

Business Segments

Energy Business



Overview

In an effort to keep up with changes in society, we, as Japan’s leading company focusing on zero-carbon energy, are making the most of renewable energy for use as main power source, maximizing the use of nuclear power and opting for zero-carbon power sources, including zero-carbon thermal power generation and zero-carbon hydrogen utilization. At the same time, we are committed to mobilizing our resources to help customers and society realize zero-carbon operations by proposing and providing optimal solutions, examining and demonstrating approaches to create a hydrogen-driven society.

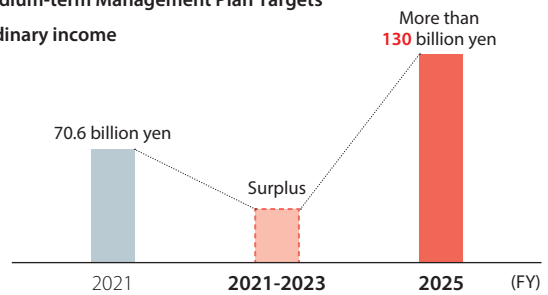
In addition, measures to improve the current account balance include safe and secure operations of the seven nuclear reactors, establishment of a competitive power portfolio, rationalization of fuel procurement and supply-demand balancing, and promotion of DX-based monitoring and maintenance, all

designed to complete cost structure reform and restore profitability.

New energy and environmental markets, meanwhile, will be developed and new values will be provided through various solutions to further boost profits.

Medium-term Management Plan Targets

Ordinary income



Business environment

Opportunities

- Create new business opportunities in new and peripheral areas in energy and environmental businesses by accelerating social change: the 3D + D* movement.
- Dramatic increase in the need to shift to “zero carbon.”

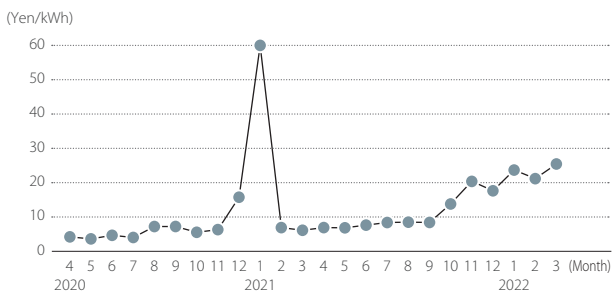
* 3D+D: Decarbonization, Decentralization, Digitalization plus *Denka* electrification

Risks

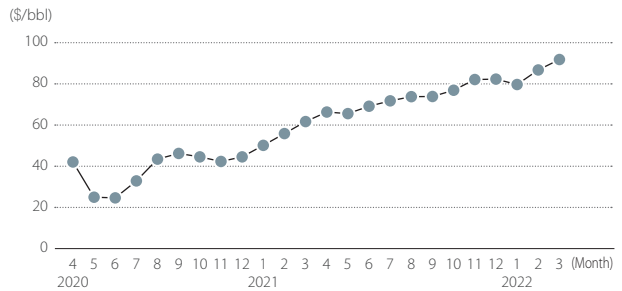
- Rising fuel prices and the yen’s sharp depreciation amid changing international situations
- Destabilization of the market due to tight supply, coupled with uncertainties in the system itself.

Market overview

JEPX market trends

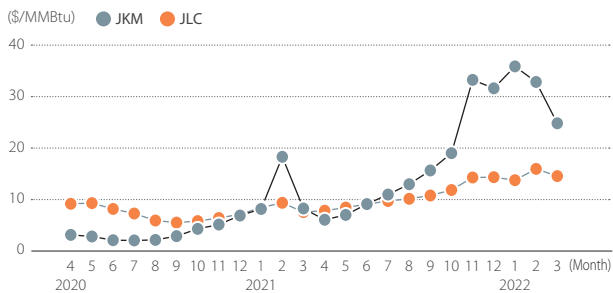


Crude oil market trends



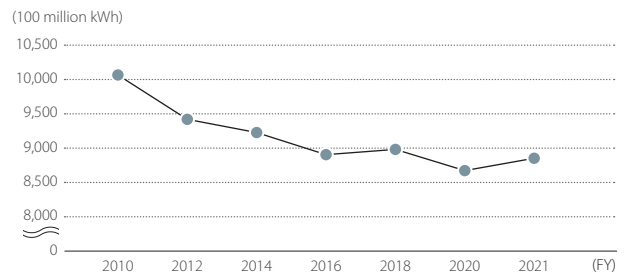


LNG market trends



Notes:
JKM: Japan Korea Marker. Platts JKM assessment spot price for LNG referenced in Northeast Asia.
JLC: Japan LNG Cocktail. Japan's average LNG import price.

Domestic electricity demand trends



Business strategies

Directions to take

- 1 Promote thorough cost structure reform to restore profitability in the energy business.
- 2 Work toward realizing "zero-carbon power sources" including zero-carbon thermal power, nuclear power and renewable energy, as well as verifying and demonstrating hydrogen energy utilization.
- 3 Provide new value through various solutions to increase profitability, while promoting electrification or *Denka*.

