

## **Green Chemical/ Ammonia Demonstration Project**

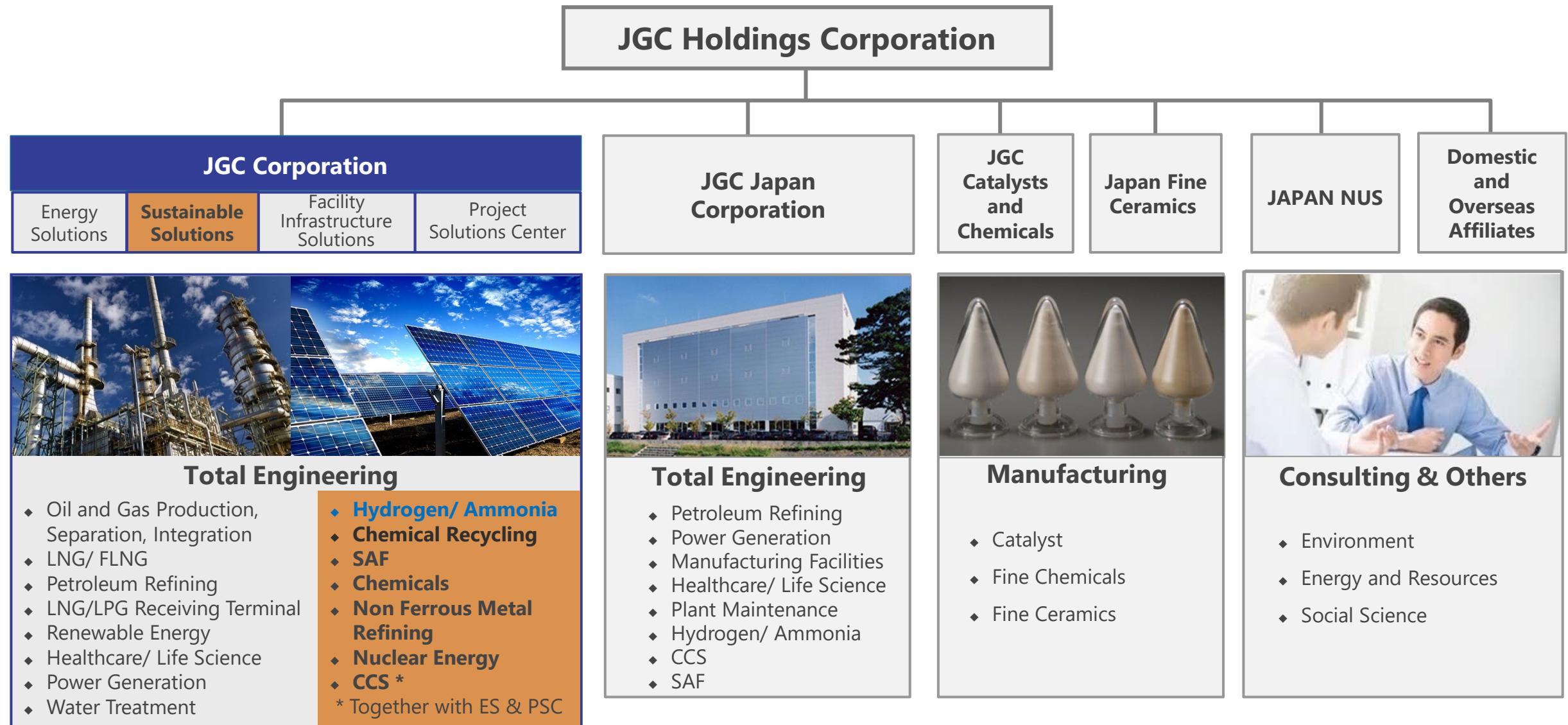
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# JGC Group Structure



