

# Development of blue ammonia production system from associated gas on offshore platforms

Nippon Foundation – Deepstar Joint  
Ocean Innovation R&D Program

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## Background

Associated gas at offshore oil production sites has created a bottleneck in plans to increase oil production because of the challenges in terms of environmental impact when flared and the limited capacity of transportation pipelines.

## Solution

Blue Ammonia production at offshore to monetize the associated natural gas

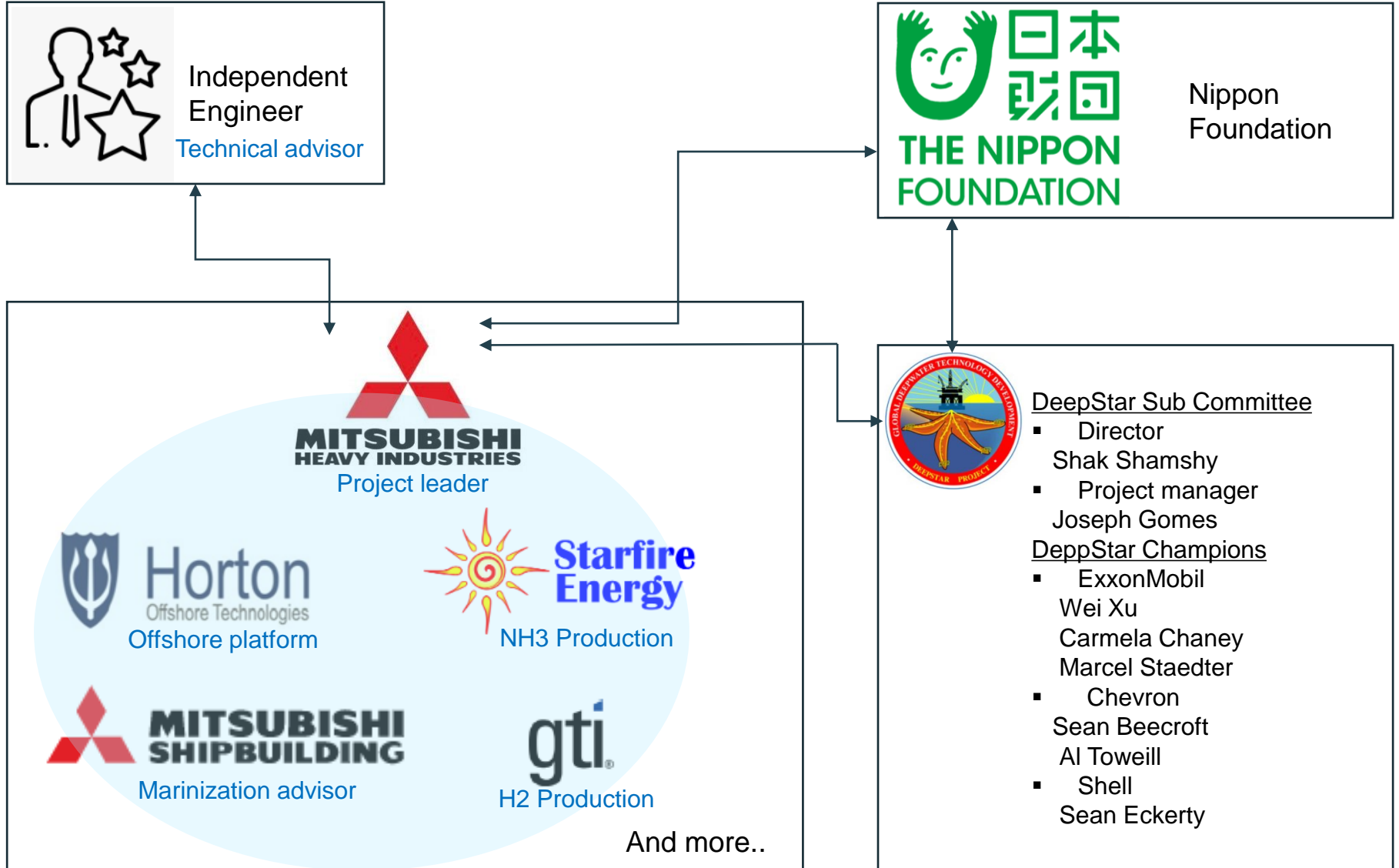
## Benefit

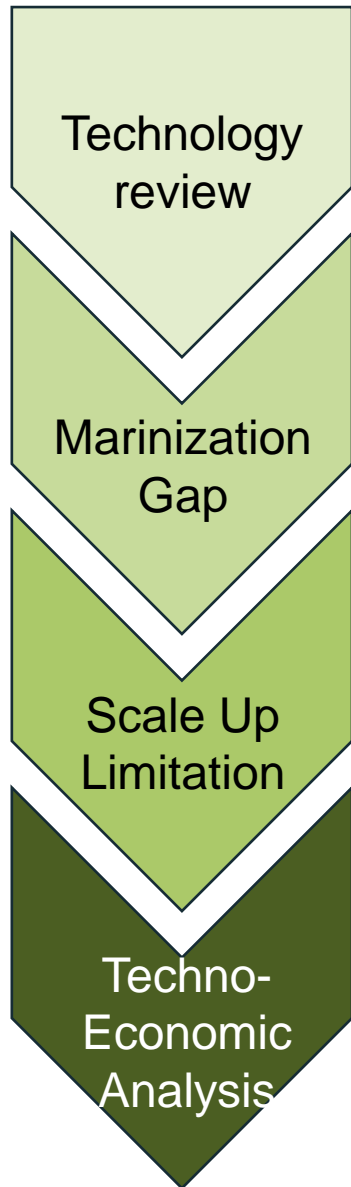
- Blue Ammonia is a valuable low carbon avenue with an existing shipping infrastructure.
- Reduce GHG emissions without flaring associated gas and mitigate pipeline capacity tightness

## Goal of Study

- Develop an offshore blue ammonia production system by combining the components of a floating structure, small size ammonia production, and CO2 capture and separation for utilization of associated gas
