



CLEAN FUEL AMMONIA ASSOCIATION

1st International Conference on Fuel Ammonia

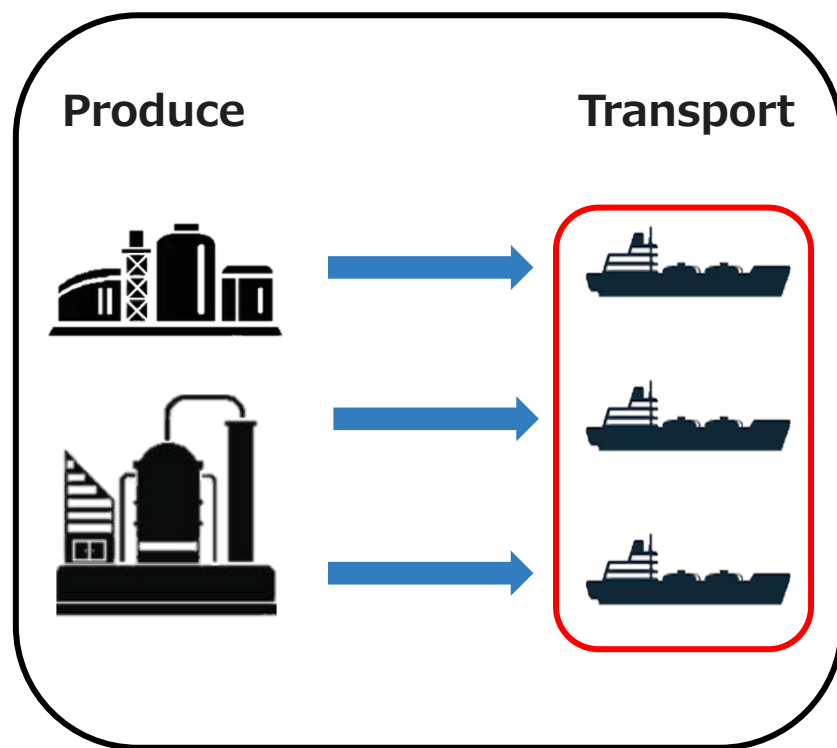
Issues in Ammonia Supply Chain from the Perspective of the Shipping Industry

October 6 (Wed.)

