

# **MALAYSIA-JAPAN ENVIRONMENT WEEK 2025**

## **Technology Development for Green Hydrogen Society**

Enhancing **planetary health**

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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 tilted slightly to the right.

## **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



1928

October 25



Approx. **8,365**  
(As of March 31, 2025)



**¥23,886** million  
(As of March 31, 2025)



**259,618,792**  
(As of March 31, 2025)

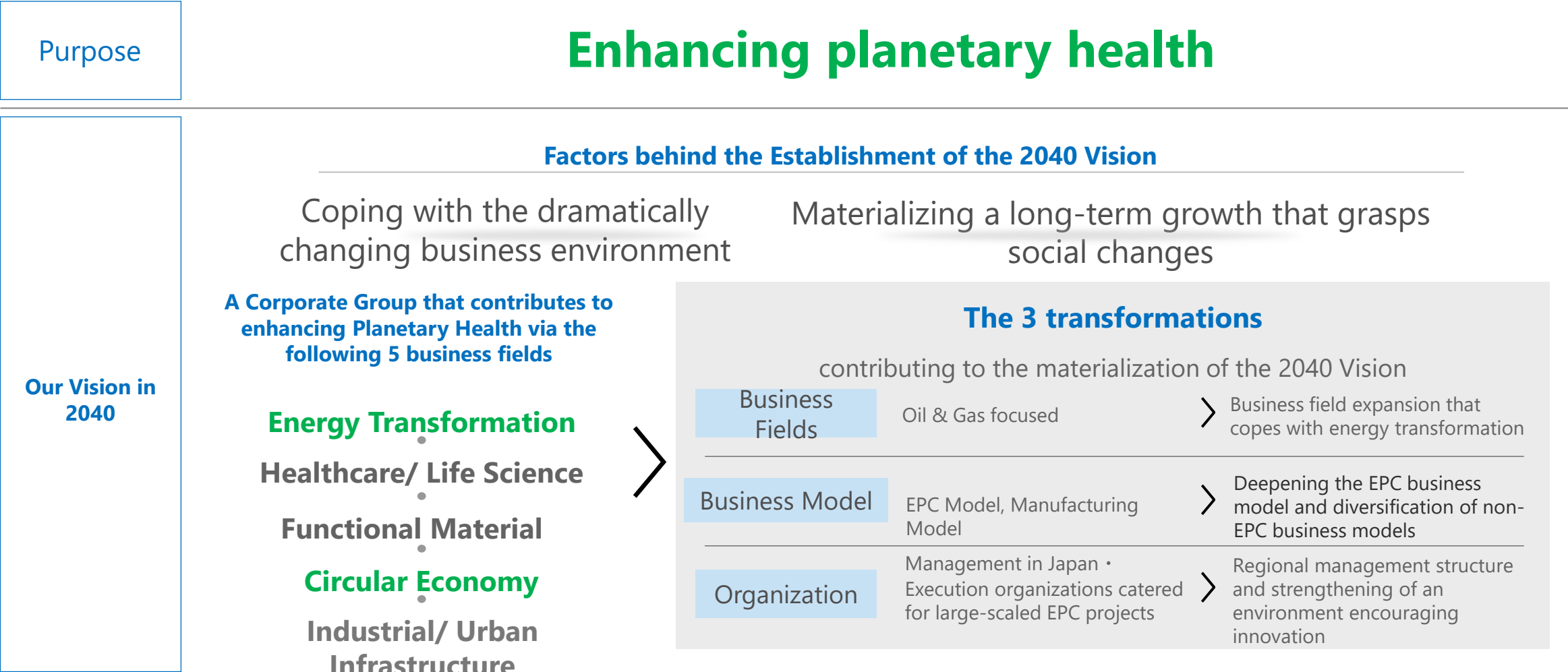


### EPC Business

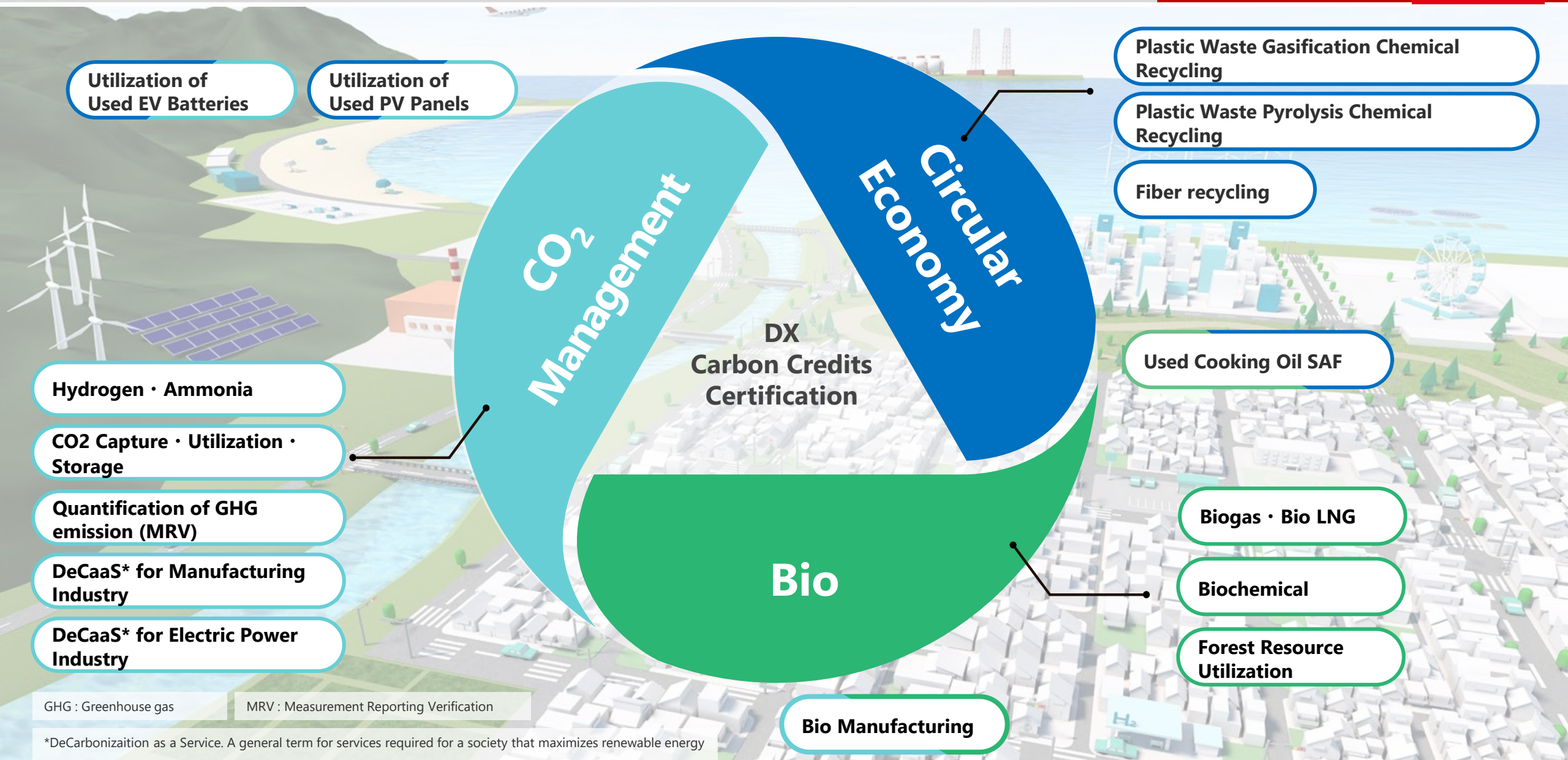
EPC business(engineering, procurement, construction) and maintenance business for various plants and facilities.

