“New Technology and Future of the Maritime Transportation”

FUNAMOTO Hiroshi

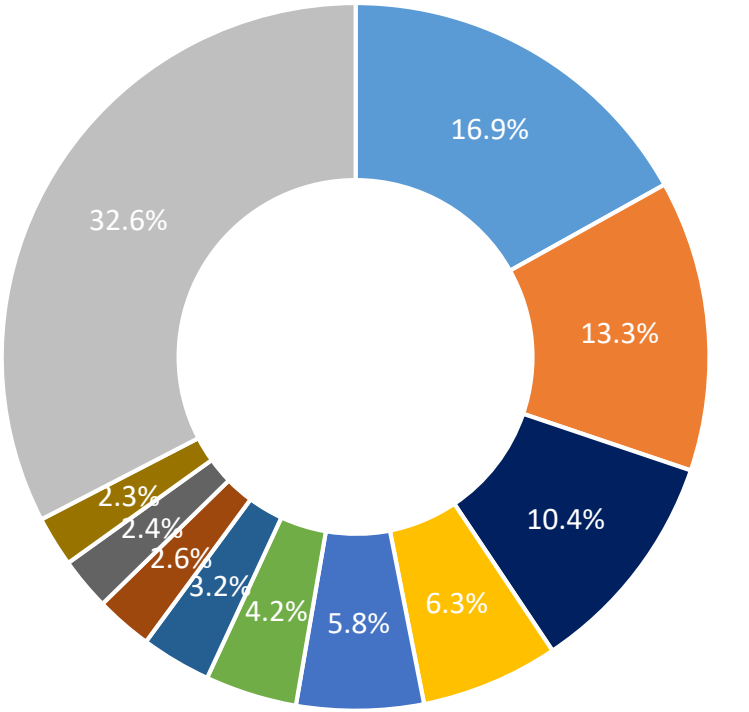
Senior Deputy Director-General,

Maritime Bureau, MLIT, Japan

1. Outline of Japanese Maritime Industry

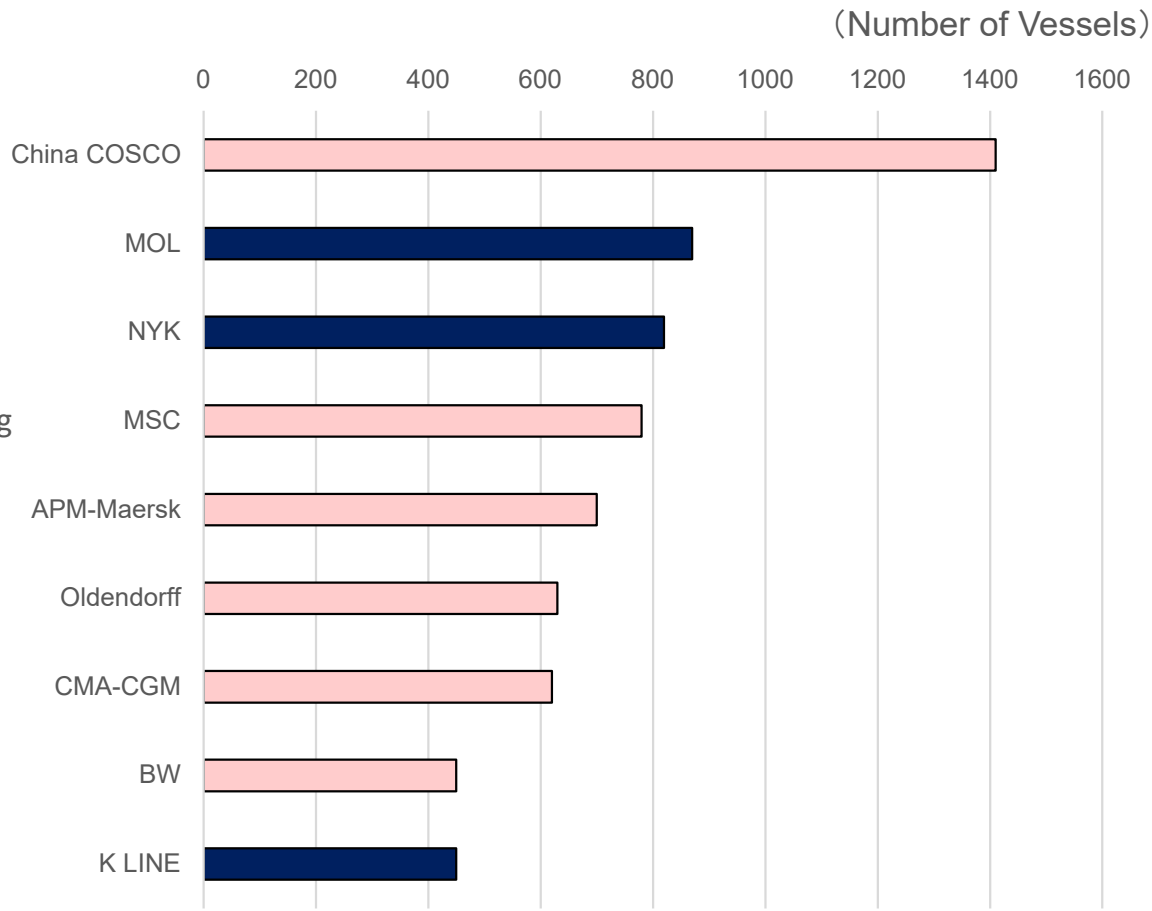
Global shipping industry

World Fleet Tonnage By Country



Source: UNCTAD “Review of Maritime Transport 2024”

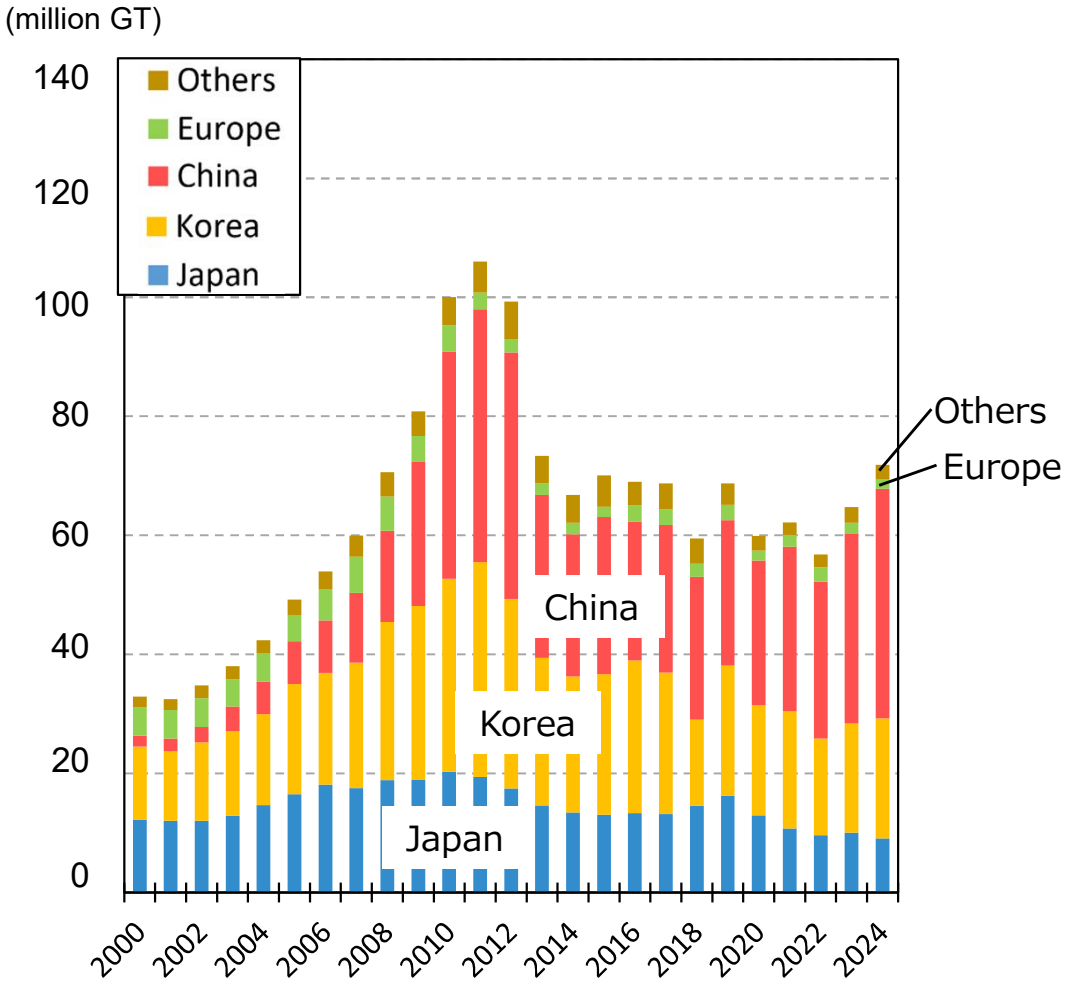
Fleet Size of Global Major companies (All vessel types)