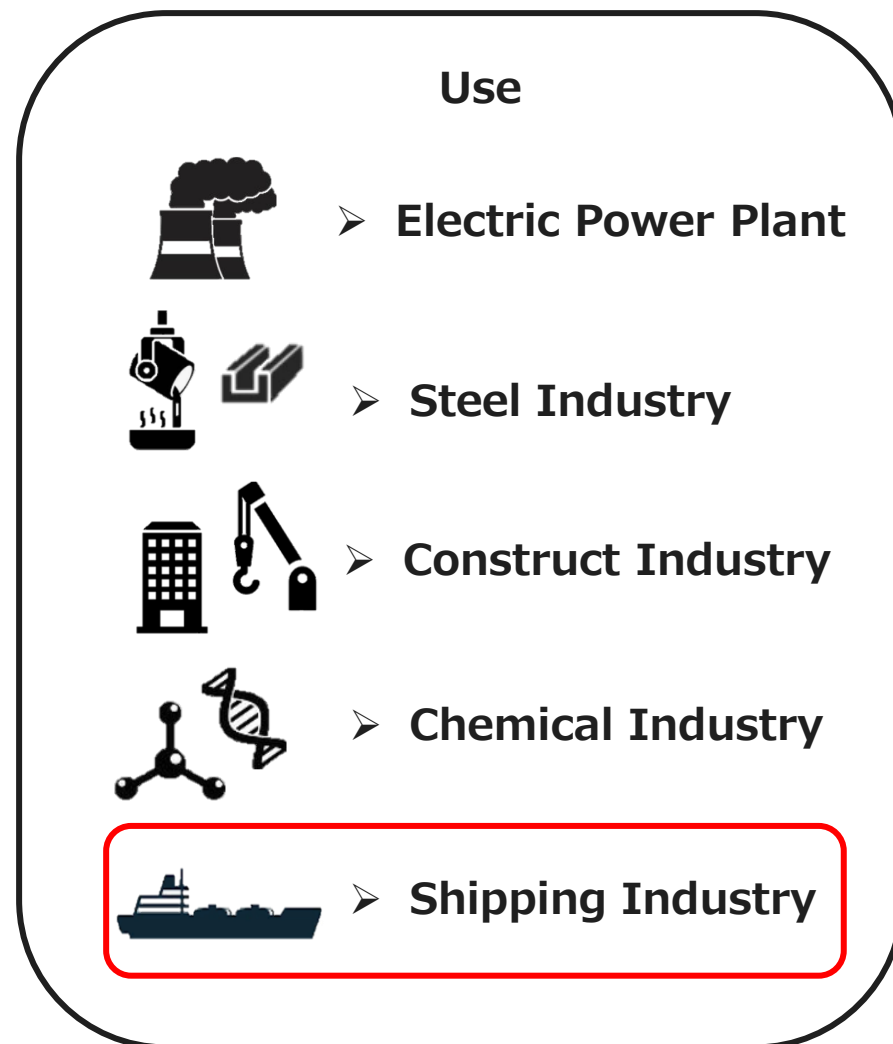
NYK Line

Executive Officer
Toshi Nakamura

SUPPLY



DEMAND



CHAPTER 1

► Large-Scale Ammonia Transportation

Large-Scale Ammonia Transportation



- Japan is expected to **import clean ammonia for thermal power generation** to reach net-zero emissions by 2050.
- For large-scale procurement, Japanese companies are jointly working to build a clean NH₃ supply chain through upstream to downstream.

➤ 2020

➤ 2030

➤ 2050

0.3 Mil MT

20% Ammonia
Co-Firing Plan

3 Mil MT

Expansion of
Operation

30 Mil MT
(clean NH₃)

Mid-EAST

North America

Australia

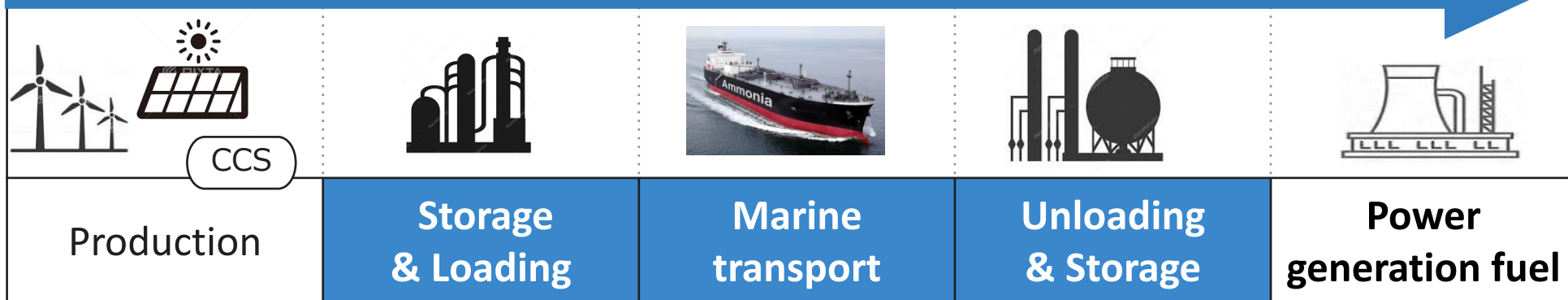
South America

Key Issues from the Shipping Perspective

Following two optimizations are required to realize the large scale ammonia transportation

(1) vessel size and **(2) port facility** (infrastructure and equipment)

CO₂-Free ammonia supply chain



Expansion of
Port facilities

Optimize the vessels size
to make more efficient .



NYK

Vessel size will be
almost twice

Unload at **existing**
berth facility for coal.



