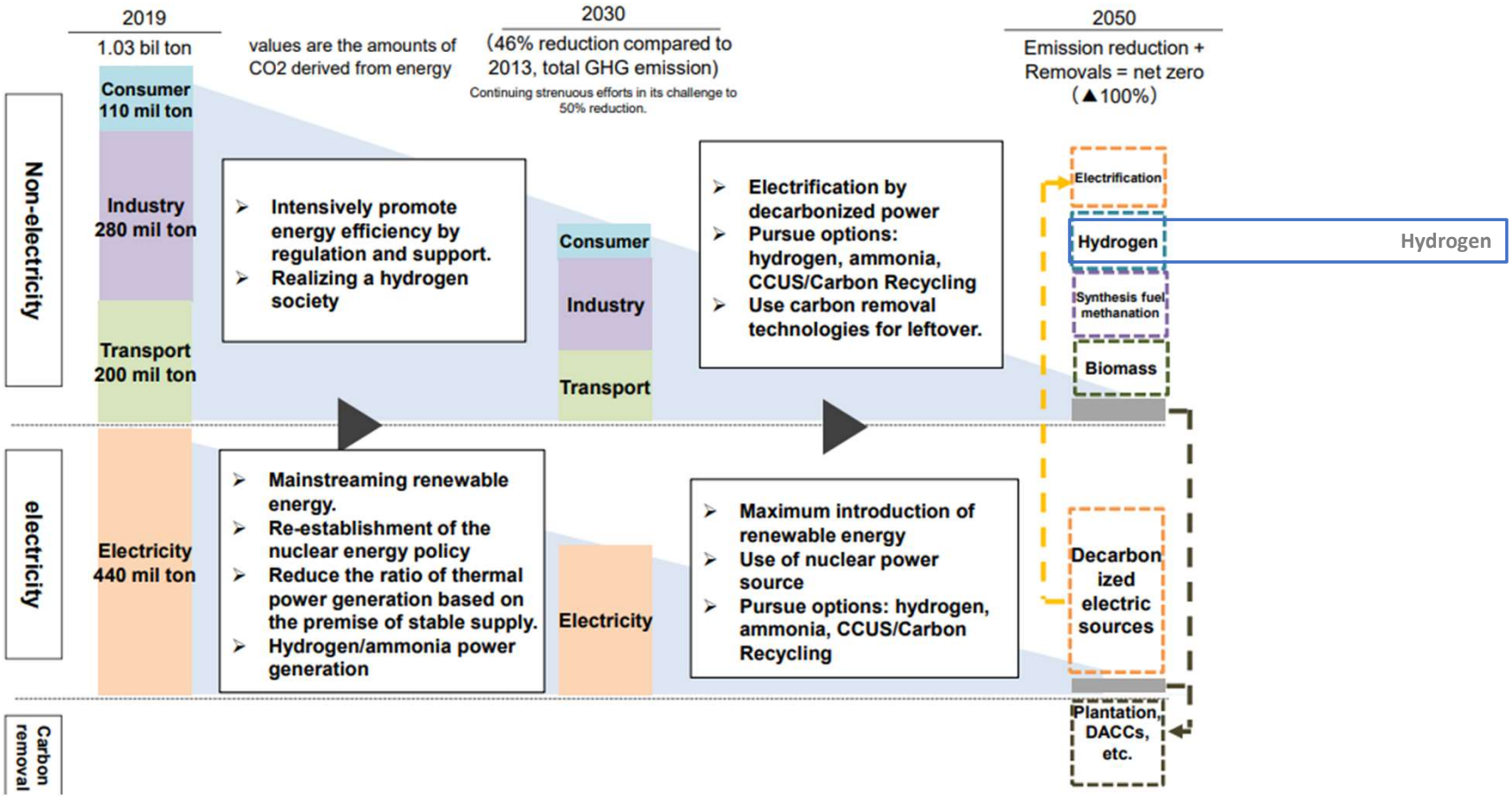
Presentation 5

Hydrogen utilization system "Hydro Q-BiC“ Promotion and development of business

Yasuo Homma,
Group Conductor of NOVARE Innovation Center, Hydrogen Group

Aiming for carbon neutrality

Green Growth Strategy for Carbon Neutrality by 2050



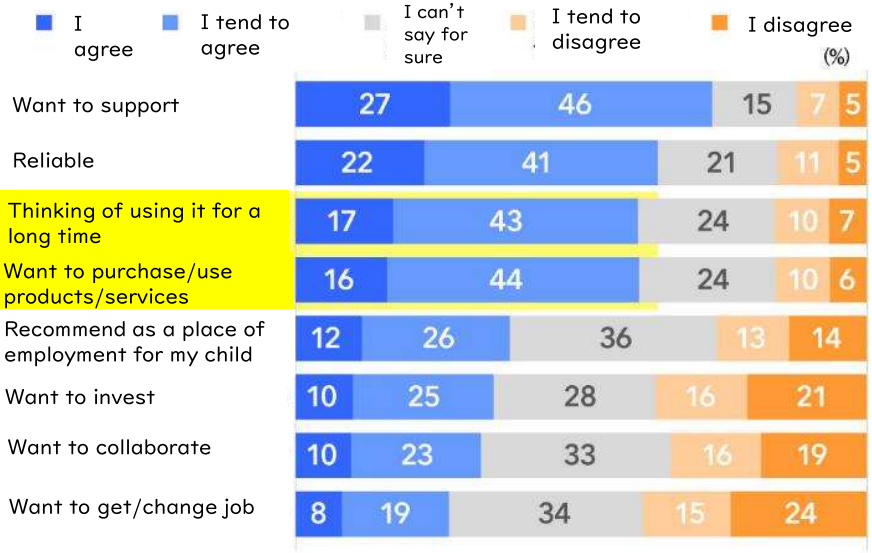
Source: Ministry of Economy, Trade and Industry
Green Growth Strategy for Carbon Neutrality by 2050

Corporate Initiatives for Decarbonized Management

Companies around the world are announcing their efforts, and the importance is increasing

Awareness of companies working on decarbonization management

Q. What do you think about companies that are working towards realizing a carbon-neutral and decarbonized society?



Sustainable d Actions Webinar report

Expansion of initiatives for decarbonization management

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

- Formulate management strategies that incorporate business risks and opportunities associated with climate change, and reduce disclosure of their financial impacts
- Supporting Japanese organizations: 1454 organizations (2023.9)

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

- Certified companies with scientific reduction targets consistent with achieving the Paris Agreement
- Number of certified Japanese companies: 601 (2023.9)

RE 100

- A framework that aims to cover 100% of the electricity required by companies for their business activities with renewable energy
- Number of certified Japanese companies: 84 (2024.1)

