

Challenges of the Cross-Border CO2 Transport Concept

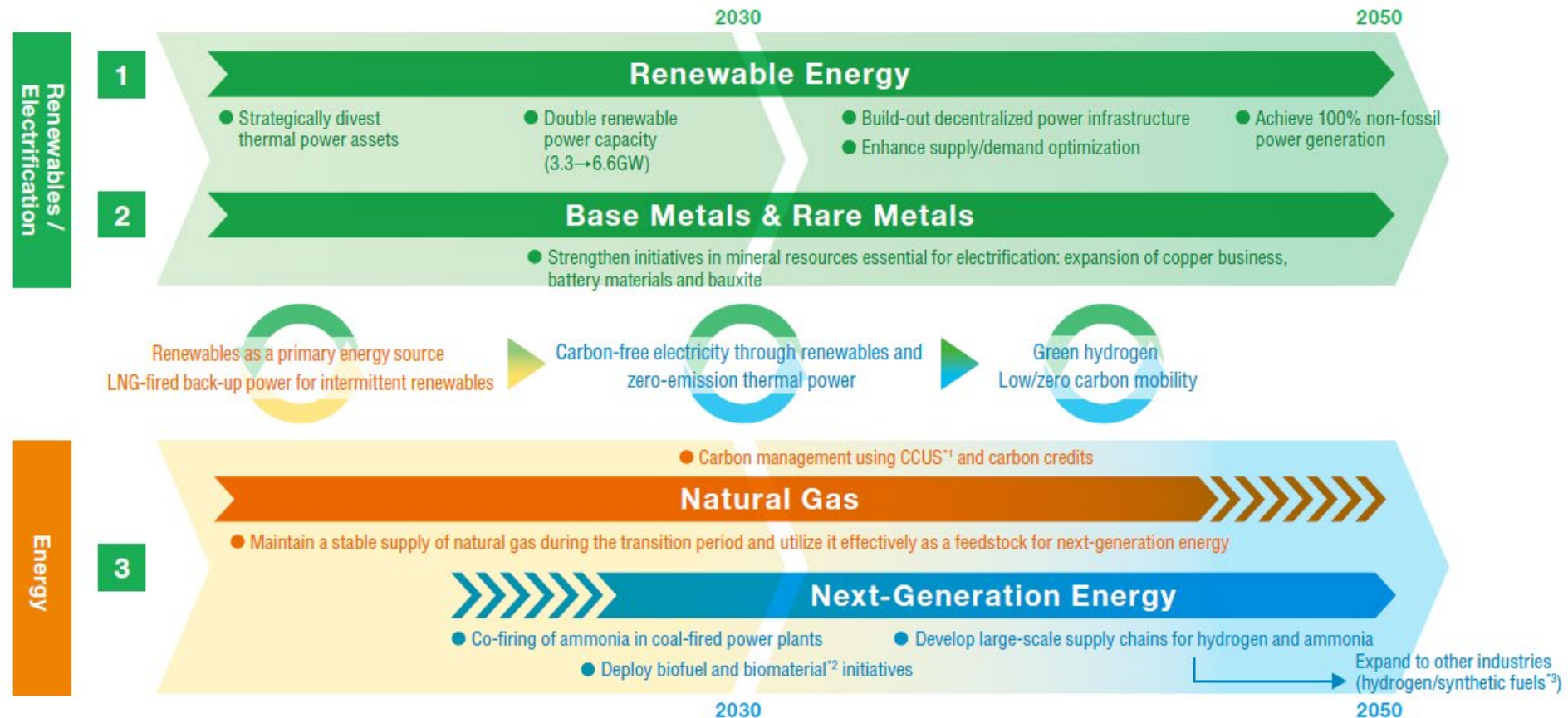
February 8, 2024

Business Development Department

New LNG Ventures & Marketing Division, Natural Gas Group

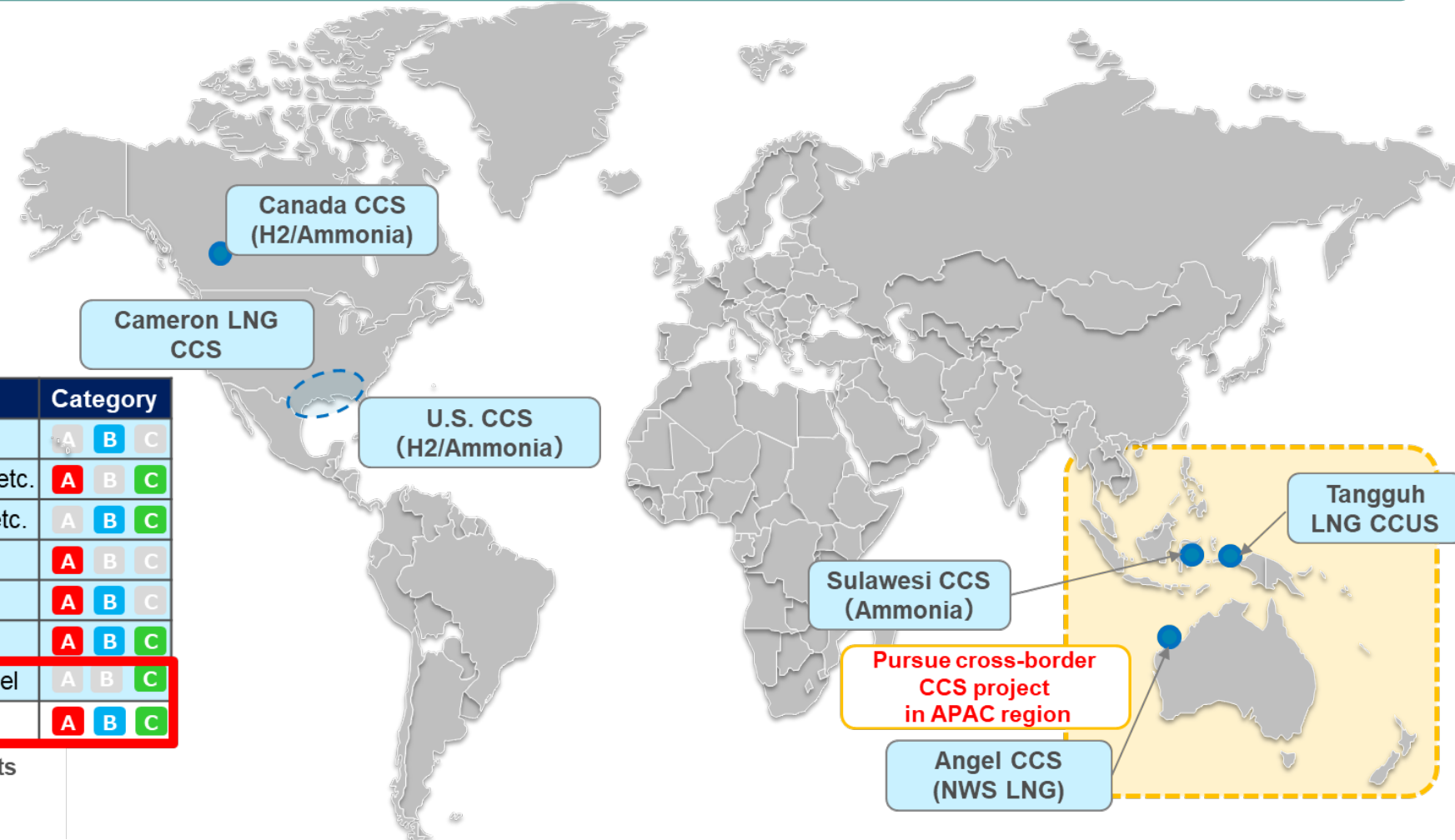
Mitsubishi Corporation

- ❑ Mitsubishi intends to continue fulfilling a pivotal role as **reliable supplier of energy**. It is our goal to push forward “Pragmatic” energy transformation so that energy supply and transformation can both be achieved.
- ❑ Mitsubishi will invest approximately **2 trillion yen by 2030** in areas including renewables, natural gas, metals, hydrogen and ammonia aiming to achieve its Carbon Neutral Roadmap.



*1 Carbon Capture, Utilization and Storage *2 Sustainable fuels and materials made from biological resources *3 Clean fuels produced with hydrogen and CO₂ from the atmosphere or industrial sources, etc.

- ❑ Mitsubishi has already participated in CCS projects to proactively decarbonize our existing LNG assets. (Cat. A)
- ❑ In addition, several blue hydrogen / ammonia projects and CCS hub projects for industrial CCS demand are under evaluation / study stage. (Cat. B & C)



CCS Projects	Partners	Category
Canada CCS (Ammonia)	Shell	A B C
Cameron LNG CCS	TotalEnergies, Sempra etc.	A B C
U.S. CCS (Ammonia)	ExxonMobil (Denbury) etc.	A B C
Tangguh LNG CCUS	bp etc.	A B C
Sulawesi CCS (Ammonia)	PAU, JOGMEC etc.	A B C
Angel CCS (NWS LNG)	Woodside, bp etc.	A B C
Cross-border CCS value chain	ExxonMobil, Nippon Steel	A B C
Various CCS value chains	Non-disclosure	A B C