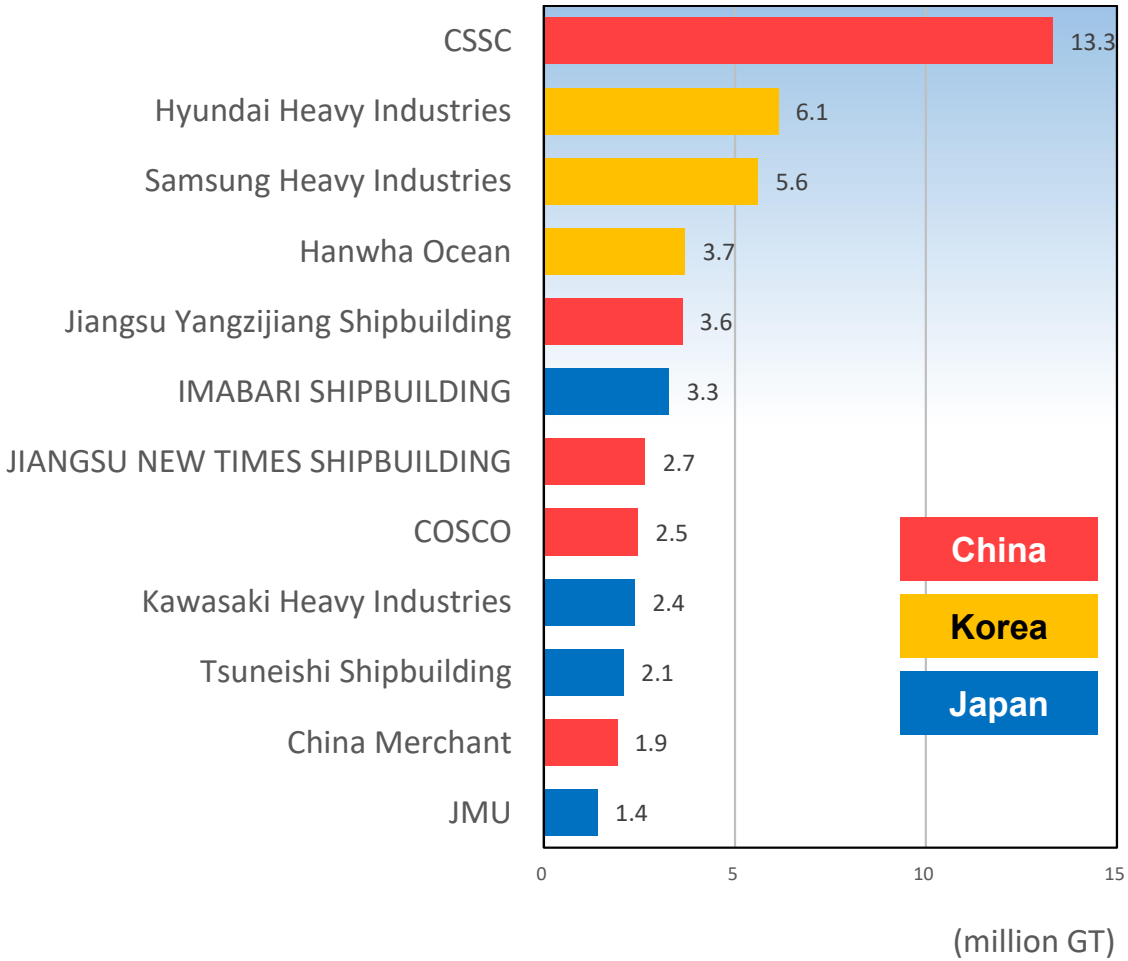
Source: MOL ”INVESTOR GUIDEBOOK 2024”

Global Shipbuilding Industry

Trend in the Global shipbuilding completions



Global shipbuilding completions By shipbuilding company groups in 2024



Source：Global shipbuilding completions（IHS Markit）、Share of Shipbuilding order（Japan Ship Exporters' Association and IHS Markit）

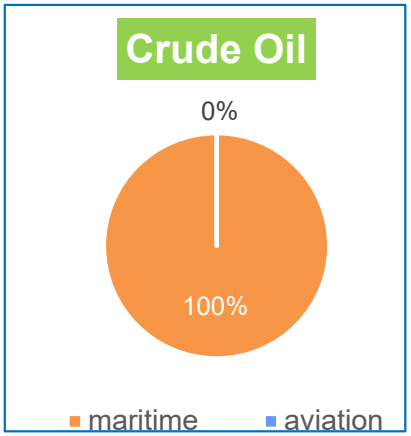
The trade of Japan as a maritime nation

MLIT Ministry of Land, Infrastructure, Transport and Tourism

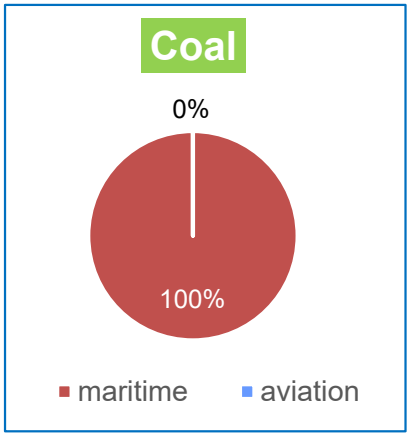
Percentage of Maritime Transport in Japan's Trade Volume（weight basis）

Energy

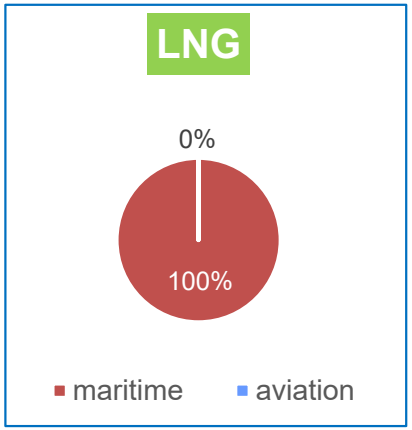
Crude Oil



Coal

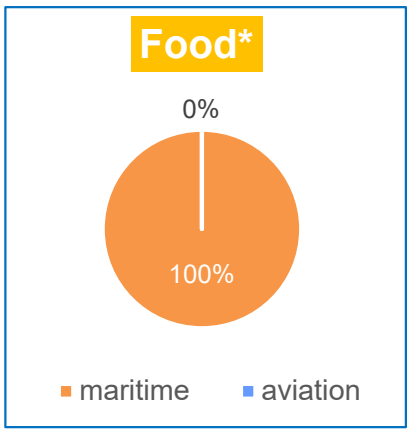


LNG



Food

Food*



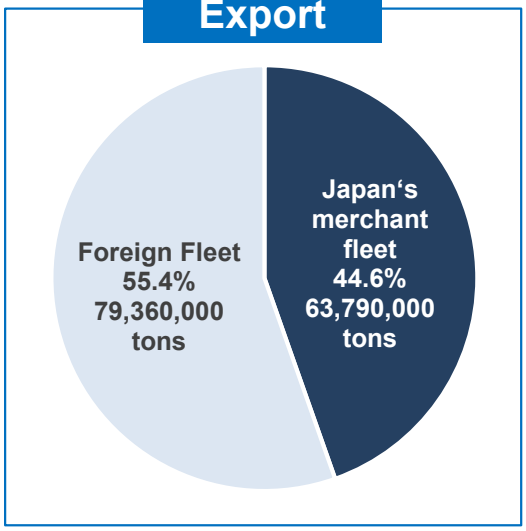
Marine transport accounts for Approximately **100%**

Source: Trade Statistics of Japan（MOF）, Maritime Bureau

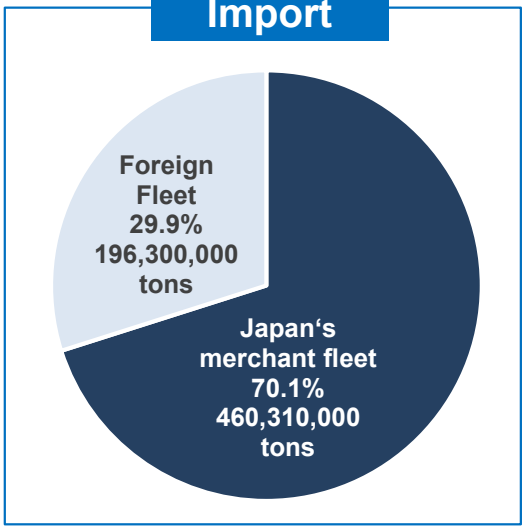
*Food：rice, wheat, corn, barley and naked barley, sugar, salt, other grains, soybeans

Percentage of import-export cargo transported by Japan's merchant fleet

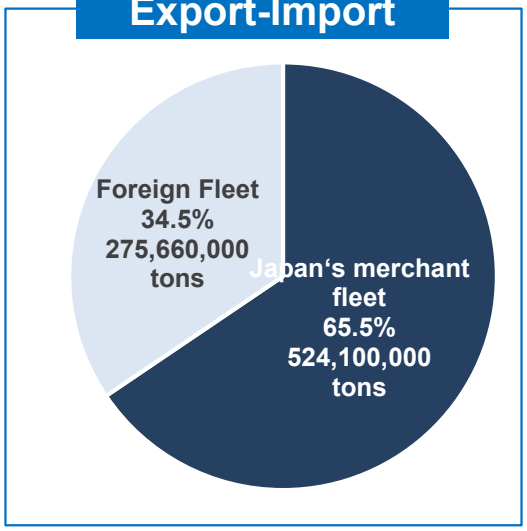
Export



Import



Export-Import



Japan's merchant fleet* accounts for **65.5%**

Source: Maritime Bureau, 2023

*Japan's merchant fleet：
ocean-going vessels of 2,000 gross tons or above operated by Japanese ocean-going shipping companies（including **ONE**）

