

J-POWER

Medium-Term Management Plan

FY2021-FY2023

April 30, 2021

Electric Power Development Co., Ltd.

Challenge to Create Value with an Eye on the Future

- With the mission of meeting people's needs for energy without fail and playing our part for the sustainable development of Japan and the rest of the world, J-POWER has been engaged in the hydroelectric, thermal, wind, and geothermal power generation business and the power transmission and transformation business¹. To achieve this mission, J-POWER announced J-POWER "BLUE MISSION 2050" in February 2021, which has set a goal to be challenged of realizing carbon-neutral power generation business by 2050 and has also set the intermediate goal of reducing CO₂ emissions by 40%² by 2030.

- As a step in the challenge to realize carbon neutrality based on BLUE MISSION 2050, J-POWER has formulated a new Medium-Term Management Plan for the three years from FY2021 to FY2023³.

In the new Medium-Term Management Plan, J-POWER will take multifaceted approaches toward realizing carbon neutrality through creativity and ingenuity based on the comprehensive technical and development capabilities that it has cultivated so far. J-POWER will strive to increase its corporate value through working on the realization of carbon neutrality by combining three approaches: accelerating the development of CO₂-free power sources in Japan and abroad, upcycling the existing assets, and challenging to new business areas.

- J-POWER will build a solid business foundation that supports advancing these approaches while responding to society's requests for a stable power supply and strengthening resilience. While focusing on improved profitability and higher efficiency in asset management, J-POWER will realize sustainable growth by promoting ESG management, share the results with all stakeholders, and contribute to sustainable social development.



Toshifumi Watanabe
Representative Director
President and Chief Executive Officer

1 From the standpoint of ensuring the neutrality of power transmission companies, our transmission and transformation business is operated by J-POWER Transmission Network Co., Ltd. (hereinafter, "J-POWER Transmission"), a wholly-owned subsidiary of J-POWER.

2 CO₂ emissions from J-POWER's domestic power generation business (compared to the 3-year average of actual emissions in FY2017-FY2019)

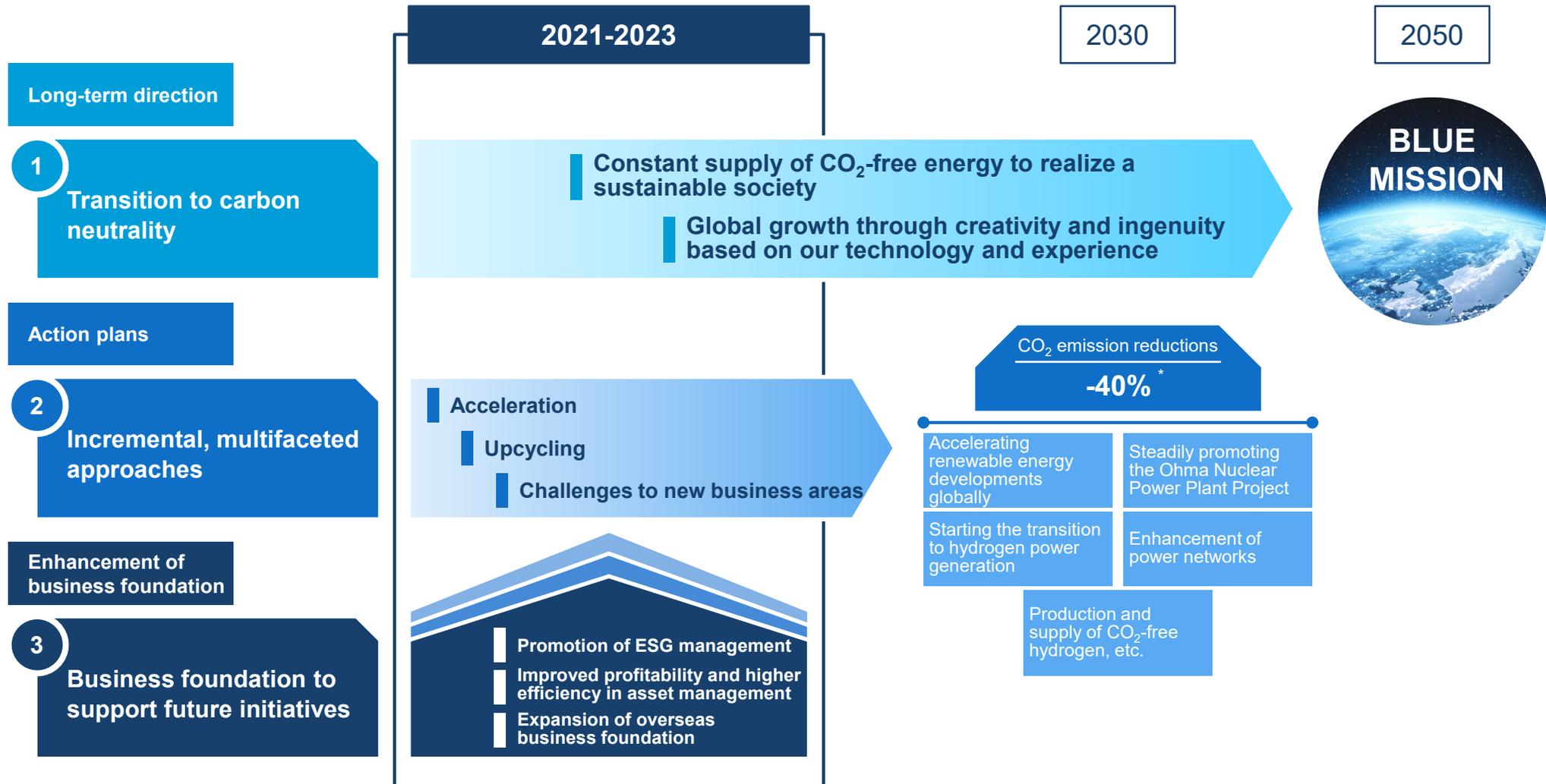
3 The FY2015-FY2025 Medium-Term Management Plan announced on July 31, 2015 was replaced with this new plan. In FY2015-FY2020, the first-half period of the old plan, J-POWER obtained desired results such as expanding power supply capacity in Japan and abroad and developing technologies to address the climate change issues. J-POWER also started new initiatives such as the electric power retailing business and the development of offshore wind power in Japan and abroad.