Category **A** : Decarbonization of existing LNG assets
B : CCS for Blue products
C : CCS for Industrial Emitters

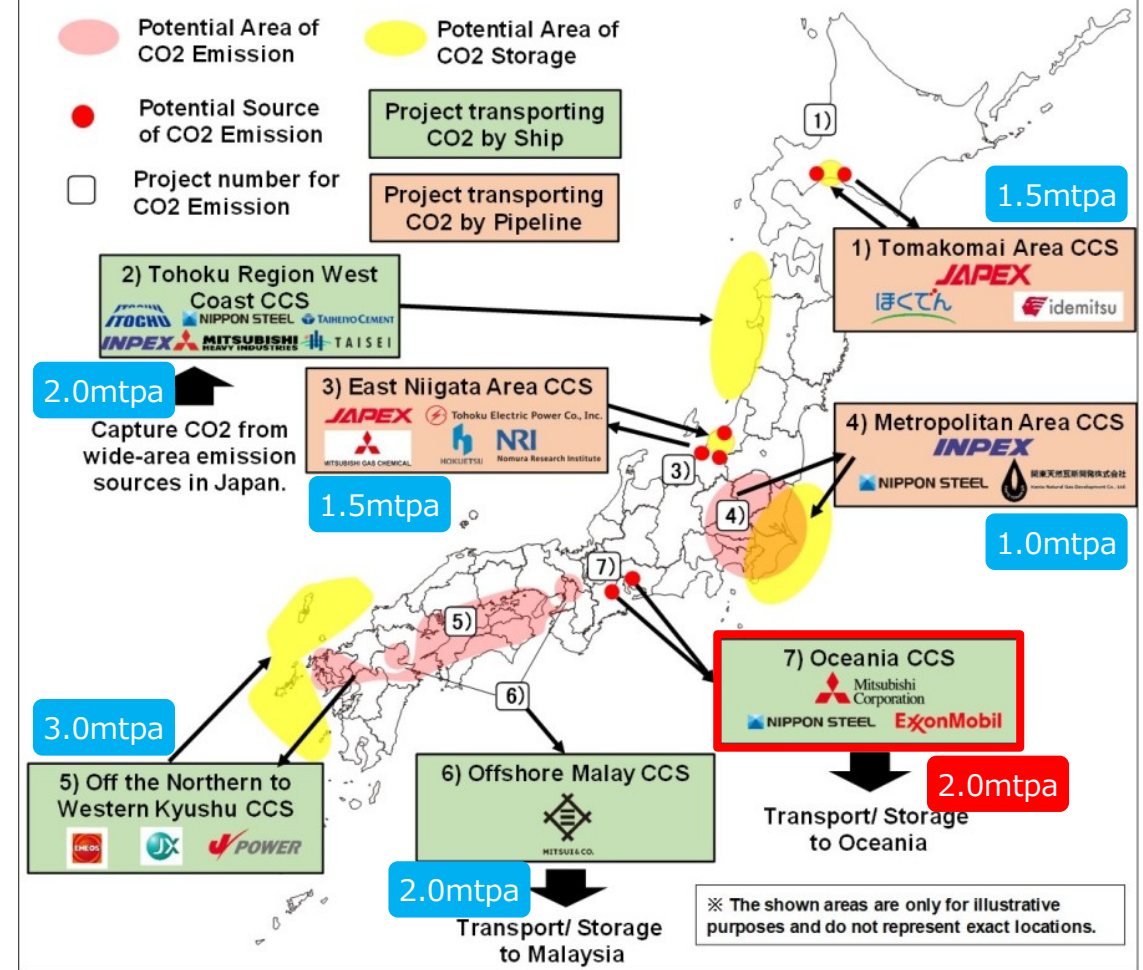
- Financial support to projects which enable to scale up and reduce costs through hubs and clusters concept as “advanced CCS project”.
- Mitsubishi is leading Oceania CCS projects with Nippon Steel and ExxonMobil (“Cross border CCS value chain”).

Major requirements for applicant

- Start CO2 injection by 2030 with a scale of greater than 0.5 MTPA.
- Aggregate CO2 from multiple industries in region.
- Japanese companies’ participation into entire CCS value chain including transportation and storage.