Status of Japan's maritime industry

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Shipping

*including seafarers

	International	Domestic
Employees	6,000*	82,000*
Economic Products	54 Billion USD	5.7 Billion USD
Operating ships	2206	7,329
Companies	179	3,767

Around 74% are Japanese ships*

Around 73% of ships are procured domestically*

*Ships delivered in 2023

Stable supply

Shipbuilding & Marine machinery

	Shipbuilding	Marine machinery
Employees	64,000	47,000
Economic Products	21 Billion USD	7.1 Billion USD
Companies	900	871

Seafarers

Domestic shipping	Japanese	**28,102**
Intl. shipping	Japanese	**2,062**
	Foreigners	**53,010**

- Financial companies
- Ports / Harbors
- Warehouse and logistics
- Trading companies
- Staffing companies
- Insurance companies
- Institutions
- Brokers / Consultants

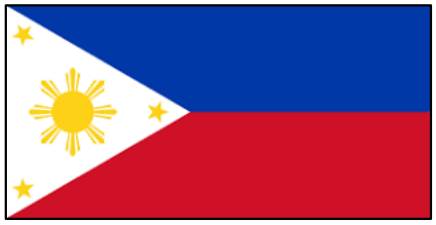
2. Japan's contributions to international rulemaking（IMO・IOPC）

Why we need international legal framework for international shipping

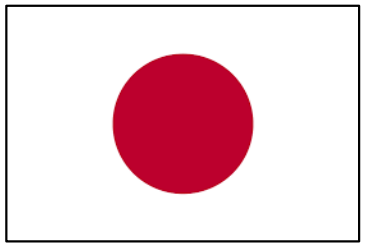
Example

Flag

Seafarer

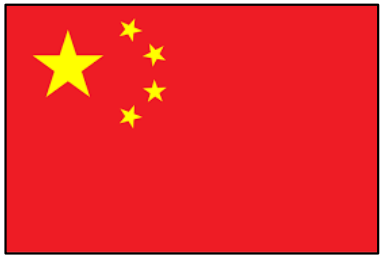


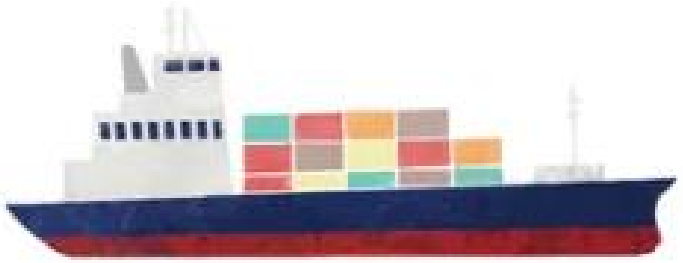
Operator



Space Charterer

Exporting Country





Importing Country

Many players are complicatedly involved in international shipping

International Maritime Organization (IMO)

- The United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships
- Established in 1958, based in London
- Member States:176 Associate Members: 3 IGOs: 66 NGOs: 89
- Adopted 59 International conventions

Source: IMO website

Contribution of Japan to the IMO

Knowledge and experience in shipping and shipbuilding industries, human resources, technical cooperations, etc

INTERNATIONAL MARITIME ORGANIZATION

Ministry of Foreign Affairs of Japan

MLIT Ministry of Land, Infrastructure, Transport and Tourism

Japan Ship Technology Research Association

Shipping

JSA THE JAPANESE SHIPOWNERS' ASSOCIATION

Japan Federation of Coastal Shipping Associations

Japan Maritime Center

Shipbuilding

SAJ THE SHIPBUILDERS' ASSOCIATION OF JAPAN

CAJS

JSMEA

Research, Class, Academic

NMRI National Maritime Research Institute

ClassNK

UTokyo

OSAKA UNIVERSITY

Tokyo University of Marine Science and Technology

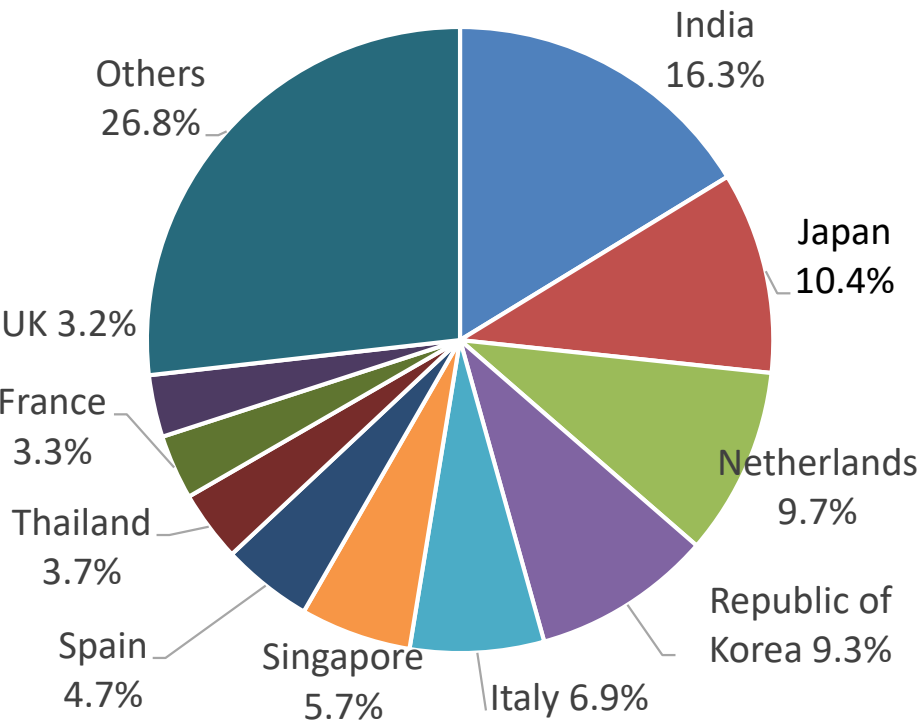
Source: IMO website

Mr. Iwaki,
Chair of Working Group on Air Pollution and Energy Efficiency, MEPC

IOPC Funds – Legal Framework of Compensation –

- IOPC Funds provide financial compensation for oil pollution damage that occurs in its Member States, resulting from spills of persistent oil from tankers.

Contributors to IOPC



Contributions to the 1992 Fund by country (2024)

Prof. Fujita, First Vice-Chair of the 1992 Fund Assembly

Source: IOPC Funds

1992 Fund Assembly
Chair : François Marier (Canada)
1st Vice-Chair : Tomotaka Fujita (Japan)
2nd Vice-Chair: Muthike (Kenya)