Medium-Term Management Plan FY2021-FY2023

The Goal of the Medium-Term Management Plan

J-POWER aims to increase its corporate value through challenging the transition toward realizing carbon neutrality in 2050. These initiatives in FY2021-FY2023 have been summarized in the framework of the Medium-Term Management Plan.



* CO₂ emissions from J-POWER's domestic power generation business (compared to the 3-year average of actual emissions in FY2017-FY2019)

Multifaceted Approaches

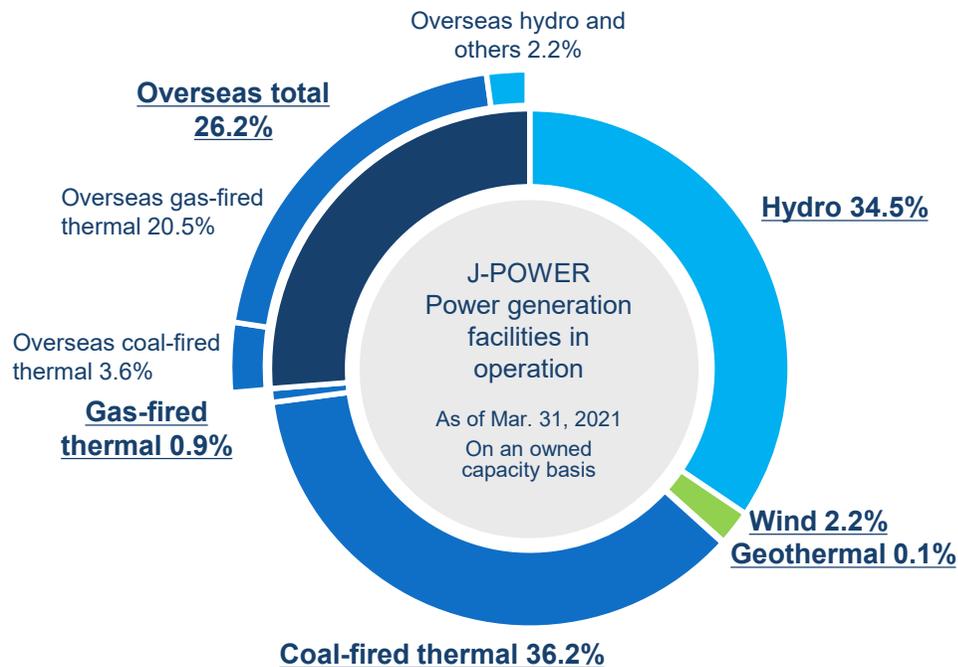
J-POWER has accumulated many achievements in Japan and abroad, building a balanced business portfolio.

J-POWER will take multifaceted approaches toward realizing carbon neutrality by leveraging the comprehensive technical and development capabilities that it has cultivated so far.