- Evaluate its technical and economical feasibility

# Organization chart

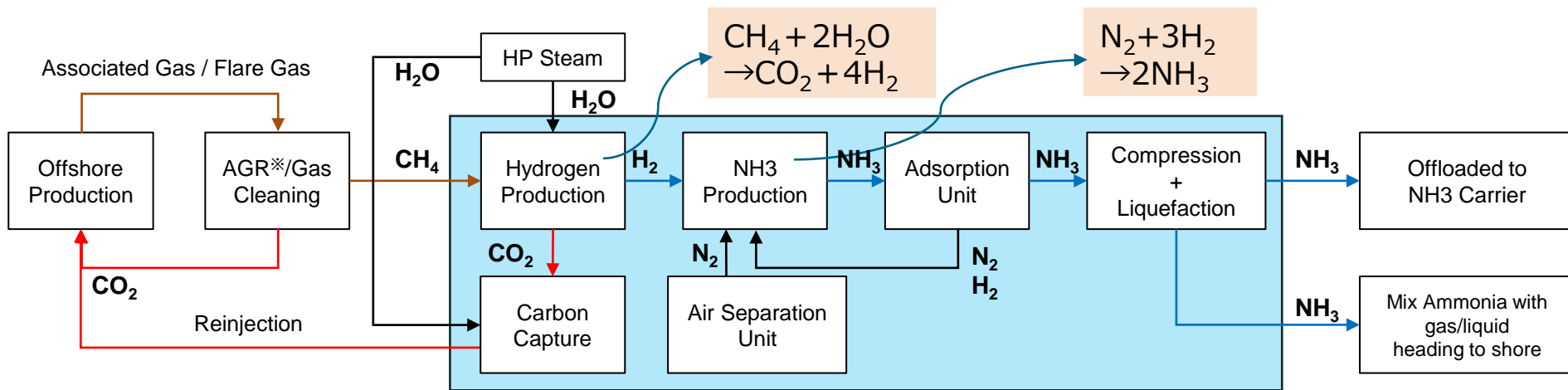




- Research on **small-scale** ammonia production, hydrogen production and other technologies.
- Scaling of facility based on the **amount of offshore associated gas**.
- Study on **the impact of wave-induced shaking** including acceleration, angle and oscillation period to **clarify design requirements for components**.
- Identify areas where **developments** are required for offshore ammonia production.
- Investigate the feasibility of scaling up by multi-trains of facilities and summarize technical issues.
- Technical **review of structure and layout** in offshore deployment.
- Overall summary of technical and **economic feasibility based on outlined OPEX and CAPEX**, summarize the challenges for realizing offshore ammonia production.

