Japan's Policies on Hydrogen / Ammonia

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- No energy source is perfect.
- Fossil fuels, renewable energy, nuclear･･･

  All energy sources･fuels have their pros and cons.
- 「Safety」「Stability」「Cost」「Decarbonization」

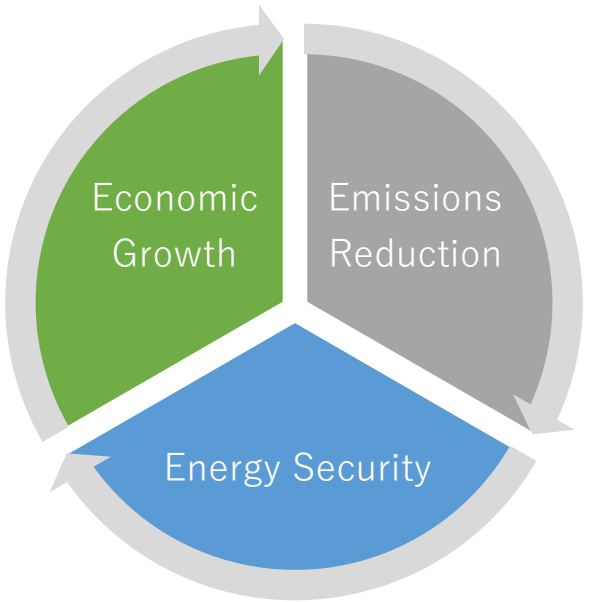
  All have to met continuously and simultaneously with the right balance.

Green Transformation's Three Principles

Triple breakthrough

Japan aims to simultaneously achieve

- Emissions Reduction
- Economic Growth
- Energy Security

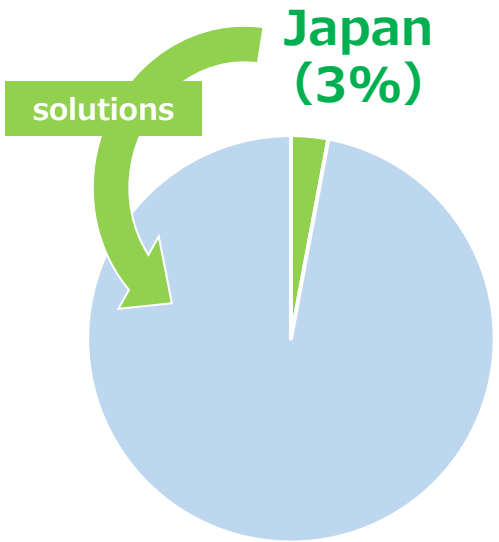


One goal, various pathways

Toward our common goal of achieving net zero, we will make practical energy transitions through various pathways depending on the circumstances of each country.

Solution to the world

Japan will decarbonize itself, but also contribute to global decarbonization by providing solutions outside Japan.



Japan's Green Growth Strategy

14 growth sectors

Energy related industries


01_Offshore wind pwr.
Solar, heat energy


02_Hydrogen, Fuel Ammonia


03_Next generation heat energy


04_Nuclear power

Transport/manufacturing industries


05_Automobile, Storage batteries


06_ Semiconductors Info/Com.


07_Shipping


08_Logistics, people flow, Civil eng.


09_Food, Agri. fishery, forestry


10_Aircraft


11_Carbon Recycling, Materials

Home/Office related industries


12_Housing/Building Next gen. electric power management


13_Resource circulation


14_Lifestyle related

Japan's Perspective on Global Hydrogen Trends

The boom may appear slowing down but renewables and EV cannot solve everything.

Serious demand is waiting in industry, heavy duty trucks, thermal power and others.

Supply chains cannot be built alone.

We should work towards global Demand Creation.