5-year Efforts

1 Restoration of profitability

Cost reduction

- Build a competitive power source portfolio (rationalization of low-operating power sources).
- Optimize power source operations including fuel and electricity market transactions, and minimize procurement costs.
- Promote introduction of a digital technology-based surveillance and maintenance system.

2 Zero-carbon power sources/hydrogen

Nuclear power

- Ensure operation of all seven reactors in our nuclear power plants in a sophisticated manner with safe and secure operations as a basic premise.
- Conduct technical studies of next-generation successor models with an eye on replacement, as well as surveying HTGRs and SMRs.
- Promote the nuclear fuel cycle.

Renewable energy

- Work on new development projects with a focus on offshore wind power.
- Improve existing hydropower plants.

Thermal power

- Conduct technical studies and cooperate on hydrogen/ammonia power generation and CCUS in the "carbon recycling technology hub," etc.

Hydrogen

- Conduct technical studies and demonstrations for building a hydrogen supply chain in the "hydrogen utilization technology hub" and other purposes.

3 Solutions

Provide new value to meet diversifying customer needs for new lifestyles, zero-carbon emissions, improved resilience, etc.

Household customers

- Provide services combining energy with electric appliances, storage batteries, etc. and platform services beyond energy.

Corporate customers

- Provide total support to on-site renewable energy power sources, zero-carbon menus, etc. aiming to achieve zero carbon.

Communities/e-mobility

- Provide community energy management services to improve resilience.
- Provide package services related to electric mobility.

Energy Business

Initiatives in fiscal 2021

Rigorous cost structure reforms

Each division is working on a variety of measures, including cutting down overhead and maintenance costs, to improve profits by about 90 billion yen in fiscal 2025.

Concrete measures

Streamlining inspections of hydropower plants

Conventional conduit inspections primarily involve a temporary plant shutdown and inspections where inspectors walk inside a conduit to check for possible damage.

The procedures, however, have been streamlined by the development and practical utilization of water surface drones to inspect the inside conduits and drones to inspect penstocks. This results in a shorter inspection period, lower inspection costs, and higher power outputs.

Meanwhile, our digital technology, including the use of these drones, is shared with others through our group companies, contributing to safe and efficient maintenance/management of infrastructure installation.

Streamlining monitoring inspections of thermal power plants

A robot monitoring system using AI technology is in place at our thermal power plants; the plan is to automate monitoring inspections to detect defects such as oil leaks and abnormal heat/sound in real time.

Approaches to nuclear power generation

Establishing the seven reactor system

Preparing for operation beyond 40 years

Nuclear power, a well-balanced energy source contributing to 3E (Energy security, Economy and Environmental conservation; zero-carbon society), is essential in resource-poor Japan. As a result, nuclear power generation should be maintained at a certain level to ensure energy security and develop technical/human resources, whereby accident-proof nuclear power plants can be operated for over 40 year-spans. Therefore, we will be making the most of our nuclear power plants, placing a premium on their safe operation.

Mihama Nuclear Power Station Unit 3 restarted in June 2021 with the consent of the local communities, and safety improvement construction has been completed at Takahama Nuclear Power Station Units 1 and 2 where inspections, drills, etc. are underway to resume operation.

In addition, we are communicating face-to-face with stakeholders through plant tours, community events and

participation in briefing sessions and lectures to help them better understand our nuclear power plants' operation of more than 40 years. We will also continue to proactively communicate with the public as well as communities near the plants.



Mihama Nuclear Power Station Unit 3, back in operation

Concrete measures

Promotion of safety improvement measures

Large-scale safety improvement work was completed at Mihama Nuclear Power Station Unit 3 and Takahama Nuclear Power Station Unit 1 in September 2020 and at Takahama Nuclear Power Station Unit 2 in February 2022 for safety operation of more than 40 years.

In addition to complying with new regulatory requirements, self-imposed safety measures are being practiced.

Examples of construction work to improve safety in fiscal 2021:

- Fire prevention measures, with main cables replaced with flame-retardant counterparts (Takahama Nuclear Power Station Unit 2)

Examples of voluntary safety improvement measures in fiscal 2021:

- Shutdown seals were installed to prevent leakage from primary reactor coolant pump (RCP) seals in case units lose all AC power sources (Takahama Nuclear Power Station Units 3 and 4, and Ohi Nuclear Power Station Unit 3).

Addressing challenges with replacement in mind

Review of options such as next-generation light-water reactors, high-temperature gas-cooled reactors and SMRs*

While maintaining and leveraging nuclear power generation are key to creating a zero-carbon society, construction, expansion and replacement of reactors should be continued to secure technical expertise and human resources for nuclear safety.