### Functional Materials Manufacturing

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



# Focused Areas





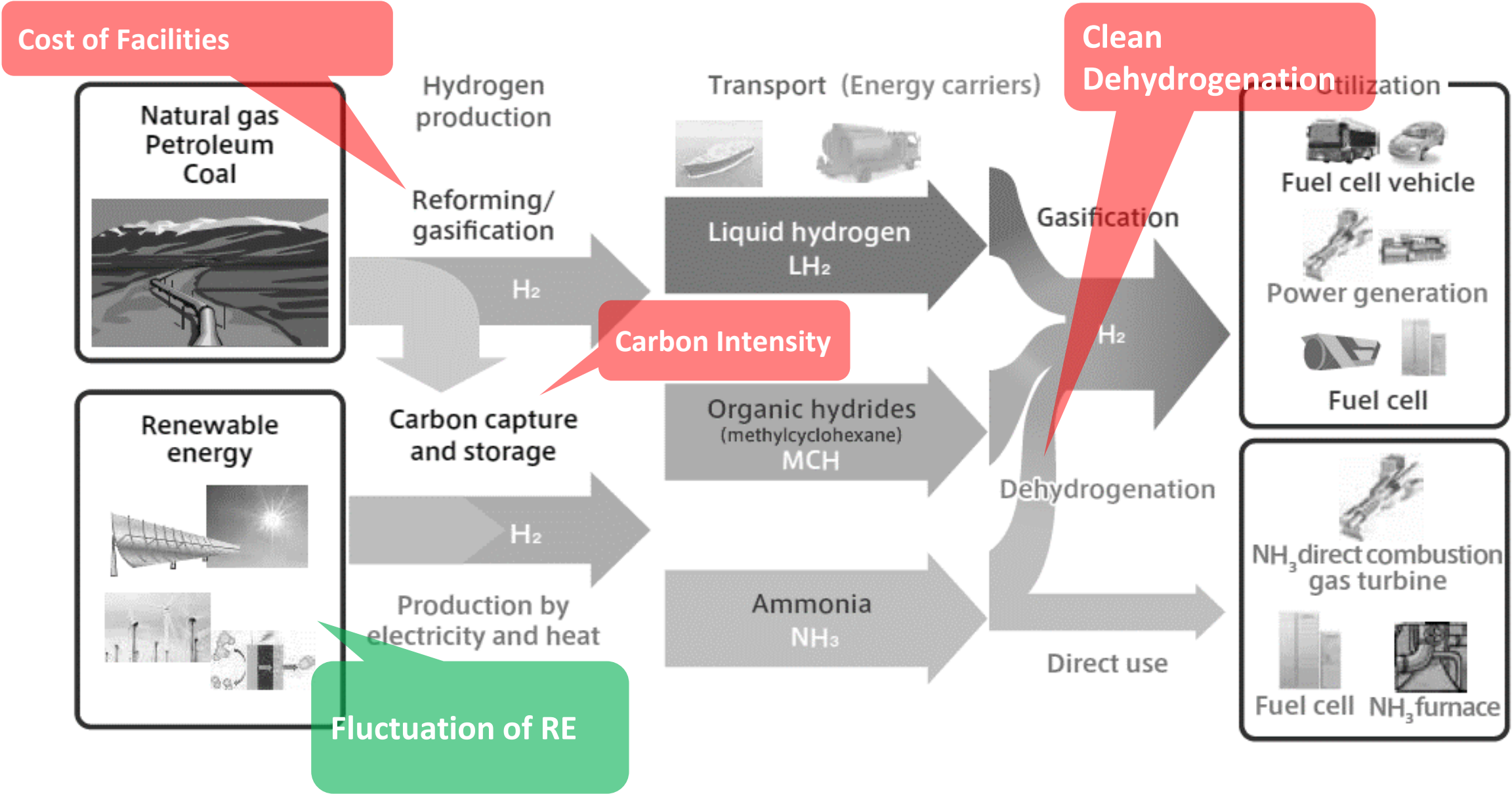


# (a) Challenges in Production of Clean Hydrogen and Ammonia

Enhancing planetary health

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# (a) Challenges in Production of Clean Hydrogen & Ammonia





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

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Enhancing **planetary health**