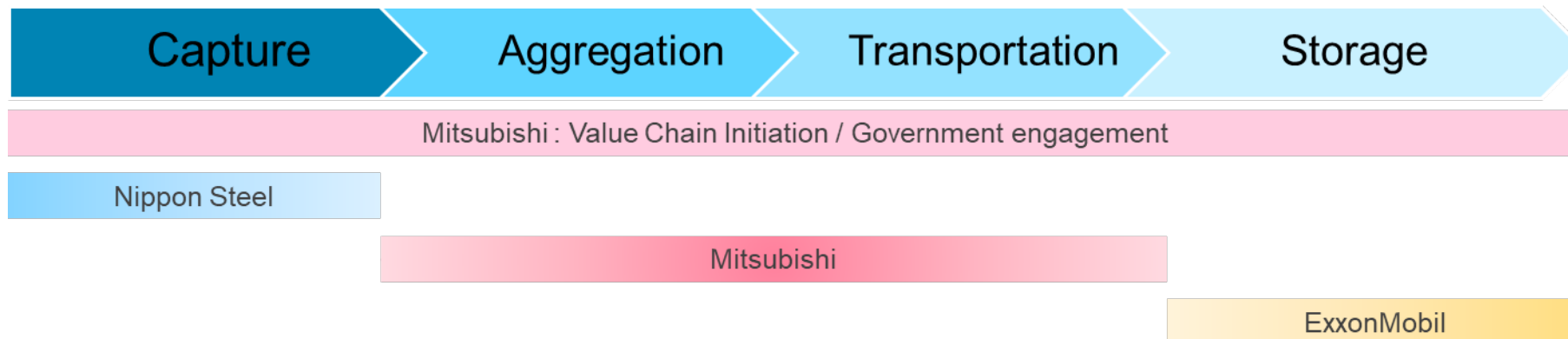
Awarded Projects

- 7 projects were awarded.
- Total amount of CO2 volume to be injected in 7 awarded projects amount for 13MTPA.
- Each study commenced around August and will be completed within FY2023.
- Advanced CCS process in FY2024 is not officially announced yet, it is expected that these 7 projects and some new projects will apply.

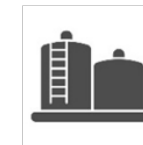
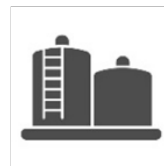
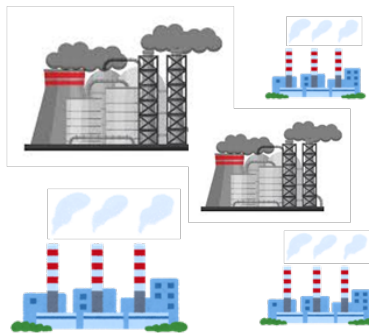
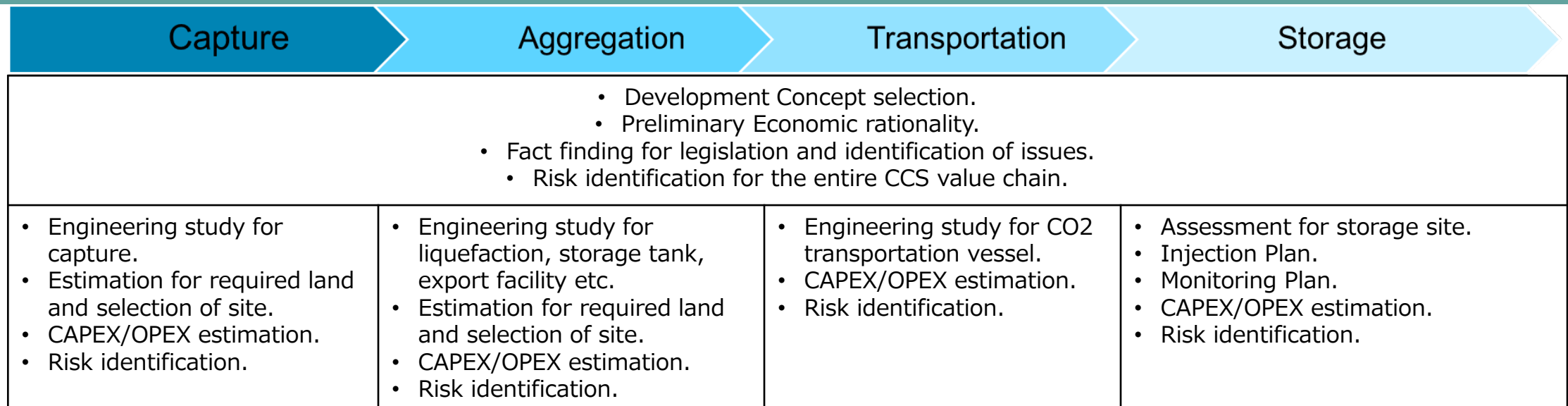