We cooperate with plant engineering companies in designing next-generation light-water reactors with improved safety and efficiency in preparation for future replacement while reviewing possible options such as high-temperature gas-cooled reactors and SMRs, monitoring the latest development trends at home and abroad.

*Small Modular Reactors

Initiatives prioritizing safety

To prevent the lessons of the Mihama Nuclear Power Station Unit 3 accident from fading away

On August 9, 2004, an accident involving the rupture of secondary system piping occurred at Mihama Nuclear Power Station Unit 3. Based on the President's Declaration "Ensuring safety is my mission, and the mission of the Company," we have strictly implemented recurrence-prevention measures, with a firm determination that we shall never cause such accidents. The Nuclear Power Division has established Five Basic Principles as preventive measures that form part of our quality policy concerning the operation of nuclear power businesses with safety as the top priority. These measures are revised as necessary for safety improvement purposes. Making every August 9th our "Safety Vow Day," every employee observes a moment of silence. We are working to cultivate a safety culture in order to implement business management with safety as the top priority and prevent the lessons of the Mihama Nuclear Power Station Unit 3 accident from fading.

Establishment of a company proclamation: Commitment to Enhancing Nuclear Safety

In response to the accident at the Tokyo Electric Power Fukushima Daiichi Nuclear Power Station, we established our Commitment to Enhancing Nuclear Safety, which clearly states our idea about nuclear power safety, as a company proclamation, one of our most important company rules. This company proclamation underlines our determination to constantly improve safety in nuclear power generation, whereby all executives and employees fully understand the characteristics and risks of nuclear power generation and always remind themselves of the potential magnitude of an accident, with the President playing a leading role in making company-wide efforts to protect local communities, society and environment.

Concrete measures

Learning lessons from the accident at Mihama Nuclear Power Station Unit 3, we place a premium on nuclear safety. Specifically, the accident at the Tokyo Electric Power Fukushima Daiichi Nuclear Power Station made us aware that our understanding and preparedness for risks unique to nuclear power generation were not necessarily sufficient. We, therefore, established a roadmap to enhance practicing voluntary and continued measures to improve safety in nuclear power generation, with relevant efforts underway.

Boosting the accident response capacity

Comprehensive emergency response drills are conducted at all nuclear power plants as a precaution in the event of a nuclear disaster. In preparation for severe accidents beyond design basis, involving serious cases such as injuries during accident response,

efforts are also underway to further improve accident response capacity. These specifically include unscripted drills for participants and quick, appropriate restoration activities based on continuous improvements made by previous drills, all designed to prevent accidents from expanding. At the same time, we are working with five power companies* and affiliates in West Japan to better deal with nuclear disasters.

Examples of drills:

- Participating in Fukui Prefecture nuclear power comprehensive emergency response drills, we helped set up a task force for operations, accident control, and community evacuation support, assuming loss of plant power in the event of an earthquake.
- "Stress training" programs were conducted for plant task force leaders to help them handle severe accidents where a variety of stressful situations occur simultaneously or in succession.

*Hokuriku Electric Power Company, our Company, the Chugoku Electric Power Co., Inc., Shikoku Electric Power Co., Inc., and Kyushu Electric Power Co., Inc.

Reliable decommissioning processes

Decommissioning status of Mihama Nuclear Power Station Units 1 and 2 and Ohi Nuclear Power Station Units 1 and 2

Decommissioning is conducted in four stages, which all together take a total of about 30 years. Currently, Ohi Nuclear Power Station Units 1 and 2 are under preparation for dismantling (stage 1), while Mihama Nuclear Power Station Units 1 and 2 started dismantling and removal of peripheral facilities of reactors (stage 2) in fiscal 2022. Appropriate measures are in place for decommissioning, with the highest priority given to safety.

Approaches to renewable energy

Further developing and leveraging renewable energy

Leading Japan in zero-carbon energy production, our Group is committed to proactively developing renewable energy based on its improved development promotion system, focusing on offshore wind power generation, which has great development potential.

Through investment of a total 1 trillion yen in domestic projects, we aim to develop 5 GW scale of new development and to achieve 9 GW scale of cumulative capacity by 2040.

On the domestic front, for example, we focus on increasing hydropower output and promoting solar power, onshore wind power, offshore wind power, biomass power and geothermal power generation, the total capacity of which stands at about 3.56 GW as of the end of March 2022. We will continue to reduce power generation costs, push ahead with ongoing projects and develop new power sources, thereby helping customers and society achieve zero carbon.