# JGC's Activities for Green Ammonia <Power to Chemical Demonstration>

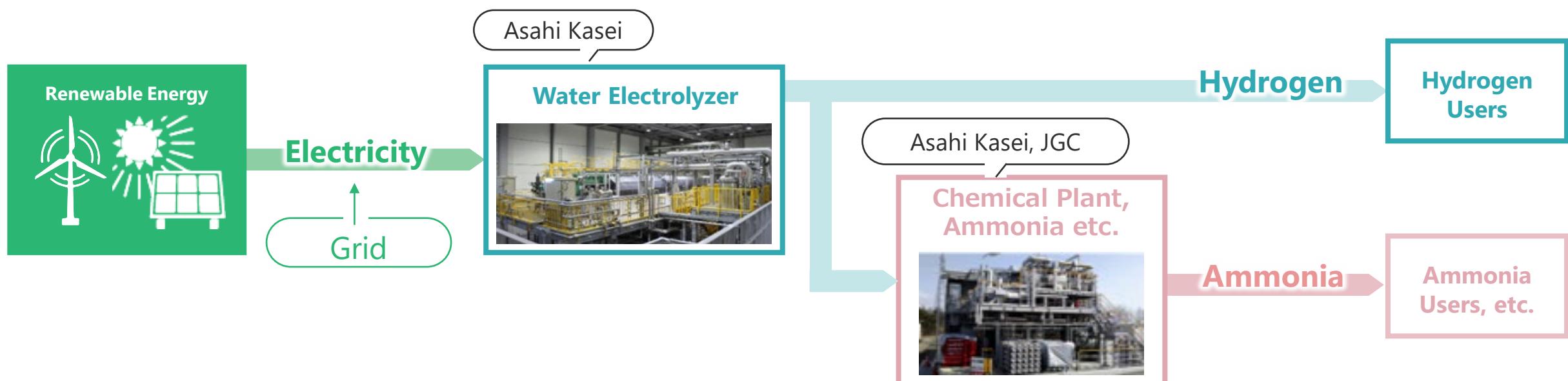


AsahiKASEI



## Outline

- 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 \*
- Semi-commercial scale (Phase 1) and Commercial scale (Phase 2) for 10 years till FY 2030