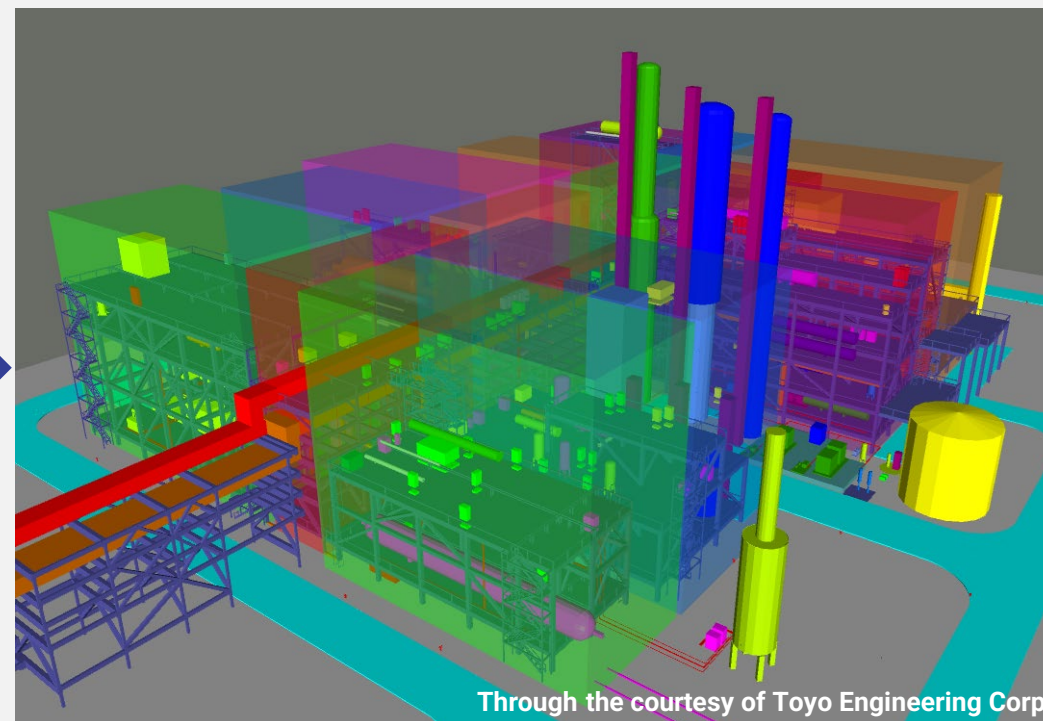
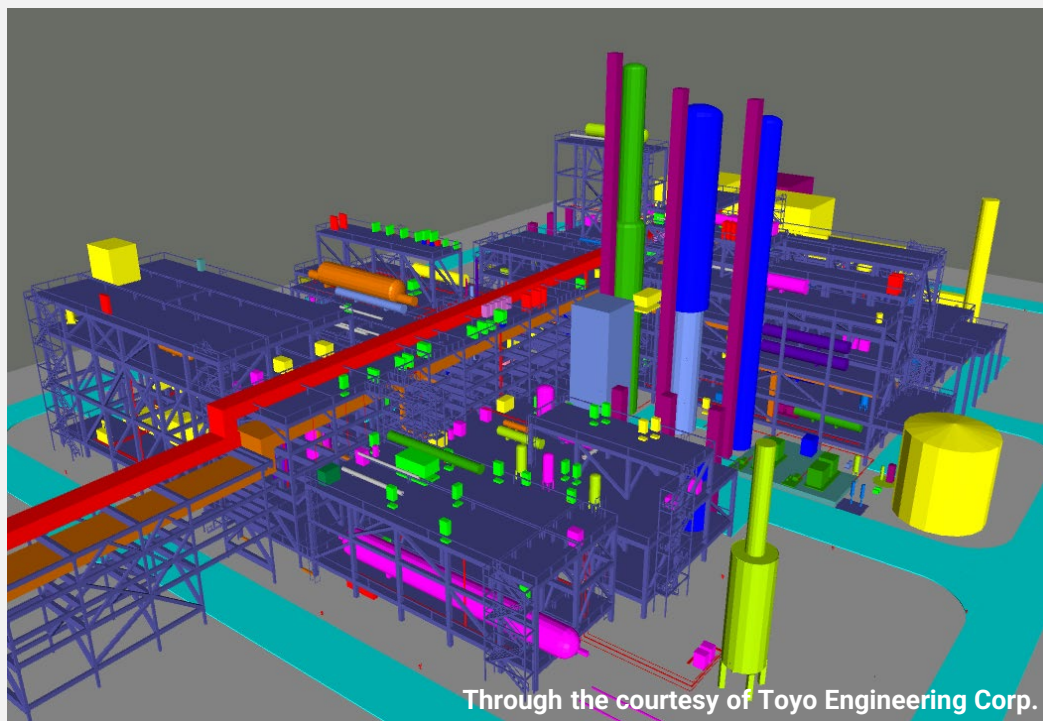
- (1) Cost reduction of Clean H<sub>2</sub>**
- (2) Carbon Intensity**
- (3) Clean Dehydrogenation**
- (4) Fluctuation of Renewable Energy**



