

# IHI Group's Efforts to Build an Ammonia Value Chain



**March 1, 2024**

**IHI ASIA PACIFIC PTE. LTD.**

CEO

Hiroki KOBAYASHI

# Company Overview

## IHI Group Company Profile

(As of March 31, 2023)



Year of establishment

1853



Number of employees  
(consolidated)

28,486



Overseas  
representative offices

21



Capital

107.1 billion yen



Works

7



Affiliated companies in Japan

61

[Subsidiaries: 43 Affiliates: 18]



Revenue(Consolidated)

1,352.9 billion yen



Branches in Japan

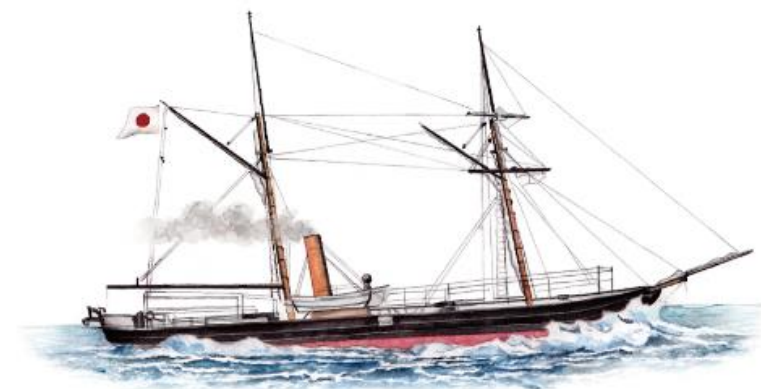
16



Overseas affiliates

138

[Subsidiaries: 116 Affiliates: 22]



日本初の蒸気艦

# Business Area of the IHI Group

## Resources, Energy & Environment Business Area

Contribute to carbon-free and recycling societies by providing optimal integrated solutions for each region and customer



- Carbon solutions
- Power systems
- Nuclear energy

● Large-scale tower type boiler

## Industrial Systems & General-Purpose Machinery Business Area

Contribute to industrial infrastructure progress by thoroughly optimizing operational lifecycles with customers



- Parking
- Transport machinery
- Turbochargers for vehicles
- Rotating machinery
- Logistics and machinery
- Heat treatment and surface engineering

● Turbochargers for vehicles

## Social Infrastructure Business Area

Contribute globally and across life cycles to materialize safe and secure social infrastructures, centered on bridges and tunnels



- Bridges and Watergates
- Shield systems
- Concrete construction materials
- Transport systems
- Urban development

● Osman Gazi Bridge across Izmit Bay

## Aero Engine, Space & Defense Business Area

Leverage advanced technology to open new vistas for air transportation, defense systems, and space utilization, and help materialize social comfort and safety

