

Hydrogen Smart City Kobe Initiative - Towards a Carbon-Neutral Future -



OUTLINE OF KOBE CITY



- One of Japan's major cities
- 7th largest GDP in Japan (JPY 6.5 trillion in FY2017)
- All modes of transportation (land, sea and air routes)



■ Area	557.01 km ²
■ Population	1,514,434 (As of Feb. 2021)
■ Households	726,077 (As of Feb. 2021)
■ Average Temperature	16.7°C

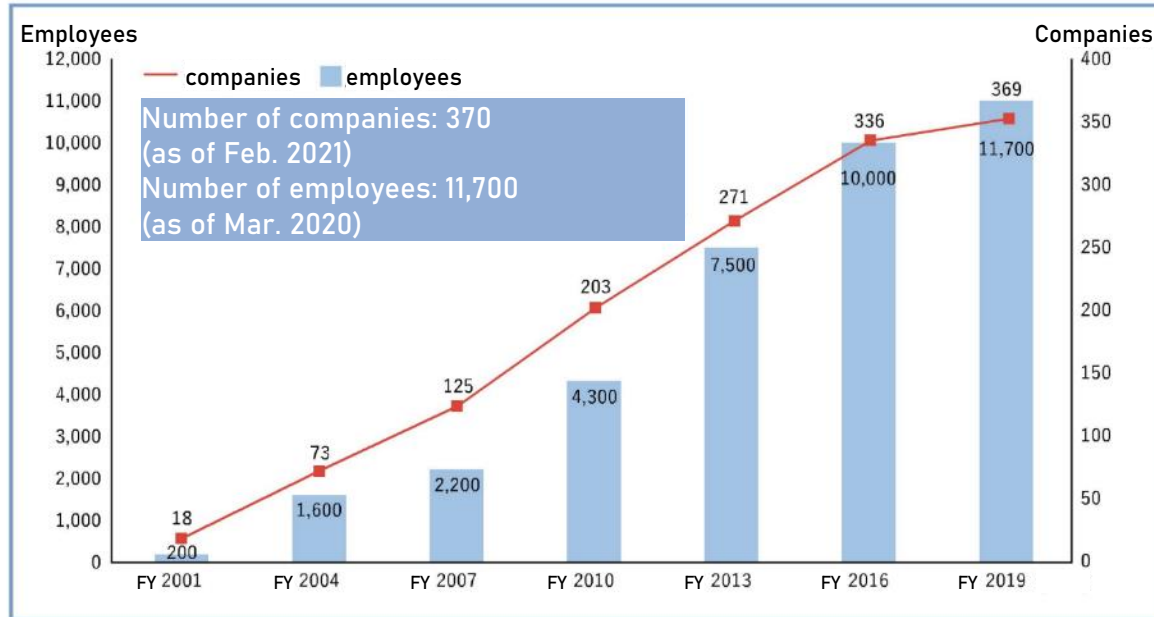


THE GREAT HANSHIN-AWAJI EARTHQUAKE (1995)