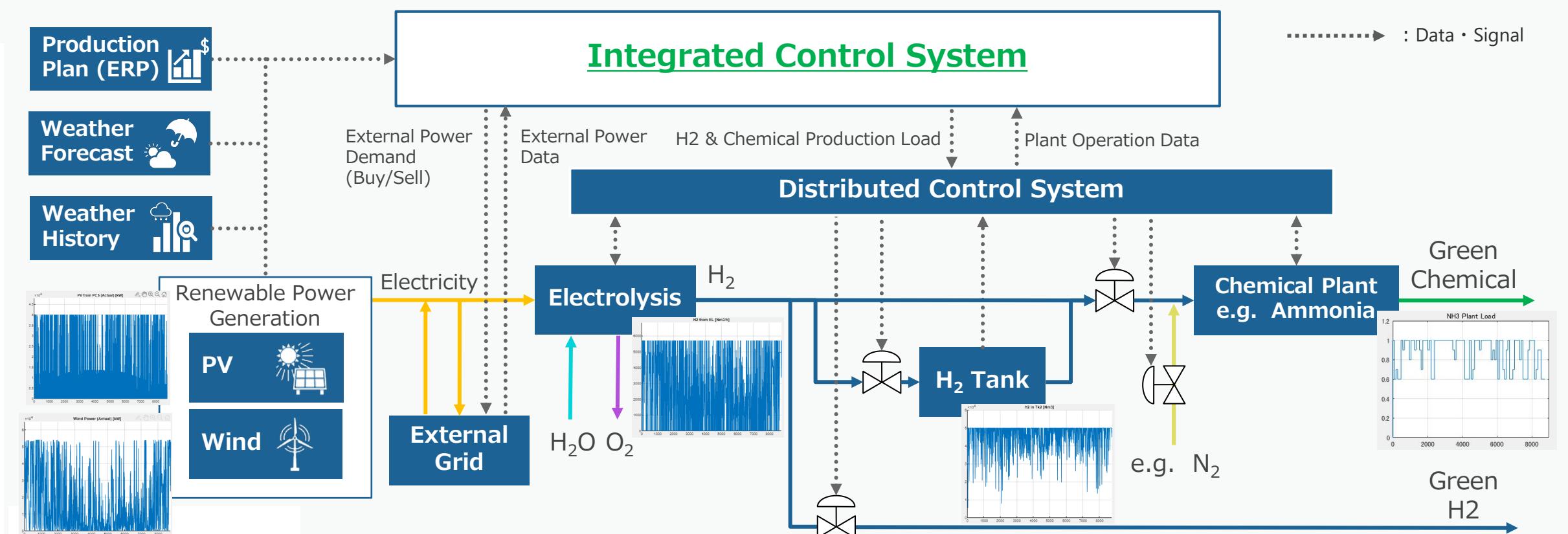


\* NEDO (New Energy and Industrial Technology Development Organization) , <https://www.jgc.com/jp/news/assets/pdf/20210826j.pdf>

# JGC's Activities for Green Ammonia <Integrated Control System>

## Outline

In Green Chemical Process, such as Ammonia, fed with Hydrogen derived from **Fluctuating Renewable Energy**, "**Integrated Control System**" which manages hydrogen supply and realize **chemical plant's optimum operation with minimum downtime** will be developed and demonstrated.