Special equipment needed for ammonia transportation.
Abt 30-40 MGCs have been allocated into existing deep sea NH3 trade.

		cbm	Ship type		NH3 capable fleet	Avg. tank capacity (cbm)	Avg. NH3 loading vol (ton)
			No.	Ratio			
Fully-refrigerated	Very Large Gas Carrier (VLGC)	70k-	312	22%	28	80,600	48,000
	Large Gas Carrier (LGC)	50k-	21	1%	19	59,800	39,700
	Medium Gas Carrier (MGC)	30k-	97	7%	96	36,900	24,400
	Handy Size (Handy)	15k-	26	2%	26	22,800	15,100
Semi-refrigerated	Medium Gas Carrier (MGC)	30k-50k	7	0%	0		
	Handy Size (Handy)	15k-	96	7%	86	20,100	13,300
	Small Gas Carrier (SGC)	1K-	211	15%	152	6,900	4,500
Pressure	Small Gas Carrier (SGC)	1-15k	669	46%	19	1,800	—

Source: Drewry Maritime Research data edited by NYK as of June 30, 2021

CHAPTER 2

► Ammonia Demand for a Marine Fuel

Ammonia as Marine Fuel



Issue



The shipping industry accounts for **2.0%** of CO2 emissions.



zero

~~50%~~ emission by 2050 (the target may increase to “zero” soon)

Solution

Only **CO2-free fuels** can realize emission reduction targets.

We still have challenges to use **clean ammonia** as a marine fuel.

Fuel cost

Tank Capacity

Fuel Supply

Safety guideline

Pilot fuel

Nox (Exhaust gas)

Government policy



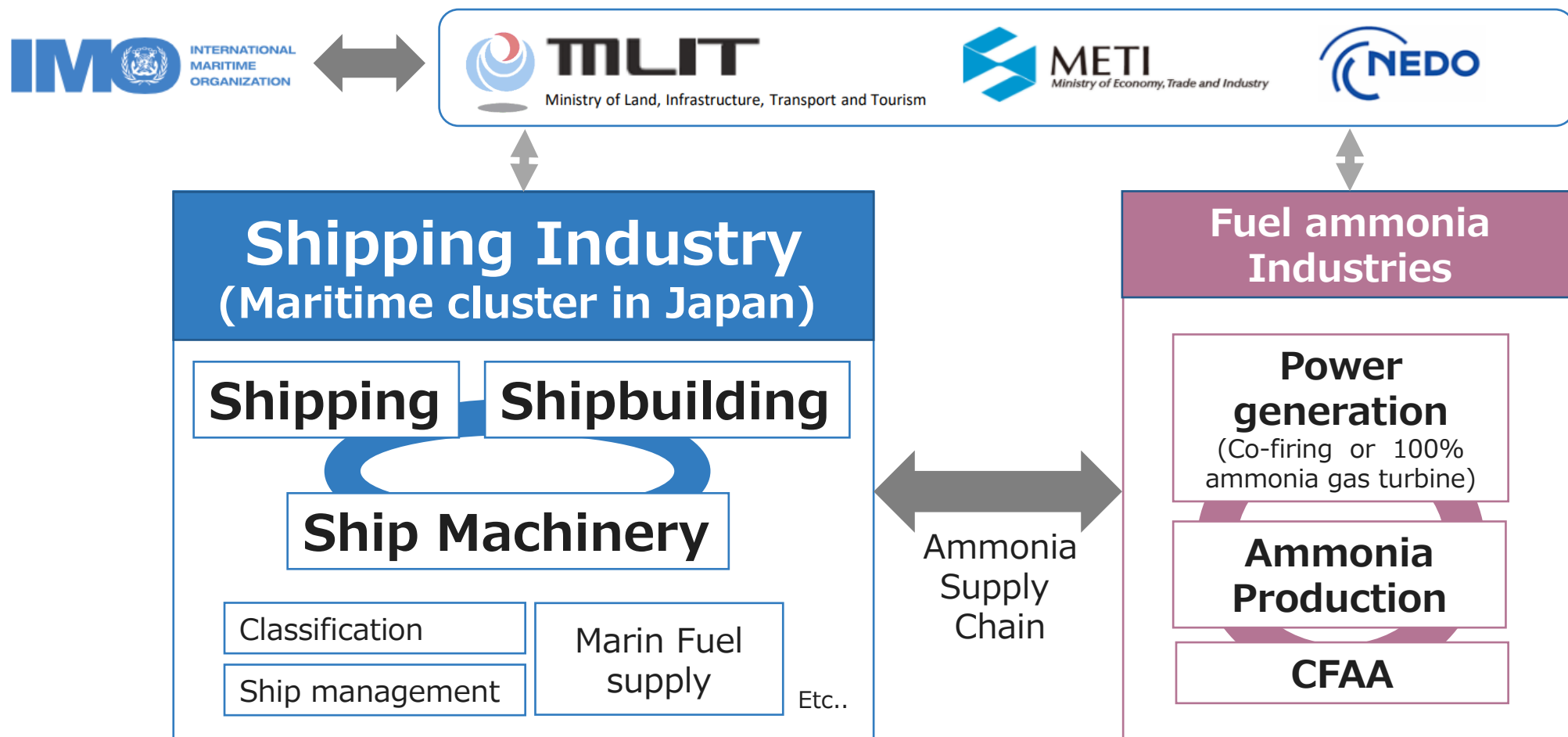
Targeting to launch Zero-Emission ship by **2028**