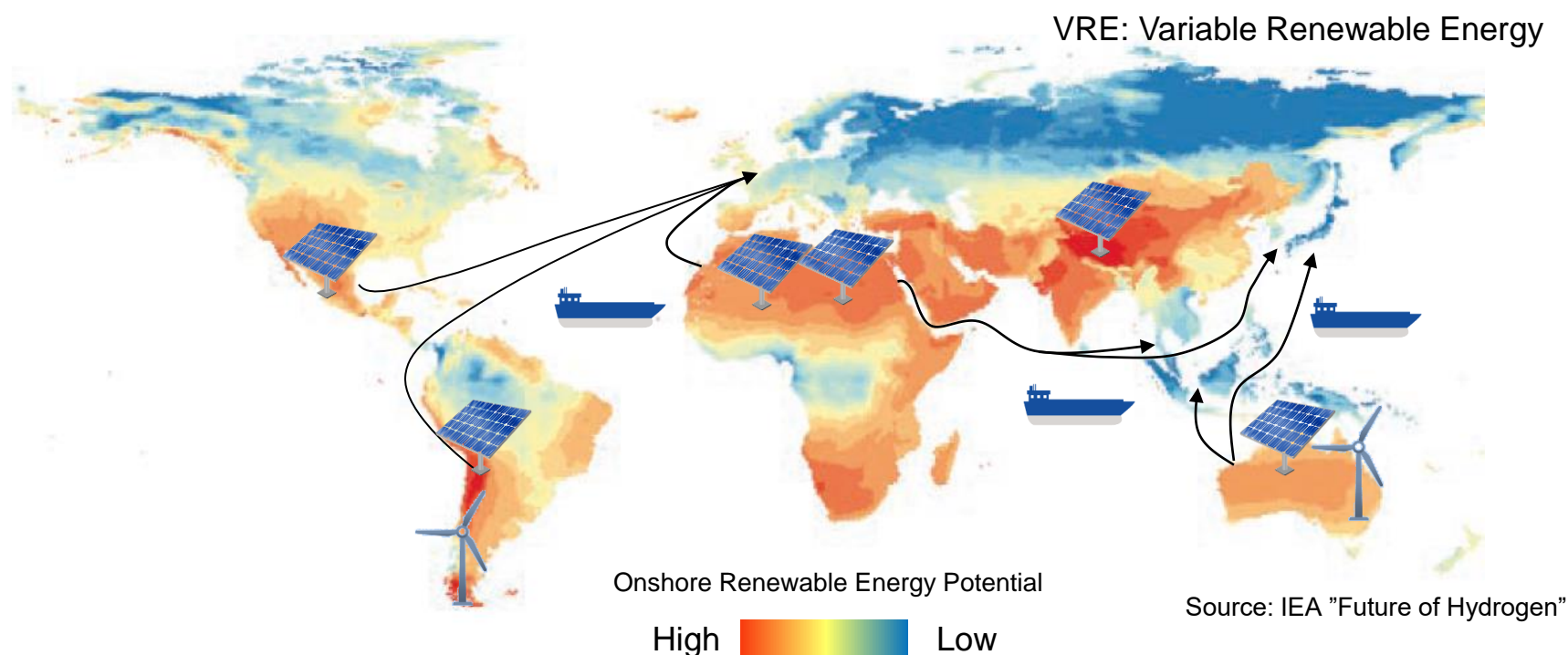


- Aircraft engines
- Rocket systems and space exploration
- Defense equipment and systems

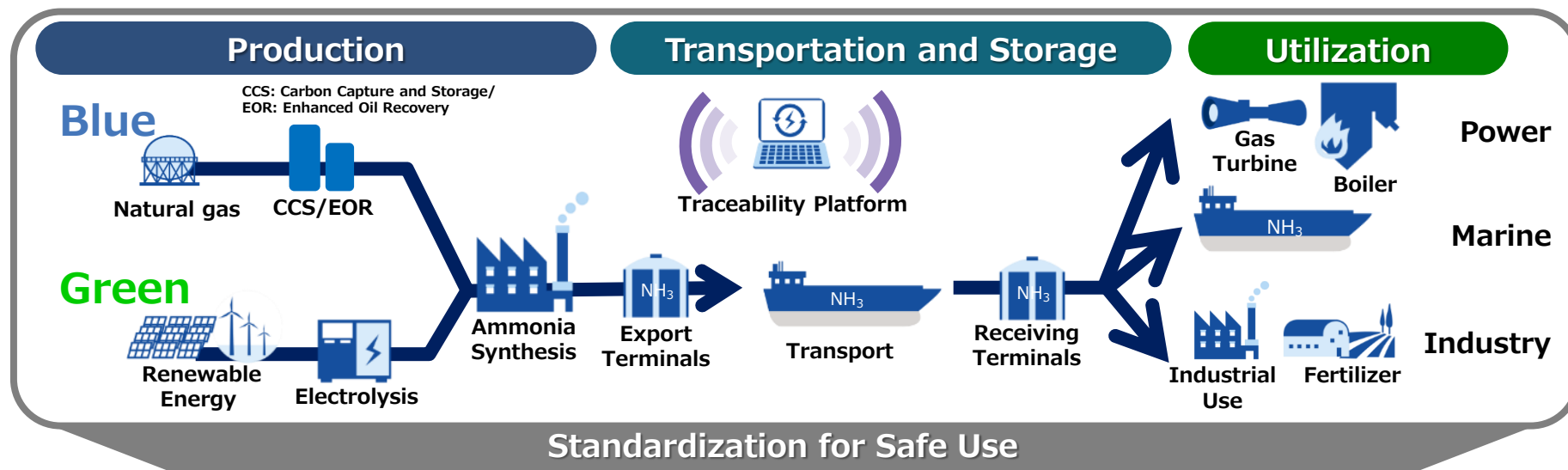
● GEEnx turbofan engine

## To utilize renewable energy worldwide

- Reducing the temporal and geographical mismatch between supply of VRE and demand.
- Decarbonized fuel is needed to transport renewable energy to the demand areas.
- IHI has been focusing on clean fuel ammonia as a hydrogen carrier and direct use in utilization.