Energy Business



Biomass:
Kanda Biomass Power Plant



Offshore wind:
Port of Akita and Port of Noshiro Project*
(Source: Akita Offshore Wind Corporation)

Concrete measures

Development status in Japan in fiscal 2021

- In May 2021, a comprehensive partnership agreement was signed with Eco Style Co., Ltd. (headed by Masataka Kinoshita, president and executive officer) to offer renewable energy solutions, with a commitment to creating a zero-carbon society and promoting renewable energy.
- The Kansai Electric Power Co., Inc., Osaka Gas Co., Ltd. and Development Bank of Japan jointly acquired Shizukuishi Solar Power Plant, Haru Mito Solar Power Plant, and Komatsu Solar Power Plant in June 2021, and Misawa Solar Power Plant in July 2021. These solar power plants in Japan were previously owned by the Canadian renewable energy power generation company Etrion Corporation.
- In June 2021, a consortium including the Kansai Electric Power Company was selected as an operator by public offering for an offshore wind power project located off the coast of Goto City, Nagasaki Prefecture.
- In August 2021, the Company signed a partnership agreement with RWE Renewables Japan to study the feasibility of a large-scale floating offshore wind turbine power generation project in Japan.
- In September 2021, the Company took a stake in the CEF Tsuyama Wind Farm, an onshore wind farm project in Tsuyama City, Okayama Prefecture.
- In February 2022, the Kansai Electric Power Group started commercial operation of the Kanda Biomass Power Plant.
- In March 2022, the Company submitted a document on planning-stage primary environmental impact consideration and other issues to the Ministry of Economy, Trade and Industry, in accordance with the Environmental Impact Assessment Act, to study the development of an offshore wind farm project located off the coast of Karatsu City, Saga Prefecture.

Refurbishment of existing hydropower facilities

Hydropower generation, which has a history of over 100 years, has been providing clean energy in a safe and stable manner while co-existing and building mutual trust with local communities. Leveraging our accumulated expertise in

hydropower, we conduct timely maintenance to extend the service life of facilities, thereby streamlining overall operations.

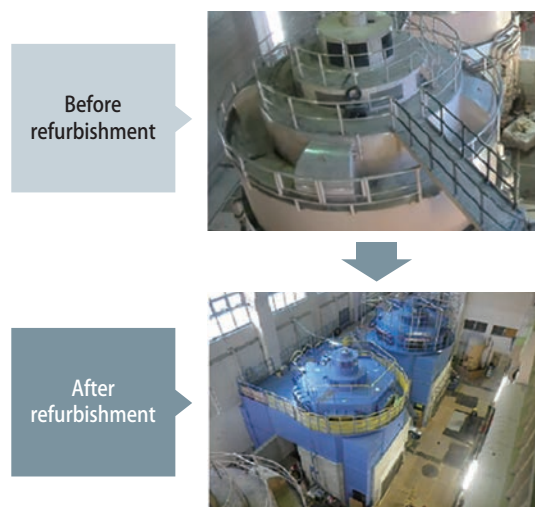
Refurbishment, for example, is planned for aging power generation facilities (replacement of water turbine generators) to further extend the service life, with modern equipment and design technology expected to improve their power generation efficiencies.

We will systematically refurbish existing hydropower facilities, as hydropower is a key power source that contributes to creating a decarbonized society.

Concrete measures

Power plants under refurbishment (FY 2021)

- Kurobegawa No. 2 Power Station Unit 3
Before refurbishment 73.6 MW
After refurbishment: 74.7 MW (to be completed in September 2023)
- Kasagi Power Station Unit 1
Before refurbishment: 41.7 MW
After refurbishment: 50.8 MW (to be completed in July 2023)



Using biomass at existing thermal power plants

We established Aioi Bioenergy Corporation with Mitsubishi Corporation Clean Energy Ltd. where fuel switch from heavy/crude oil to woody biomass is planned at the Aioi Power Station Unit 2 (Aioi City, Hyogo Prefecture); construction started in February 2020, with commercial operation scheduled for January 2023.

Woody biomass is a carbon-neutral energy source and we have been working on co-firing with coal at the Maizuru Power Station.

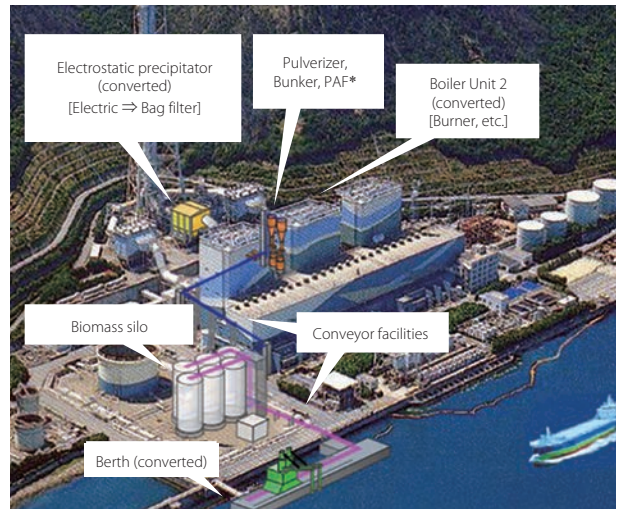
With a designed output of 200,000 kW, the Aioi Power Station Unit 2 is set to become one of the largest biomass thermal power plants in Japan.