Image: From KHI video

Japan's Hydrogen Policy Trends

- Japan was the first country to formulate a **national hydrogen strategy**, in 2017, which was then revised in 2023.
- Establishment of the **Green Innovation Fund** of approximately ¥2 trillion* in 2021.
  * ¥2 trillion = € 12.5billion (EUR/JPY=160)
- Enacted and enforced the **Hydrogen Society Promotion Act** in 2024.

Milestones

2017
・Basic Hydrogen Strategy

2020
・2050 CN Declaration
・Green Growth Strategy

2021
・Green Innovation Fund
・Revised Strategic Energy Plan

2023
・GX Promotion Act
・Revision of Basic Hydrogen Strategy

2024
・Hydrogen Society Promotion Act

Targets

□Supply & Demand volume:

Current (Approx. **2Mt**) → 2030 (Approx. **3Mt**) → 2040 (Approx. **12Mt**) → 2050 (Approx. **20Mt**)

The 7th Strategic Energy Plan (February, 2025)

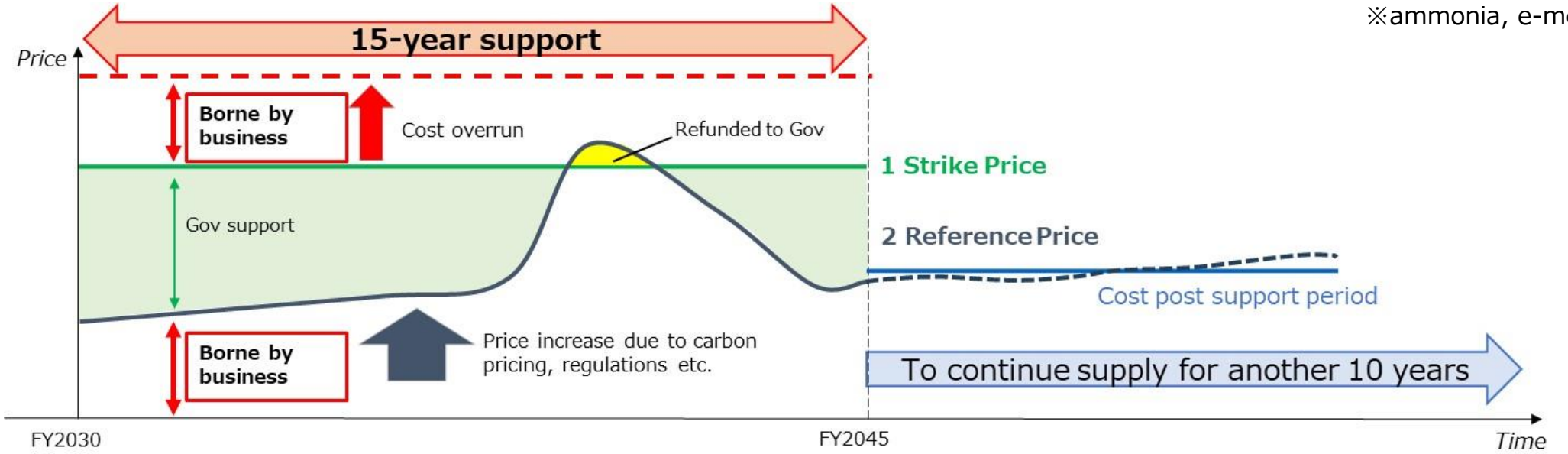
7. Next Generation Energy Security/Supply System

- **Hydrogen and its derivatives (including ammonia, e-methane, and e-fuels)** are **expected to be utilized in a wide range of fields** and are key energy sources for achieving carbon neutrality. Some countries are beginning to provide support not only for technological development, but also for the acquisition of natural resources and suitable sites for hydrogen production and capital investment. In this context, Japan will also **hone its competitiveness through technological development** and encourage **companies to make proactive capital investments** with an eye to the expansion of the global market. Japan will also **promote the introduction of biofuels**.
- In addition, for public implementation, based on the **Hydrogen Society Promotion Act enacted in May 2024**, we will strongly underpin **the establishment of supply chains** through **support focusing on the price gap** and other measures, and for the further large-scale supply and use of low-carbon hydrogen and its derivatives both in Japan and overseas, we will implement **regulatory and support policies in an integrated manner** to **reduce costs and expand use**.