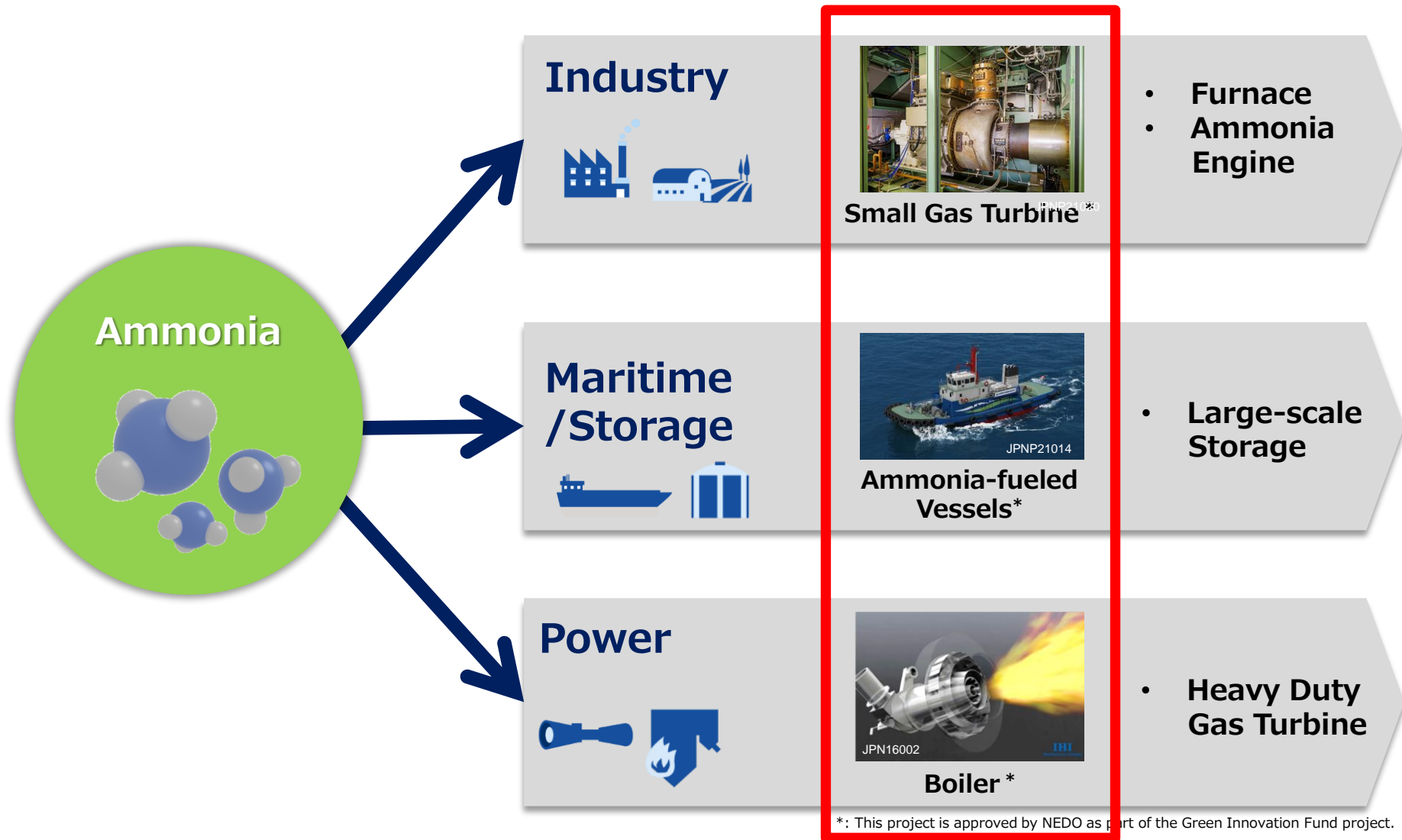
# Building Clean Fuel Ammonia Value Chain



IHI's wide range of **development activities to build an ammonia value chain include –**

- ① Ammonia Production; NH<sub>3</sub> Direct Synthesis
- ② Transportation and Storage; Large Capacity Tanks
- ③ Utilization; Boilers, GTs, Reciprocating Engines, Package Boilers, Industrial Furnaces
- ④ Standardization for Safe Use