We will continue to reduce CO₂ emissions, playing a part in achieving a zero-carbon society.

<Aoi Power Station overview>

Location: 5315-46 Aoi, Aoi City, Hyogo Prefecture

	Unit 1	Unit 2	Unit 3
Commencement of operation	September 1982	November 1982	January 1983
Rated capacity	375,000 kW	375,000 kW ⇒ Approx. 200,000 kW	375,000 kW
Fuel	LNG, Heavy oil and Crude oil	LNG, Heavy oil and Crude oil ⇒ Woody biomass	LNG, Heavy oil and Crude oil



*A ventilator that feeds pulverized fuel to burners

Initiatives of the thermal power division

Challenge for realizing zero-carbon thermal power generation system

We support an entity*1 involved in a NEDO*2 project where the feasibility of treating coal-fired emissions with solid sorbent system CO₂ capture technology*3 is studied, providing a site for testing facilities at our Maizuru Power Station for future demonstrations. The solid sorbent system to be demonstrated is potentially a great deal more energy efficient than its conventional counterparts in capturing CO₂ and hence is considered promising next-generation capture technology. The construction of demonstration facilities started on July 1, 2021, with the commissioning run starting in fiscal 2022, followed by demonstrations in fiscal 2023.

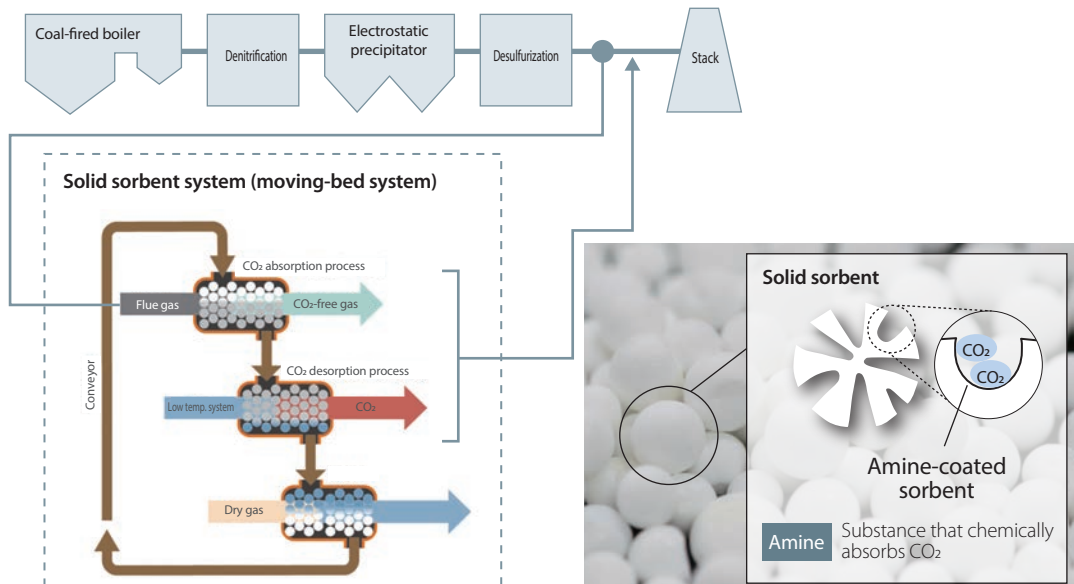
We also support an entity*4 involved in an additional NEDO project*5 at our Maizuru Power Station to develop bulk CO₂

marine transport technology where R&D/demonstration sites are provided. The project, which involves CO₂ liquefaction at the shipping base, includes 1) R&D of liquefied CO₂ marine transport technology, 2) demonstrations of annual 10,000 tonne scale of CO₂ marine transport and 3) marine transport feasibility studies for CCUS purposes. Demonstrations of CO₂ marine transport are scheduled to start in fiscal 2024.

Through these initiatives, we are committed to reducing CO₂ emissions toward the realization of a decarbonized society.

- *1 Kawasaki Heavy Industries, Ltd. Research Institute of Innovative Technology for the Earth (RITE)
- *2 New Energy and Industrial Technology Development Organization
- *3 CCUS R&D and demonstration project / R&D of CO₂ capture technology / Feasibility study of treating coal-fired emissions with advanced solid sorbents
- *4 Japan CCS Co., Ltd., Engineering Advancement Association of Japan, Itochu Corporation, Nippon Steel Corporation
- *5 CCUS R&D and demonstration project / Large-scale CCUS demonstration in Tomakomai / Technological development and demonstration of CO₂ shipping

Demonstration flow



Energy Business

Securing procurement of fuel

Our ongoing efforts include securing procurement of fuel, improving flexibility in responding to fluctuations in power demand, and further improving the economic efficiency of the operations.

Specifically, our efforts involve diversifying suppliers and pricing systems, and taking part in the LNG value chain from

production to receiving of LNG, including upstream (interest acquisition) and midstream (transportation, etc.) operations, with various business activities underway.