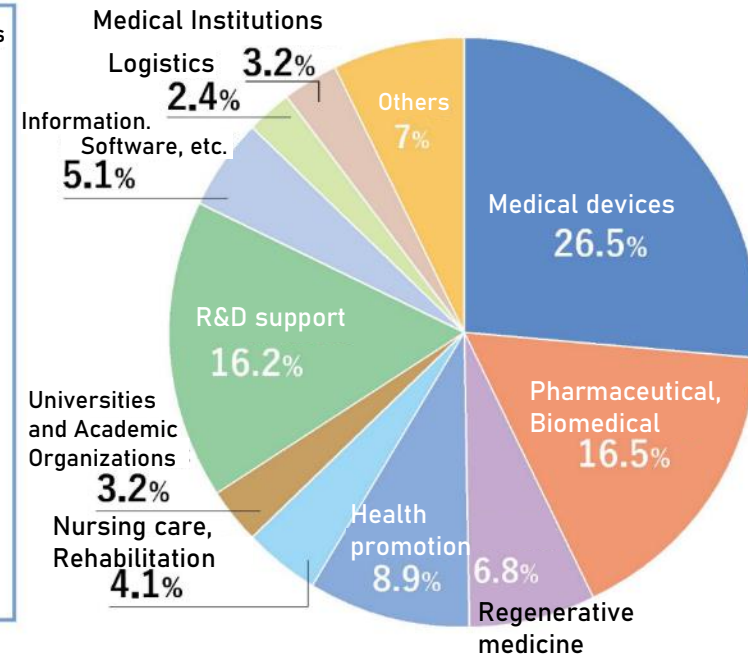


ATTRACTING MEDICAL COMPANIES

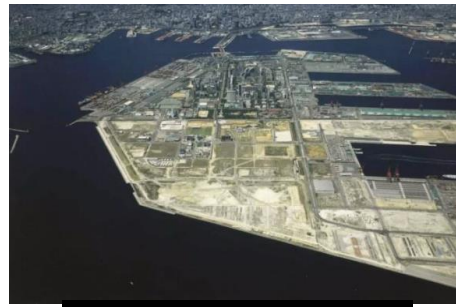
▶ Number of companies and employees



▶ Breakdown of companies



1998 (0 companies)



2001 (18 companies)



2007 (125 companies)

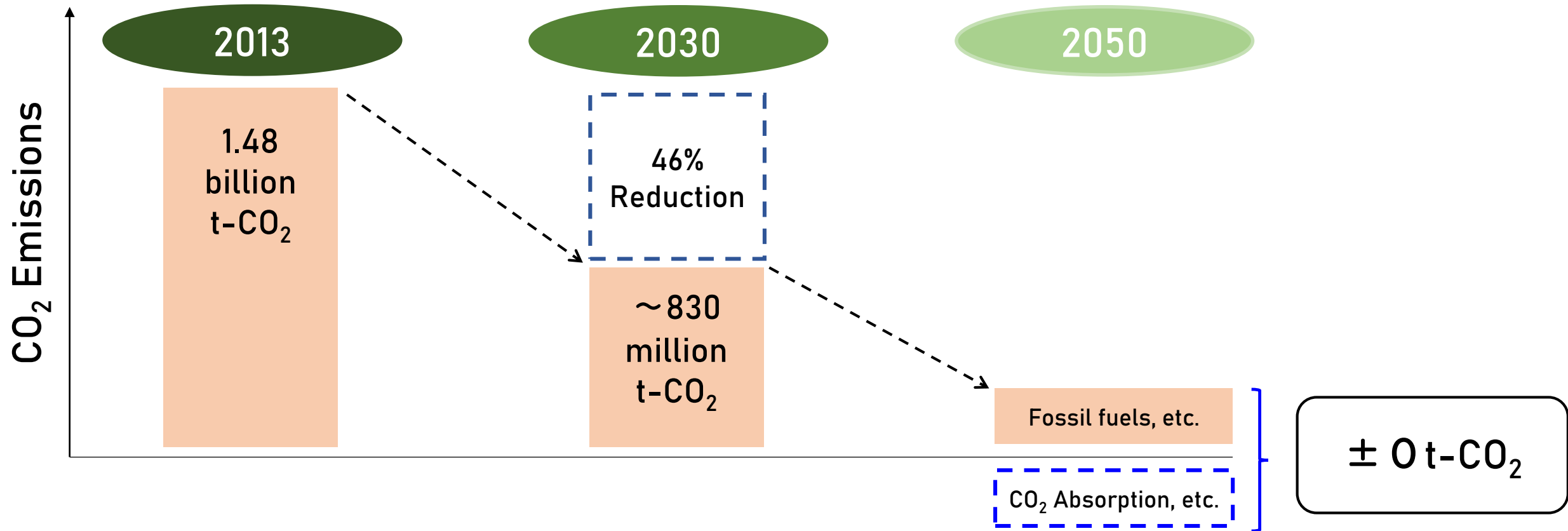


2020 (370 companies)



ENERGY POLICY IN JAPAN

- 2050 CARBON NEUTRALITY
- 2030 46% REDUCTION IN GREENHOUSE GAS EMISSIONS (COMPARED TO FY2013 LEVELS)



REDUCING CO₂ EMISSIONS

POWER GENERATION

Under the premise that the power generation sector undergoes full decarbonization:

