

Sept 2022

# WEBINOR of Ammonia Energy Association

= Integrated Project for NH<sub>3</sub> Fuel Ship =

ITOCHU Corporation  
Green Innovation Business Unit



I am One with Infinite Missions

# 1. Integrate Project by ITOCHU

# 1. Introduction

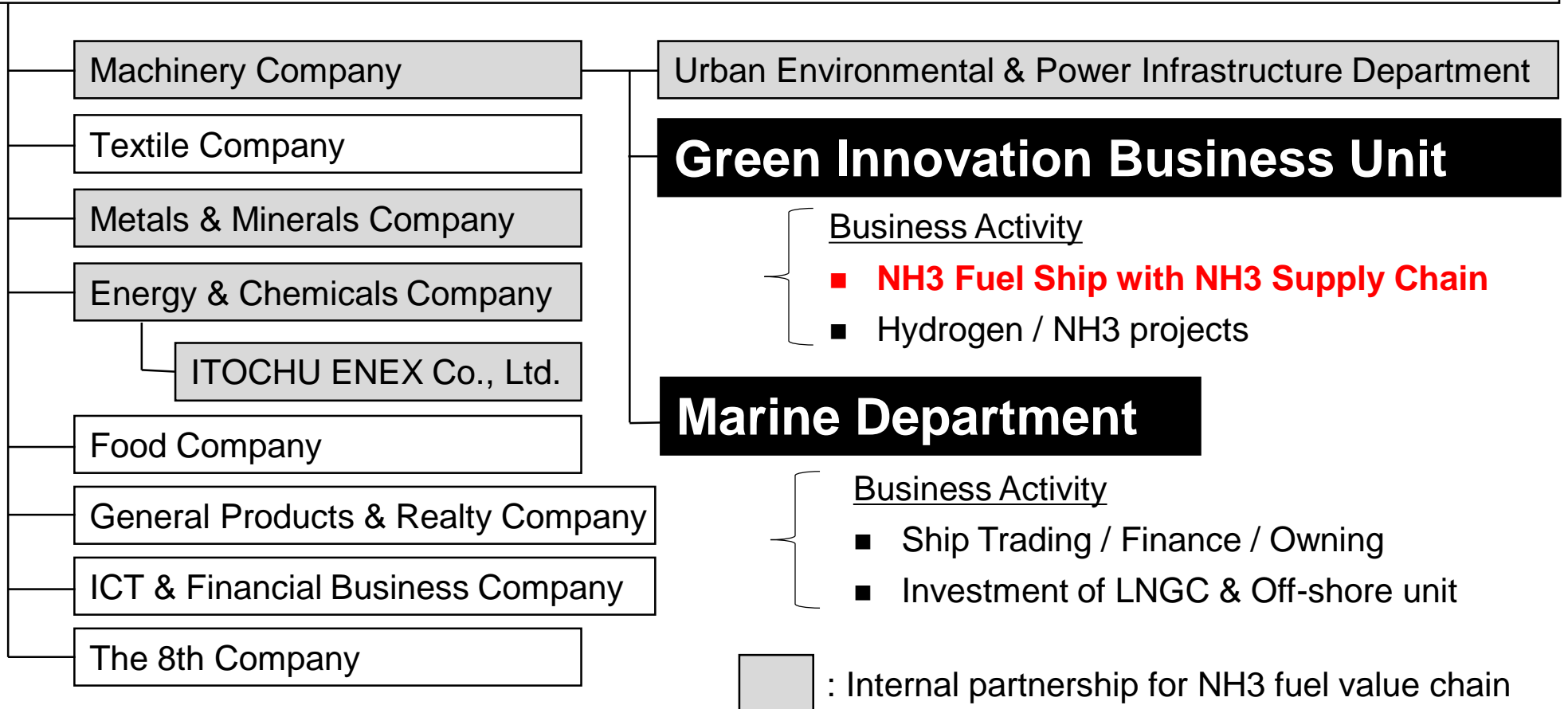


Founded : 1858 (incorporated 1949)

Number of employees : 4,319

Number of offices: 94 (oversea) & 9 (domestic)

Website: <http://www.itochu.co.jp>



## 2. Option for Zero-Emission Fuel

Fuel		CO2 Emission	Liquid	Tank Capacity	Status
Existing	LSFO	1	-	1.0	■ Slow speed under EEXI / CII
	LNG	0.74	-163°C	1.7	■ 25% reduction
	Methanol	0.90	-	2.3	■ 10% reduction
	Biofuel	NET 0	-	~1.2	■ Limited supply volume



