



2nd International Conference on Fuel Ammonia

Decarbonization of Shipping with Ammonia as Marine Fuel

燃料アンモニアの船用使用による海運の脱炭素化

September 28 2022

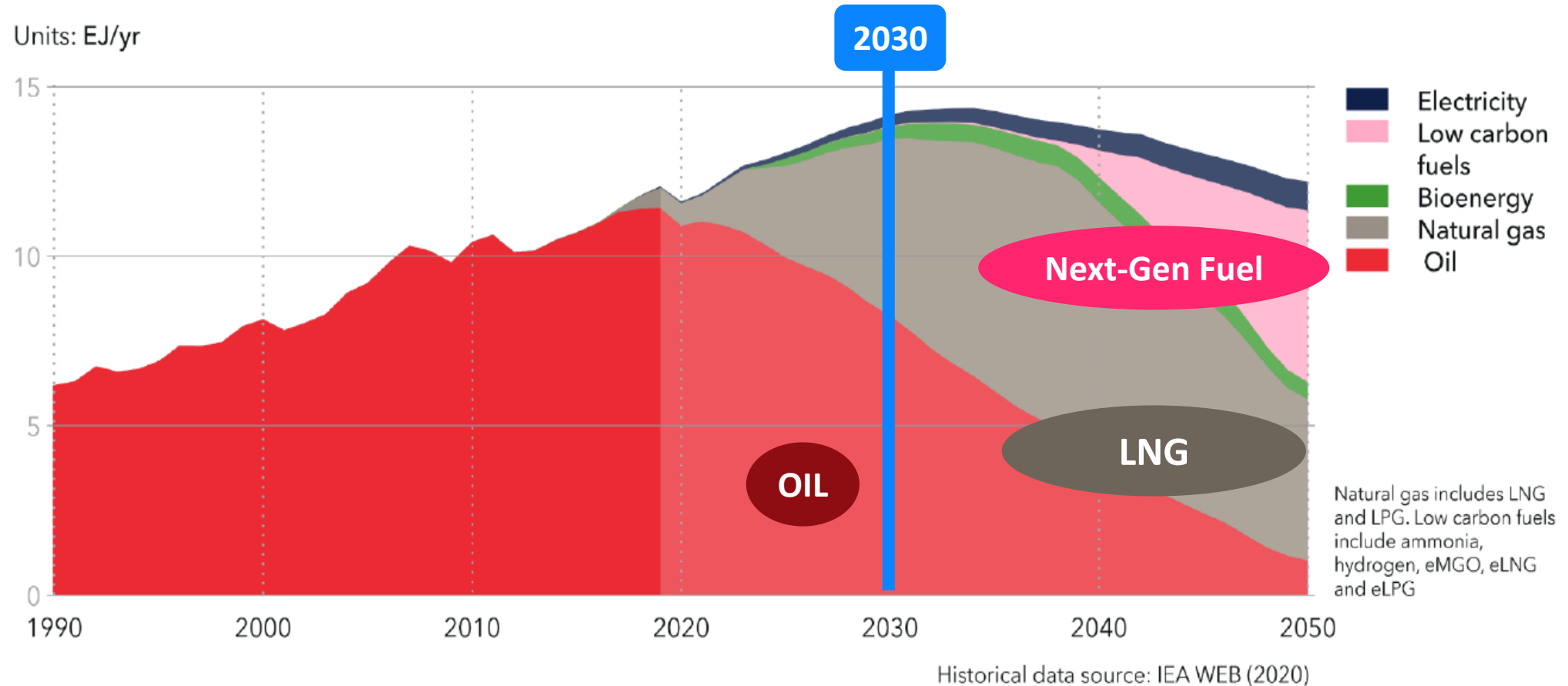
Toshi Nakamura
NYK Line
Executive Officer

Expected Marine Fuel Transition (Source: DNV, May 2022)

IMO plans to adopt a resolution in 2023 at MEPC80 to set net-zero at 2050.