Support measure ① Focusing on the Price Gap

- The government plans to provide a 15-year support to **suppliers** who aim to develop a **commercial-scale supply chain** of **low-carbon hydrogen and its derivatives※** which meets Japan's primary energy policy and GX policy. (i.e. S+3E: Safety + Energy Security, Economic Efficiency, Environment)

※ammonia, e-methane and e-fuel



Key requirements

- **Supply to users including in hard-to-abate sectors**, such as steel and chemical industries.
- **Start supply by FY2030 and must continue for another 10 years** following the support period.

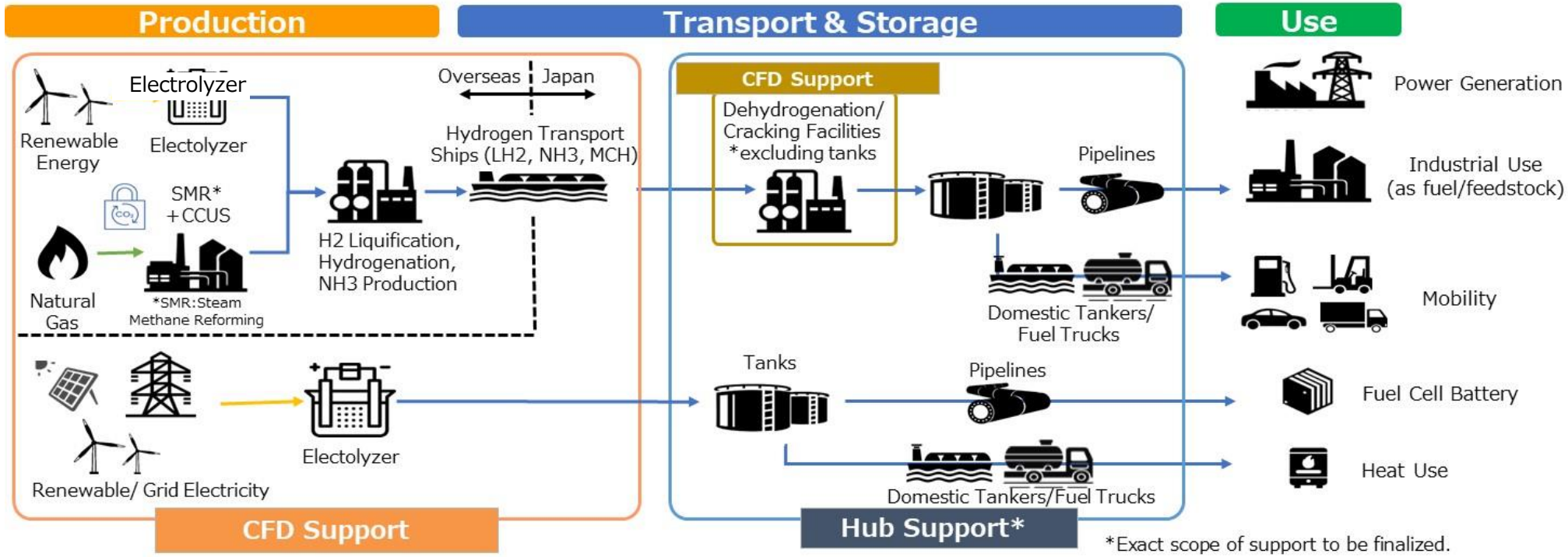
* In the approval process, business plans are to be reviewed holistically from Japan's energy and GX policy perspectives

Application Acceptance Period

- **Start: November 22,2024　Deadline: March 31, 2025**

Support measure ②　Hub Development Program

- **The Hub Development Program** supports the **establishment of infrastructure which leads to large-scale expansion of the use of low-carbon hydrogen and its derivatives** and widely benefits a variety of companies, with an aim to stimulate demand creation and the efficient buildout of hydrogen supply chains.
- The Program will subsidize a portion of the CAPEX for developing "**facilities necessary to transport low-carbon hydrogen from the receiving terminal to the point of actual use by consumers** and **used by multiple companies** (e.g. shared pipelines and tanks)"
- **Applications are now being accepted** from March 5 to the end of June 2025.