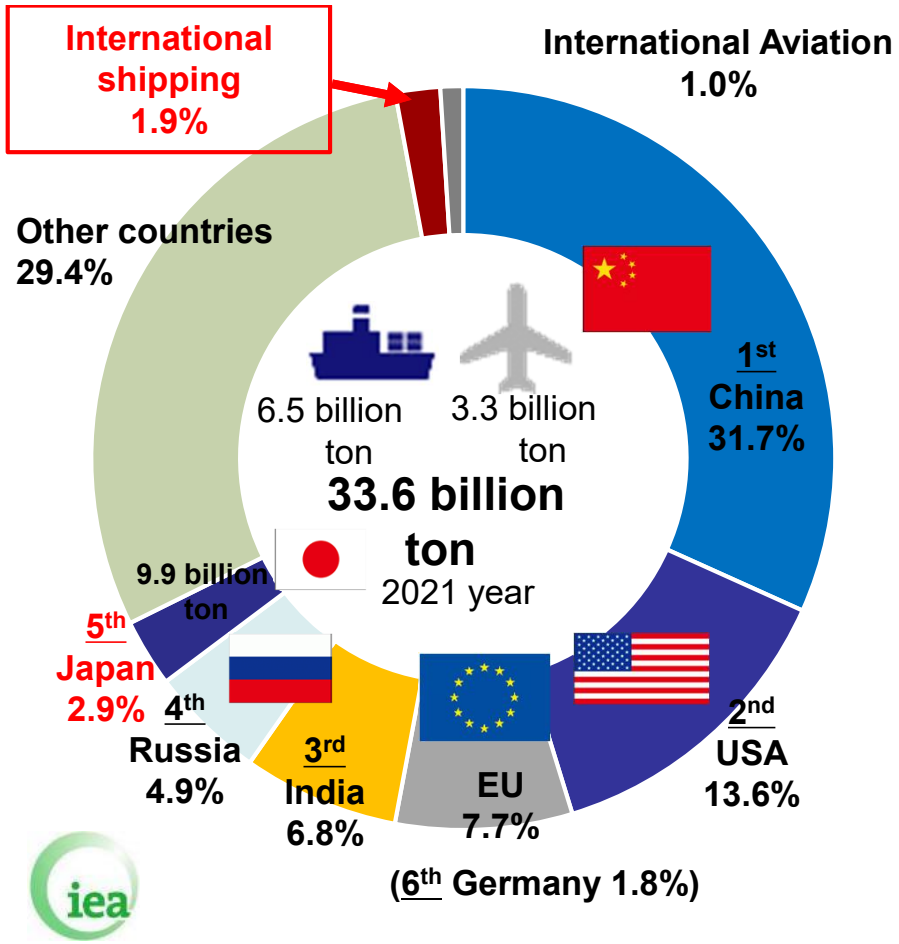
3. Key Maritime Policies

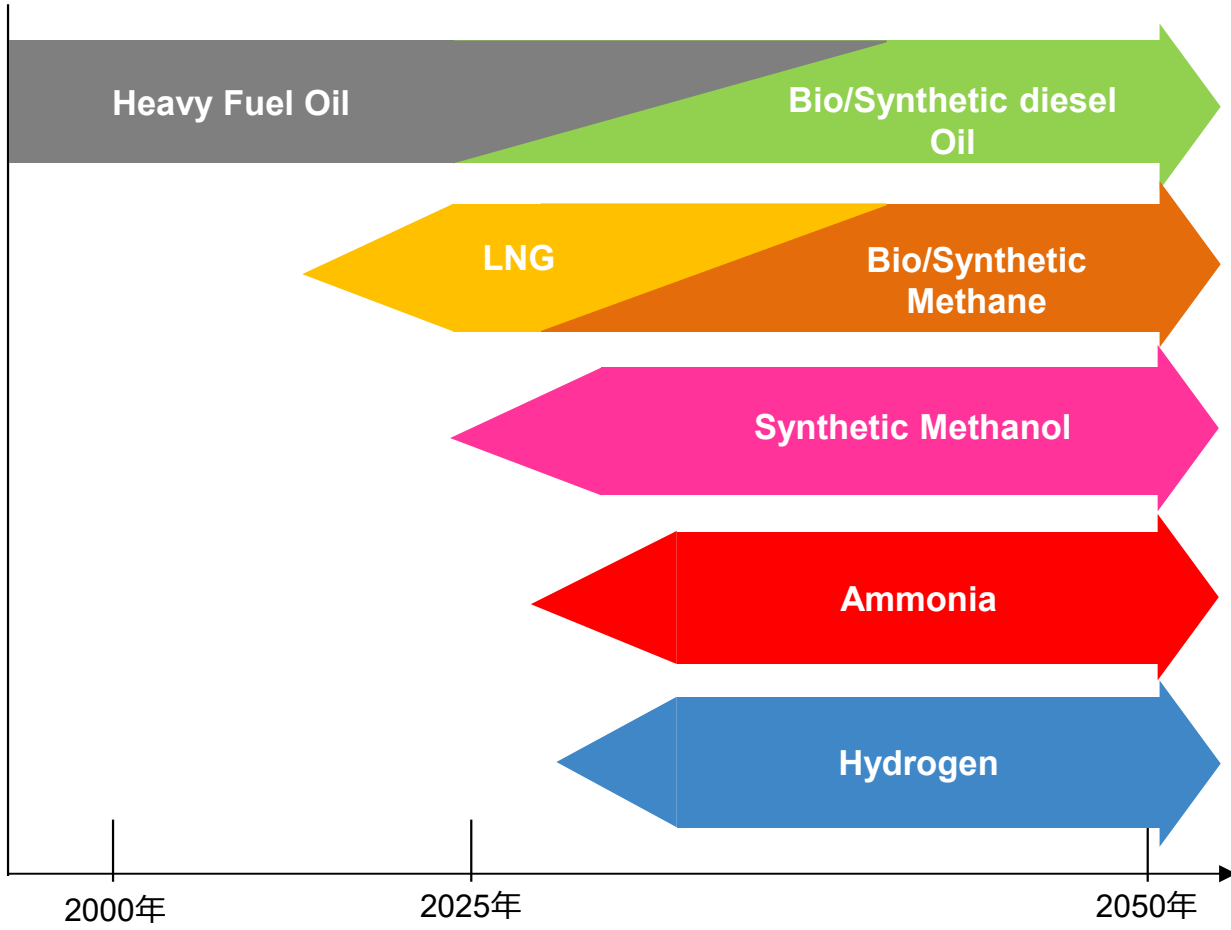
(1) GX

(2) DX

(3) Safety and Security of Sea Lanes

Energy transition in international shipping

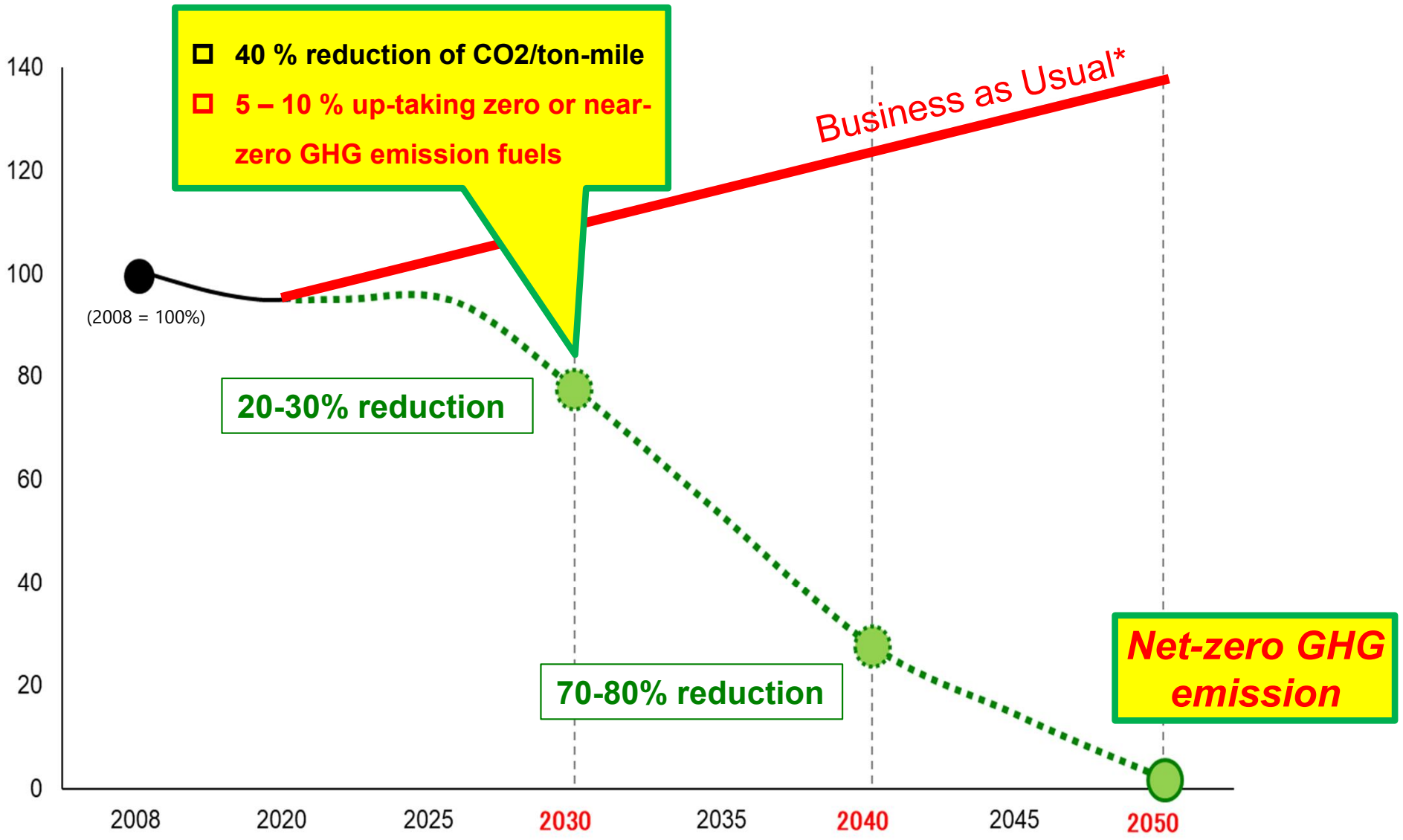




Source：IEA ”Greenhouse Gas Emissions from Energy Highlights”(2023)

Adopted GHG net zero from international shipping around 2050

Targets of 2023 GHG reduction strategy



Measures for GHG net-zero emissions

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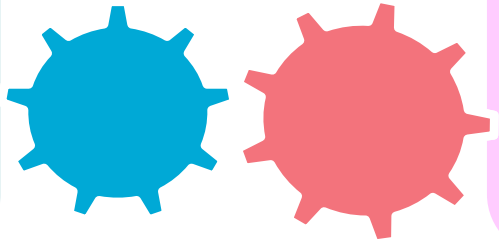
☐ The IMO 2023 Strategy introduces following basket of candidate mid-term GHG reduction measures