- Renewables Introduced wherever possible
- Hydrogen Power Generation Pursued as an option whenever possible
- Thermal Power + Carbon Capture Pursued as an option whenever possible
- Nuclear Energy Utilized to the fullest extent, while at the same time lowering the country's reliance on this energy source

OTHER FIELDS

With electrification as the main pillar, demand for heat energy will be covered through the introduction of hydrogen and carbon-capture technologies:

- Industry Hydrogen-reduction steelmaking
- Transportation Electric motors, bio-fuels, hydrogen fuel
- Business & Home Use Transition to hydrogen, electricity and accumulators



GLOBAL WARMING POLICY OF THE KOBE CITY GOVERNMENT



REDUCTION TARGETS

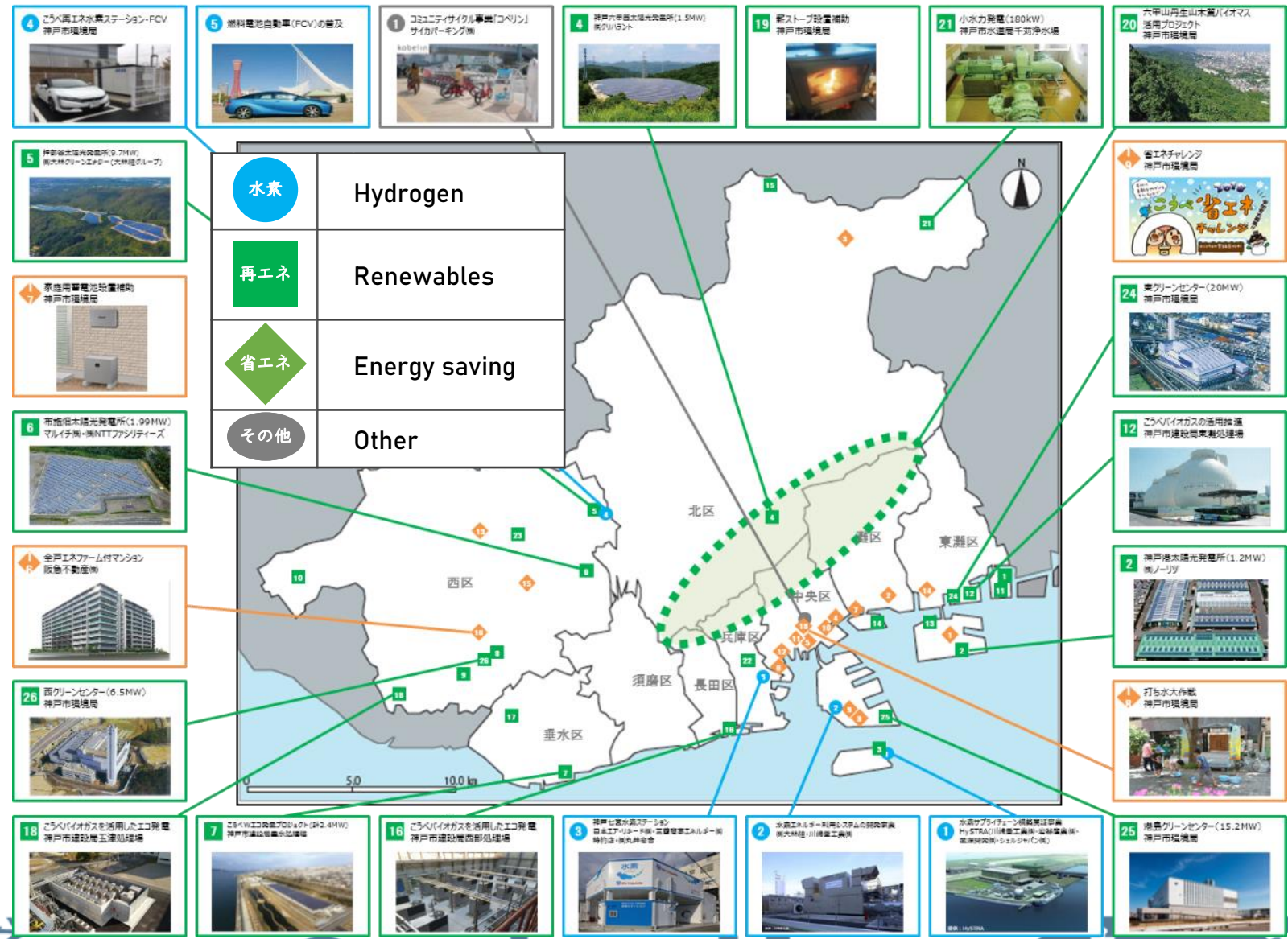
Target year	Final Energy Consumption	Greenhouse Gas Emissions
	c.f. 2013	
2030	22% ↓	34% ↓