Hydrogen base fuel	Hydrogen	0	-253°C	4.4	<ul style="list-style-type: none"> <li>■ Fuel Tank with low temperature</li> <li>■ Coastal ship as pilot project</li> </ul>
	Carbon recycle fuel <ul style="list-style-type: none"> <li>■ E-methanol</li> <li>■ E-LNG</li> </ul>	NET 0	-	-	<ul style="list-style-type: none"> <li>■ Definition of "NET 0"</li> <li>■ Carbon recycle with                             <ul style="list-style-type: none"> <li>• CCS on board ; or</li> <li>• Direct Air Capture</li> </ul> </li> </ul>
	Ammonia	0	-33°C	3.0	<ul style="list-style-type: none"> <li>■ Engine Development</li> <li>■ Safety Guideline (Toxicity)</li> <li>■ CO2 emission at production (grey)</li> </ul>

# 3. Development of Integrated Project



MOU for NH3 Fuel Ship



Green Innovation Fund



JDA with End-Users  
(Pilot Project)

End-User



NH3 Fuel Ship

2019

2020

2021

2022

Bunkering (Singapore)

MOU for NH3 Bunkering



AIP of NH3 Bunkering Ship



MOU for NH3 Bunkering Safety

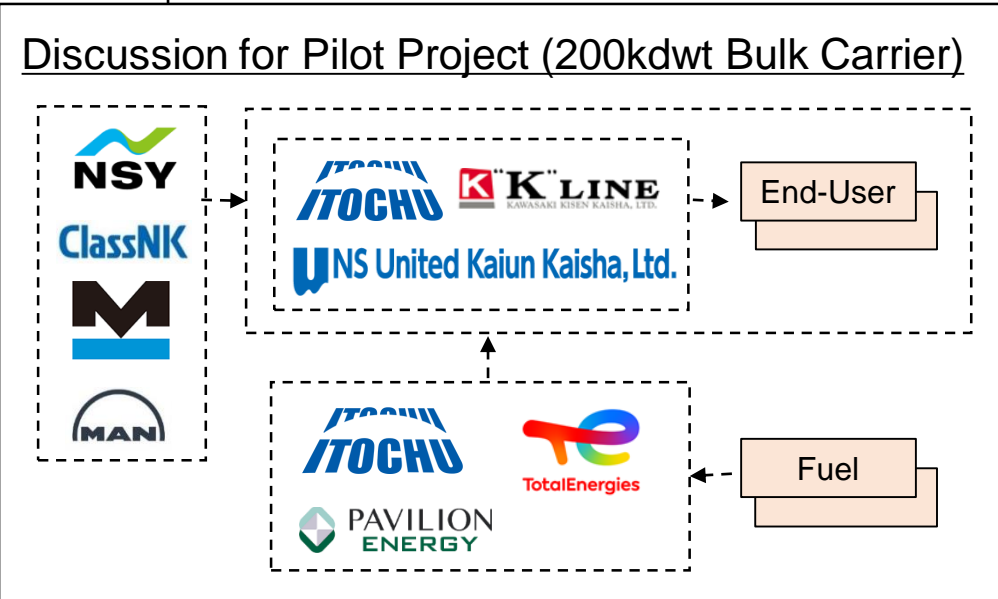
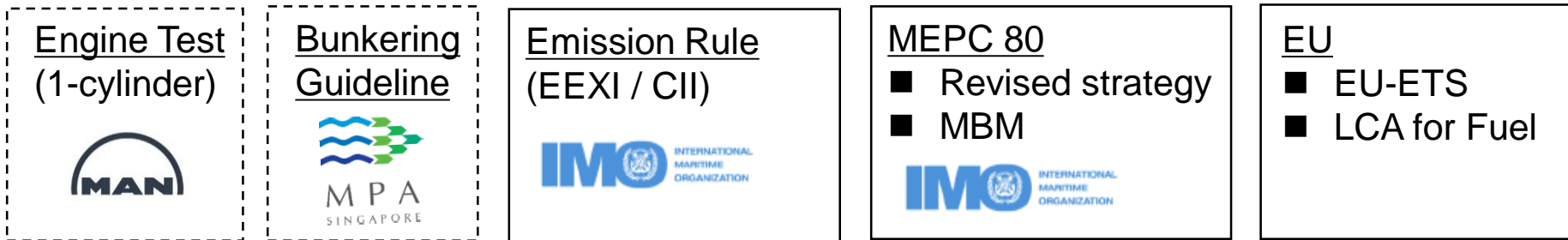


# 4. Frameworks of JOINT STUDY



- ✓ Original JOINT STUDY (established in 2021) for Common Issues, i.e.
  - A) Safety for NH3 Fuel Ship
  - B) Safety for NH3 Bunkering
  - C) NH3 Fuel Specification
  - D) NET CO2 emission of NH3
  
- ✓ After Original JOINT STUDY program in 2021, ITOCHU proposed “Joint Session” as to item B) with separated framework of JOINT STUDY with port authorities for NH3 Bunkering Safety (established in 2022).
  