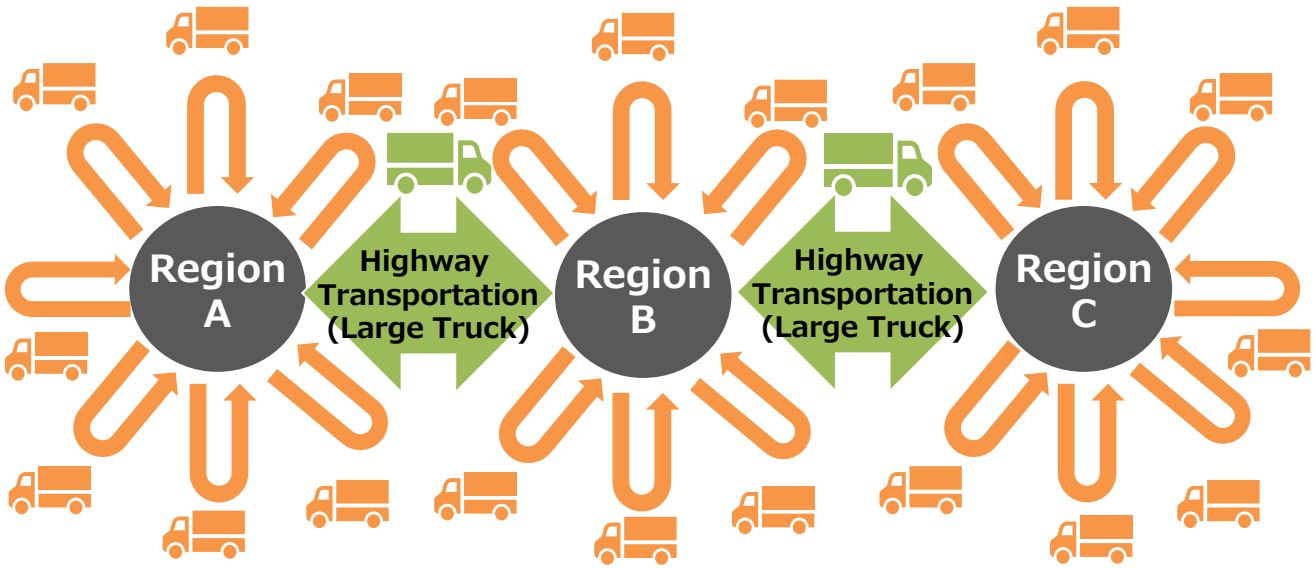


*Exact scope of support to be finalized.

Efforts for Hydrogen Utilization in Mobility

- Towards social implementation of FC commercial vehicles, **local governments are expected to lead discussions among FCV users, FCV manufacturers and Hydrogen refueling station (HRS) operators**, and to develop integrated plans for the introduction of FC commercial vehicles and HRS.
- The Japanese government plans to select **priority regions** and to provide intensive financial support to these regions for introduction of FC commercial vehicles.

Concept of priority regions



Local Transportation (Small Truck or Bus)

Key requirements for priority regions

High potential FCV demand

- ◆ Many commercial vehicles registered in the region
- ◆ Many commercial vehicles traveling through the region

and

Commitment by the local government

- ◆To set goals for introduction of FCV & HRS by 2030
- ◆To provide financial support for introduction of FCV & HRS

Development of Hydrogen Supply Chain

- Japanese industrial sector have technical strength throughout the entire supply chain; "**Production**", "**Transportation**", and in "**Utilization**".
- We are supporting **mass-production** and **promoting domestic cutting edge technologies to develop resilient supply chains**.