Toward the Realization of a Hydrogen Town

AIST※
Green Hydrogen Production, Storage and Utilization Technology

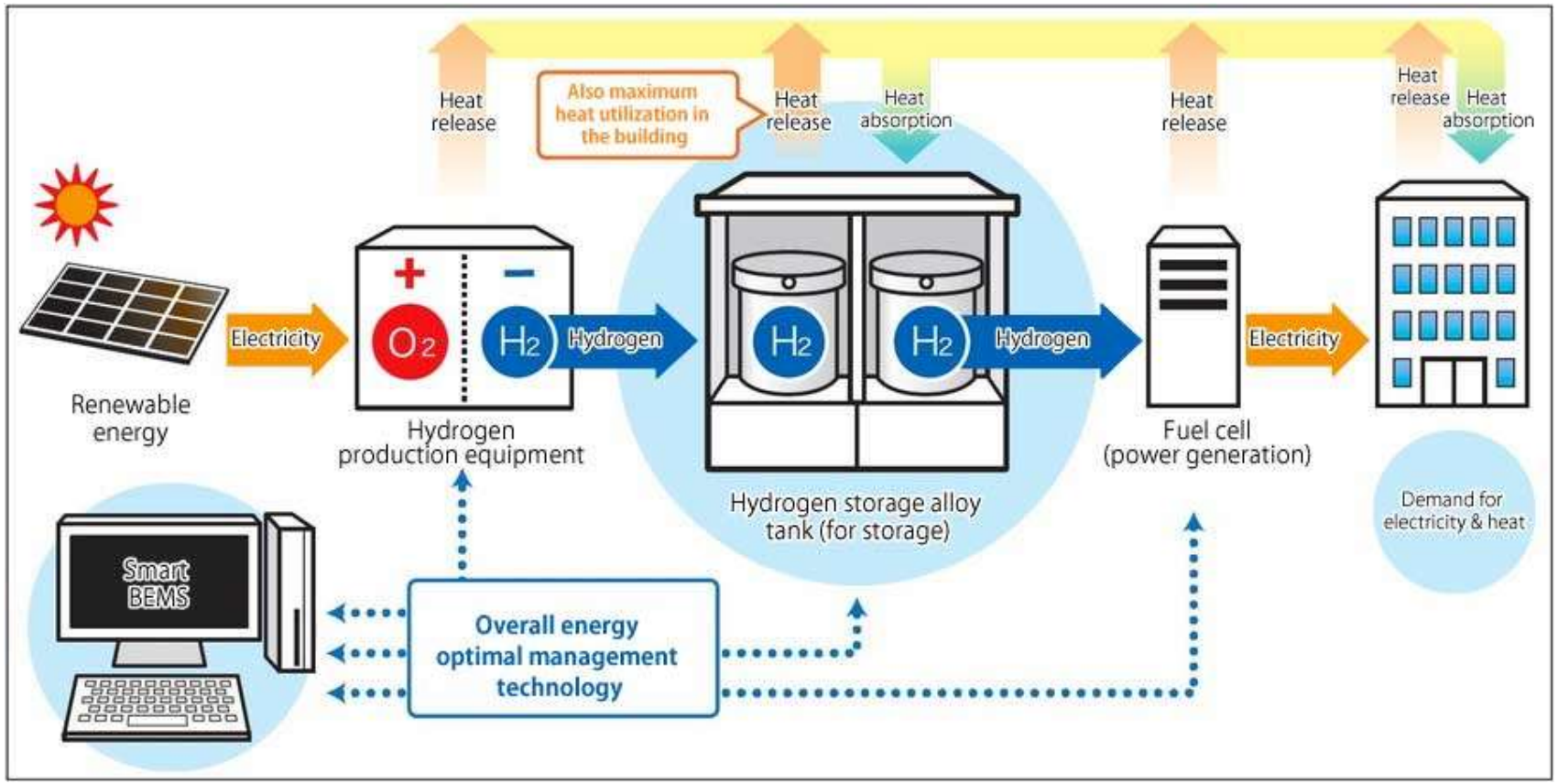
Collaborating Laboratories
CO_2 reduction in buildings and city blocks /Energy supply during disasters

Shimizu Corporation
Energy-management technology /Mobility Collaboration Technology

※：National Institute of Advanced Industrial Science and Technology

Hydrogen Energy Utilization System "Hydro Q-BiC"