# JGC's Activities for Green Ammonia <Automated Operation>

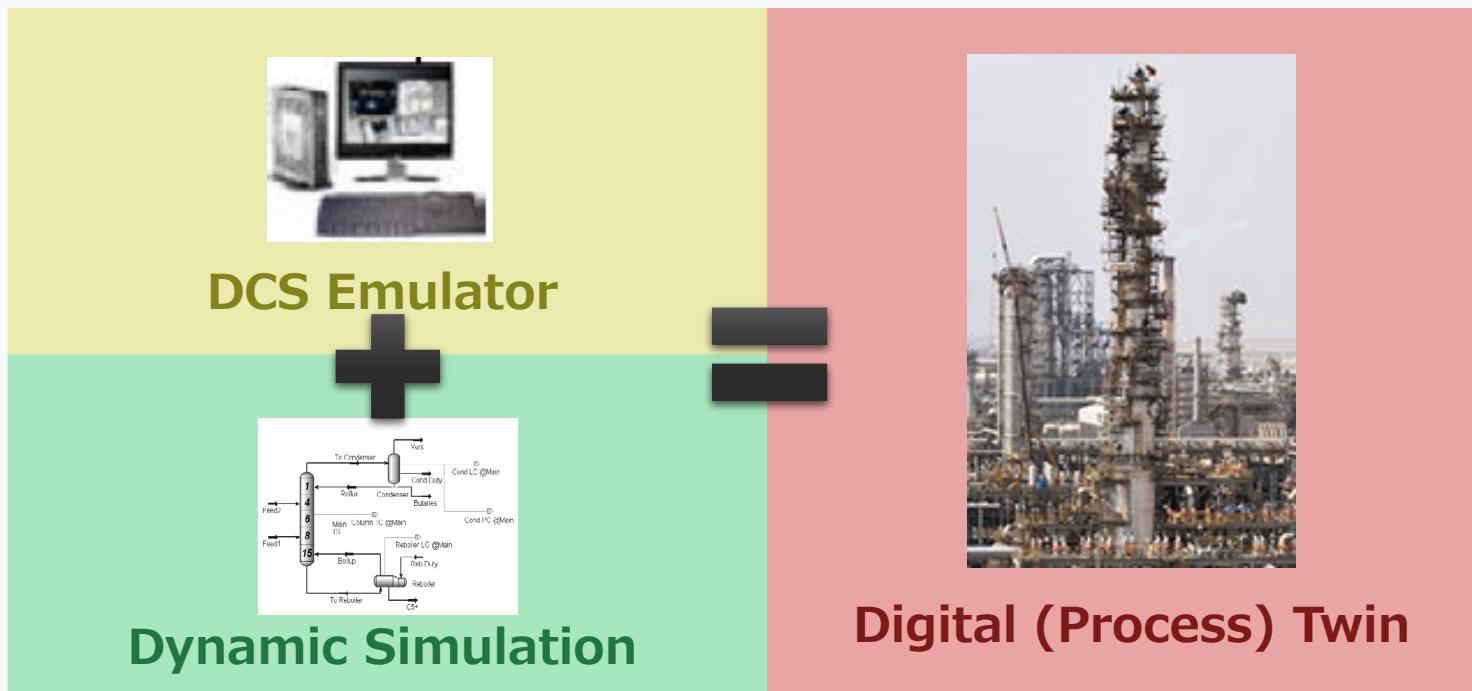
## Outline



AsahiKASEI



**Automated Start-up and Shutdown Operation** for Green Ammonia Plant will be developed and demonstrated based on JGC experiences in Power Plant and LNG Facilities, which will contribute **reducing Human Resources** for plant operations and **Time for start-up and shutdown** to increase benefit for customers. The key technology for success is "Plant Digital (Process) Twin" using Dynamic Simulation model.



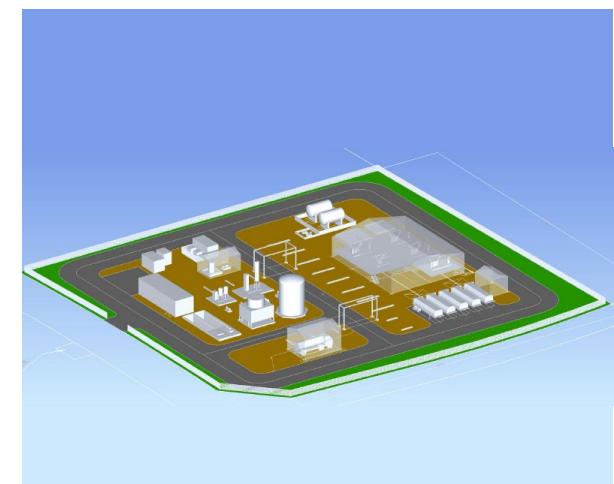
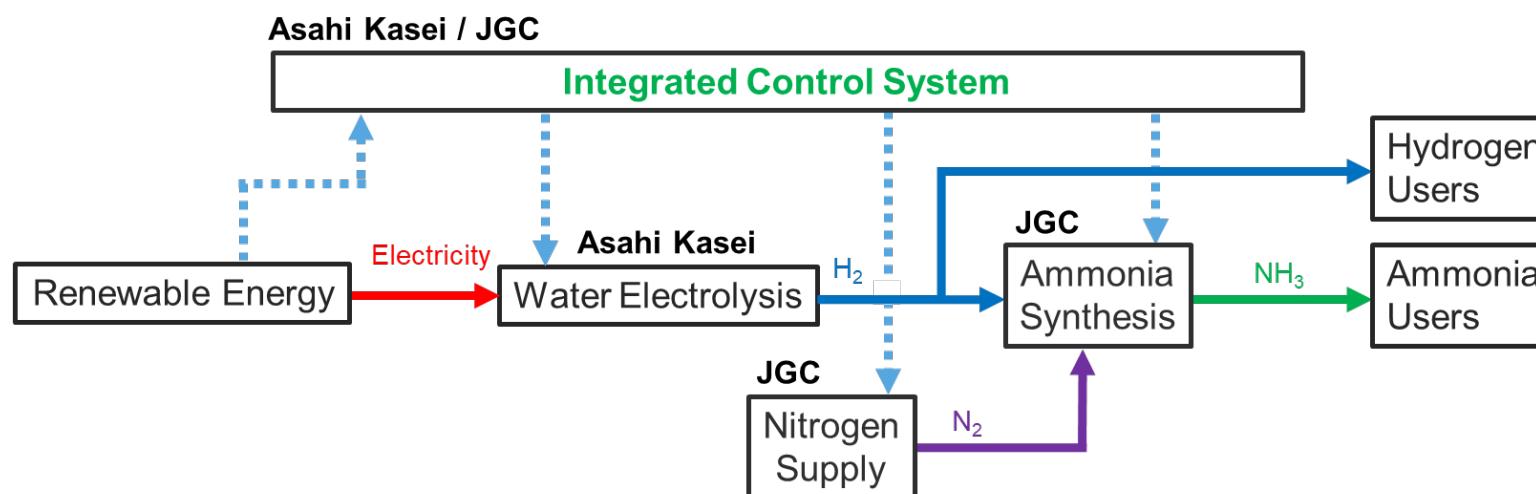
# Semi-commercial scale (2024~ Demonstration operation ; Phase1)