MEPC: Marine Environment Protection Committee

World maritime subsector energy demand by carrier



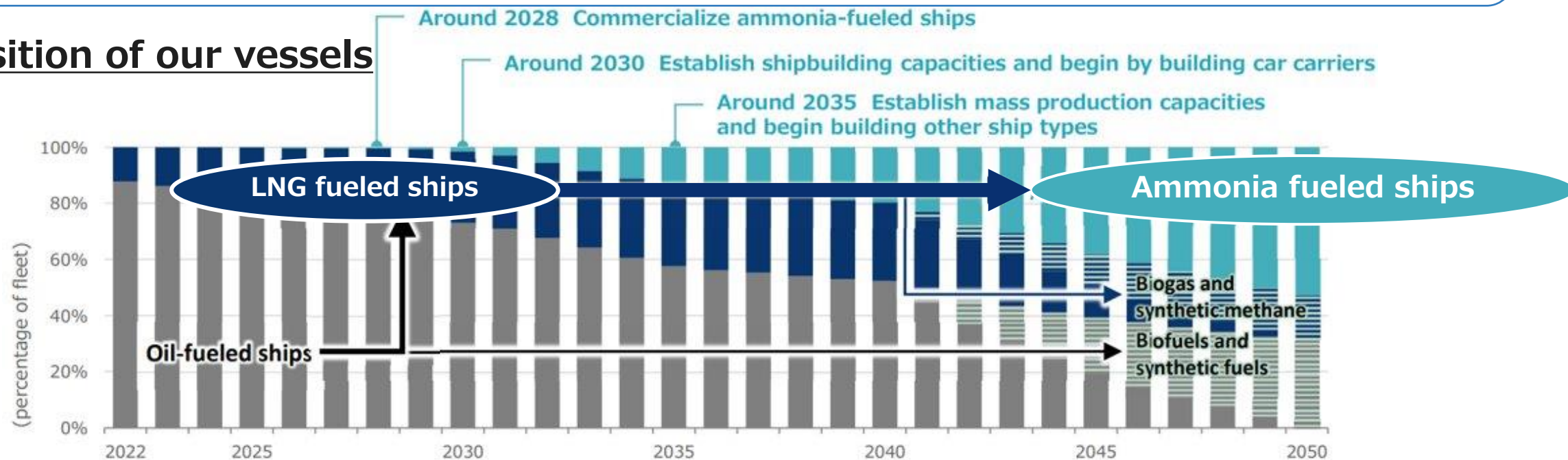
DNV © 出典 : DNV Energy Transition Outlook(24th May 2022)

NYK's strategy of Net-Zero Emissions by 2050

On Sep 2021, NYK has set a long-term target of **net-zero emissions by 2050** for the NYK Group's oceangoing businesses.

NYK expects **ammonia** as a marine fuel to be a practical solution from the viewpoint of its potential **availability**. NYK also recognize LNG as a **bridging solution** from existing availability and its established supply chain.



Transition of our vessels



*1 LNG-fueled ships include LNG carriers.

*2 The amount of investment in ships powered by zero-emission fuels is premised on the introduction of ammonia-fueled ships.

Japan's maritime industry leads global maritime decarbonization in R&D and the realization of ammonia-fueled ships

Project 1 (Coastal vessel)	Project 2 (Oceangoing vessel)
<p>Ammonia Fueled Tugboat (A-Tug)</p> 	<p>Ammonia Fueled Ammonia Gas Carrier (AFAGC)</p> 
<ul style="list-style-type: none"> • Delivery scheduled in FY2024 • Concluded contract for the conversion from LNG-fueled tugboat in Jun 2022 • AiP awarded in July 2022 	<ul style="list-style-type: none"> • Delivery scheduled in FY2026 • Completed HAZID in July 2022 • AiP awarded in Sep 2022