# (1a) Cost Reduction of Blue Hydrogen

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

## 3,000MTPD-NH<sub>3</sub> module



- Evaluated design of 6,000 MTPD NH<sub>3</sub> plant, and ready for FEED

# (1b) Cost Reduction of Green Hydrogen

## Outline



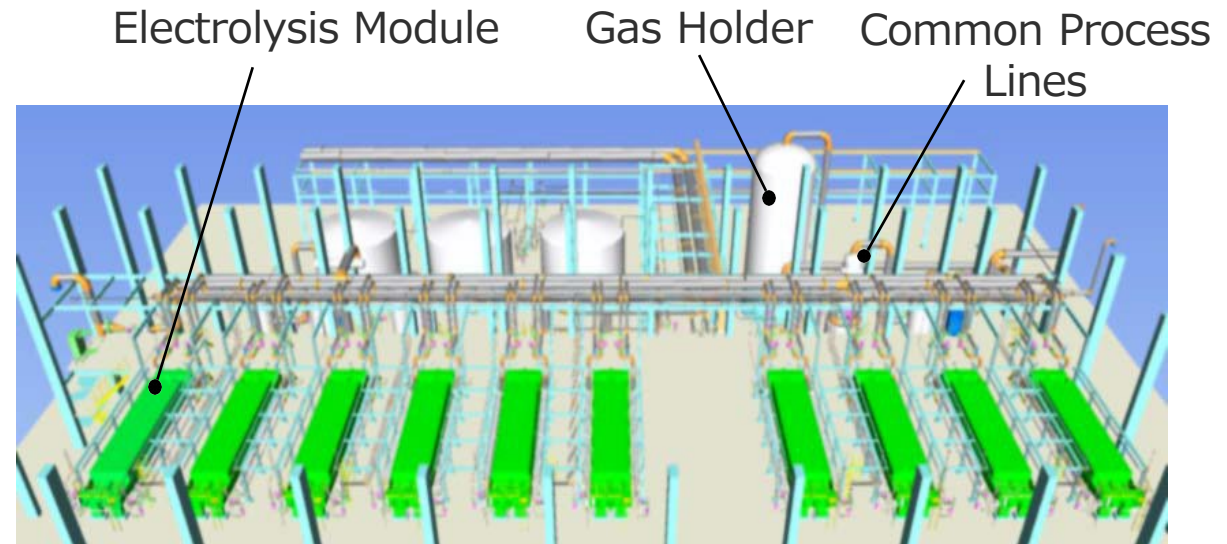
AsahiKASEI



- 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

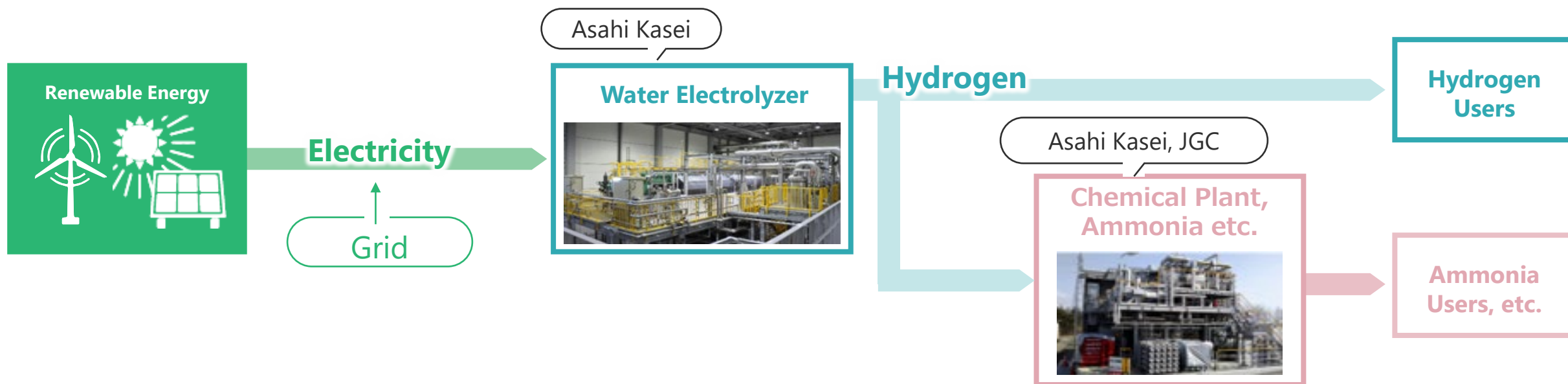
## Outline



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>

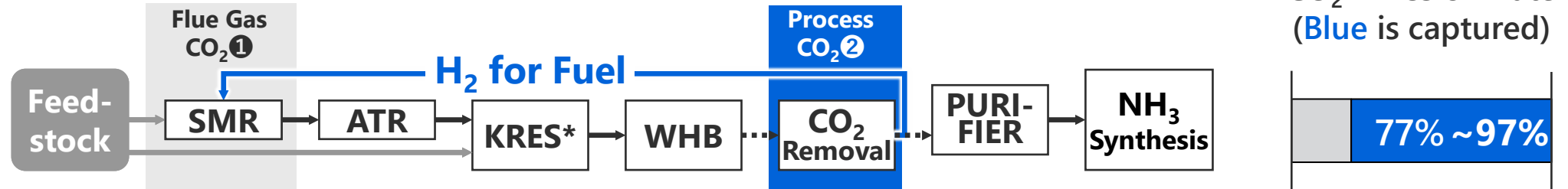
- KBR/AAJ can propose various range and options against CO<sub>2</sub> recovery requirement