Fuel prices, meanwhile, are soaring along with short supply due to the increasingly tense international situation caused by the war in Ukraine. We will thus continue to focus on international affairs and fuel market trends to secure fuel in a stable and cost-effective manner.

Enhanced spot trading for agile LNG procurement and sale

We are expanding our information gathering network in Singapore, the LNG hub in the Asia Pacific region, to respond to fluctuations in power demand.

This network is designed to gather information on LNG trade movements and prices in a timely manner, promoting procurement and sale of LNG through KE Fuel Trading Singapore Pte. Ltd. to reinforce our trading capabilities.



Approaches to hydrogen energy utilization

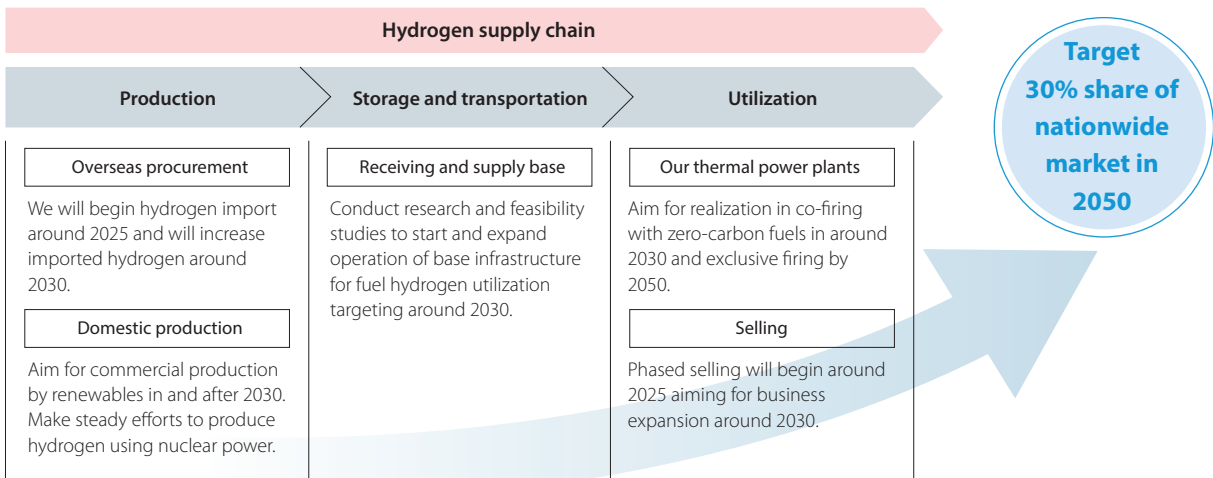
Toward realizing a hydrogen-driven society

The Kansai Electric Power Group has been bracing itself for the upcoming hydrogen society, given that hydrogen is key to achieving zero carbon in various sectors such as power generation, industry, and transportation.

In March 2022, for example, we developed the Zero Carbon Roadmap to achieve the Zero Carbon Vision 2050 where

