

MALAYSIA-JAPAN ENVIRONMENT WEEK 2025

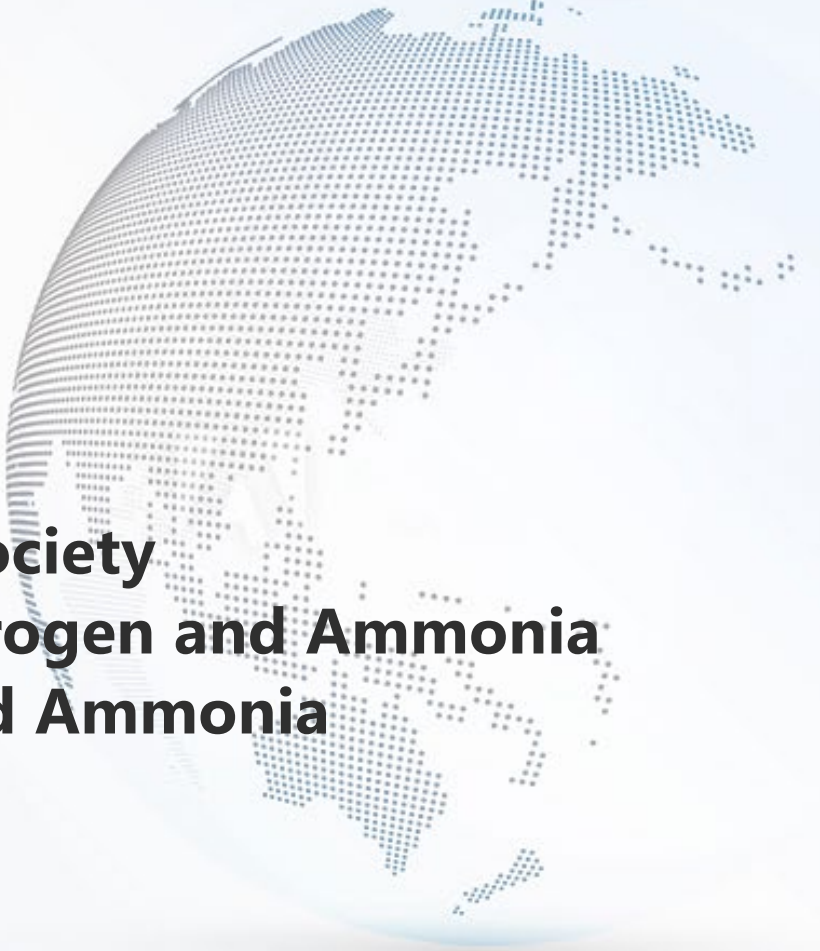
Technology Development for Green Hydrogen Society

Enhancing **planetary health**

Oct 15, 2025

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A stylized globe is positioned on the right side of the slide. It is composed of a grid of small, light blue dots that form the continents and oceans, giving it a digital or pixelated appearance. The globe is slightly tilted and has a soft shadow beneath it.

Technology Development for Green Hydrogen Society

- (a) Challenges in Production of Clean Hydrogen and Ammonia**
- (b) JGC's Activities for Clean Hydrogen and Ammonia**

JGC HOLDINGS CORPORATION



Established

1928

October 25



Total Group
Manpower

Approx. **8,365**

(As of March 31, 2025)



Capital

¥23,886 million

(As of March 31, 2025)



Shares issued
and outstanding

259,618,792

(As of March 31, 2025)



Our Business

EPC Business

EPC business(engineering, procurement, construction) and maintenance business for various plants and facilities.

Functional Materials Manufacturing

Production and sales of various catalysts, Fine Chemical products and Fine Ceramic products.

Purpose

Enhancing planetary health

Factors behind the Establishment of the 2040 Vision

Coping with the dramatically changing business environment

Materializing a long-term growth that grasps social changes

A Corporate Group that contributes to enhancing Planetary Health via the following 5 business fields