- Establish connection between Asahi Kasei's Water electrolysis (**10MW**) in FH2R \* with JGC's Ammonia synthesis facilities (**4TPD**), and implement jointly developed "**Integrated Control System**"
- Utilize produced ammonia as De-NOx agent in thermal power plant, or material for chemical or fertilizer production plant, and study local supply chain.
- Current Status and Milestone :
  - FEED\*\* for Green Ammonia Plant has been completed By JGC & JGC Japan, with KBR Ammonia Synthesis Process
  - Start EPC\*\*\* within Fiscal Y.2022
  - Start Demonstration Operation within Fiscal Y. 2024 until Fiscal Y. 2026

\* Fukushima Hydrogen Energy Research Field

\*\* FEED : Front End Engineering Design

\*\*\* EPC : Engineering, Procurement, and Construction

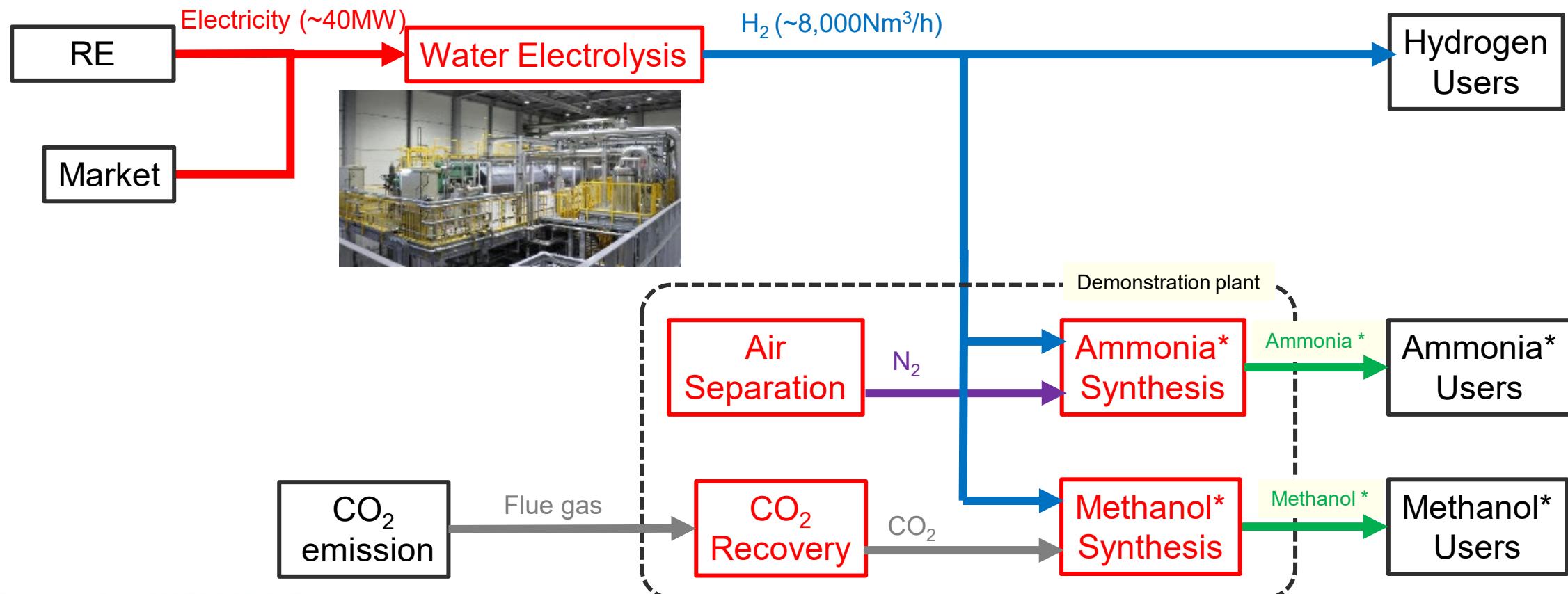


Sample of 3D Image of Ammonia Plant