- ✓ ITOCHU established Working Group to focus on “Key Factors” for NH3 Bunkering among limited parties of JOINT STUDY.

# 5. ITOCHU's Plan for next step



- ITOCHU's Plan after Pilot Project
- 2<sup>nd</sup> Project with 200kdwt Bulk Carrier
  - Development for other ship type
  - Development for other bunkering port

## 2. Challenge for Integrated Project



# 1. Challenges for Integrated Project

item		Challenges
Technical	Ship Design	<ul style="list-style-type: none"><li>■ Ship Design Development with interface of Safety Guideline for NH3 Bunkering</li><li>■ Alternative Design Approval with Flag country</li></ul>
	Safety Guideline	<ul style="list-style-type: none"><li>■ Safety Guideline at IMO for NH3 Fuel Ship</li><li>■ Local Guideline for NH3 Bunkering at each bunkering port</li></ul>
Commercial	Certificate	<ul style="list-style-type: none"><li>■ Scope of CO2 emission (Life Cycle Assessment)</li><li>■ Trade Structure with Certificate</li></ul>
	Price Mechanism	<ul style="list-style-type: none"><li>■ Price INDEX</li><li>■ CO2 Premium for Blue / Green NH3</li></ul>

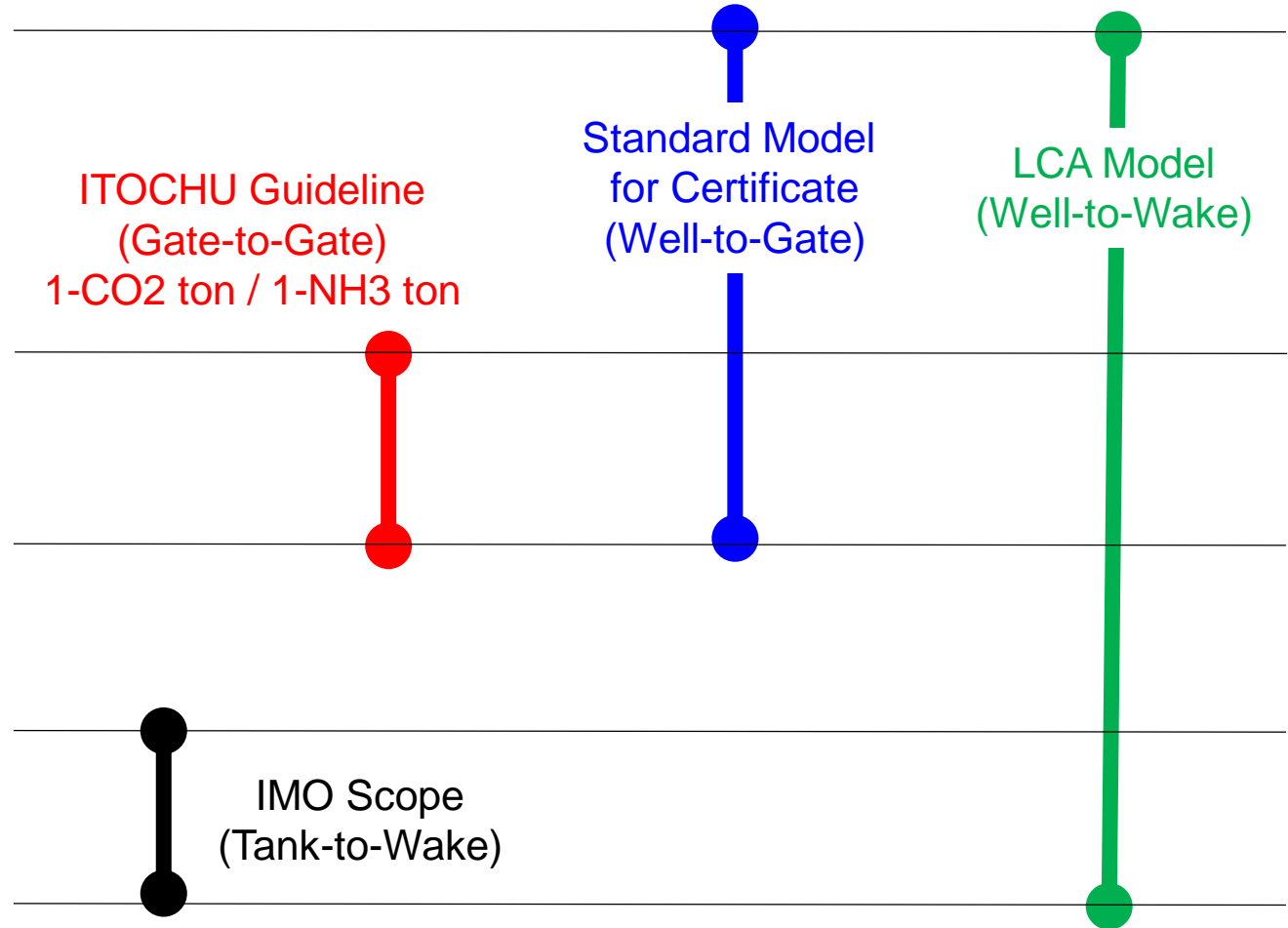
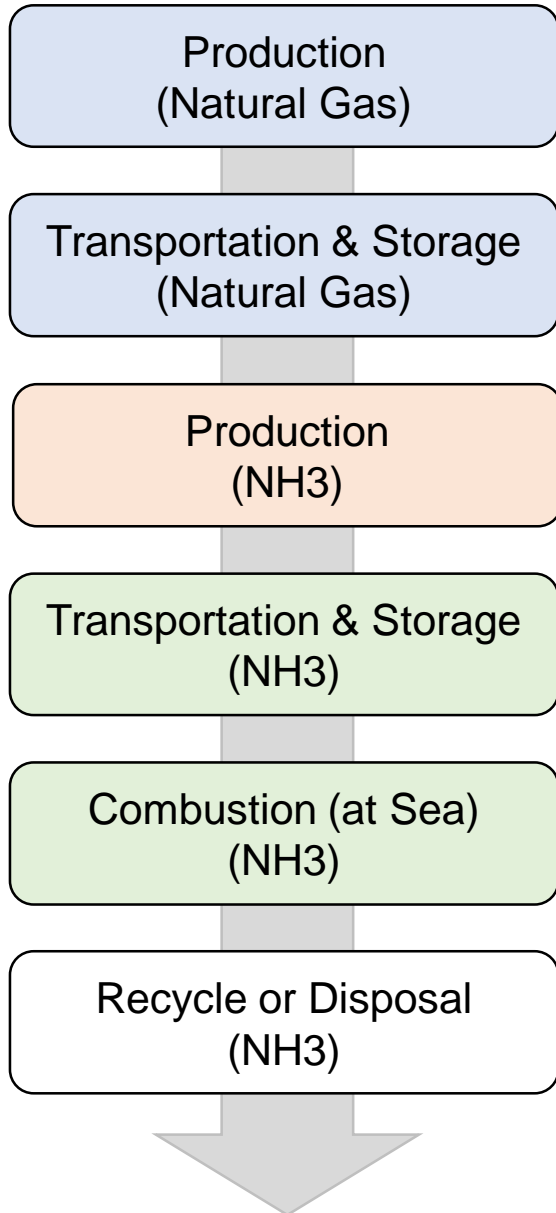
## 2. ITOCHU's Questionnaire (Key Factors)