Energy Transformation

Healthcare/ Life Science

Functional Material

Circular Economy

Industrial/ Urban Infrastructure



The 3 transformations

contributing to the materialization of the 2040 Vision

Business Fields

Oil & Gas focused

Business field expansion that copes with energy transformation

Business Model

EPC Model, Manufacturing Model

Deepening the EPC business model and diversification of non-EPC business models

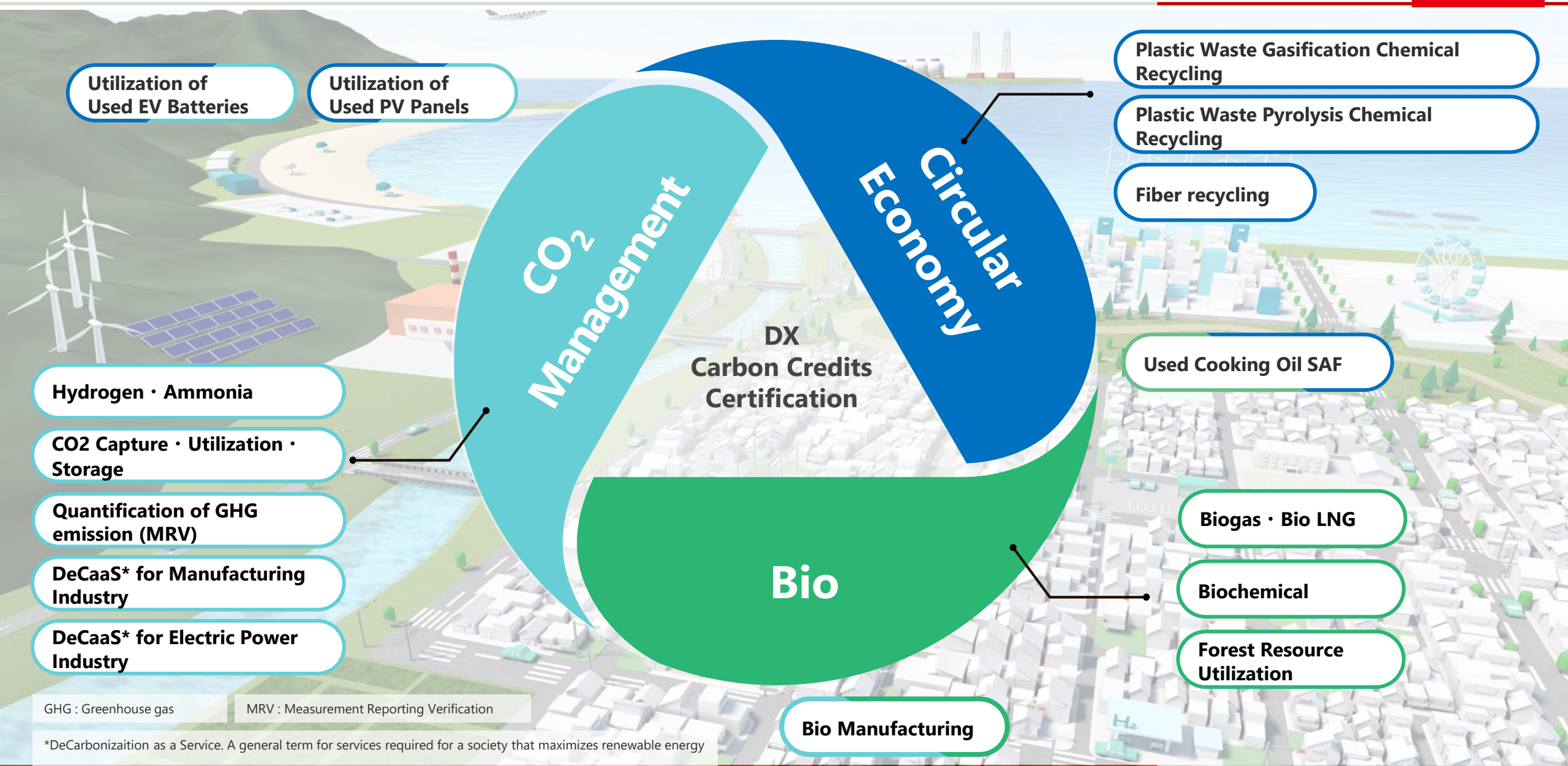
Organization

Management in Japan • Execution organizations catered for large-scaled EPC projects

Regional management structure and strengthening of an environment encouraging innovation

