibits waste disposal into sub-seabed except for ...

- (1) specified waste, and
- (2) **gases consist overwhelmingly of CO2**, named "specified CO2", that meet the requirements defined by a ordinance.

# CO2 property to be disposed into sub-seabed (current law)

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- Enforcement Ordinance of the Law Relating to the Prevention of Marine Pollution and Maritime (partially amended under the Cabinet Order No. 282, 2007)

<Outline of the amendments about CO2 disposal>

Requirements for the stream which can be disposed under the seabed are as follows.

- (1) It is captured by the **amine-based technology**.
- (2) The concentration of CO2 in the stream is **≥ 99%(vol.)**  
**(≥ 98%(vol.))** for the stream captured according to (1) from hydrogen production process at petroleum refinery).
- (3) No wastes or other matters are added other than CO2.

The CO2 concentration measurement should be held under a ministerial order of MOE.

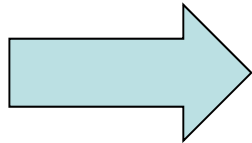
# Monitoring plan (current law)

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- Marine Pollution Prevention Law

<Outline of the amendments about CO2 disposal>

- The operator who intends to dispose CO2 stream under the seabed must obtain permission from the Minister of the Environment.
- The operator who wants to get the permission have to submit required documents **including the monitoring plan** to the Minister of the Environment.



The monitoring plan is a prerequisite for getting the permission. The operator has to follow the plan during the real monitoring.

## Items of sea area monitoring

- Temperature and pressure of geological formations (once or more a year)
- CO2 location and extent (about twice during the operation period)
- Chemical properties of seawater (once a year), etc.



# Monitoring plan (current law)

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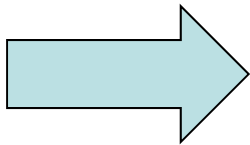
- Announcement that prescribes details of application for permission for specified CO<sub>2</sub> gas disposal into sub-seabed

Points to be considered when developing the implementation plan for CO<sub>2</sub> sub-seabed disposal.

## (1) Disposal period

The operator has to set the disposal period **less than 5 years**, and have to specify it in the implementation plan.

If the operator who intends to inject the specified CO<sub>2</sub> during the disposal period has to specify the injection period as well.



Operators have to renew the permission every 5 years under the Marine Pollution Prevention Law as long as CO<sub>2</sub> is stored under the seabed.

# Requirements for ending monitoring

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Several investigations show that monitoring could end if the following requirements are met.

1. Contents described in the application documents (e.g. well closure plan) is already achieved.
  2. Seawater monitoring shows the changes are within the background level.
  3. CO<sub>2</sub> behavior analysis based on geological monitoring shows CO<sub>2</sub> behavior reaching stable state.
  4. Existing studies such as seismic exploration support the CO<sub>2</sub> behavior in geological formations that is illustrated in the application documents based on numerical simulations, etc.
- \* If the period of operator's monitoring is finite, additional discussions will be required to determine the period of subsequent monitoring by the government and the scope of operator's responsibility.

# Monitoring periods under existing CCS schemes in other nations

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- Each of the CCS schemes in other nations defines a specific period for monitoring.
- All are prioritized meeting “performance standards” and require flexible monitoring based on the monitoring results.
  1. US Underground Injection Control (UIC) Program
    - requires monitoring by the operator for 50 years in principle after the start of injection.
  2. EU CCS Directive
    - requires monitoring by the operator for > 20 years in principle, and by the governments for > 30 years.
  3. AU Offshore Petroleum Act Amendment
    - requires monitoring by the operator for up to 5 years, and by the government for 15 years.

# Proposal for monitoring period

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Several investigations show the following opinions for monitoring period.

- Precedents show appropriate periods of 20 to 50 years in total.
- Determining whether the monitoring responsibility should share between the operator and government in the long term is also required as well as determining the period.
- There are two options about monitoring responsibility sharing:
  - Option-A: Without sharing (US UIC Program)
    - E.g. 50-yr monitoring only by the operator
  - Option-B: With sharing (EU CCS Directive and AU OPA)
    - E.g. 5- to 20-yr monitoring by the operator and 15- to 30-yr monitoring by the government thereafter

# Conclusions

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- Responding to the amendment of the Annex I of the London Protocol 1996, the Marine Pollution Prevention Law was amended in 2007, allowing operators to dispose CO<sub>2</sub> into sub-seabed with permission from the Minister of the Environment.
- When applying for permission, the operator has to submit the implementation plan, monitoring plan, and environmental impact assessment report. The operator has a responsibility of monitoring while the disposal is ongoing.
- In view of the operators' excessive cost burden, setting a finite monitoring period is rational if CCS risks (e.g. CO<sub>2</sub> leakage) diminish after the beginning of injection. Based on this opinion, several investigations have been conducted focusing on “conditions for allowing monitoring termination” and “appropriate monitoring duration”.

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Thank you for your attention!