Source: JOGMEC, edited by Mitsubishi Corporation

Tripartite MOU	Press Release on January 26 th 2023
CO2 Source	<ul style="list-style-type: none"> Nippon Steel's domestic steel mill + other major CO2 emitters in Ise-Bay area ⇒ 2 Mtpa from Ise-Bay area with optionality of expansion
CCS Site	<ul style="list-style-type: none"> Combination of depleted oil and gas fields, and aquifer in Australia, Indonesia and Malaysia (operated by ExxonMobil). Proven CCS capacity : >>> 2Mtpa <ul style="list-style-type: none"> multiple depleted reservoirs (as primary target) additional aquifer potentials ready to operate in late 2020s
Project Status	<ul style="list-style-type: none"> Awarded JOGMEC "Advanced CCS project" in Aug 2023 Feasibility Study is ongoing Aiming to start operation by 2030 (subject to governmental funding / legislation / transborder agreements)



- ❑ Aggregate CO2 from multiple industries, transport to overseas CCS sites by shipping, and storage into depleted fields.
- ❑ Sharing of common facilities such as storage tanks, export / import facilities, transportation vessels which enables cost reductions through the entire value chain.
- ❑ Substantial CO2 emission volume storage in destination (depleted fields) incentivizes storage company as it creates larger revenues.

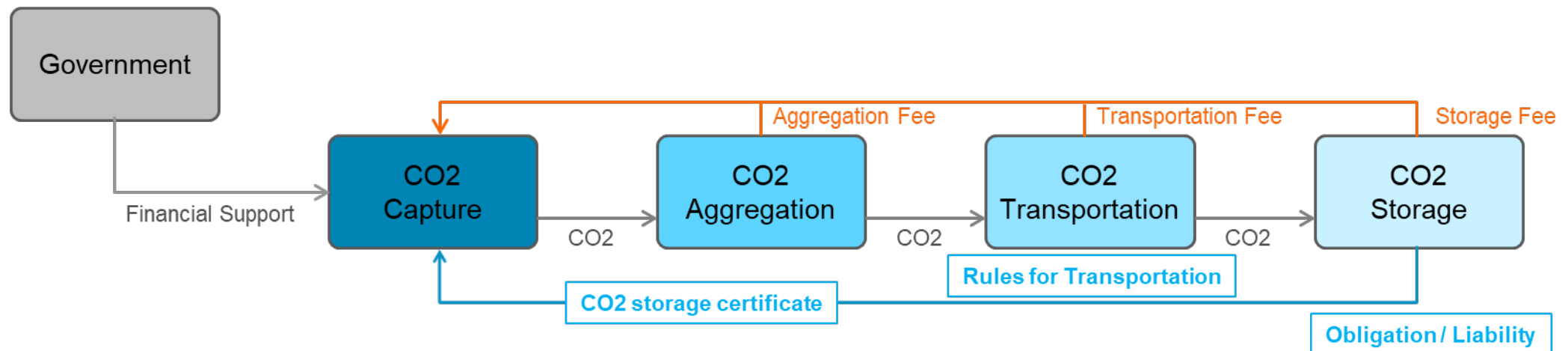


□ Purposes of cross-border CCS value chain:

- ✓ Sufficient storage capacity and diversification of storage site outside Japan.
- ✓ Early start up by utilizing depleted oil and gas fields.
- ✓ Significant cost saving and reduction by utilizing depleted oil and gas fields.
- ✓ Promoting CCS industry by participating promising/cost-competitive CCS project and gaining further intelligence.
- ✓ Initiative and leadership for rule making of decarbonization in Asia Pacific region.

□ Challenges related to cross-border CCS value chain:

- ✓ Appropriate financial support from government required to implement CCS value chain.
- ✓ Establishment of legislation and regulation for CCS operation.



【Entire Value Chain】

- ❑ Priority and timeline of implementing CCS as low-carbon solutions vary depending on companies and industries.
- ❑ Manpower shortages of engineering firms during both pre-FID (F/S, pre-FEED and FEED) phase and project phase.
- ❑ Construction and manufacturing capacity of necessary equipment and facility.
 - Storage tanks, pipelines, liquefied CO2 vessels etc.
- ❑ Importance of governmental financial support especially for CAPEX / OPEX funding particularly in project phase.

【Aggregation】

- ❑ Securing land for aggregation, liquefaction, and exporting facilities.
 - Storage tanks, pipelines, exporting facilities etc.
- ❑ Involvement / engagement / collaboration among both industrial emitters and local governments are indispensable for implementation of CCS operation.
 - Sharing of project progress / status with industrial emitters who have submitted LOI.