◎ To use renewable hydrogen in buildings and city blocks



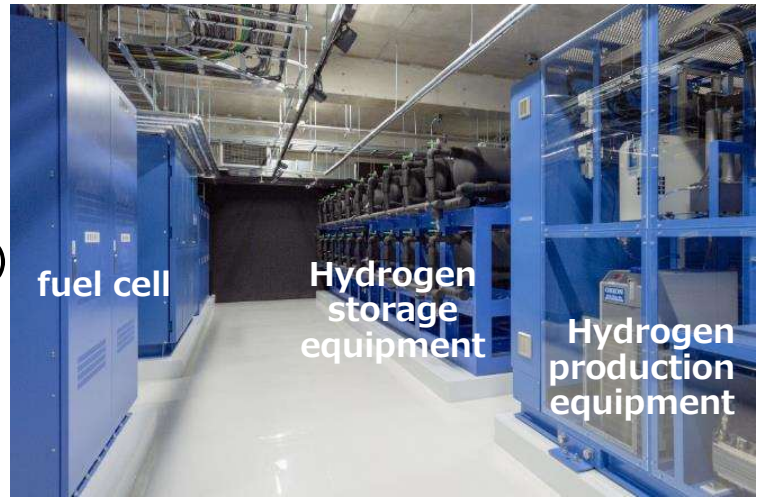
コージェネ大賞
2018
理事長賞

Overview and Features of "Hydro Q-BiC"

■System Overview

◆ Hydrogen is produced using green electricity and stored in a hydrogen storage alloy (Metal Hydride). Hydrogen energy utilization system that utilizes hydrogen as needed.

◆ Optimal control of the energy of the entire building, including hydrogen, by smart BEMS(Building and Energy Management System)



■Features & Strengths

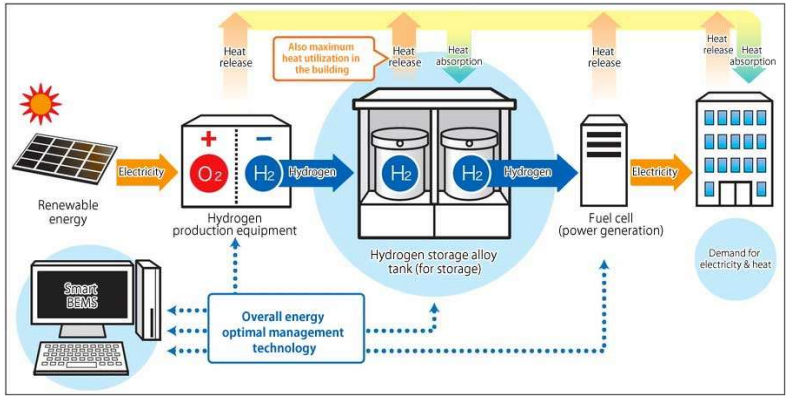
◆ Our proprietary Metal Hydride does not fall under the category of hazardous materials.

◆ Expensive rare earths are not used as raw materials for alloys.

◆ Off-site hydrogen can be quickly filled into the storage equipment.

◆ Not subject to the High Pressure Gas Safety Act and does not require a qualified person to handle it.

◆ There are no special regulations on installation in the building.



Safe and compact energy storage with hydrogen

- A large amount of energy can be stored in the vicinity of the building without qualified personnel.

Newly developed MH(Metal Hydride)

✓Nonflammable

☛ Not classified as dangerous

✓Not using rare earth

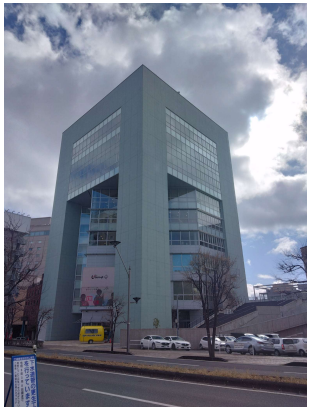
☛ Expectation of cost reduction

Commonly used MH

Classified as dangerous goods under the Fire Service Act
Because it ignites

Implementation results of Hydro Q-BiC

2021.05 Hokuriku Branch



2022. 03
U Group
(Nagano
Toyota)
Prism Building

2025.03
Demonstration
scheduled to start

Tokyo Waterfront City
District heat supply
(under construction)