(Roadmap to Zero Emission from International Shipping, issued on Mar 2020)



1. **Green Innovation Fund : 2 trillion yen** over 10 years to achieve Green Growth Strategy.
2. Support to develop **alternative fuel technologies** and contribute to zero emissions of international shipping.

Maritime cluster in Japan will promote the development and practical use of **ammonia-fueled** engines, fuel tanks and fuel supply systems for long-distance and large ships.



NYK's View of Clean shipping in 2050

NYK keep challenging for **transition to zero emission shipping.**

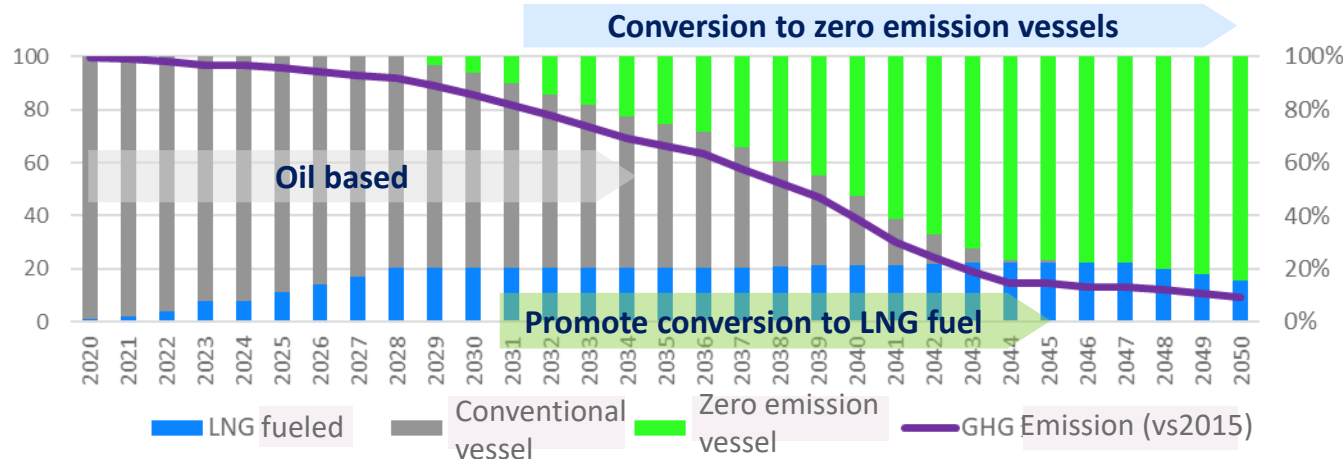


ARLFV

Ammonia-fuel Ready
LNG-Fueled Vessel

Next Bridging Solution
(LNG -> Ammonia)

Image of NYK PCTC Fleet Renewal Plan (2020~2050)



20 LNG-PCTCs Ordered

Within 10years,
We start to switch to
Zero emission vessels



Bringing Value To Life.

Bringing value to life.

There's only one Earth. Its vibrant hues of green and blue remind us of life. Yet, commerce and industry have placed enormous demands on our planet. As a company that transports goods by ocean, land and air, NYK is working to reduce environmental loads with earth-friendly policies, efficient use of resources, and in-house standards to improve our environmental performance and prevent pollution. The Earth comes first in everything we do. "Bringing value to life."

免責事項

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