Carbon Neutral in 2050

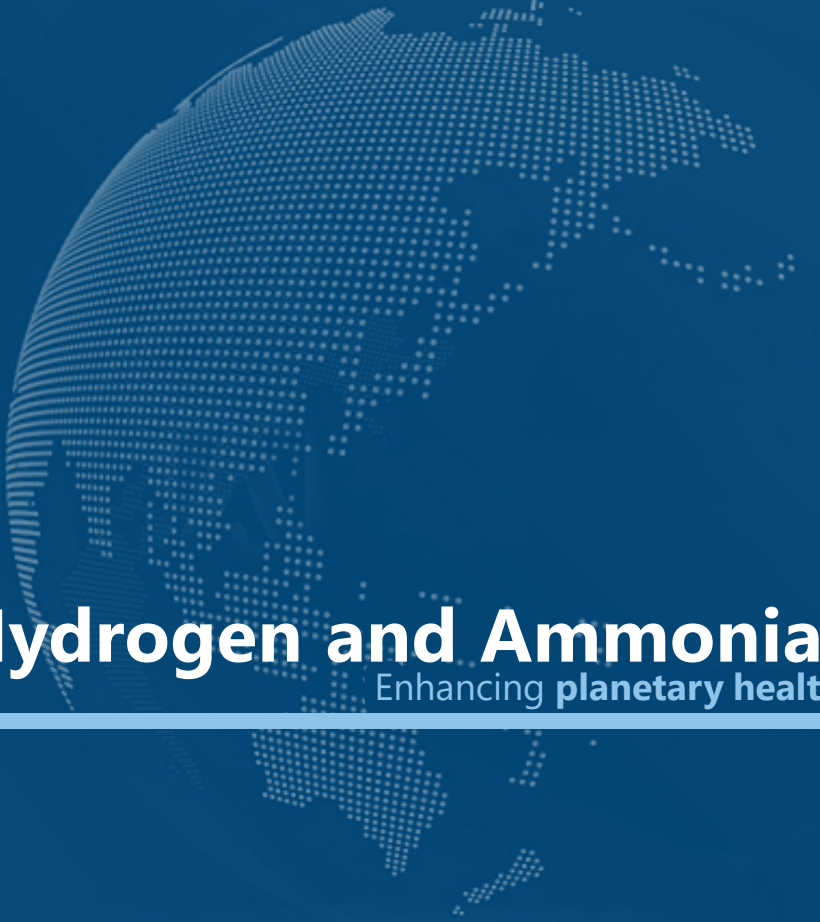
Focused Areas



GHG : Greenhouse gas

MRV : Measurement Reporting Verification

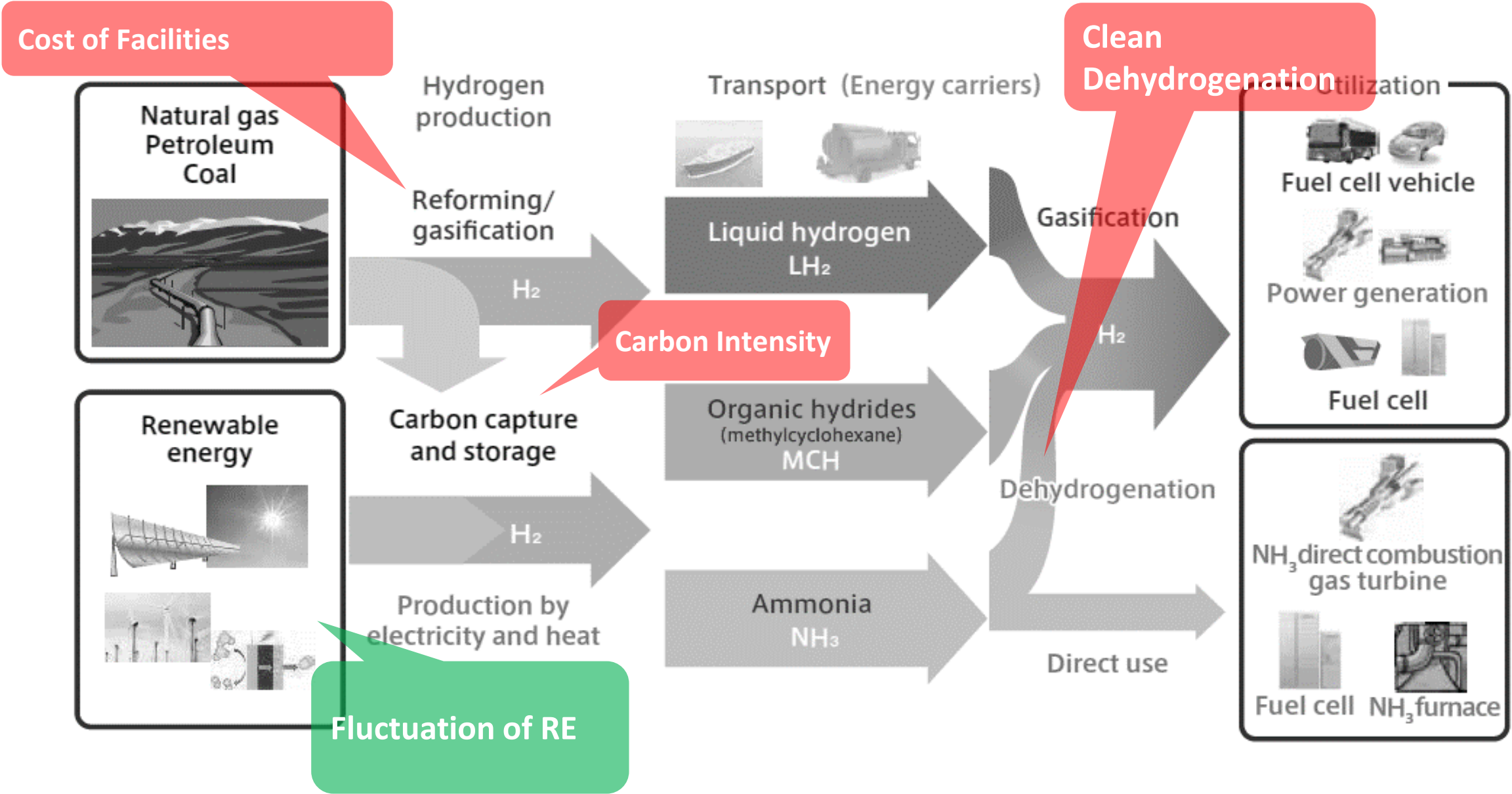
*DeCarbonization as a Service. A general term for services required for a society that maximizes renewable energy