HAZID: Hazard Identification
 AiP: Approval in Principle

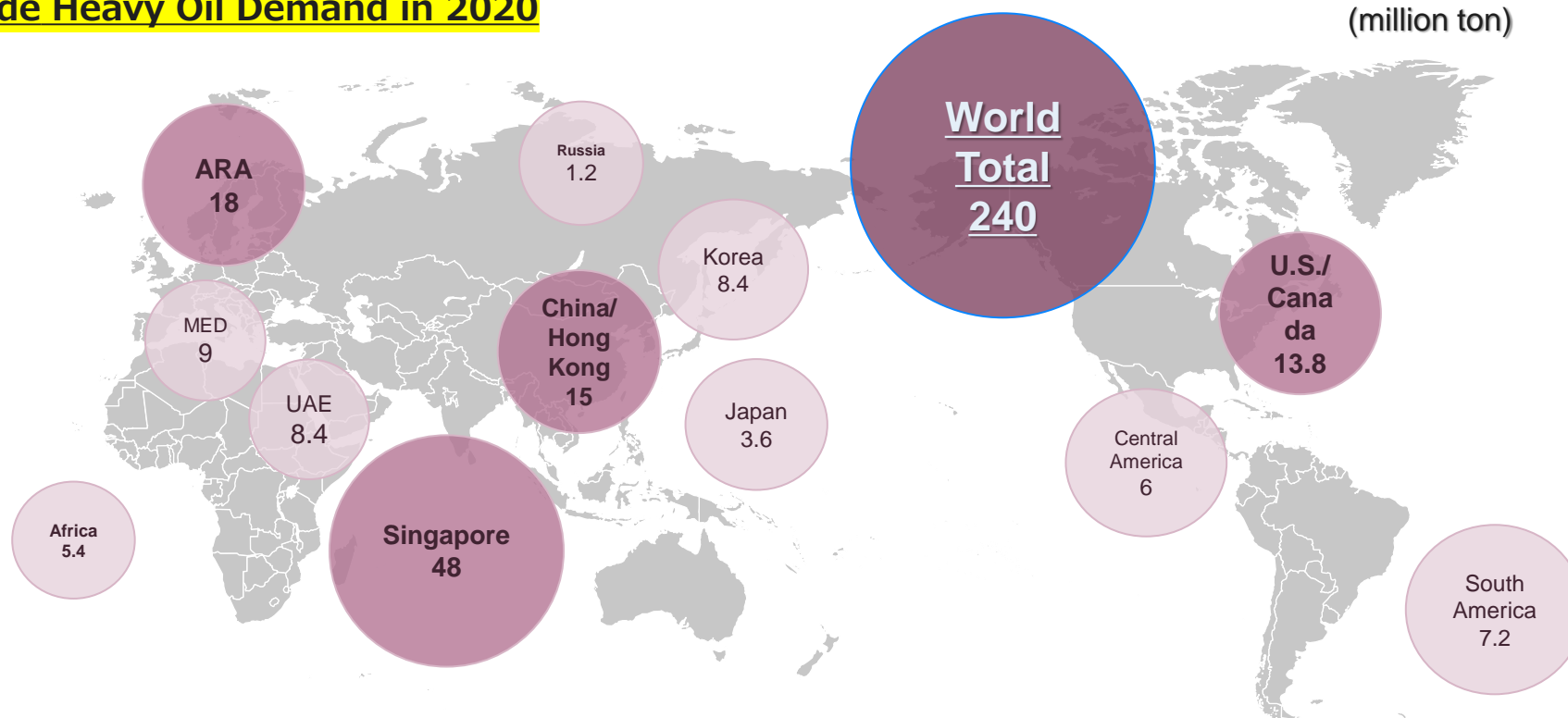
This project was granted a subsidy of **8.4 billion Japanese Yen** through **the Green Innovation Fund.**



World Marine Fuel Demand


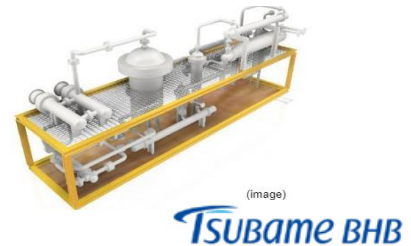






- The current worldwide demand for heavy oil is **240 million tons**.
- If **40%** of heavy oil is to be replaced by ammonia in 2050, about **200 million tons of ammonia** as marine fuel will be needed.

Worldwide Heavy Oil Demand in 2020



Establishing Ammonia Supply Chain

R&D + Biz Development to establish alternative fuel supply chain

Production	Ocean transport	Storage & delivery	Bunkering	Marine Fuel
<p>Upstream Projects</p>  <p>Technology</p> 	<p>AFAGC (Ammonia Fueled Ammonia Gas Carrier)</p>  <p>ARLFV (Ammonia Ready LNG Fueled Vessel)</p> 	<p>A-FSRB (Ammonia Floating Storage & Re-gas Barge)</p>  <p>Distribution</p> 	<p>ABV (Ammonia Bunkering Vessels)</p> <ul style="list-style-type: none"> • Leverage experiences in LNG bunkering • Ongoing LNG bunkering projects in various locations 	<p>AFV (Ammonia Fueled Vessels)</p> 

■ **Establishing an ammonia supply chain** is essential for utilization of ammonia as a marine fuel

To Power



Collaboration with Overseas Partners

- NYK are working for decarbonization as a member of overseas associations.

MMMCZCS

(Maersk Mc-Kinney Moller Center for Zero Carbon Shipping)

The center is committed to seeing commercially viable **deep-sea zero-carbon vessels powered by zero-carbon fuels**

Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

Founding Partners



GCMD

(Global Centre for Maritime Decarbonization)



NYK contributes to the GCMD as an expert on **bunkering rule development**.

Founding Partners



- NYK also works with **overseas leading companies (BP, BHP, YARA etc)** for pursuing decarbonization.



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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