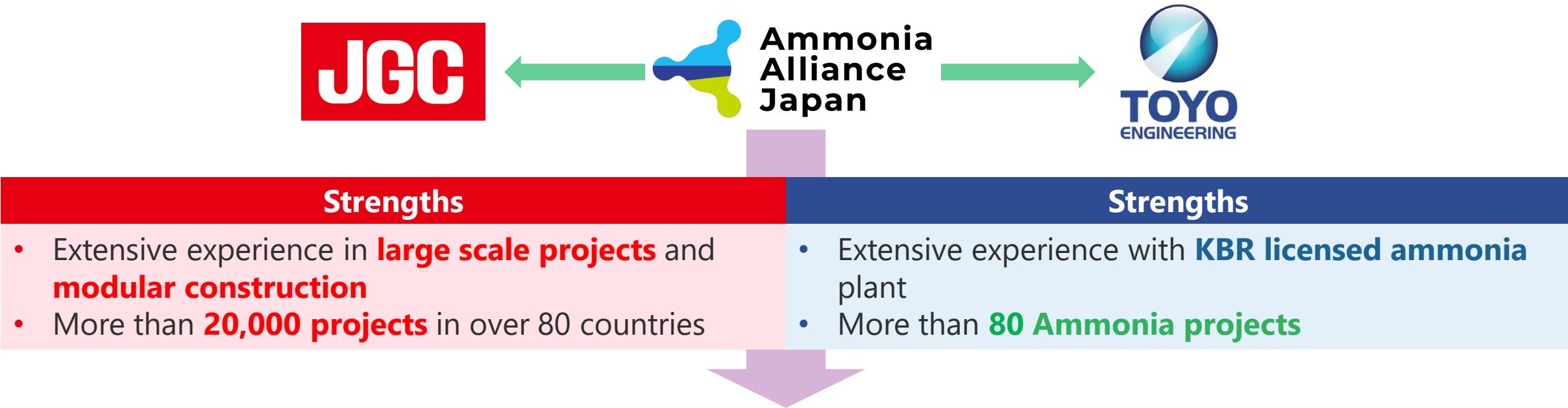
## Commercial Scale (2027~Demonstration operation ; Phase 2)

- Installation of **Large-scale Alkaline Water Electrolysis System (40MW)** with Basic Chemical Synthesis Facility
- Hydrogen production by renewable energy and electric power market, Basic Chemical Synthesis, such as **Ammonia and/or Methanol**, Demonstration operation as Decarbonized plant



\* Products for the Demonstration plant is not determined yet.

## JGC and TOYO entered Business Alliance for Fuel Ammonia Project

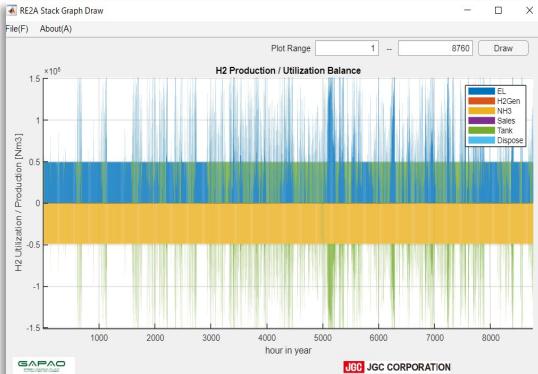


### JGC&TOYO Ammonia Alliance Japan can

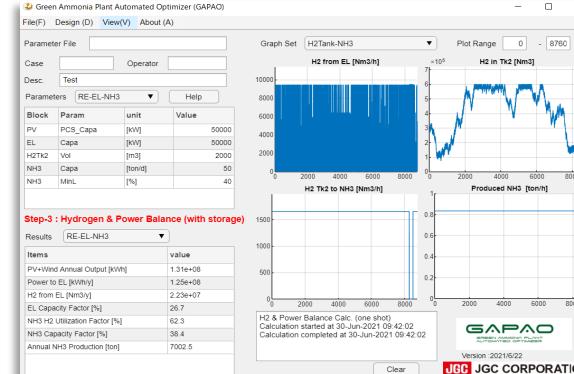
- provide **one stop high value solution** from planning phase to EPC in a timely manner with **KBR licensed ammonia process**
- offer **the competitive proposal** based on the extensive experience of both parties