(a) Challenges in Production of Clean Hydrogen and Ammonia

Enhancing planetary health

(a) Challenges in Production of Clean Hydrogen & Ammonia





(b) JGC's Activities for Clean Hydrogen and Ammonia

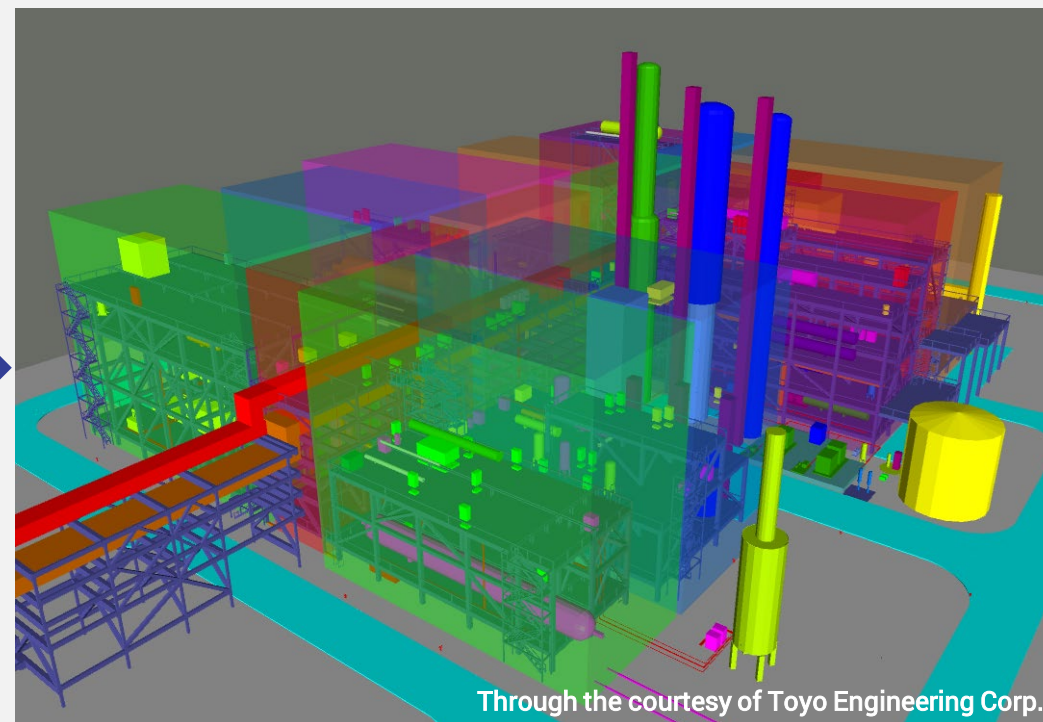
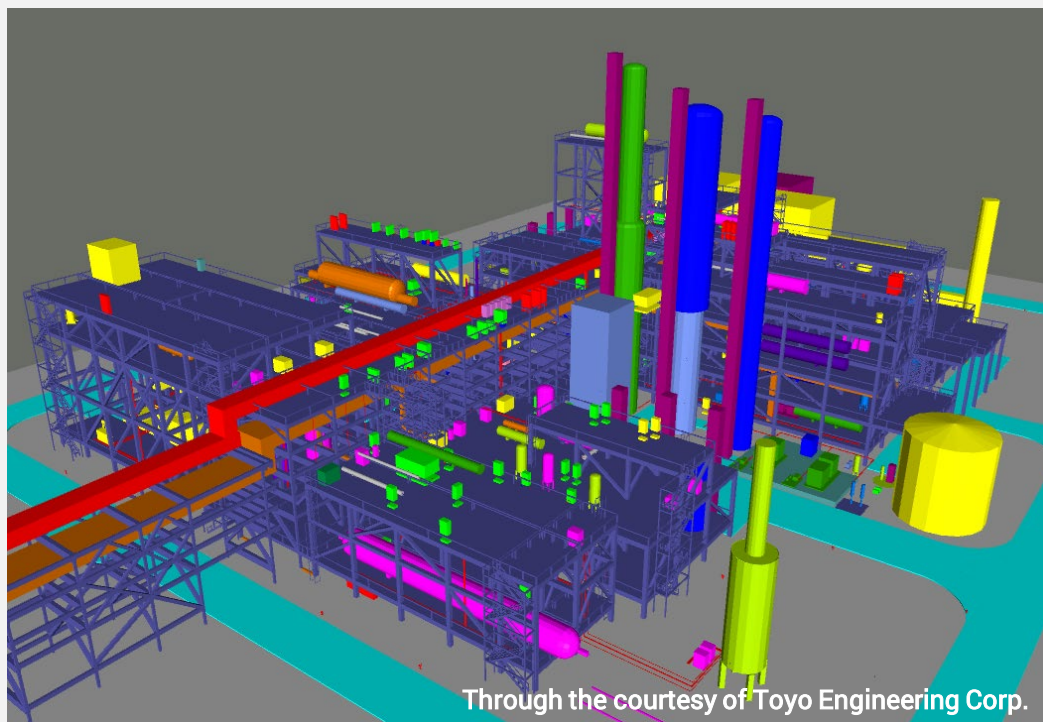
Enhancing **planetary health**