2023.09 NOVARE

2024.03 Susumu Kogyo
Obama Plant

2025.04 Planned
Osaka Expo NTT Pavilion (under construction)

Deployment Models of Hydro Q-BiC

1. Local production for local consumption of renewable energy,

   BCP (Disaster Utilization) model

2. Construction of carbon-free city block model using hydrogen infrastructure

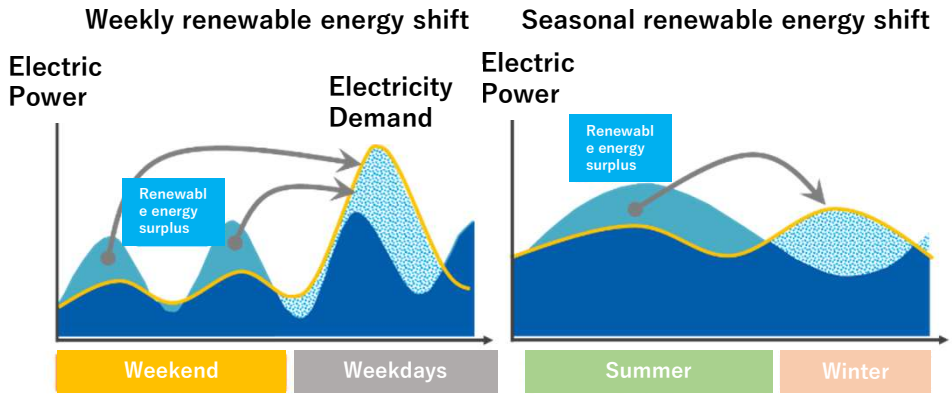
3. Carbon-neutral model of factory supply chain

4. District heat supply model (use of off-site hydrogen heat supply)

5. Hydro Q-BiC Lite (packaged model)

1. Local production for local consumption of renewable energy, BCP (Disaster Utilization) model

Shimizu Hokuriku Branch (completed in May 2021)



In consideration of BCP, we save enough to supply the minimum amount of electricity required for three days at the time of disasters

■ Facility Overview
Use: Office Total floor area: 4,224m2
Power Required: 109 kW max
■ Overview of Hydrogen Facilities
Solar Panels : 140kW
Hydrogen Production Equipment : 10Nm³/h
Hydrogen Storage Equipment : 1350Nm³ (2000kWh fairly)
Fuel Cell : 100kW Lithium-Ion Battery : 100kWh