GLOBAL WARMING PREVENTION POLICY

- Promoting energy saving
- Spreading renewable energy
- Promoting the development of innovative technologies



DISTRIBUTED ENERGY IN KOBE



PROMOTING RENEWABLES (WASTE-TO-ENERGY)

Generating energy through the combustion of waste (3 locations in Kobe)

Minatojima Clean Center



Overview of the Minatojima Clean Center

- Began operation in April 2017
- Generation capacity 15.2 MW (Generation efficiency 20.8%)
- Supplies electricity to approx. 30,000 households
- Can continue to generate electricity for more than a week in wake of a disaster

East Clean Center



West Clean Center



Waste-to-Energy accounts for 90% of renewable energy generated by municipal facilities



PROMOTING RENEWABLES (KOBE BIOGAS)

Generating biogas at wastewater treatment plants through anaerobic digestion (4 facilities in Kobe)



Overview of Kobe Biogas

- Digestion gas
(approx. 60% methane, 40% CO₂)
- ↓ Purification
- Kobe Biogas
(98% Methane)

Municipal Projects (first in Japan)

- April 2008
Started using biogas as a fuel for NGVs
- October 2010
Started injecting biogas into city gas supply

PROMOTING RENEWABLES (SOLAR ENERGY)

With some of the longest annual sunshine hours in Japan, Kobe promotes solar power, installing solar panels on public properties.



Facilities and properties with solar panels

- 340 municipal facilities
- Schools, municipal offices, parks
(Generation capacity 5,857 kW)
- 3 public properties
(Generation capacity 4,699 kW)
- 18,800 residential properties
(Under the “feed-in” tariff scheme)