# Technology review Overview

- Large-scale SMR, Carbon Capture and NH3 Production facilities on the land have already been commercialized, but some **small-scale facilities are still in the development stage and need to be reviewed for applicability** to this project.
- Identify the **range of capacities** of each technology which and determine the capacity of the base case facility based on **the requirement from the throughput of offshore associated gas.**

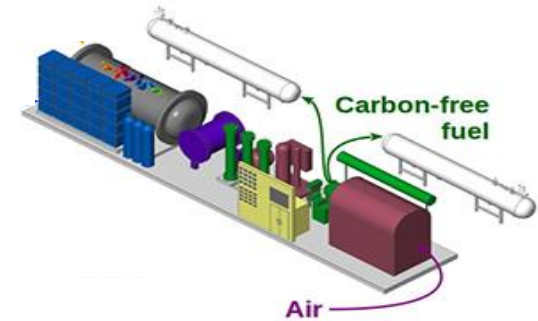


※ AGR : Acid Gas Removal

# Throughput target of this study

## Industrial ammonia production technology

2,000 TPD - 6,000TPD of Ammonia Production  
→ requires 50 mmscfd – 160 mmscfd of CH<sub>4</sub>



## Small size ammonia production technology

50 TPD - of Ammonia Production → requires 1.4 mmscfd – of CH<sub>4</sub>

## Offshore associated gas Volume

Having large variability by oil field location  
→ 10 mmscfd - 500 mmscfd

## Throughput target of this study

Set **10 mmscfd Natural gas** which is a typical amount of Gulf of Mexico as a base case and consider the multi-train of the base case for scale-up.

→ Base case would be approx. 350TPD ammonia production in the meantime, 520ton/d CO<sub>2</sub> would be produced.



Image of base case of 1train

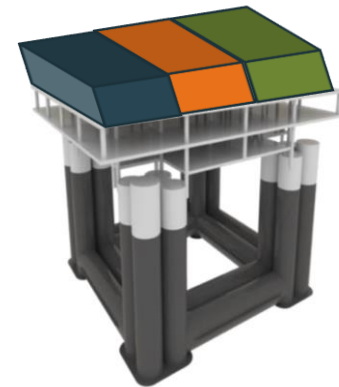
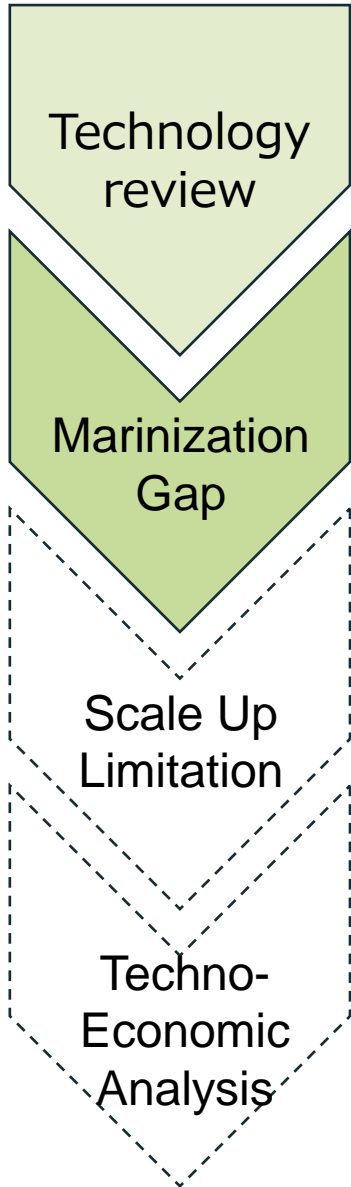


Image of multi-train plant



- Researched and contacted 10+ Company who has small-scale ammonia production, SMR, and other technologies. Done
- Fixed the throughput of the plant and based on it, now developing a combination of technologies. Done
- Also now investigating the impact of wave-induced shaking including acceleration, angle and oscillation period to clarify design requirements for components. On going
- Identify areas where developments are required for offshore ammonia production.
- Investigate the feasibility of scaling up by multi-trains of facilities and summarize technical issues.
- Technical **review of structure and layout** in offshore deployment.
- Overall summary of technical and **economic feasibility based on outlined OPEX and CAPEX**, summarize the challenges and roadmap for realizing offshore ammonia production.

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