- (1) Cost reduction of Clean H₂**
- (2) Carbon Intensity**
- (3) Clean Dehydrogenation**
- (4) Fluctuation of Renewable Energy**

(1a) Cost Reduction of Blue Hydrogen

- Developed 3D model & BOQ for **3,000MTPD modularization**

3,000MTPD-NH₃ module



- Evaluated design of 6,000 MTPD NH₃ plant, and ready for FEED

(1b) Cost Reduction of Green Hydrogen

Outline



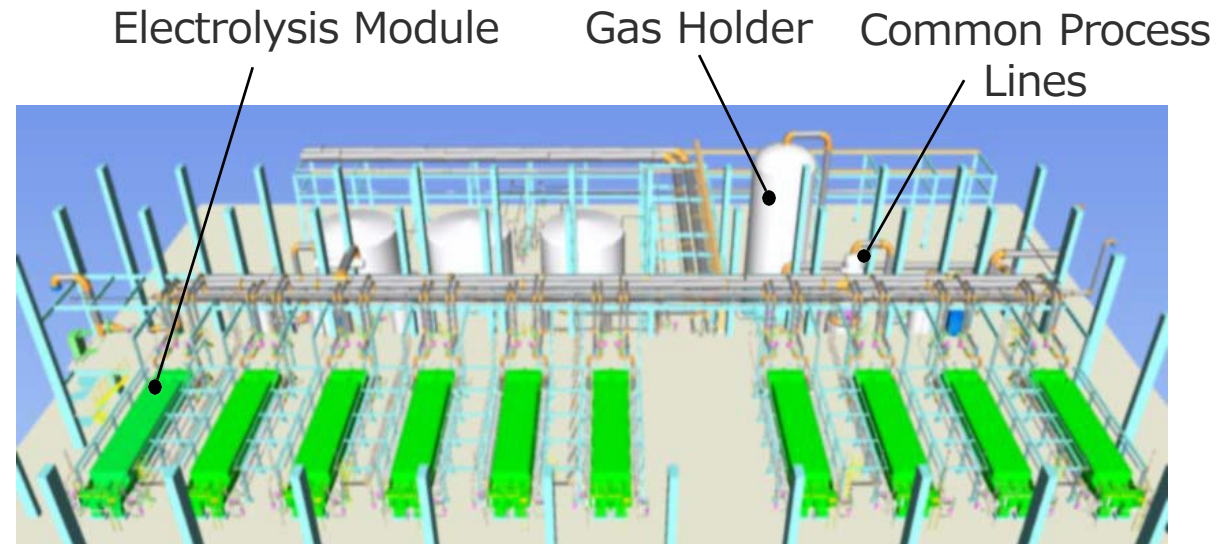
AsahiKASEI



- Asahi Kasei intends to develop a **100MW class Alkaline Water Electrolysis System** and commercialize them at a **lower cost with high reliability** by 2030
- JGC will support Asahi Kasei in cost reduction of 100MW AWE System



10MW Alkaline Water Electrolysis
Fukushima, FH2R



100MW Alkaline Water Electrolysis System Concept

(1b) Cost Reduction of Green Hydrogen

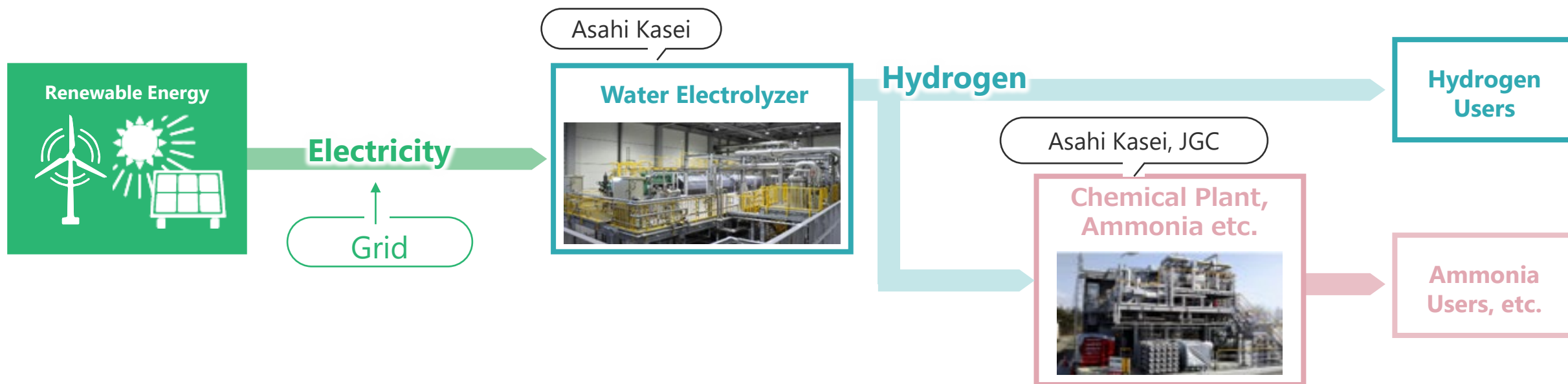
Outline



AsahiKASEI



- JGC and Asahi Kasei have been selected and started “**Large-scale Alkaline Water Electrolysis System Development and Green Chemical Plant Demonstration**” under “Green Innovation Fund” by NEDO *
- Planning to start Demonstration operation at semi-commercial scale from **FY2025**