Technical Element

fuel standard related to the GHG intensity



Economic Element

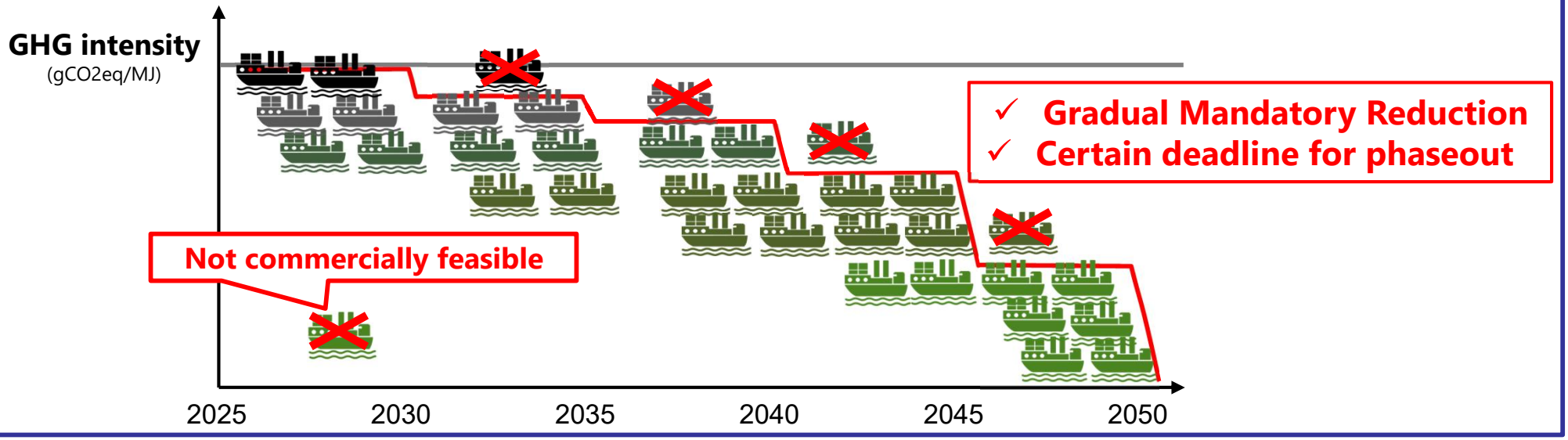
pricing mechanism

Combination of both elements

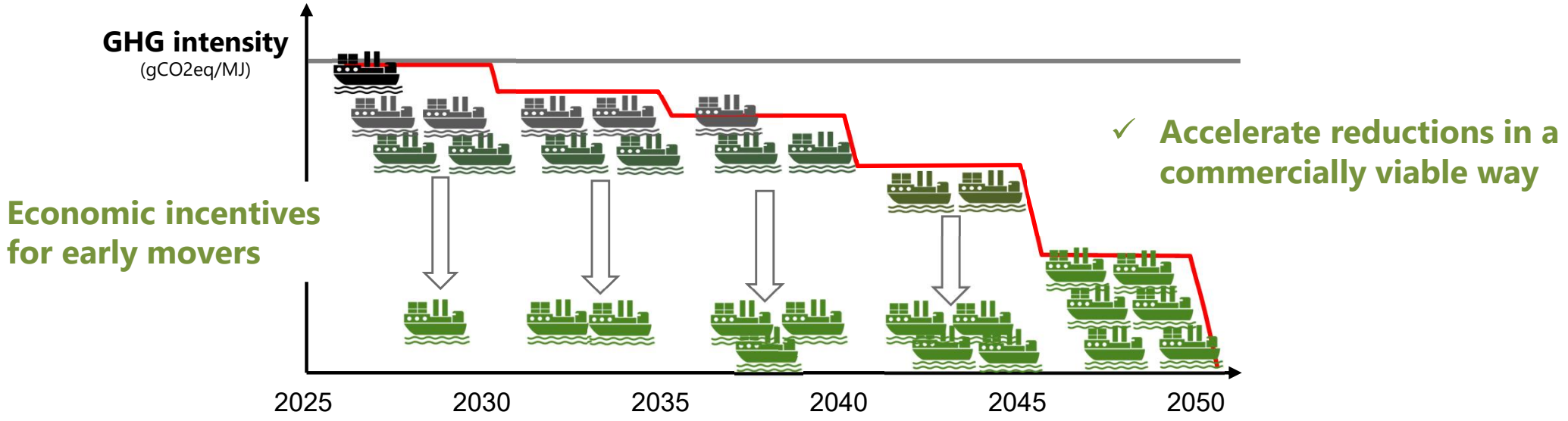
Aiming to achieve “GHG net-zero emissions by or around 2050”

Technical and Economic measure

Technical measure (GHG intensity regulation)



Economic measure (GHG pricing mechanism)



Development of midterm measures at IMO

2023/7 2025 2027 2030 2050

"2023 IMO GHG Strategy"

Negotiation on measures

GHG intensity regulation (Technical measure)

+

GHG emissions pricing mechanism (Economic measure)

Approval (MEPC 83, April 2025)

Adoption (October 2025)

Entry into force (March 2027)

Start implementation (2028~)

Accelerate transition

The result of MEPC83 (April 2025)

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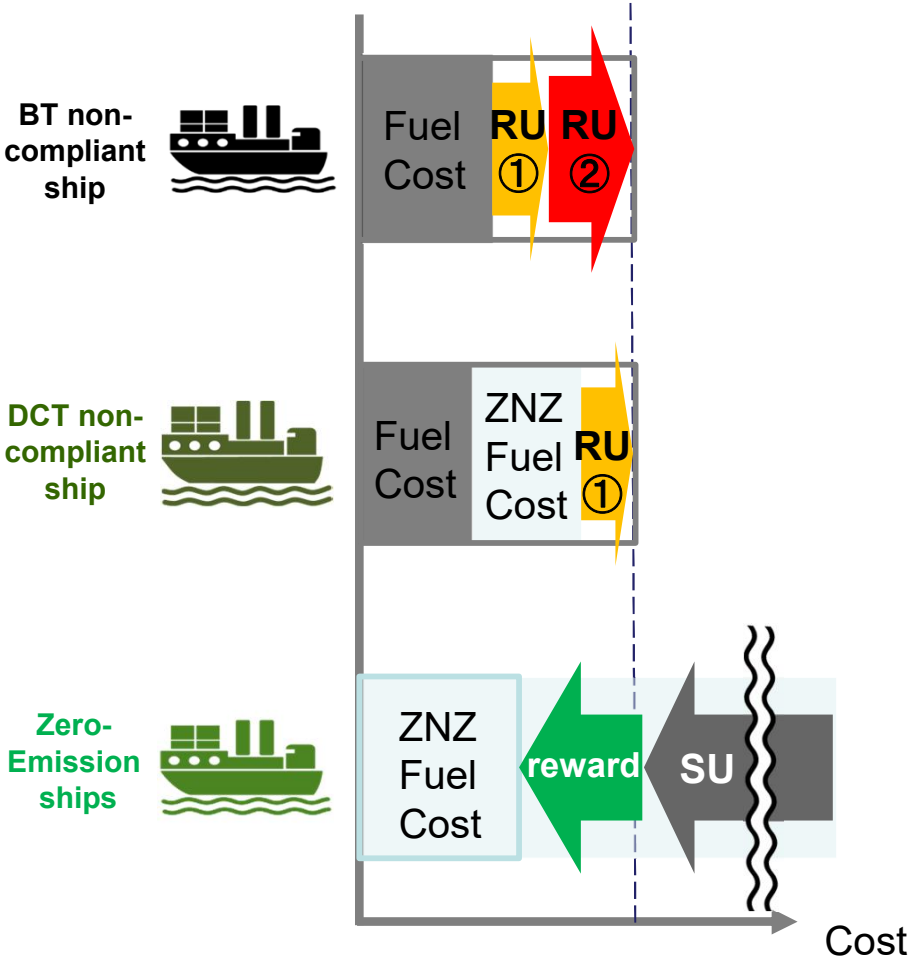
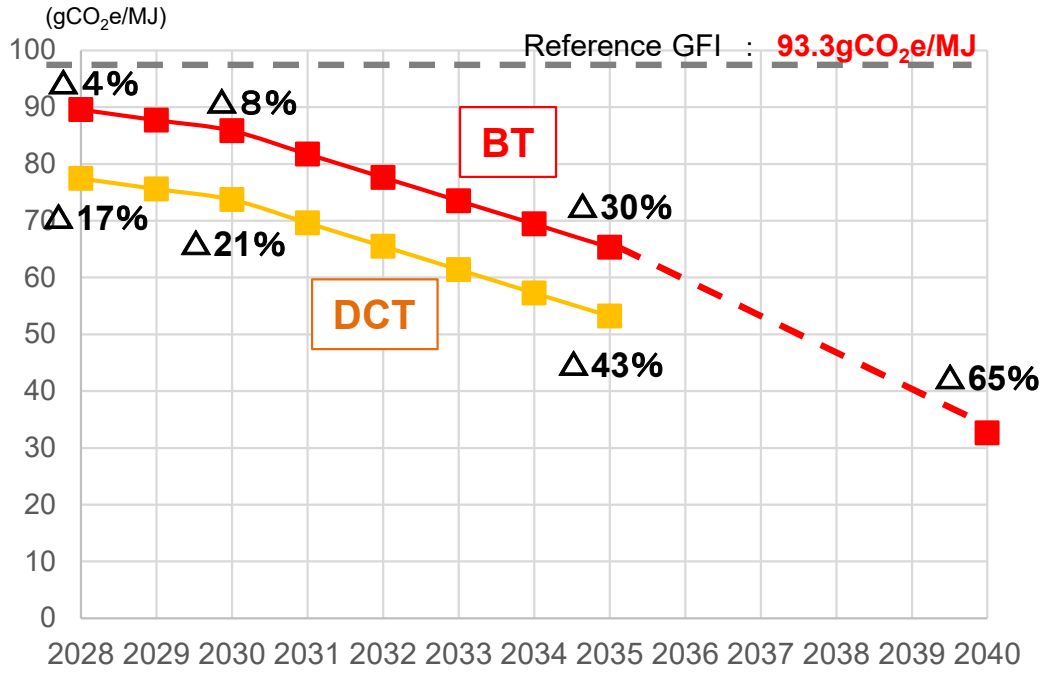
☐ MEPC83 approved draft amendments to MARPOL Annex VI with a view to circulation.