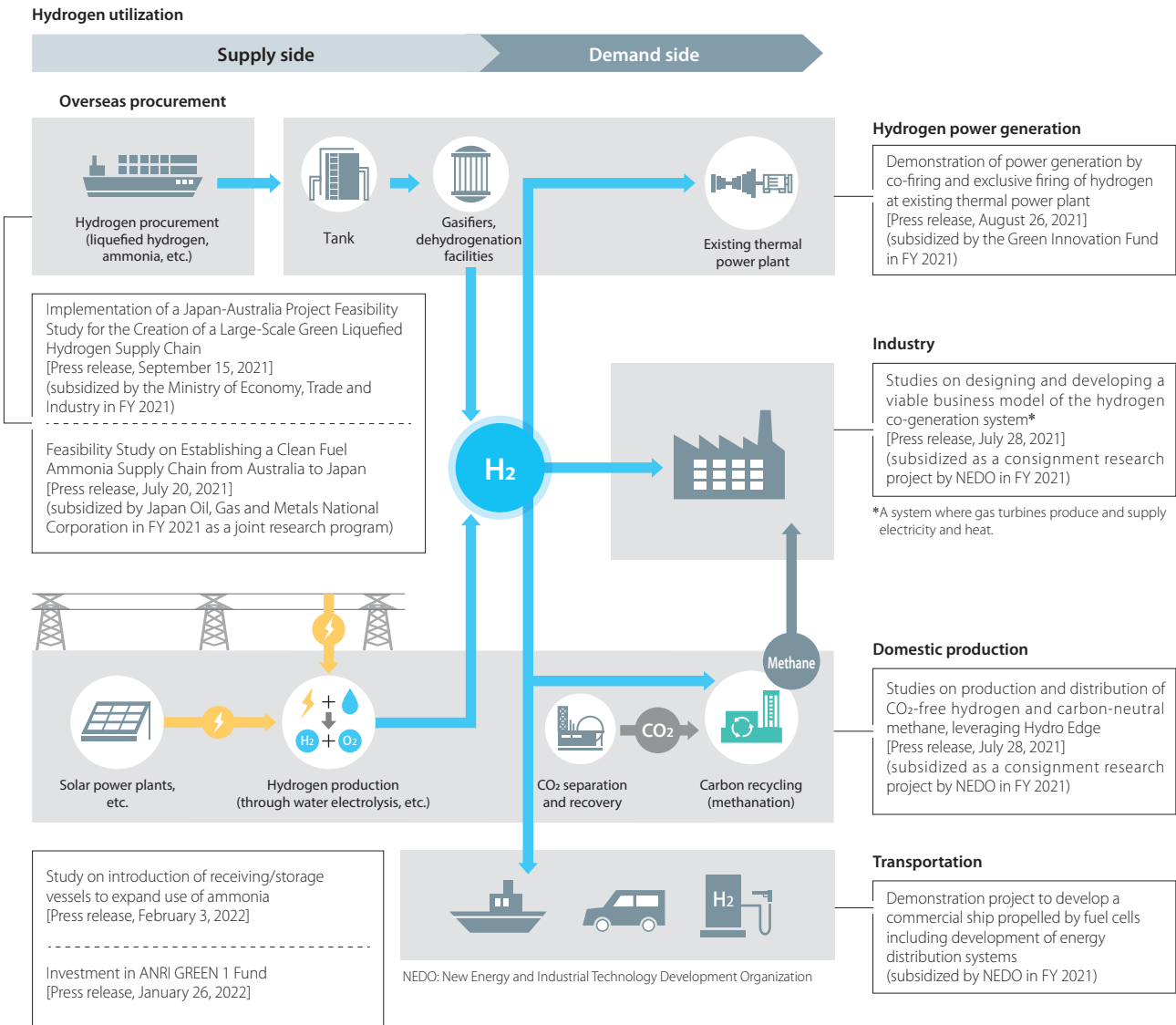
targets are set for creation of a hydrogen society.

We will pursue every possible option, including hydrogen and ammonia, while working together with various stakeholders to accelerate efforts with the future in mind.



Concrete measures

We are advancing efforts to realize a hydrogen-driven society through consideration of a wide range of hydrogen business opportunities in production, transport, supply, and utilization of generation fuel, including ammonia, as a hydrogen carrier.