* NEDO (New Energy and Industrial Technology Development Organization) ,<https://www.jgc.com/jp/news/assets/pdf/20210826j.pdf>

(2) Carbon Intensity of Blue Hydrogen

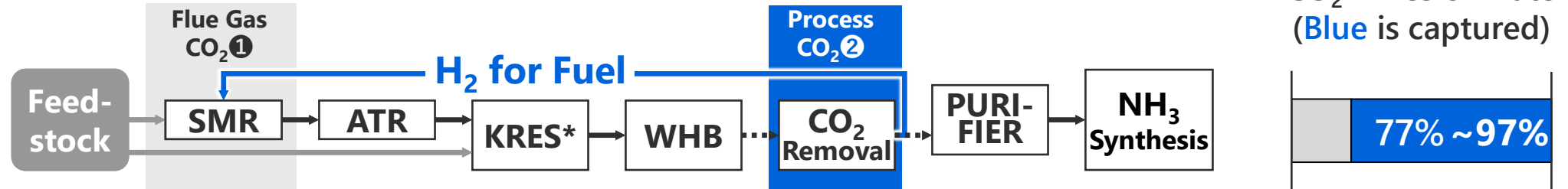
- KBR/AAJ can propose various range and options against CO₂ recovery requirement

Propose Optimum CO₂ Recovery Percent in the range of 77% to 99%

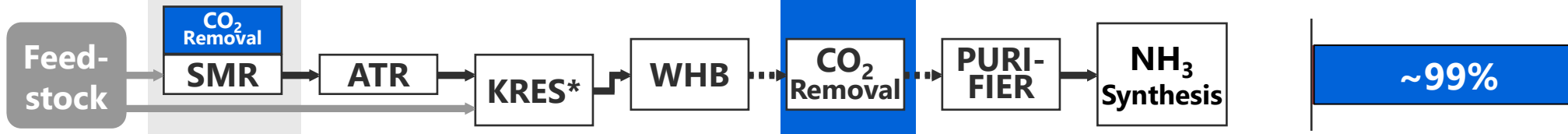
- (1) with proven and efficient **SMR + Air-ATR (KBR PurifierPlus™ Process)**
- (2) with options of CO₂ recovery percent increase

“**①H₂ Recycle for Fuel**” or “**②PCCU (Post Combustion Capture Unit)**”

① H2 Recycle for Fuel



② PCCU (Post Combustion Capture Unit)



* KRES : KBR Reforming Exchanger System

(3) Clean Dehydrogenation (Ammonia Cracking Technology)

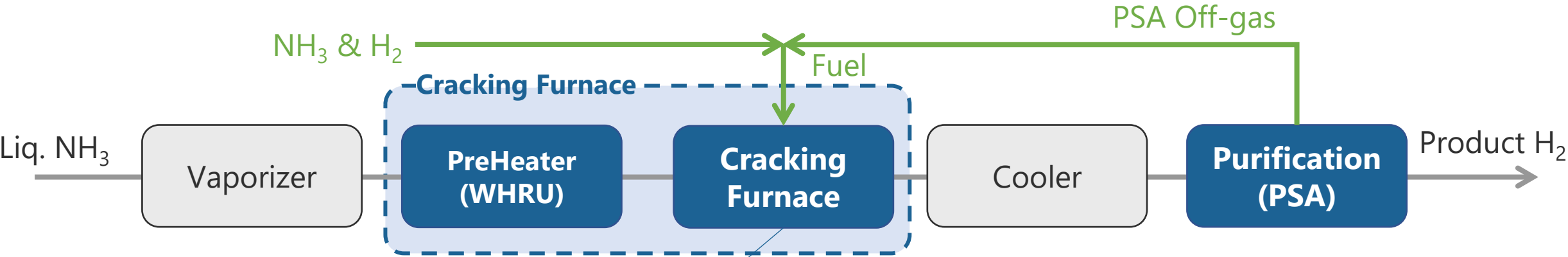
"Research and Development of Large-scale Ammonia Cracking Technology for Low-carbon Hydrogen Production by Tubular Ammonia Cracking Furnace"