Image of cost composition

SU : Surplus Unit
RU : Remedial Unit



Base Target (BD) / Direct Compliance Target (DCT)



Development of zero-emission ships in Japan

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	2021	2025(Today)	～2030	～2040	～2050
Ocean Going / Large	R&D **Ammonia-fueled ship**				
	2023.6: The first ammonia engine trial	2024.8: The first commercial ammonia-fueled ship	2024: Ammonia Bunkering guidelines	2026: Ammonia-fueled ammonia gas carrier will start service	
	R&D **Hydrogen-fueled ship**				
	Source:MOL Techno-Trade, Ltd. Already introduced on some routes From 2023	**LNG/methanol fueled ship**			**Utilization of e-methane/e-methanol**
Coastal / Small	**Wind Propulsion** Source:Oshima Shipbuilding co., Ltd. From 2022	**Hybrid ship (energy-saving ship)**			**Utilization of biofuels**
	Source:MOL Techno-Trade, Ltd. From 2024	Source:Iwatani Corporation From 2025			**Hydrogen fuel cell ship**
	Source:Asahi Tanker co., Ltd. From 2022	**Battery propulsion ship**			

Experimental operations From 2028

Toward net-zero

R&Ds

Development of
Safety Requirements

Liability
Regime

Development of
Technical and Economic measures

LCA certification scheme

Supply of green energy

Bunkering
infrastructures

Expansion of
Green shipping corridors

Development of
Supply-chain of Equipment

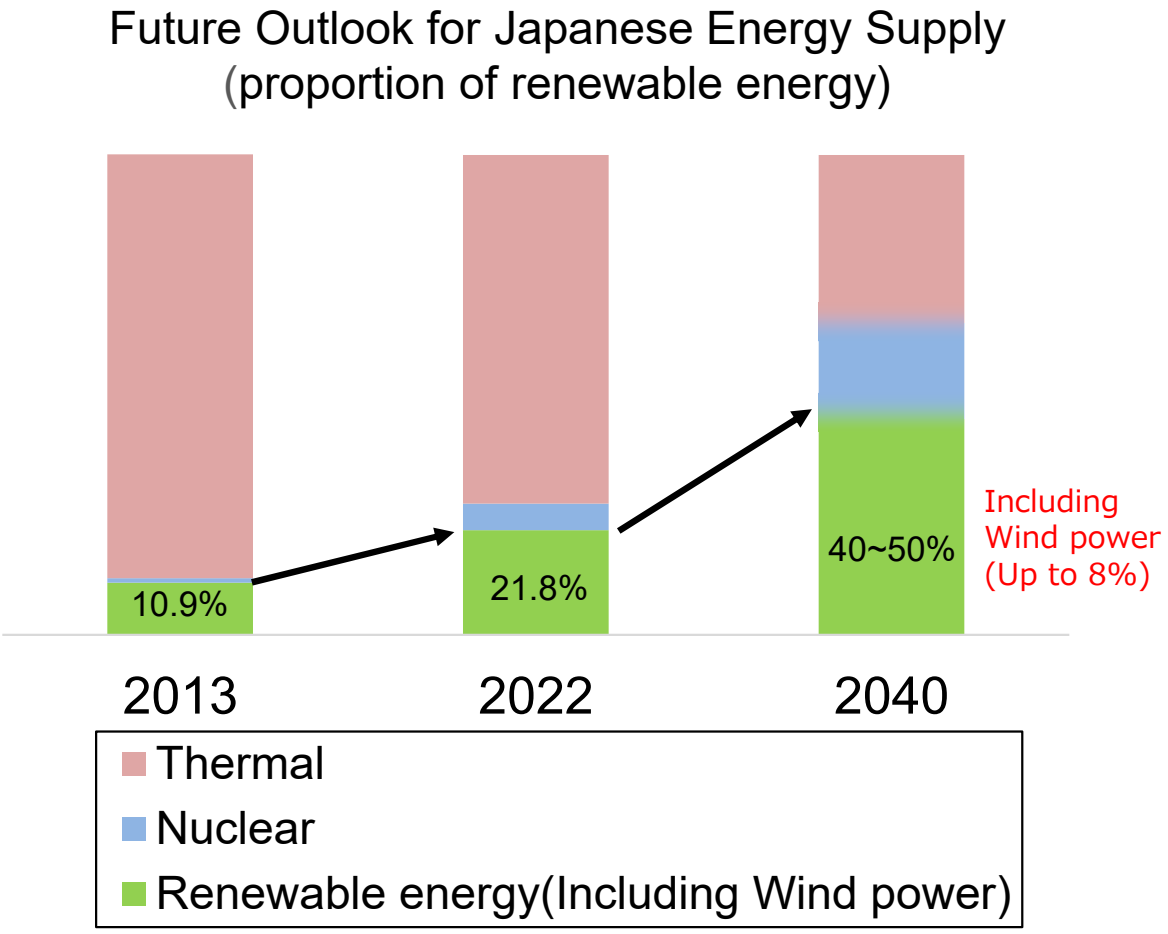
Construction of
Zero-emission Ships

GHG
net-zero

2020 Today 2030 -2050

Floating Offshore Wind Power Generation System

Source: NEDO HP



Source: 7th Strategic Energy Plan
(Cabinet decision on February, 2025)

Challenges:
National Jurisdiction in the EEZ, Application of the UNCLOS (e.g., structures or vessels), Navigation Safety

3. Key Maritime Policies

（1）GX

（2）DX

（3）Safety and Security of Sea Lanes

Objectives for commercial operation of MASS

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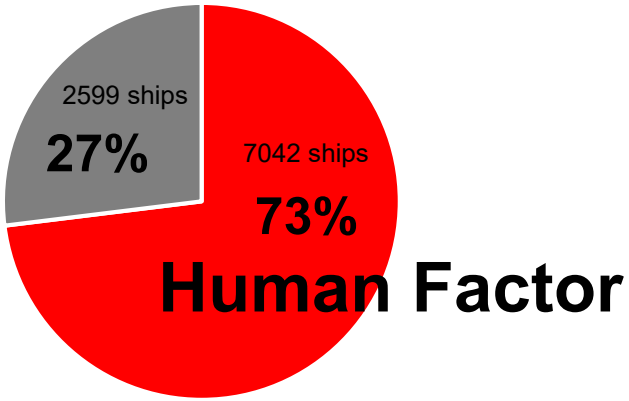
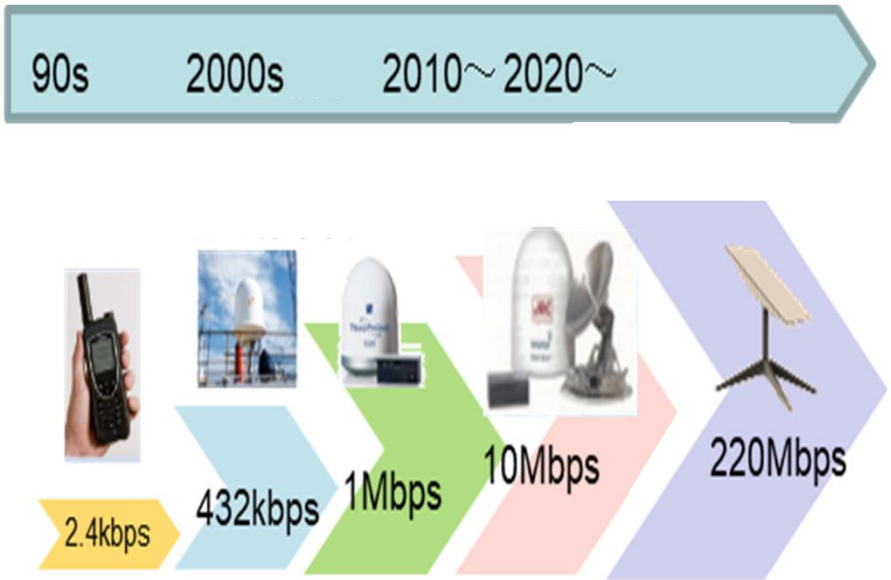
Causes of marine accidents



Innovation for communication technology



Maritime Autonomous Surface Ships(MASS) as solution

“MEGURI2040” Project

The Nippon Foundation MEGURI 2040:
Demonstration projects aimed at the social implementation of MASS