HYDROGEN SMART CITY KOBE INITIATIVE PROJECT MAP

Kobe Renewable Energy Hydrogen Station



Development of a Hydrogen Energy Utilization System

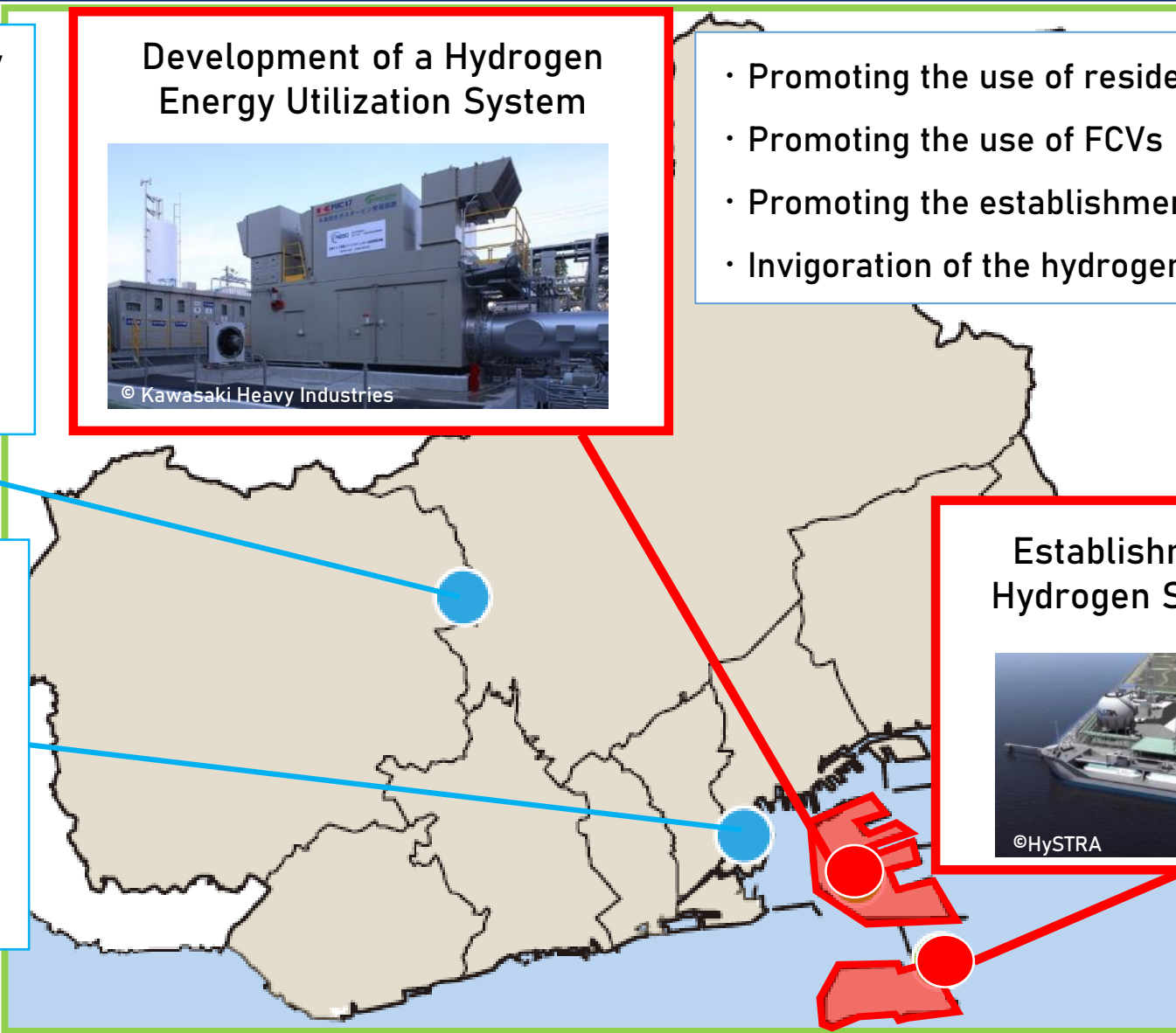


- Promoting the use of residential fuel cell units (ene-farms)
- Promoting the use of FCVs
- Promoting the establishment of hydrogen stations
- Invigoration of the hydrogen industry