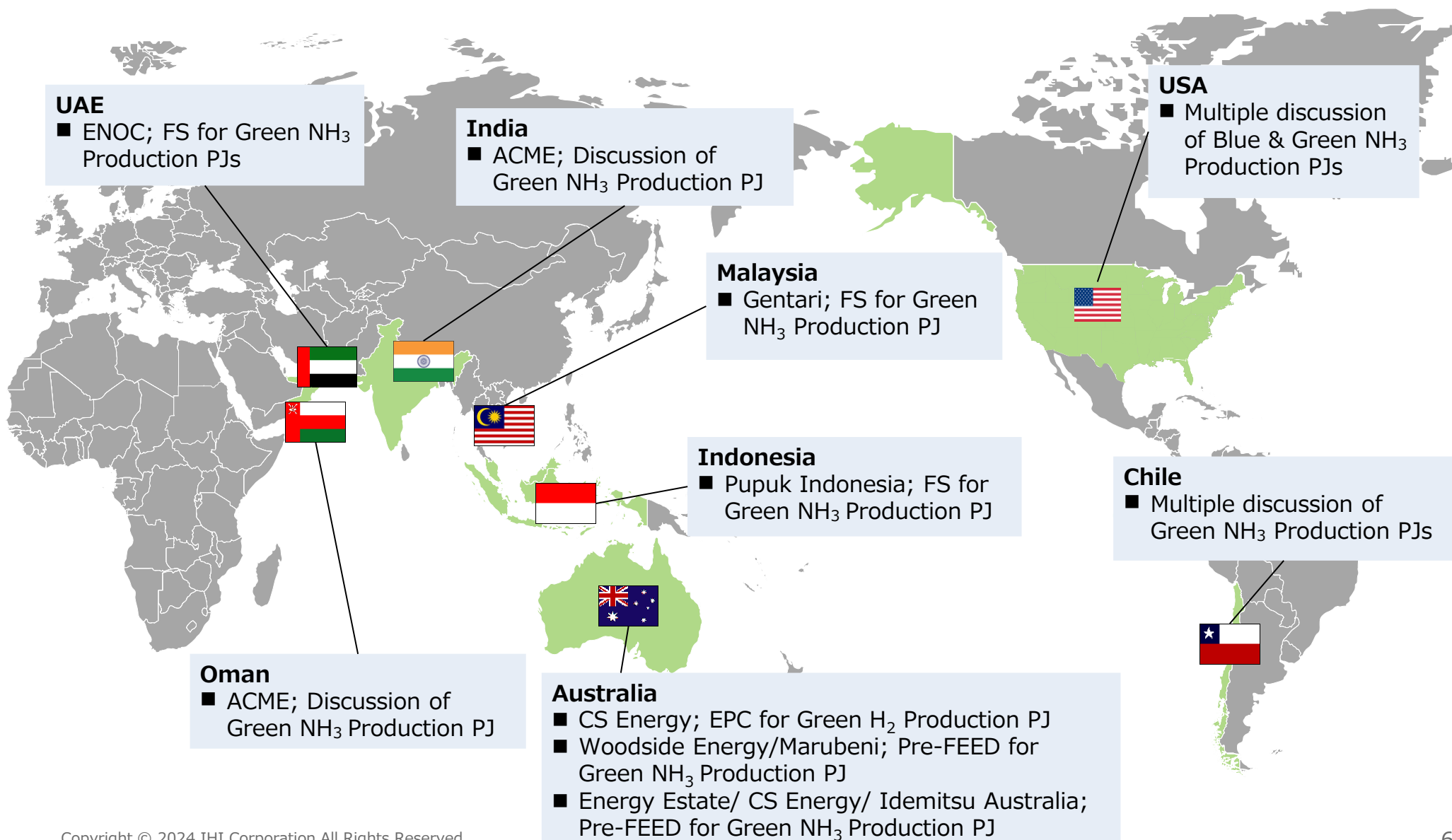
# Our Ammonia Utilization Technologies are around the corner



**Implementation DEMO will be started in 2024**

# Green Ammonia Production Projects

IHI is exploring the investment opportunity for Green Ammonia Production Projects.



# Green Ammonia Production and Sales Project in India

## IHI and ACME Signed Term Sheet to Supply Green Ammonia from India to Japan

- Jan 23, 2024 - **Press Release**

IHI and ACME Group, a leading renewable energy company in India, today signed a term sheet for the supply of green ammonia from Odisha, India to Japan. The term sheet was signed by Hiroshi Ide, President and CEO of IHI, Shri Manoj Upadhyay, Founder and Chairman of Acme Group in the presence of Union Minister for Power and New & Renewable Energy Shri RK Singh, New & Renewable Energy Secretary Shri Bhupinder Singh Bhalla, and Ambassador of Japan to India Hiroshi Suzuki. Both companies intend to develop the term sheet into a legally binding document within this year.