Shimizu Hokuriku Branch New Building and System Overview

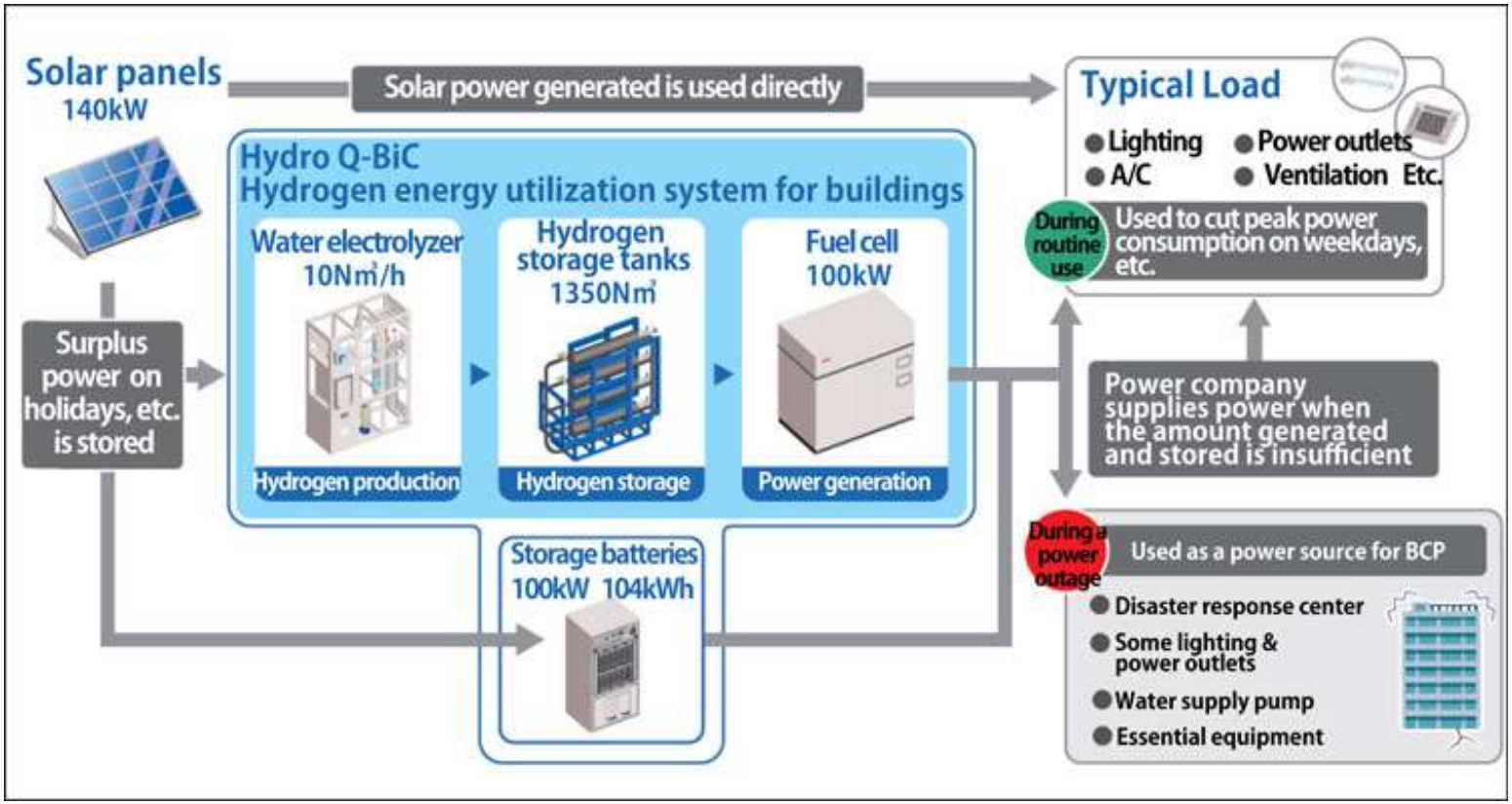


Image diagram of renewable energy utilization at Hokuriku Branch

1. Local production for local consumption of renewable energy, BCP (Disaster Utilization) model

U-Group Prism Building (completed in January 2022)

・The office building was renovated as ZEB Ready, and solar panels and Hydro Q-BiC equipment were installed on the roof of the third floor.

・At the time of disasters, the 1st ~ 3rd floors of the building will be used as an evacuation site and a private-sector disaster prevention center that accepts surrounding residents.

Hydro Q-BiC Facility installation situation

Hydrogen storage equipment

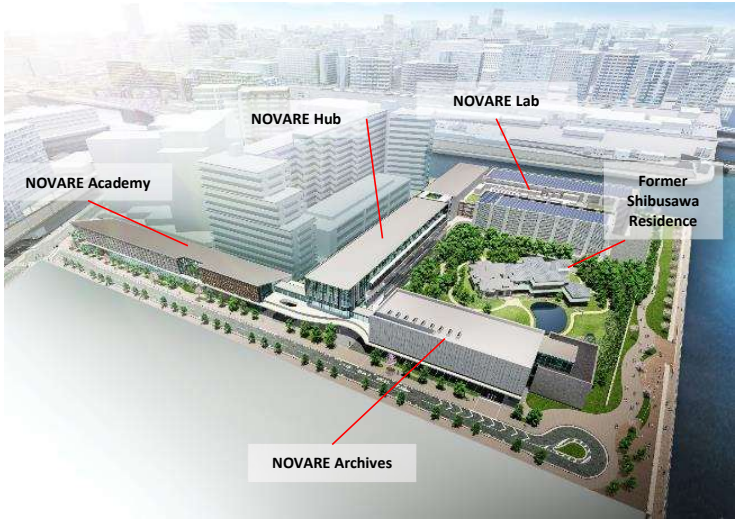
2. Carbon-free block model with hydrogen infrastructure