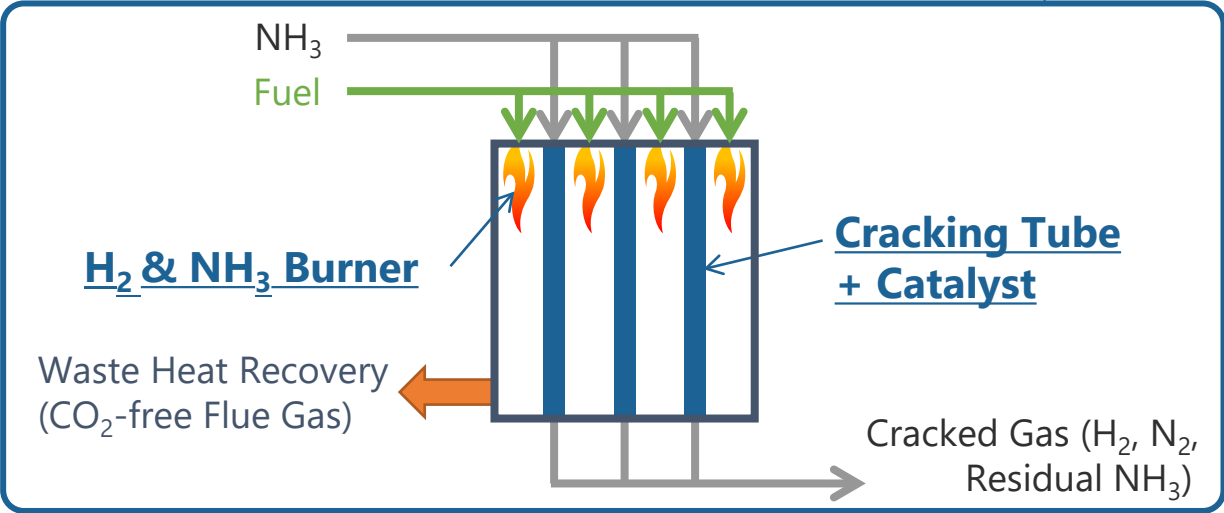
<https://www.jgc.com/en/news/assets/pdf/20230706e.pdf>

◆ Block Flow Diagram for Fired Tubular Ammonia Cracking and Hydrogen Production

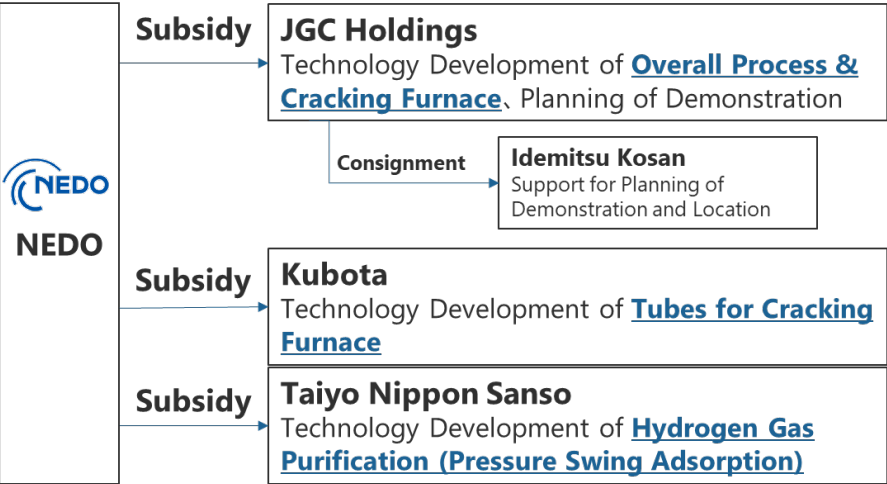
... large-scale, high-efficient, and zero-emission cracking system