Under this term sheet, IHI considers off-taking up to 400,000 tons of green ammonia from 2028, which will be supplied to various industrial customers located mainly in Japan. Both companies are in discussion to partner across the value chain, starting from production to logistics, supply to customers and creation of the green ammonia market for use in a range of applications in power generation and industrial uses in Japan to reduce overall emissions across the value chain.

[https://www.ihico.jp/en/all\\_news/2023/resources\\_energy\\_environment/1200584\\_3523.html](https://www.ihico.jp/en/all_news/2023/resources_energy_environment/1200584_3523.html)





# Green Ammonia Production & Sales Project in Dubai/UAE

**IHI**

## IHI and ENOC Group Agree to Undertake Detailed Commercial and Technical Assessment for Dubai's First Green Ammonia Production and Sales Project

-December 6, 2023-

Press Release

IHI announced today that it has launched a detailed commercial and technical assessment for producing and selling green ammonia derived from renewable energy sources in Dubai and elsewhere in the United Arab Emirates. The goal is to tap abundant local solar energy resources. This initiative is pursuant to a business feasibility study that IHI conducted in November 2022 with Emirates National Oil Company (ENOC), a Dubai-based integrated global oil and gas player.

Under this study, the two companies prioritized identifying issues and formulating measures to undertake competitive green ammonia production. Having confirmed that potential, they agreed to embark on a study that would comprehensively evaluate technical aspects.

[https://www.ihj.co.jp/en/all\\_news/2023/resources\\_energy\\_environment/1200460\\_3523.html](https://www.ihj.co.jp/en/all_news/2023/resources_energy_environment/1200460_3523.html)



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**IHI**

Realize your dreams

# Ammonia Terminal Development & Operation

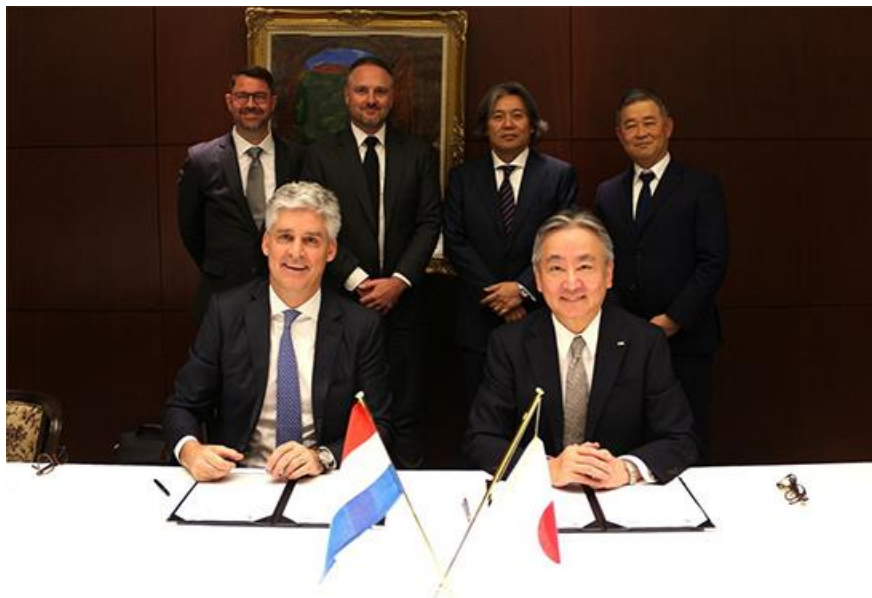
## IHI and Vopak sign MOU for joint study on low-carbon ammonia terminal development and operation

-November 21, 2023-

Press Release

IHI Corporation (IHI) and Royal Vopak (Vopak) have signed a Memorandum of Understanding (MOU) to jointly explore the development and operation of efficient, high value-added ammonia terminals in Japan. IHI and Vopak will furthermore assess a collaboration outside of Japan.

The collaboration focusses on large-scale ammonia storage terminals, strategically positioned for the economical distribution of ammonia. Ammonia plays an important role as a fuel for reducing carbon emissions from thermal power generation and as a hydrogen carrier, both in Japan and abroad. In addition, the study will examine the possibility of streamlining the operation of ammonia terminals to enhance price competitiveness, as well as the conversion and supply of various hydrogen derivatives.



[https://www.ihico.jp/en/all\\_news/2023/resources\\_energy\\_environment/1200429\\_3523.html](https://www.ihico.jp/en/all_news/2023/resources_energy_environment/1200429_3523.html)

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