Smart Innovation Ecosystem NOVARE

・In addition to the renewable energy grid, green hydrogen produced off-site (outside the premises) is supplied

・Establish a foundation for the diversification of CO_2-free energy that does not depend only on the power grid

■3（Tri）CE
① Charge Energy　Recharge the energy
② Chain Edge　Continuity with the supply chain
③ Connect Element　Flexibility and coordination




Hydrogen Transportation

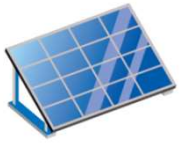
hydrogen


Hydrogen storage equipment

hydrogen


Fuel batteries

electricity


Solar Power

electricity


Electrolyzer

hydrogen


Hydrogen storage equipment

hydrogen

heat

heat


Hot water storage tank

Hydro Q-BiC System Configuration Diagram

3. Carbon-neutral model of supply chain in factories

Susumu Kogyo Co., Ltd. Obama Factory (Completed in March 2024)

- Contribute to the carbon neutrality of the supply chain at factories and use them as disaster bases
- Introduced Hydro Q-BiC to its production facilities and used hydrogen as an energy source.
  Can also be used in production processes in the future (additional piping work required)

4. District heat supply model (use of off-site hydrogen heat supply)

Joint research that contributes to the decarbonization of the waterfront subcenter

Joint research with Bureau of Port and Harbor, Tokyo Metropolitan Government, National Institute of Advanced Industrial Science and Technology(AIST), Tokyo Teleport Center Inc., Tokyo Rinkai Heat Supply Inc., Hirakawa Corporation.

【Decarbonization of electricity】 Utilization of green electricity using green hydrogen and sunlight for building lighting, etc.

【Decarbonization of heat】 First in Japan to implement hydrogen co-firing boiler for district heat supply using Metal Hydride

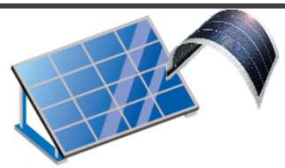
Yamanashi Prefecture

H_2

Green Hydrogen Procurement

Waterfront Subcenter

Fuel Cell



Solar Power

battery

Green Power

※1

Hydrogen Storage equipment

Hydrogen Co-Firing Boiler

heat

Green Hydrogen Combustion produces Zero CO2 emissions

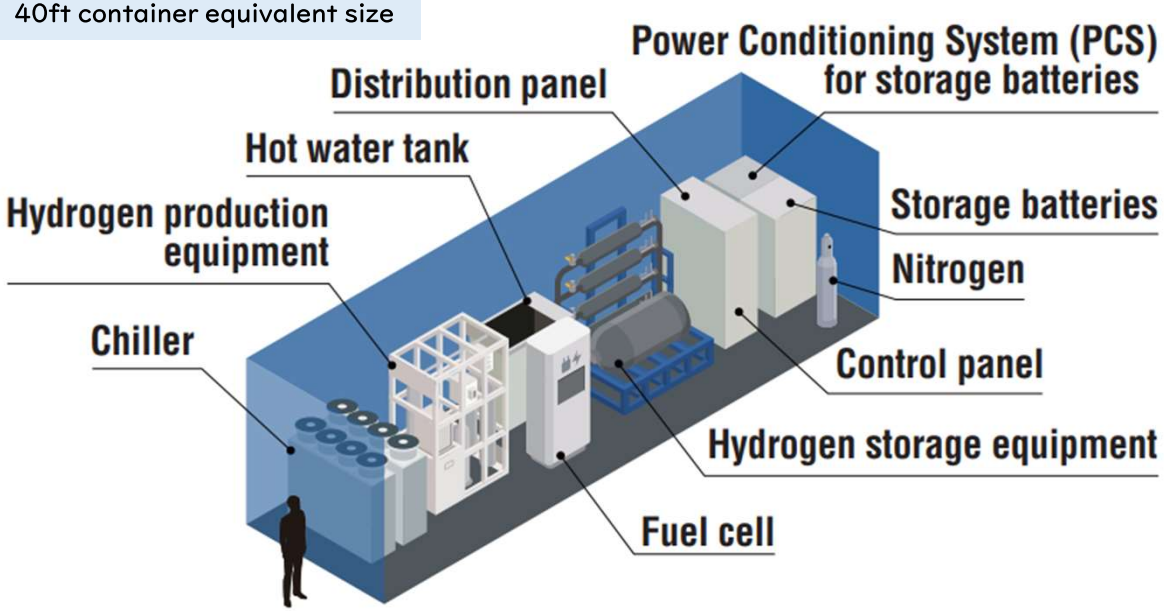
※1 Lighting Design by Motoko Ishii Lighting Design Inc.