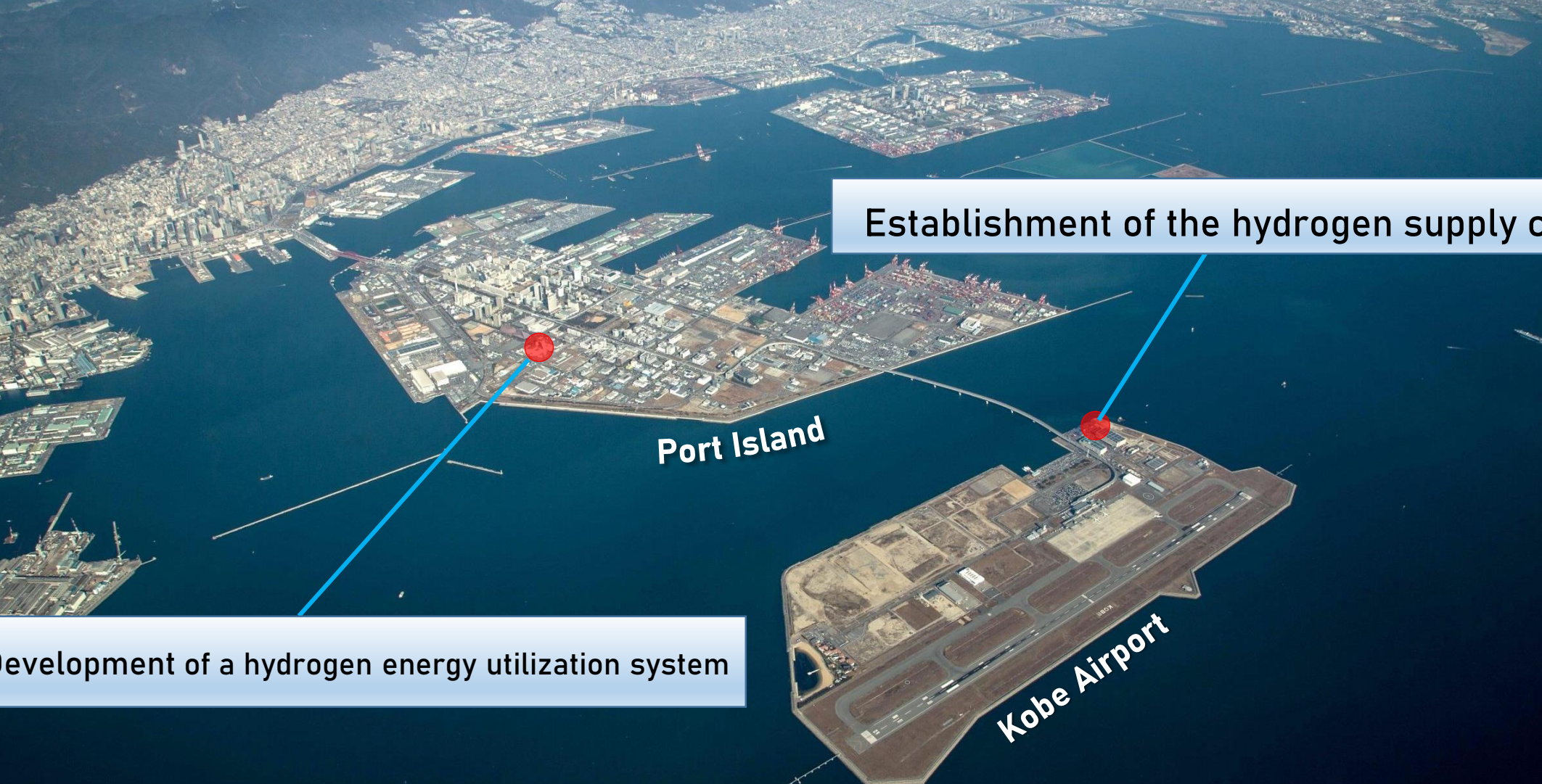
Kobe Shichinomiya Hydrogen Station



Establishment of the Hydrogen Supply Chain



WORLD'S FIRST VERIFICATION PROJECTS TOWARDS THE ESTABLISHMENT OF HYDROGEN SOCIETY



Establishment of the hydrogen supply chain

Development of a hydrogen energy utilization system



VERIFICATION PROJECT 1 ESTABLISHMENT OF THE HYDROGEN SUPPLY CHAIN



Project lead: **HYSTRA**

Courtesy of Kawasaki Heavy Industries

Supported by The New Energy and Industrial Technology Development Organization (NEDO)

INVOLVEMENT OF
THE KOBE CITY
GOVERNMENT

- Site acquisition support
- Construction of public quays
- Public awareness campaign



VERIFICATION PROJECT 2 DEVELOPMENT OF A HYDROGEN ENERGY UTILIZATION SYSTEM

The project has succeeded in supplying an urban area with heat and electricity generated by a gas turbine operating solely on hydrogen fuel

Hydrogen Co-Generation System

Courtesy of KHI



Project leads:



Kawasaki
Powering your potential

Supported by The New Energy and Industrial
Technology Development Organization (NEDO)