◆ Concept of Cracking Furnace



◆ Organization

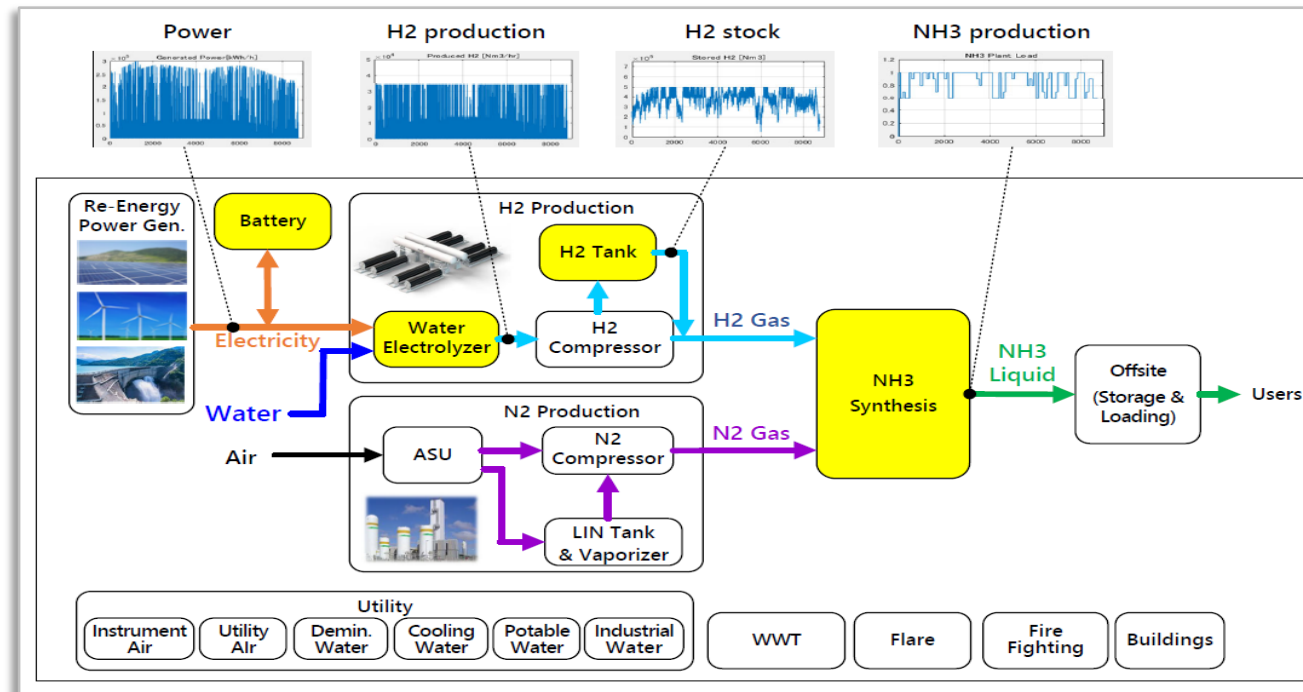


NEDO: New Energy and Industrial Technology Development Organization

(4a) Green Ammonia Plant Automated Optimizer (GAPAO™)

Outline

- ✓ Several buffers are needed to absorb fluctuation of renewable energy.
- ✓ The buffers should be optimized so that levelized cost of hydrogen derivatives (e.g. ammonia) is at minimum.
- ✓ JGC's software "GAPAO" will strongly assist finding optimum design point in a short time.

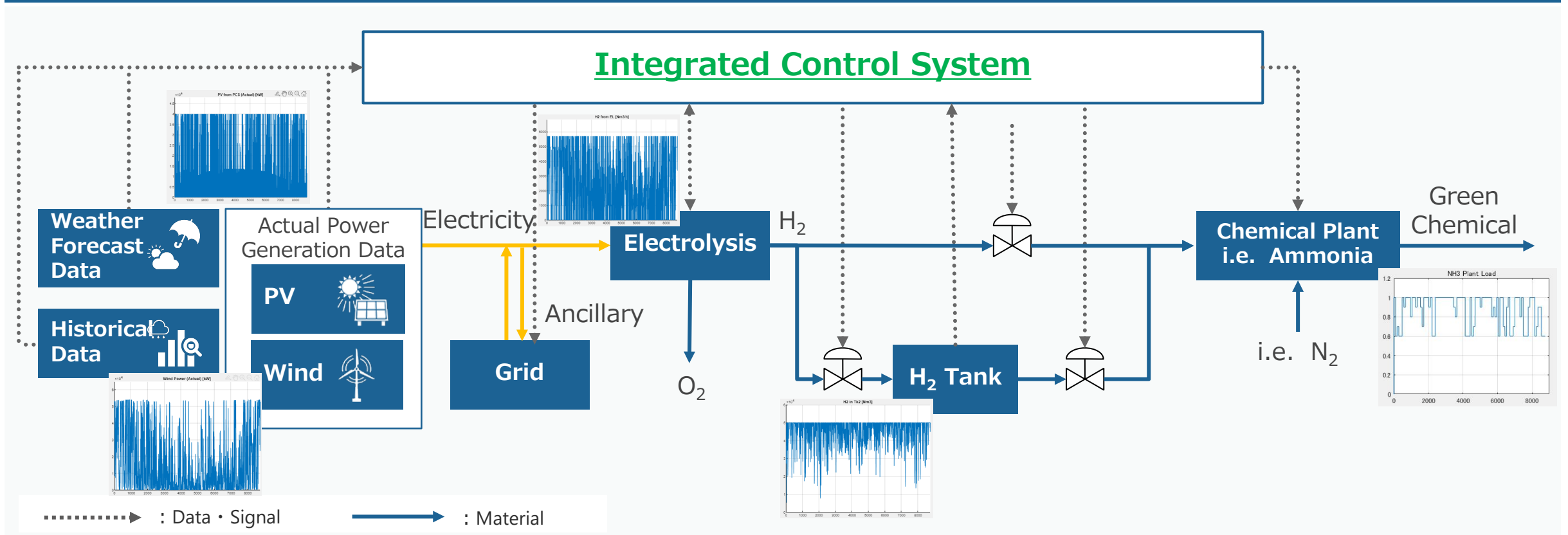


Typical configuration of green ammonia production plant

(4b) Plant Operation Control System: "Integrated Control System"

Outline

In Green Chemical Process, such as Ammonia, fed with Hydrogen derived from Fluctuating Renewable Energy, "**Integrated Control System**" which manage hydrogen supply and realize optimized operation will be developed and demonstrated.



(4b) Plant Operation Control System: “Integrated Control System”

Namie Green Ammonia Integrated Control System Demonstration Field

- Namie, Fukushima, Japan
- 4TPD Ammonia Production Capacity
- To demonstrate variable operation with ICS.
- Operation starts in FY2025.
- Ammonia will be used by local users.