Balanced business portfolio

J-POWER has power generation facilities such as hydroelectric, thermal, wind, and geothermal, and has transmission and transformation facilities*, constituting a balanced portfolio. J-POWER also has comprehensive technical capabilities ranging from fuel procurement to facility siting, construction, operation, and maintenance.

Based on its achievements in Japan, J-POWER is also involved with overseas consulting business and power generation business for more than half a century.



A track record of projects and technology developments



Global renewable energy developments

J-POWER has been expanding its overseas business for more than half a century. By leveraging these business foundations and the technical and development capabilities it has cultivated, J-POWER is also actively working on new renewable energy development such as solar and wind.



Japan's top runner in the wind power business

J-POWER started wind power generation early in Japan. As of Mar. 31, 2021, J-POWER owns a capacity of 540,060kW at 23 locations in Japan (owned capacity basis, the second largest in Japan), with further expansion currently underway.



CO₂-free nuclear power

J-POWER promotes the Ohma Nuclear Power Plant Project as a CO₂-free power source that can stably generate a large amount of electric power, with its safety as a major prerequisite.



R&D of hydrogen production from coal

J-POWER's successful research and development of coal gasification and CO₂ separation and capture for many years made it possible to produce hydrogen from coal. J-POWER will continue to study the utilization and storage of CO₂, aiming to produce CO₂-free hydrogen.



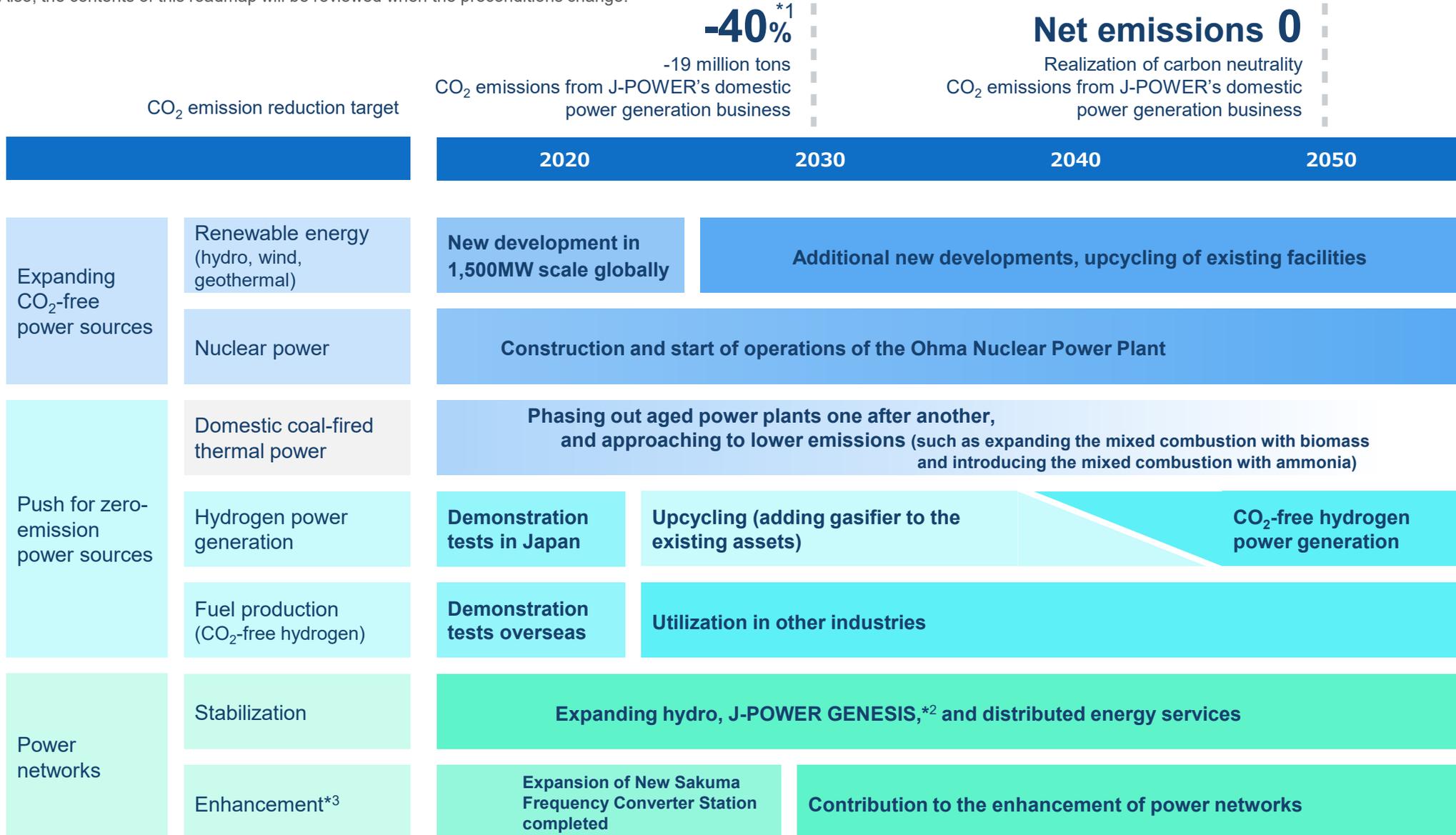
Transmission and transformation facilities* contributing to the expansion of renewable energy