無人運航船プロジェクト
MEGURI 2040
THE NIPPON FOUNDATION

Stage 1 : 6 ships (2022)
✓ Tests of Autonomous Navigation

Stage 2 : 4 ships (2025~)
✓ Putting Autonomous Ships into Practical Use

Stage 1

The Land-Based Fleet Operation Center

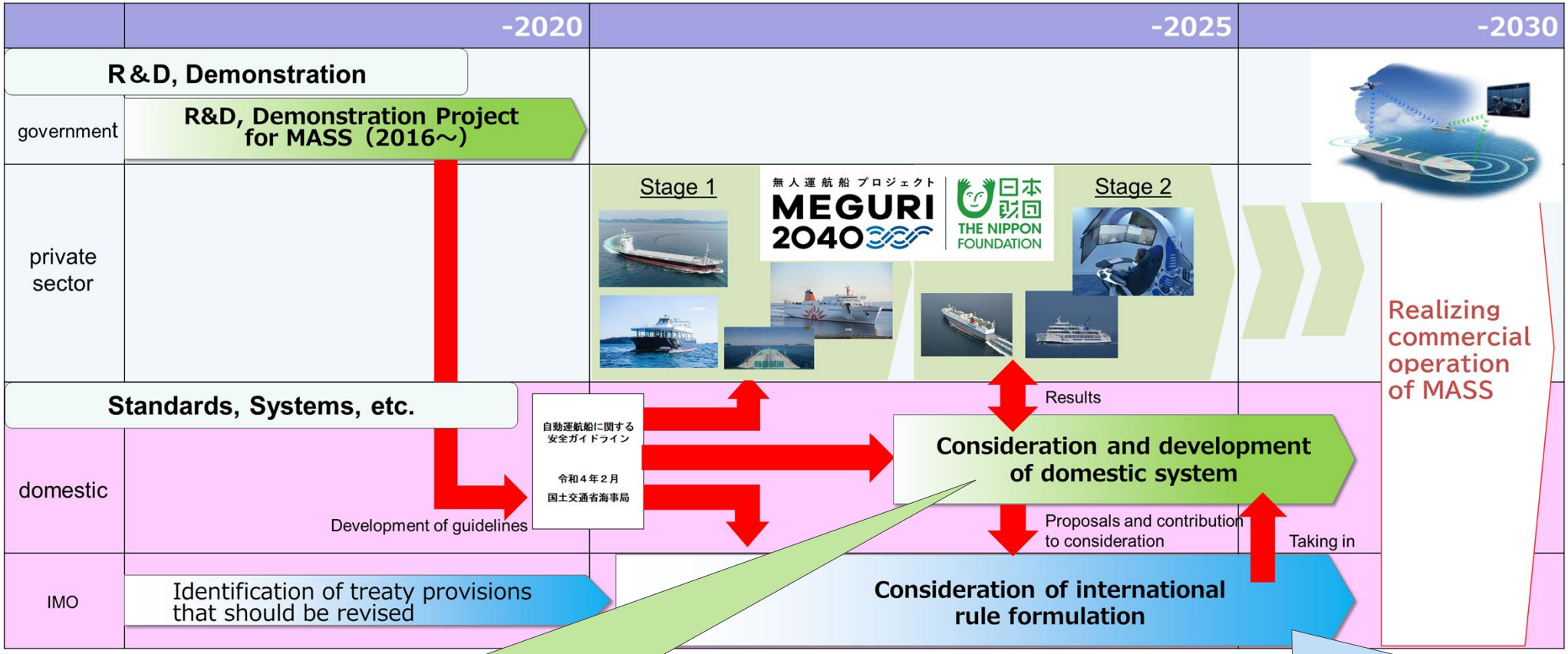
Container Vessel (749GT)

Stage 2

Fleet Monitoring Booth

Engine Support Booth for Individual Ship

MASS Roadmap in Japan



- ✓ Develop **the domestic safety and inspection rules for MASS** by June this year
- ✓ Contribute to the discussions in IMO

- ✓ Develop **the MASS Code** at IMO (non-mandatory:2026, mandatory:2030)

Legal issues with respect to MASS

- Legal issues with respect to MASS have been considered at LEG and the MSC-FAL-LEG Joint Working Group (JWG) on MASS of IMO.

Joint Working Group on MASS

Prof. Goto (Chair)

Source: IMO website

<Main Issues>

- Liability
- Relation with UNCLOS
- Remote Operation Center
- Responsibility of MASS Master and crews

- In Japan, MLIT established a study group on civil liability issues with respect to MASS (Chair: Prof. Fujita) to consider a suitable legal framework for MASS and contribute to the discussions in IMO.

New Mobilities (Autonomous Underwater Vehicles (AUVs))

The use of AUVs is expected to expand for marine surveys, seabed resource exploration and maintenance of offshore facilities.

Autonomous Underwater Vehicles (AUVs)

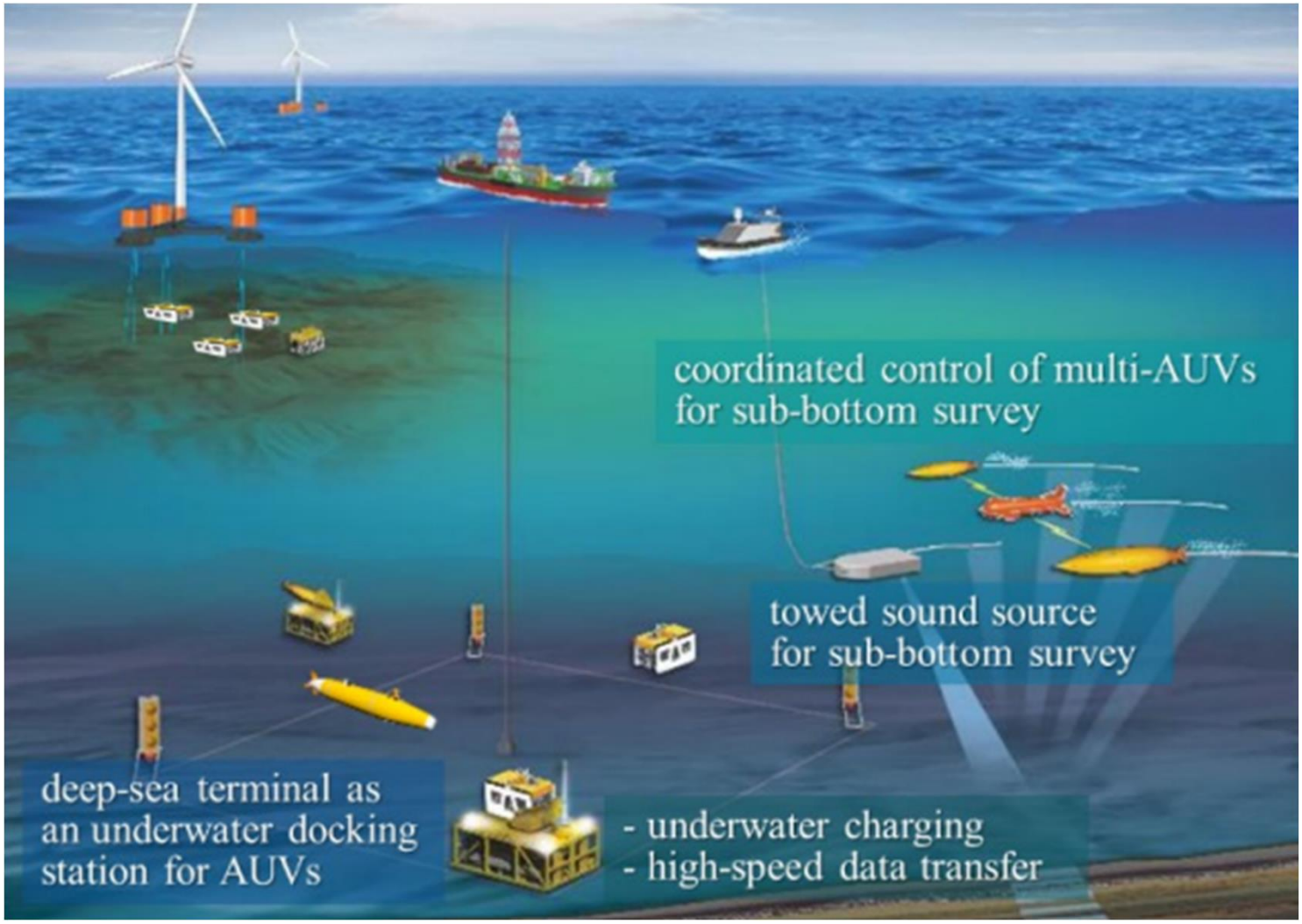


Image of utilization of AUVs

Ref. National Maritime Research Institute, Japan

Challenges: safety and environmental regulations, insurance regime

Cyber Security Management

- The cyber risk for ships is increasing due to the digitalization of ships.
- To address this, IMO developed **the Guidelines on Maritime Cyber Risk Management** and continues to discuss further measures.