### Propose Optimum CO<sub>2</sub> Recovery Percent in the range of 77% to 99%

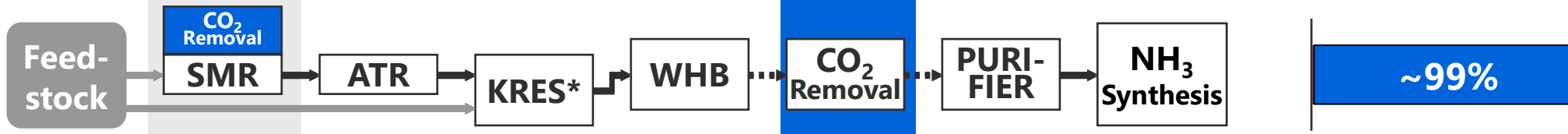
- (1) with proven and efficient **SMR + Air-ATR (KBR PurifierPlus™ Process)**
- (2) with options of CO<sub>2</sub> recovery percent increase

“**①H<sub>2</sub> Recycle for Fuel**” or “**②PCCU (Post Combustion Capture Unit)**”

#### ① H<sub>2</sub> Recycle for Fuel



#### ② PCCU (Post Combustion Capture Unit)



\* KRES : KBR Reforming Exchanger System



# (3) Clean Dehydrogenation (Ammonia Cracking Technology)

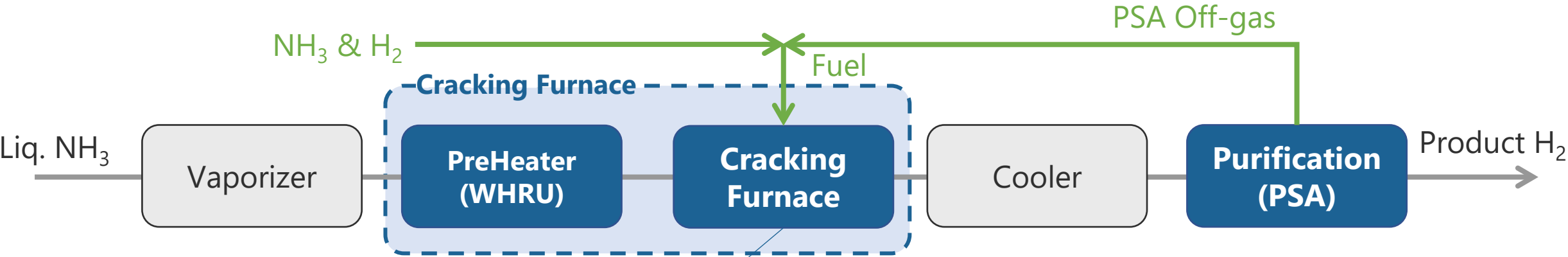
"Research and Development of Large-scale Ammonia Cracking Technology for Low-carbon Hydrogen Production by Tubular Ammonia Cracking Furnace"