	Production	Transportation (store)	Utilization
			 
Core Technologies	・Water electrolysis ・Membrane	・Transportation （LH2, MCH, etc.）	・Fuel cell system/vehicle/truck ・Power generation
Key Players	<Water electrolysis> **Asahi Kasei, Toyota, Toshiba ESS, Kanadevia, Toray** ThyssenKrupp (Germany) Siemens Energy (Germany)	<Liquefied hydrogen carrier> **Kawasaki Heavy Industries** HD KSOE (South Korea) GTT (France)	<Fuel cell> **Toyota, Honda** Daimler (Germany) Hyundai (South Korea) <Power generation> **Mitsubishi Heavy Industries, IHI** Siemens Energy
Strengths (Japan)	Safe and stable operation of water electrolysis and innovative material development	Conducted the world's first demonstration of large-scale hydrogen transportation	Leads technological development of fuel cell and is top class in number of patents

International Cooperation -Bilateral

MoU to develop global green ammonia value chain and commercial demonstration of fully ammonia-powered gas turbine

- **Collaboration Outline** : IHI Corporation and Gentari Hydrogen Sdn Bhd, a subsidiary of PETRONAS' clean energy arm Gentari Sdn Bhd (Gentari), signed a memorandum of understanding to co-invest in the development of green ammonia value chain from production, transportation, storage and utilization. This includes the commercial demonstration of IHI's ammonia-powered gas turbine, developed with NEDO's Green Innovation Fund.
- **Purpose** : The objective of the collaboration is to co-develop a competitive, global green ammonia supply chain and demonstrate the commercial utilization of ammonia as fuel to support the decarbonization of Asia Pacific's power sector.

Ammonia Gas Turbine (IM270)

Joint Development Agreement(JDA) for Green Ammonia Initiative from Aceh(GAIA) by Pupuk Indonesia(PIHC), ITOCHU and TOYO

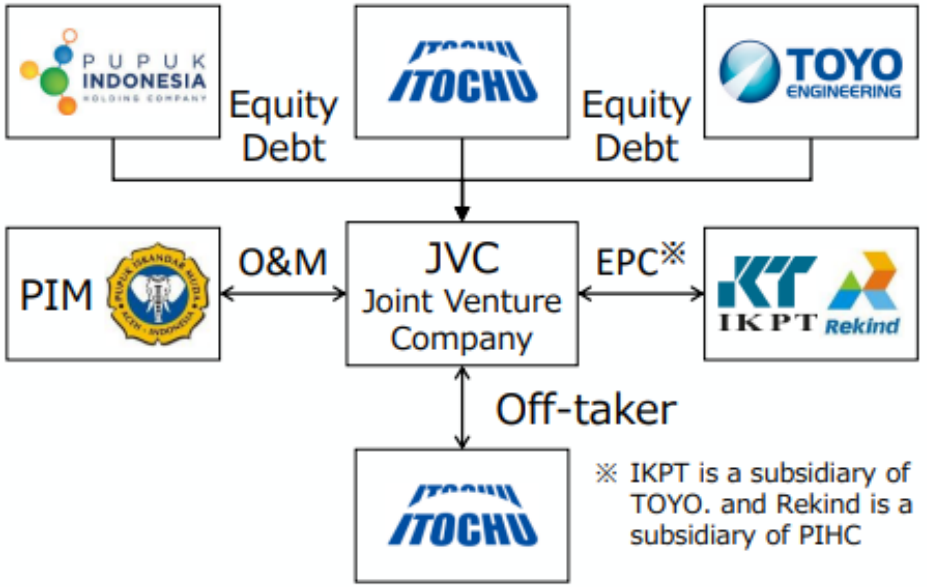
Collaboration Outline : Agreed to jointly develop, including basic engineering design (FEED), a project to produce green ammonia by leveraging existing ammonia plant of Pupuk Iskandar Muda(PIM) which is PIHC's subsidiary