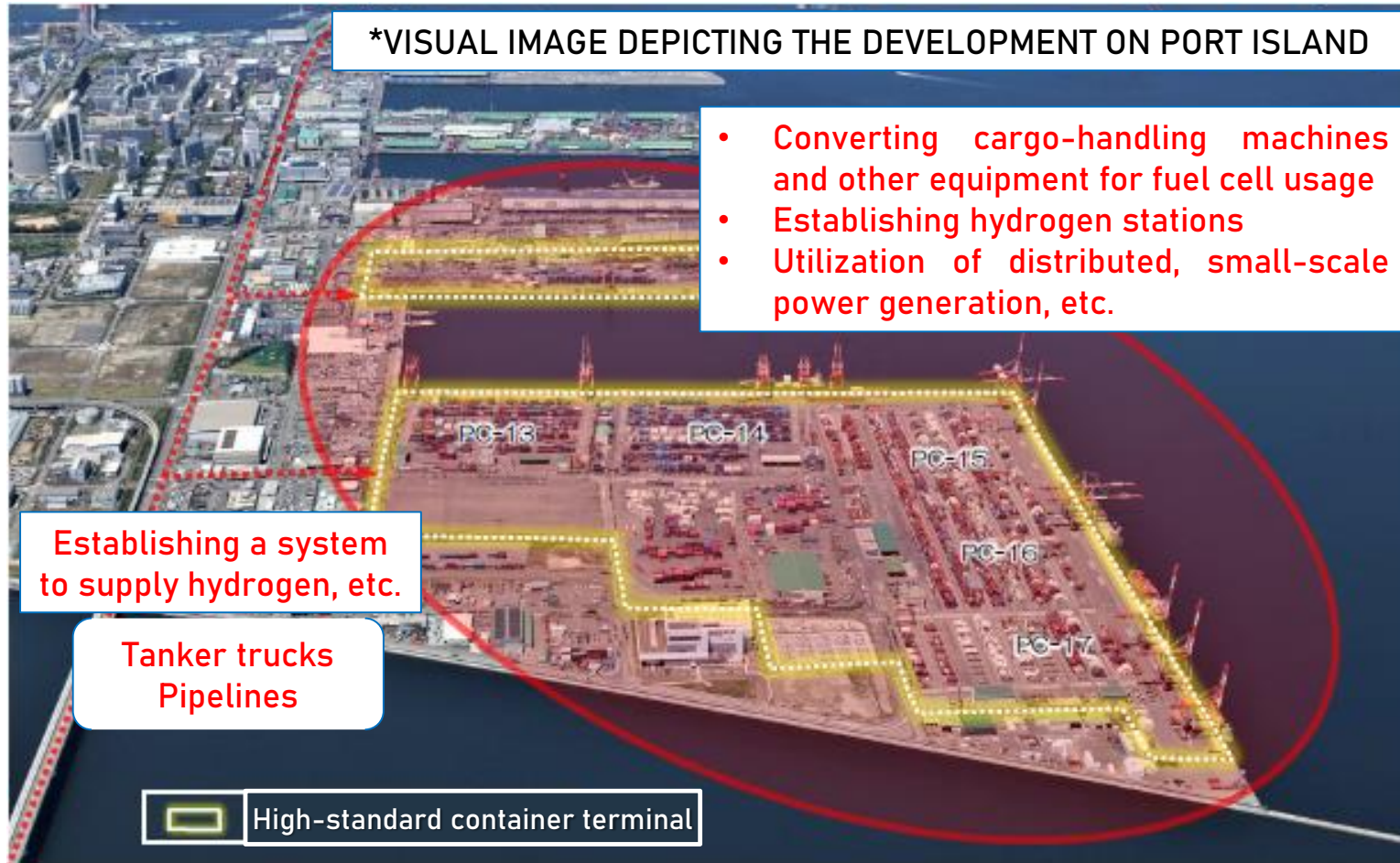
INVOLVEMENT OF THE
KOBE CITY GOVERNMENT

- Site acquisition support
- Coordination with energy recipients
- Public awareness campaign



PORT AND HARBOR LOGISTICS AREA DEVELOPMENT

By utilizing liquefied hydrogen cargo handling bases that have been established at Kobe Airport, and through our pioneering efforts to examine the potential of next-generation energy usage at our state-of-the-art port and harbor logistics areas, we aim to achieve societal implementation of these technologies.