5. Package Model (Hydro Q-BiC Lite)

- Developed package-type Hydro Q-BiC Lite
- Packaging of hydrogen from “producing→ storing → using”
- Can be used from a small start

Hydro Q-BiC Lite (Package Type)

40ft container equivalent size



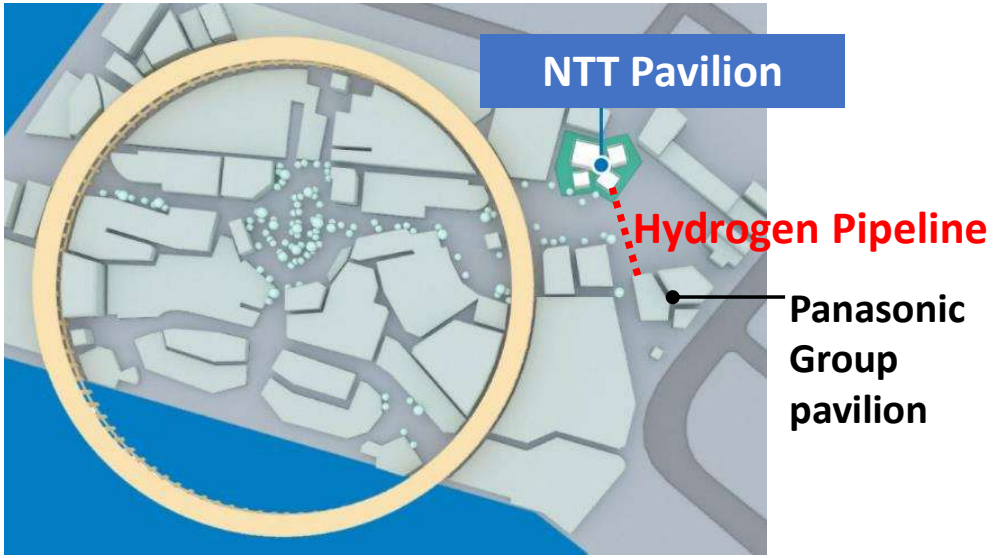
Tokyo Metropolitan Government

Subsidies can be used

5. Package Model (Hydro Q-BiC Lite)

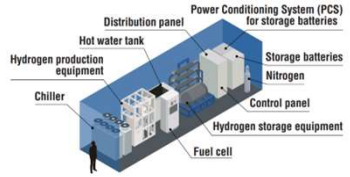
Osaka Expo NTT Pavilion

- Electricity generated by fuel cells will be supplied to the NTT Pavilion for the purpose of exhibiting next-generation power generation methods
- In addition to the fuel cells installed in the NTT Pavilion



Toward the development of "Hydro Q-BiC"

0. Small start by a packaging



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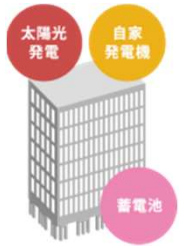
1. On-site local production for local consumption in buildings, use for BCP



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2. Utilization of hydrogen infrastructure in city blocks

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3. Decarbonization utilization in areas such as district heat supply