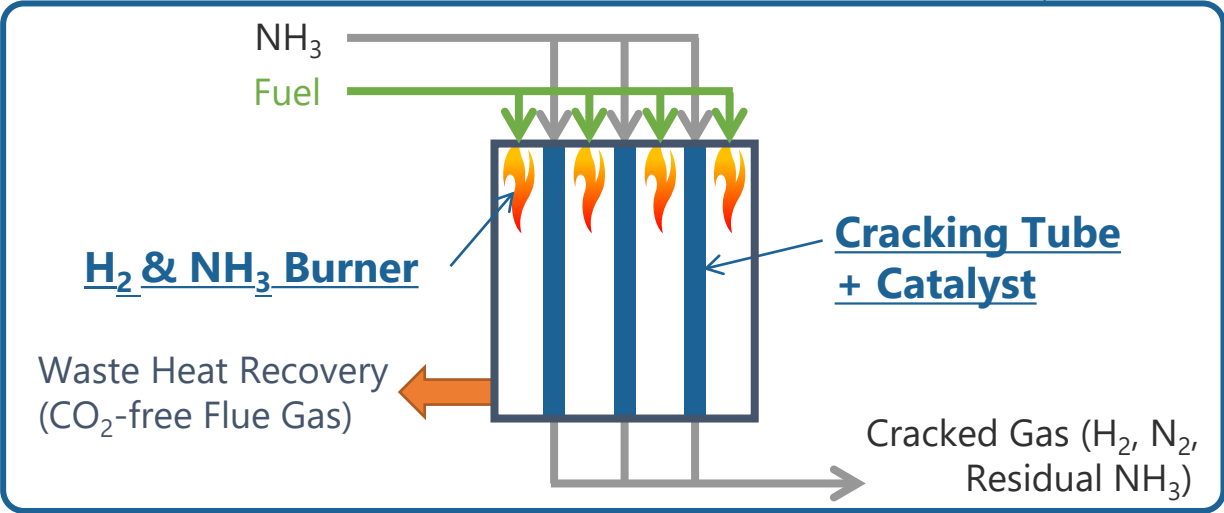
<https://www.jgc.com/en/news/assets/pdf/20230706e.pdf>

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

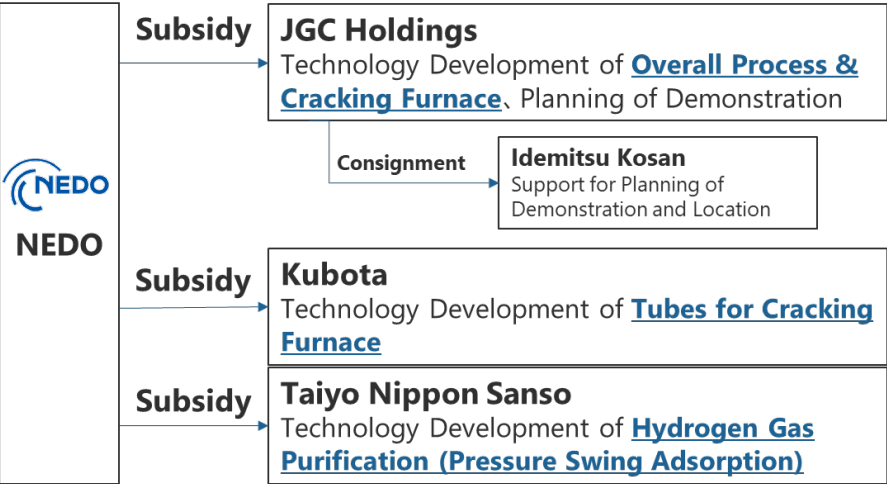
... large-scale, high-efficient, and zero-emission cracking system