Purpose and Strategy : Utilize the part of capacity of PIM's existing ammonia plant (designed and constructed by TOYO) in the Special Economic Zone (SEZ) to produce green ammonia and integrate with ITOCHU's bunkering business. Aim to replicate this green ammonia initiative at other PIHC's existing plants in the future

Schedule : JVC establishment: Nov. 2024, FID: Mar. 2025, COD: Nov. 2027

【Location of PIM's Existing Ammonia Plant】

【Structure Outline】



International Cooperation -Multilateral

International Multilateral Cooperation

- Capacity building, awareness, sharing objectives and challenges.
- Objective analysis on world's energy outlook (e.g. carbon intensity, cost estimate)
- Advocate for Japan's cases, whilst accommodating views from various countries.

G20 SOUTH AFRICA 2025

G7 2025 KANANASKIS

IPHE
International Partnership for Hydrogen and Fuel Cells in the Economy

CLEAN ENERGY MINISTERIAL
Advancing Clean Energy Together

COP30 BELÉM·PARÁ·BRASIL

BREAKTHROUGH AGENDA

IEA

IRENA
International Renewable Energy Agency

Hydrogen Energy Ministerial Meeting (“HEM”)

- HEM was first held in Tokyo in 2018 as the world’s **first ministerial meeting exclusively on hydrogen**.
- Chaired by Japan with a number of key participants, HEM has been an ideal forum to **discuss most recent hydrogen policy developments** and **emerging issues** for **policy coordination.**
- The **7th HEM** under consideration to be held in conjunction with the Expo 2025 Osaka, on the 12th of October.

6th Hydrogen Energy Ministerial Meeting

- Date: September 23, 2023
- Venue: Tokyo, Japan
- Key outcomes: Issued a chair’s summary affirming the following.
  - Global goals to increase **hydrogen demand to 150 million ton by 2030**, and **up to 90 million ton for renewable and low-carbon hydrogen**.
  - The potential for hydrogen utilization will **create new industries and jobs of close to 800,000 by 2030**.
  - The importance of developing **international standards and certification schemes based on carbon intensity**.
  - The importance to strengthen international support for access to **financial support in emerging countries**.

Expo 2025 Osaka, Kansai, Japan × Hydrogen/Ammonia

Unique Cruise Experience aboard Hydrogen Fuel Cell Ship “Mahoroba”

- Japan’s first commercial hydrogen fuel ship, operating on a hybrid system that combines fuel cell-generated electricity with plug-in electricity (Operated by Iwatani Corporation). This journey will offer a glimpse into the future of sustainable energy.

Hydrogen Supply Chain

- Green hydrogen is generated at NTT Pavilion and supplied to the Panasonic Group Pavilion through a pipeline that uses underground telecommunications pipelines. At both pavilions, Panasonic will generate electricity with pure hydrogen fuel cells (made by Panasonic) and implement the “use” of hydrogen.

Hydrogen Technologies Exhibition

- Experience exhibitions of hydrogen technologies (electrolyzer, fuel cell ship, hydrogen power generation, etc.) during the theme week (Sep 22-25).

Electricity Supply by Hydrogen/Ammonia Power Generation

- The Kansai Electric Power Company, Incorporated supplies electricity generated with clean hydrogen using the large gas turbines of an existing thermal power plant.
- IHI Corporation mono-fires ammonia to generate electricity.