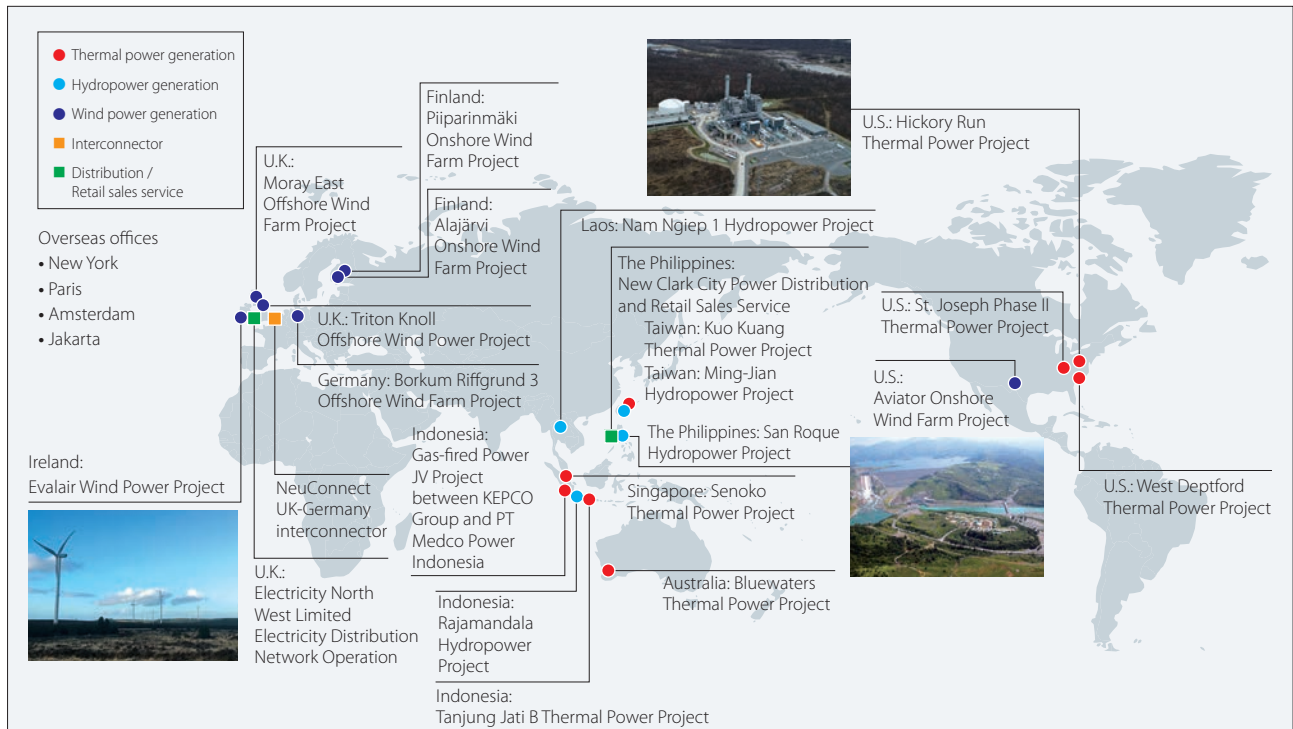
Energy Business

Overseas Energy Business

Overview

We are participating in a total of 22 projects in the domains of power generation, transmission and distribution across 11 countries. Our first international project was in 1998 when we participated in the San Roque Hydropower Project located in the Philippines. This made us the first Japanese utility to participate in an overseas electric power project.

Utilizing our overseas bases including New York and Amsterdam, we aim to expand our overseas energy business so it can continue to grow as a key cornerstone of the Group's overall earnings.



Business environment

Opportunities

- Rising energy demand, particularly in emerging countries, expands opportunities to increase revenue.
- As the notion of ESG and shift toward decarbonization gain momentum, new business opportunities emerge in the field of renewable energy.
- Development of new technologies such as hydrogen, batteries, and floating offshore wind power lead to new business opportunities.
- Advancement in the use of digital technologies (AI, IoT, etc.) expands the frontier for new business opportunities.

Risks

- Risk associated with pandemics, natural disasters, civil wars and terrorism
- Decline in the business conditions of thermal power projects due to the acceleration of global decarbonization.
- Risks where ongoing projects become less profitable due to external factors such as international instability, economic slowdown, policy changes, market fluctuations, and climate change.

Business strategies

Directions to take

- ① Promote energy businesses that contribute to achieving zero-carbon society.
- ② Provide solutions related to our customers' energy usage.
- ③ Improve profitability by utilizing our business know-how and leveraging our network.

5-year Efforts

① Zero carbon

- Focus on IPP projects mainly in the field of renewable energy.
- Participate in transmission and distribution businesses that contribute to power grid stabilization when large-scale renewables are introduced.
- Participate in businesses utilizing new technologies such as hydrogen, storage batteries and floating offshore wind turbines.

② Solutions

- Support the reduction of energy costs and the environmental load.
- Support the planning, construction and operations of power stations by combining AI and IoT with our technological strengths.

③ Increase profitability

- Asset portfolio reclassification.
- Apply feedback from overseas operations to domestic businesses.
- Enhance risk management capabilities.

Initiatives in fiscal 2021

Expansion of our overseas power business

In fiscal 2021, we launched joint business of advanced gas-fired power generation and O&M services in Indonesia in partnership with Kanden Power-Tech Corporation and PT Medco Power Indonesia; a joint venture between the three companies operates five gas-fired power plants (with a total installed capacity of 202,000 kW) while providing O&M services at three locations. This project marked our first overseas undertaking to collaborate with local power developers for the continuous and sustainable development of energy infrastructure in the country.

We have also acquired a stake in the Alajärvi Onshore Wind Farm Project in Finland, our second onshore wind farm project in the country, with the first being in Piiparinmäki. The currently under-construction Alajärvi Onshore Wind Farm Project boasts 36 large-scale onshore wind turbines with a total generation capacity of 221,000 kW. Once in operation it will serve as one of Finland's largest-scale onshore wind farm. Furthermore, in Germany, we have acquired a stake in the Borkum Riffgrund 3 Offshore Wind Farm Project, one of the largest of its kind and our first ever German power generation project. It marks the seventh overseas wind farm project in our asset portfolio. With these new projects on stream, our overseas renewable capacity has been expanded to reach approximately 1.09 GW.

The Triton Knoll Offshore Wind Power Project and the Moray East Offshore Wind Farm Project in the UK, along with the aforementioned Piiparinmäki Onshore Wind Farm Project in Finland, have all been completed and started commercial operations in fiscal 2022.

The Group is committed to continued development of renewable power, helping lead the way toward a zero-carbon society both in Japan and worldwide.

Power generation capacity by investment ratio (as of the end of June 2022)

2.878 GW

Breakdown:
Thermal power: 1.788 GW
Renewable energy: 1.090 GW

Overseas power projects (as of the end of June 2022)

22 projects in 11 countries



Inauguration of the gas-fired power JV project between KEPCO Group and PT Medco Power Indonesia



Piiparinmäki Onshore Wind Farm Project

Achieving the targets set in our Medium-term Management Plan

We are concentrating our efforts toward achieving the profit targets set in the Medium-term Management Plan by participating in regulated business with stable cash flow and early development stage projects with higher expected return, and by moving planned projects forward successfully as well as by continually improving businesses in which we have a pre-existing stake.