### ◆ Concept of Cracking Furnace



### ◆ Organization



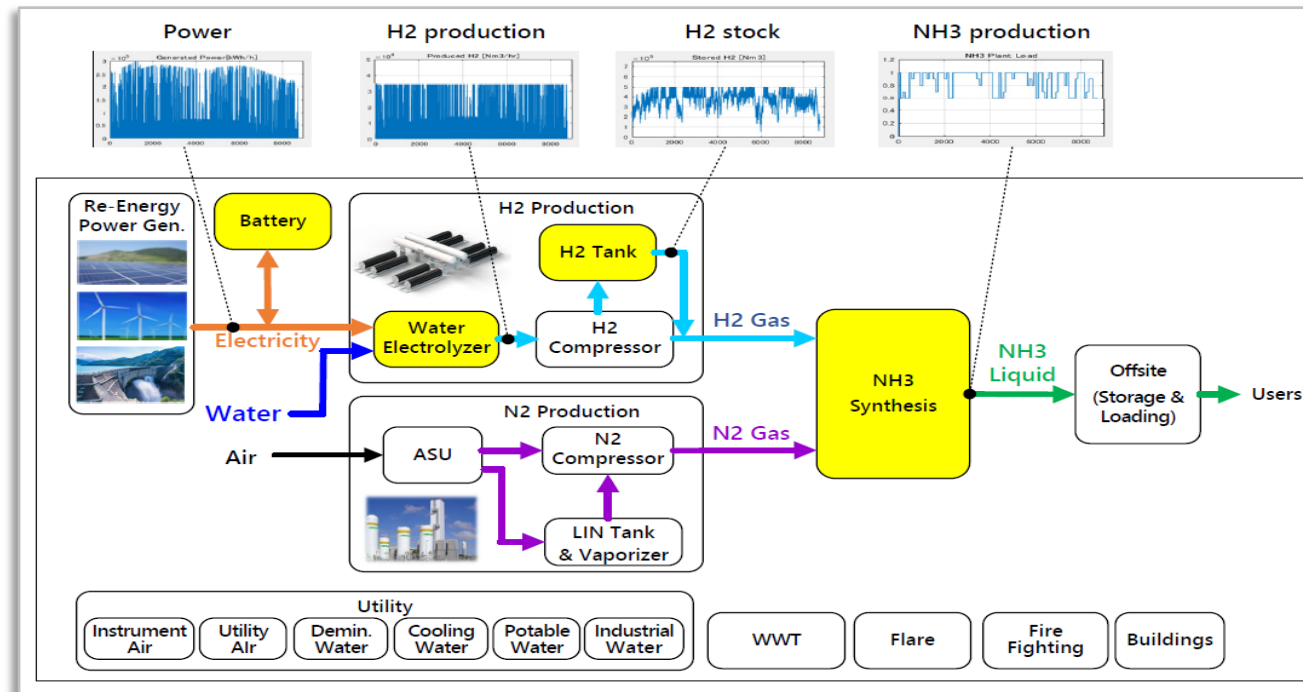
NEDO: New Energy and Industrial Technology Development Organization



# (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.

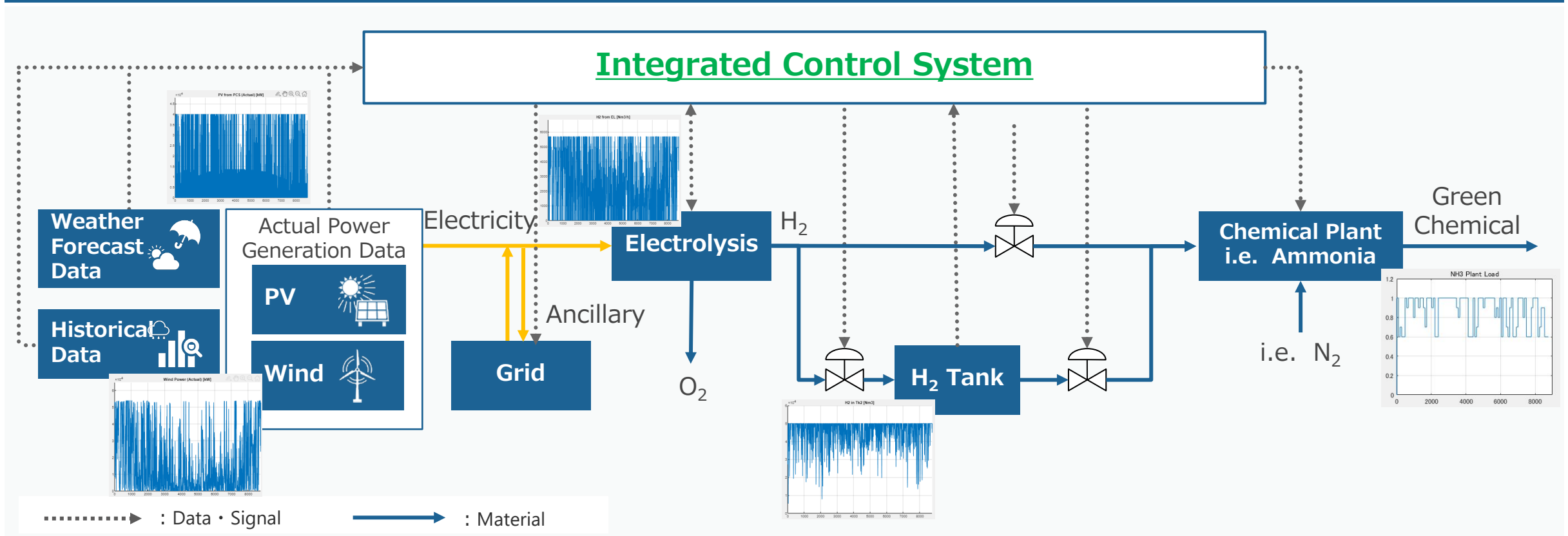


Typical configuration of green ammonia production plant

# (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.