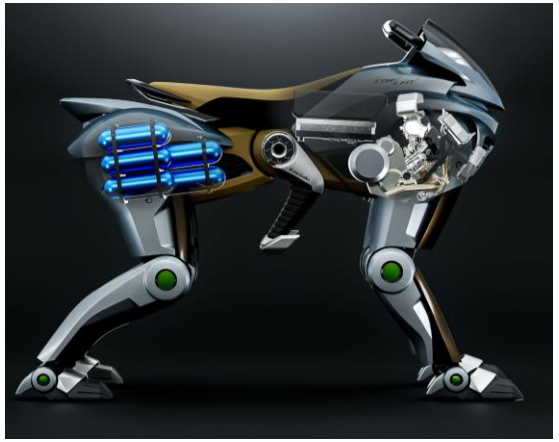
“Mahoroba” Hydrogen Fuel Cell Ship by Iwatani Corporation

- Mahoroba is the **first hydrogen fuel cell ship to operate as a commercial passenger ship in Japan**.
- The boat is powered by a **hybrid of electricity generated by a fuel cell and plug-in power**.
- **No exhaust gas or noise** is generated during fuel consumption, and vibration is minimal due to the motor propulsion.
- It is scheduled to operate regularly on Tuesdays, Fridays, and Saturdays between Universal City Port, Yumeshima, and Nakanoshima Gate.

Kawasaki Heavy Industries “Impulse to Move” @ Future City

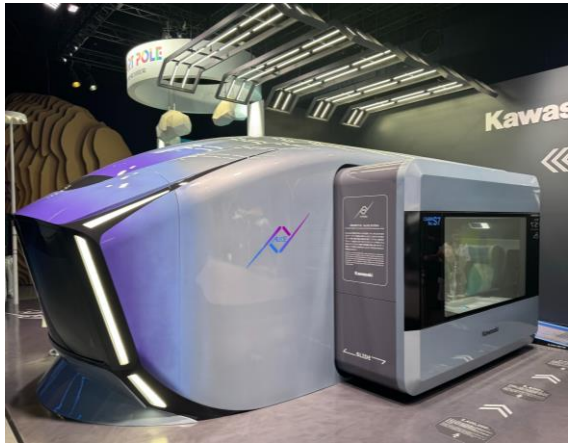
- Kawasaki Heavy Industries, Ltd. exhibits two **sustainable mobility vehicles** at “City of the Future” based on the concept of “mobility instinct,” which is “feeling happiness through mobility.”
- On full-scale display will be the **“CORLEO,” a four-legged off-road personal mobility vehicle**, and the **“ALICE System,” which is redefining public transportation**.
- Visitors can experience them at any time during the Expo.

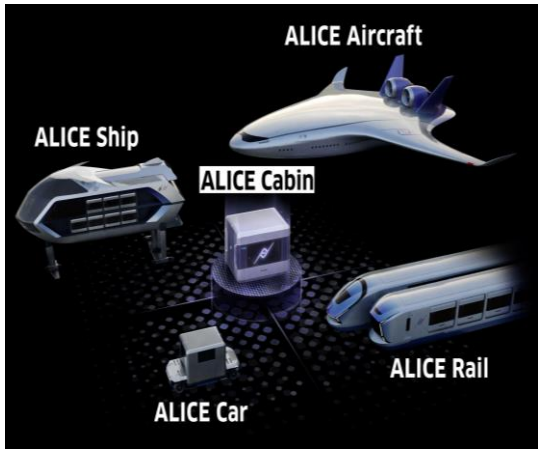
CORLEO



- A new type of quadrupedal mobility vehicle that is driven by a human rider.
- The rider rides astride the vehicle like a horse, and the vehicle is operated by shifting the center of gravity.
- The vehicle is powered by hydrogen. Hydrogen is supplied from a canister mounted in the rear, and the vehicle is driven using electricity generated by the canister.
- A mock-up was displayed at the Expo site.

ALICE SYSTEM





- Just by getting into the cabin, each mobility (ship, plane, train, car) automatically transfers to the destination.
- The concept is that each mobility runs on hydrogen energy.
- At the Expo site, a railroad that captures the moment when the cabins connect is on display.

Thank you

Ministry of Economy, Trade and Industry