Source: IMO website

<Main Elements of the IMO Guidelines>

- Organization governance
- Cyber risk assessment
- System monitoring
- Incident response and recover plan

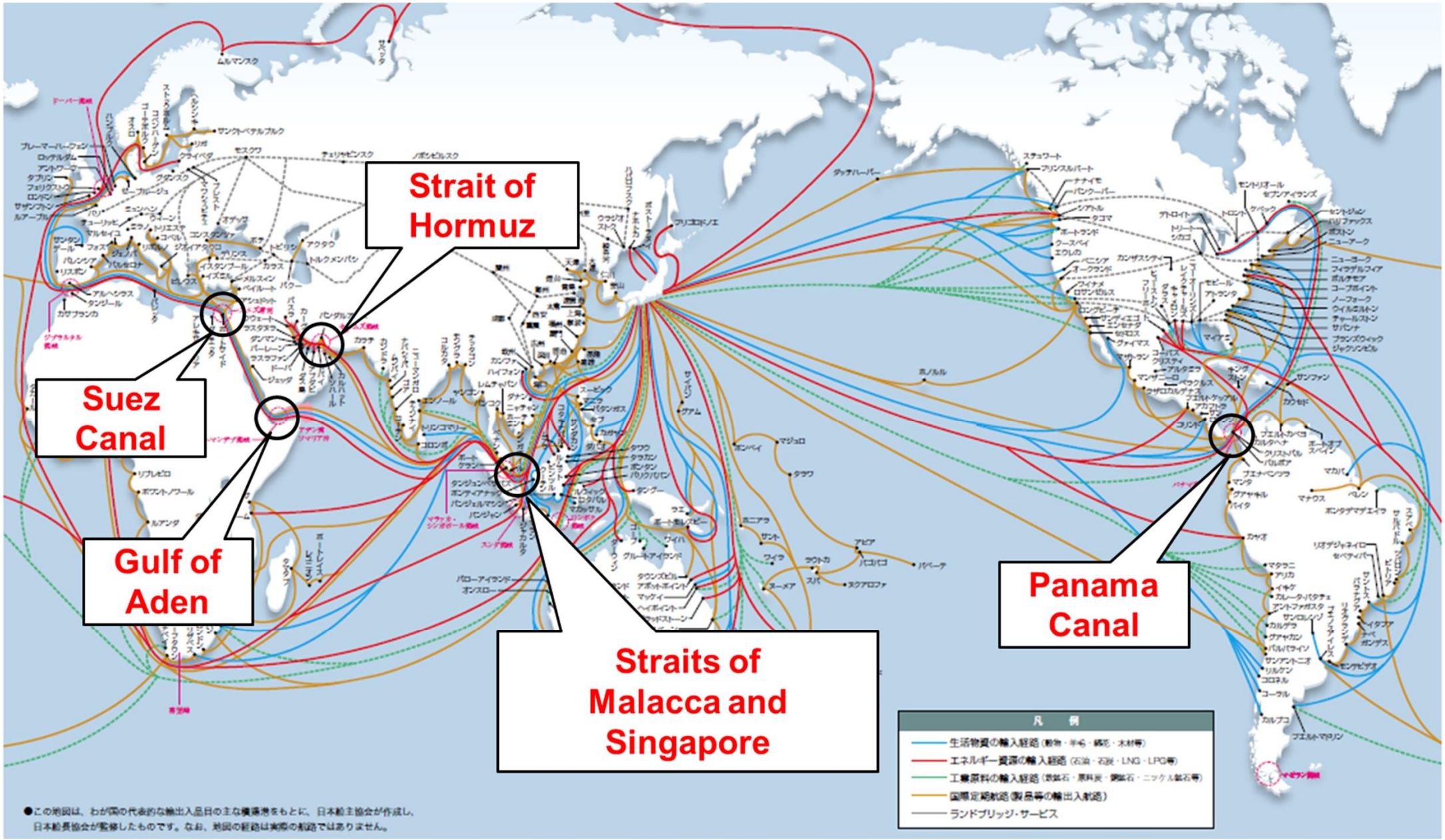
3. Key Maritime Policies

（1）GX

（2）DX

（3）Safety and Security of Sea Lanes

Global sea lanes and major choke points



Source: SHIPPING NOW 2024-2025

Risks to sea lanes and supply chains

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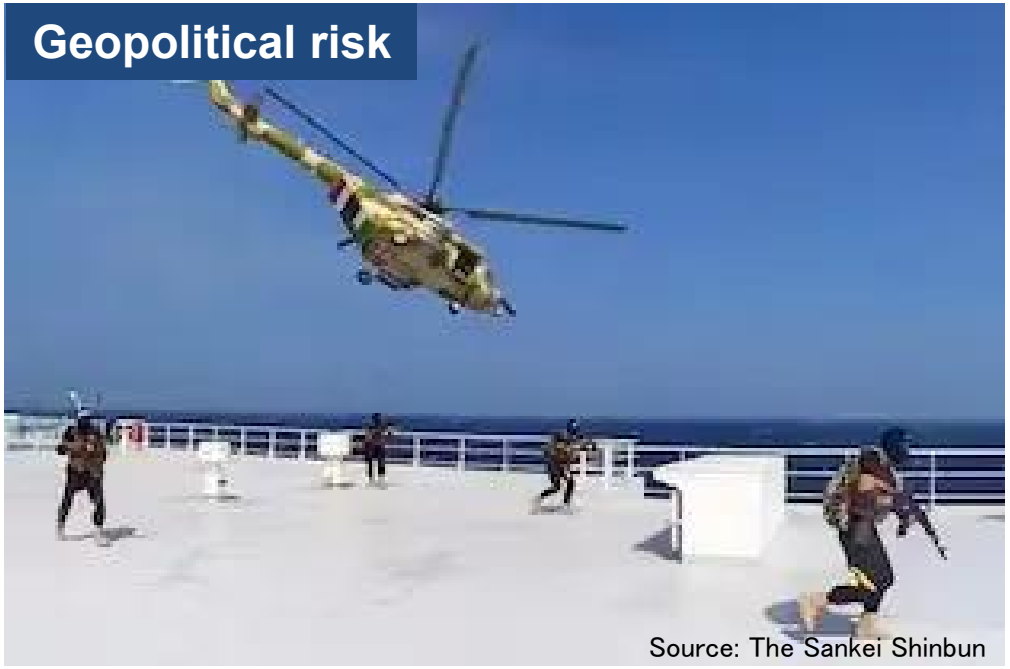
Geopolitical risk



Source: The Sankei Shinbun

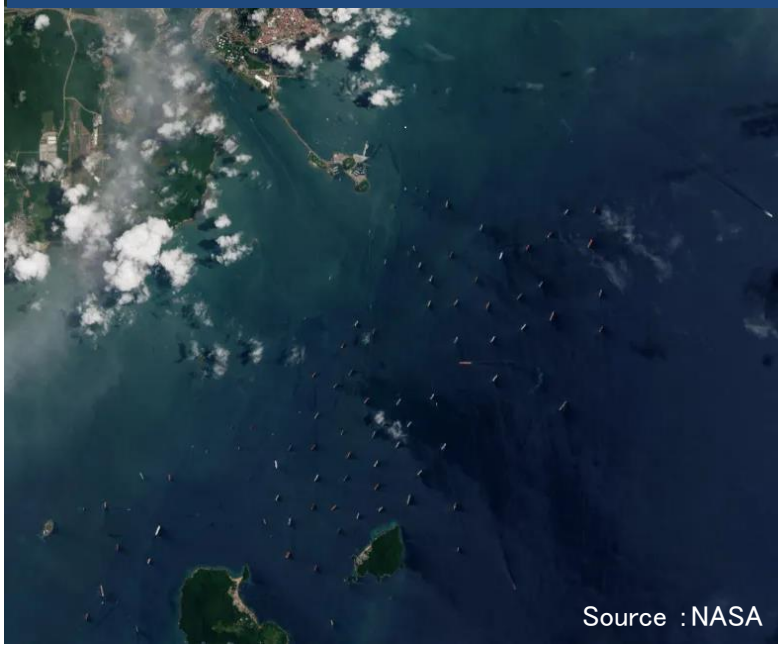
Cyber risk

Source ：Nippon TV NEWS 24

Pandemic risk

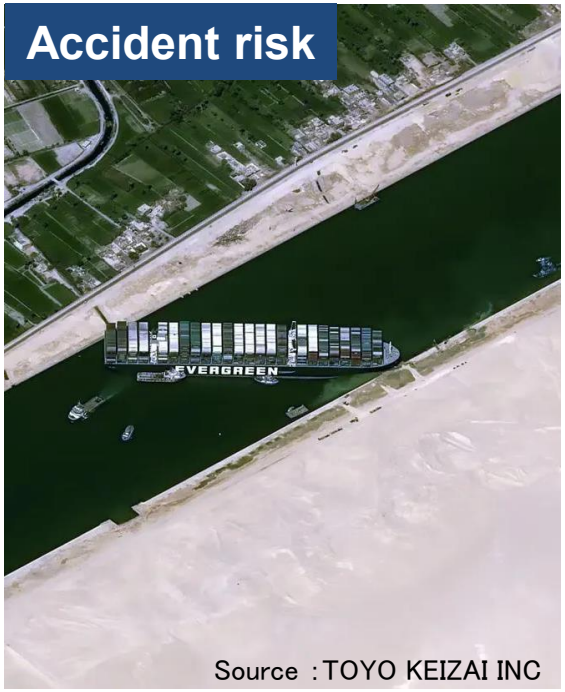
Source ： The Nikkei

Climate change and natural disaster risk



Source ：NASA

Accident risk



Source ：TOYO KEIZAI INC

International cooperation for maritime safety

Maintenance of navigational aid facilities

Capacity building for coast guard agencies

Trainings for maritime administrative officials (held in Japan)

4. Conclusion

Conclusion

- International shipping is essential for social and economic activities of Japan, a maritime nation surrounded by seas on all sides.

- Japan will further promote GX and DX in the maritime industry and the enhancement of navigation safety in sea lanes, through contributing to global rulemaking and technical cooperation.

- Due to technical advancement and social changes, we need to address more diverse legal issues in international shipping.
  Specifically, the IMO/LEG has agreed to start deliberations on “liability and compensation regimes with respect to alternative fuels” and “legal matters arising from maritime security threats”.

  Expectations for CMI's contributions are rising.