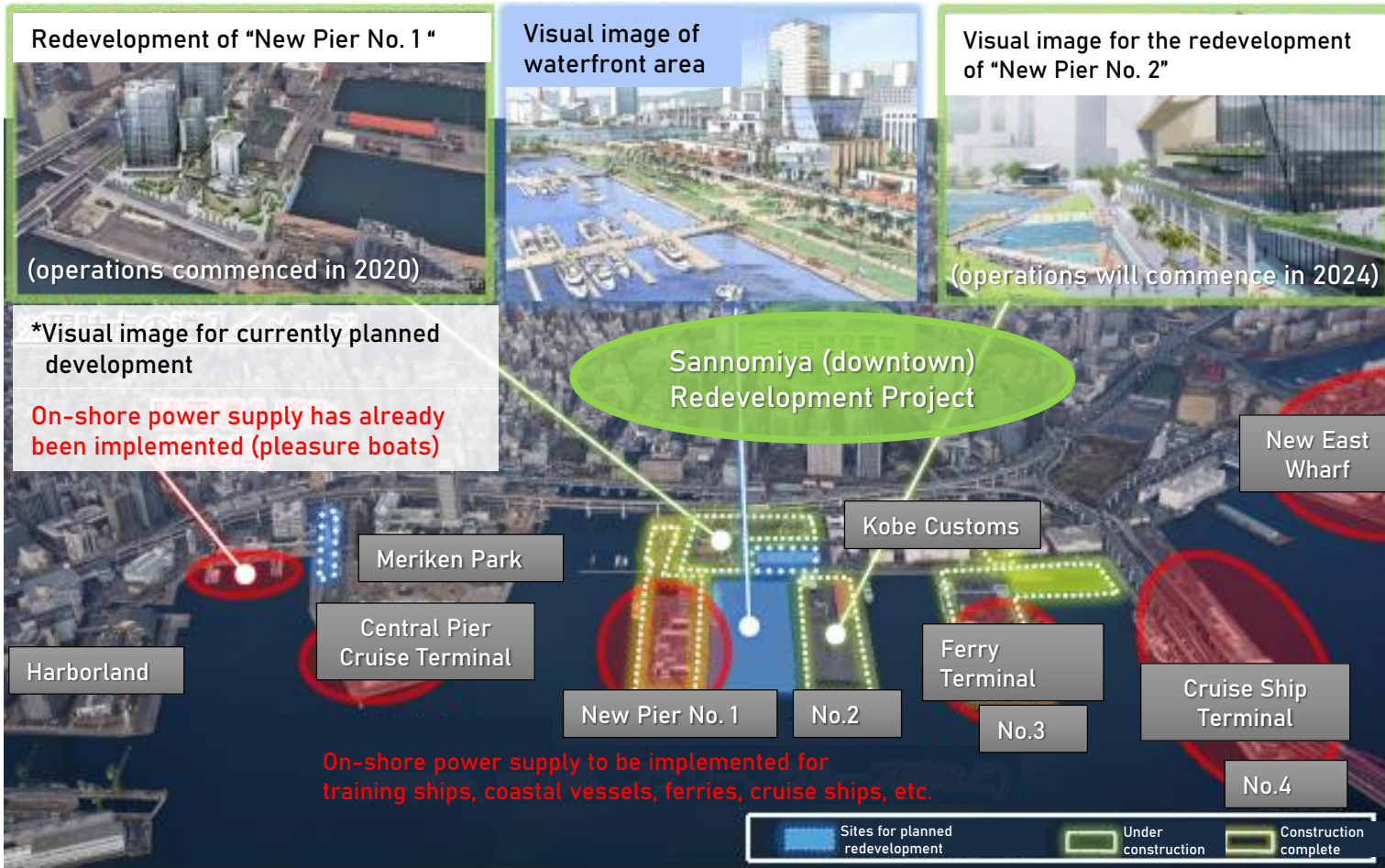


- Converting cargo-handling machines and tractor-trailer heads used to haul containers for fuel cell usage
- Establishing next-generation energy supply systems, such as hydrogen stations and distributed, small-scale power generators, etc.
- Measures for providing on-shore power supply for moored vessels/converting marine vessels for fuel cell usage, etc.



WATERFRONT DEVELOPMENT

In cooperation with private businesses in the waterfront area, the city intends to examine the possibility of implementing methods and systems that will enable us to supply energy to a diverse range of marine vessels.



- Rapid development of a highly sought-after onshore power supply system for marine vessels with a relatively long mooring time, such as training and coastal vessels
- Examining the possibility of implementing similar systems for other types of marine vessels
- Implementation of distributed hydrogen power generation, etc.

Thank you for your kind attention!