**Simulation Tool for Green Ammonia Plant Optimization** based on Fluctuating Renewable Energy Input, by Balancing H<sub>2</sub> and Energy, and Consideration of Dynamic Features

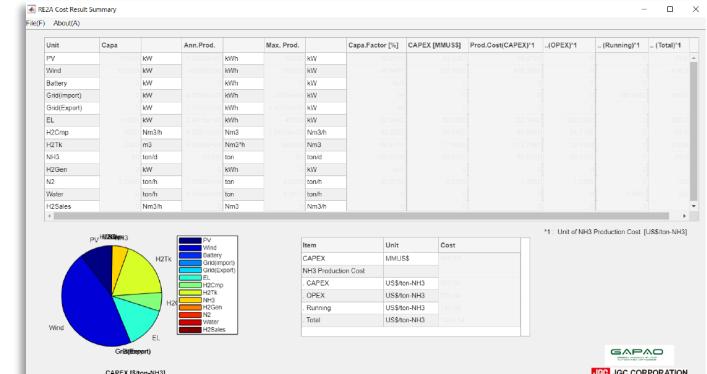
## ◆ Output Image



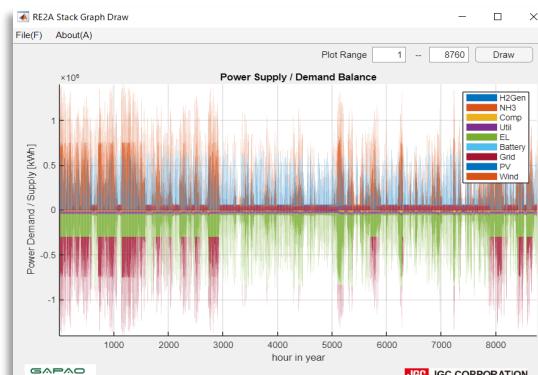
Hydrogen balance



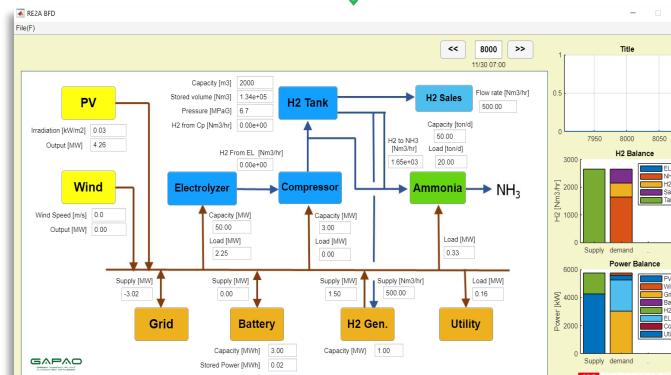
Main GUI



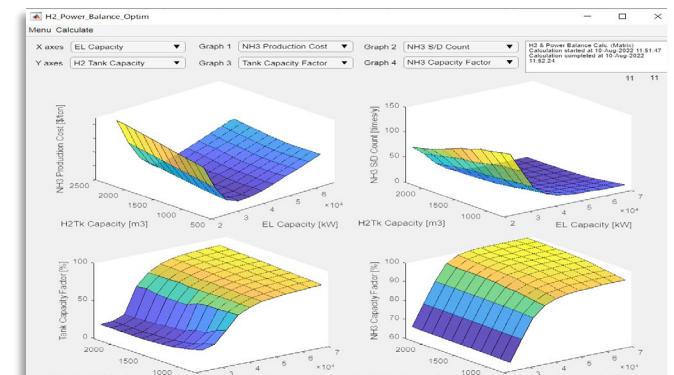
Levelized cost and breakdown



Power balance



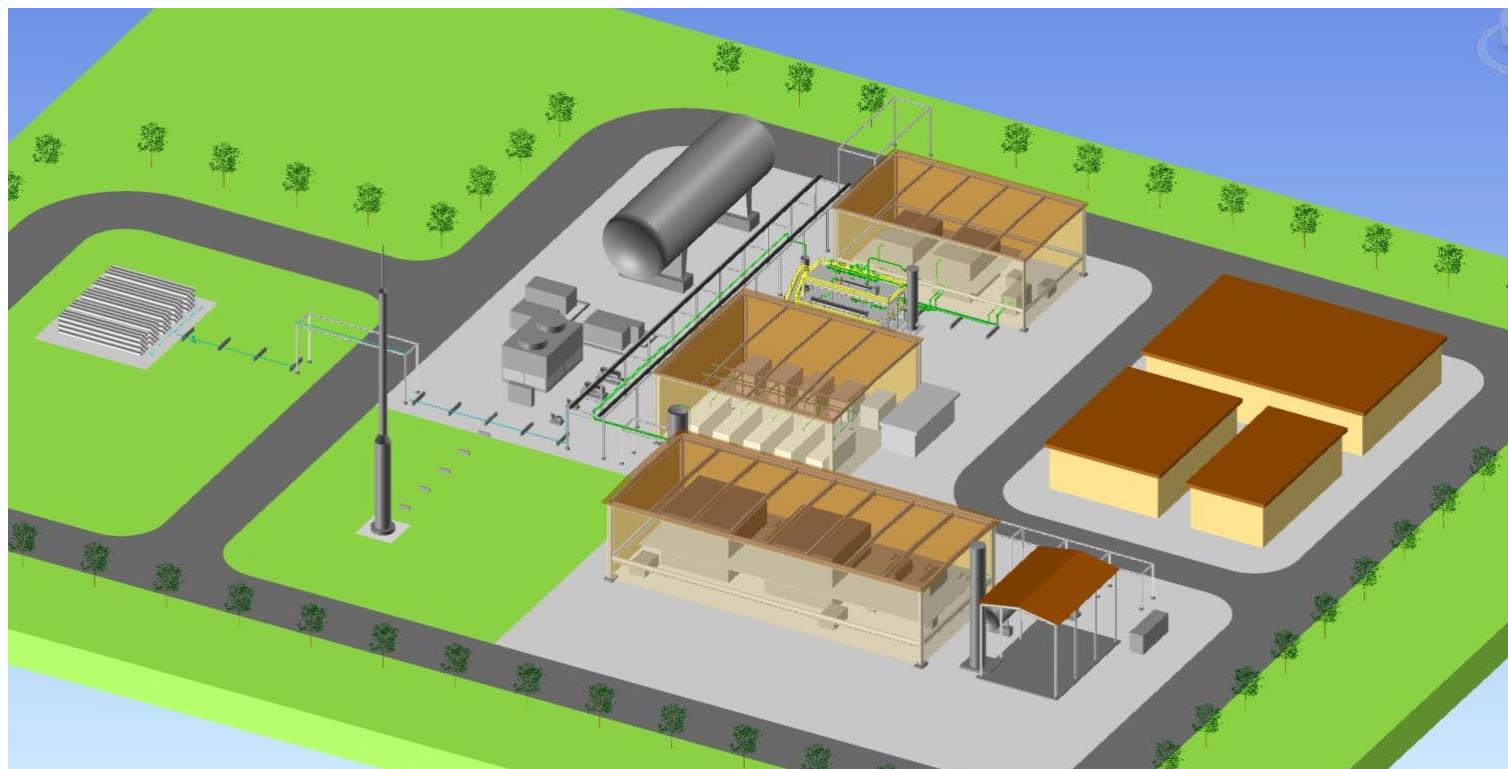
Block flow diagram and material balance



3D graphs visualizing optimum design point

## Outline

- ✓ Design standardization and packaging for cost competitiveness and early delivery.
- ✓ Construction cost saving by skid / modular design concept.



Sample of 3D Image of mid-scale Green Ammonia Plant



## THANK YOU VERY MUCH

**WE LOOK FORWARD TO BEING INVOLVED  
IN YOUR CLEAN H<sub>2</sub> & AMMONIA/CHEMICAL PROJECTS,  
AS ENGINEERING AND/OR INVESTMENT PARTNER**

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**Enhancing planetary health**