Item		ITOCHU's Questionnaire
1	Gas Detection System	<ul style="list-style-type: none"> <li>■ whether automatic activation of water spray against NH3 leakage during NH3 bunkering should be required or not.</li> <li>■ If it is so, what would be condition for automatic activation.</li> </ul>
2	Water Spray against NH3 leakage	<ul style="list-style-type: none"> <li>■ How much capacity for storage of drain tank for NH3 contaminated water for NH3 Fuel Ship and/or NH3 Bunkering Ship.</li> <li>■ What is requirement for treatment of NH3 contaminated water such as (i) discharge such water to on-shore for treatment by 3<sup>rd</sup> party or (ii) dilution with sea water for disposal to sea or (iii) disposal to sea without any treatment but outside of port.</li> </ul>
3	Handling of Vent Gas	<ul style="list-style-type: none"> <li>■ Whether limited discharge into air shall be permitted or not.</li> <li>■ If it is so, what would be threshold</li> </ul>
4	Safety Zone	<ul style="list-style-type: none"> <li>■ Whether PPE for all of crew / stevedore on deck during NH3 bunkering should be required or not.</li> <li>■ Whether restriction of cargo operation during bunkering is requested or not.</li> <li>■ If it is so, what is purpose of restriction, if limited crew / stevedore are protected by PPE.</li> </ul>
5	Bunkering Station	<ul style="list-style-type: none"> <li>■ whether enclose "Bunkering Station" is required or not</li> </ul>



We are happy to hear of any opinion or suggestion or views from experts

# 3. Life Cycle Assessment



IMO Scope  
(Tank-to-Wake)

We are happy to hear of any opinion or suggestion or views from experts

THANKS