J-POWER Transmission has power network facilities that play essential roles in spreading renewable energy, such as submarine DC cables and frequency converter stations. The company has high levels of technology and track records in construction and maintenance.

* J-POWER Transmission operates our transmission and transformation business

Roadmap

* This roadmap will be updated and refined as needed, subject to changes in policy and other conditions and industrial progress. Also, the contents of this roadmap will be reviewed when the preconditions change.

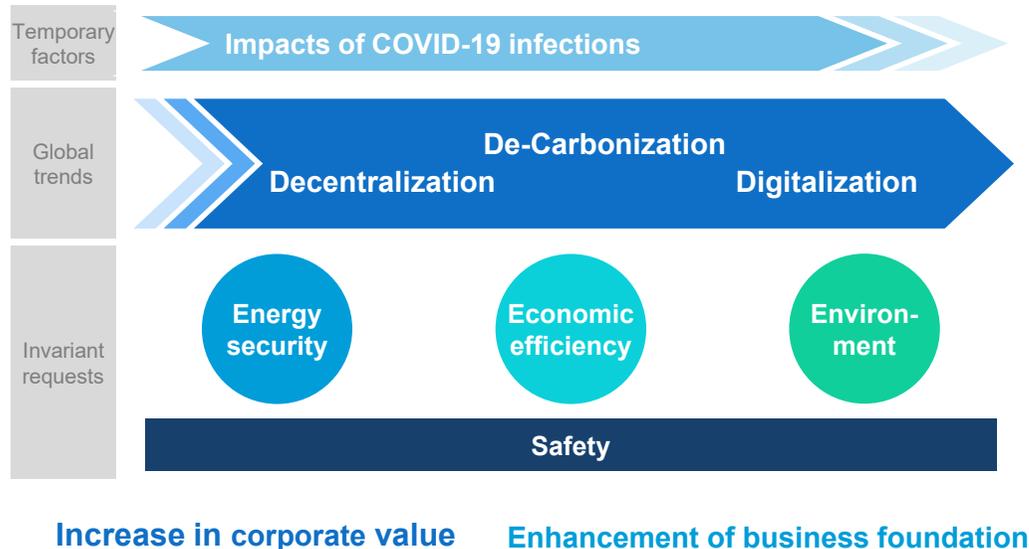


*1 Compared to the 3-year average of actual emissions in FY2017-FY2019 *2 See Appendix *3 The power networks enhancement is an initiative of J-POWER Transmission

Medium-Term Management Plan FY2021-FY2023

The transition to carbon neutrality would require the pursuit of diverse possibilities toward the future of 2050.

J-POWER will take multifaceted approaches by accelerating the ongoing initiatives, upcycling, and challenging new business areas.



Increase in corporate value

J-POWER will strive to increase its corporate value through multifaceted challenges to the transition to carbon neutrality, including accelerating the development of CO₂-free power sources such as renewable energy, economically and speedily rebuilding the value of the existing assets by upcycling, and pursuing possibilities in new business areas.

Enhancement of business foundation

With the economic situation becoming uncertain due to the impacts of COVID-19 infections, J-POWER will build a solid business foundation that supports initiatives to realize carbon neutrality while continually responding to society's requests for a stable power supply.

Actions FY2021-FY2023

1. Accelerating the development of CO₂-free power sources

- Accelerating the development of renewable energy globally
- Steadily promoting the Ohma Nuclear Power Plant Project

2. New value creation utilizing existing assets (upcycle)

- Promoting GENESIS Matsushima Plan
- Increasing the value of renewable energy

3. Challenges to new business areas

- Pursuing the possibility of CO₂-free hydrogen
- Distributed energy services/social implementation of innovations

4. Enhancement of business foundation

- Promoting ESG management, improving profitability and asset management efficiency
- Expanding overseas business foundation



Actions

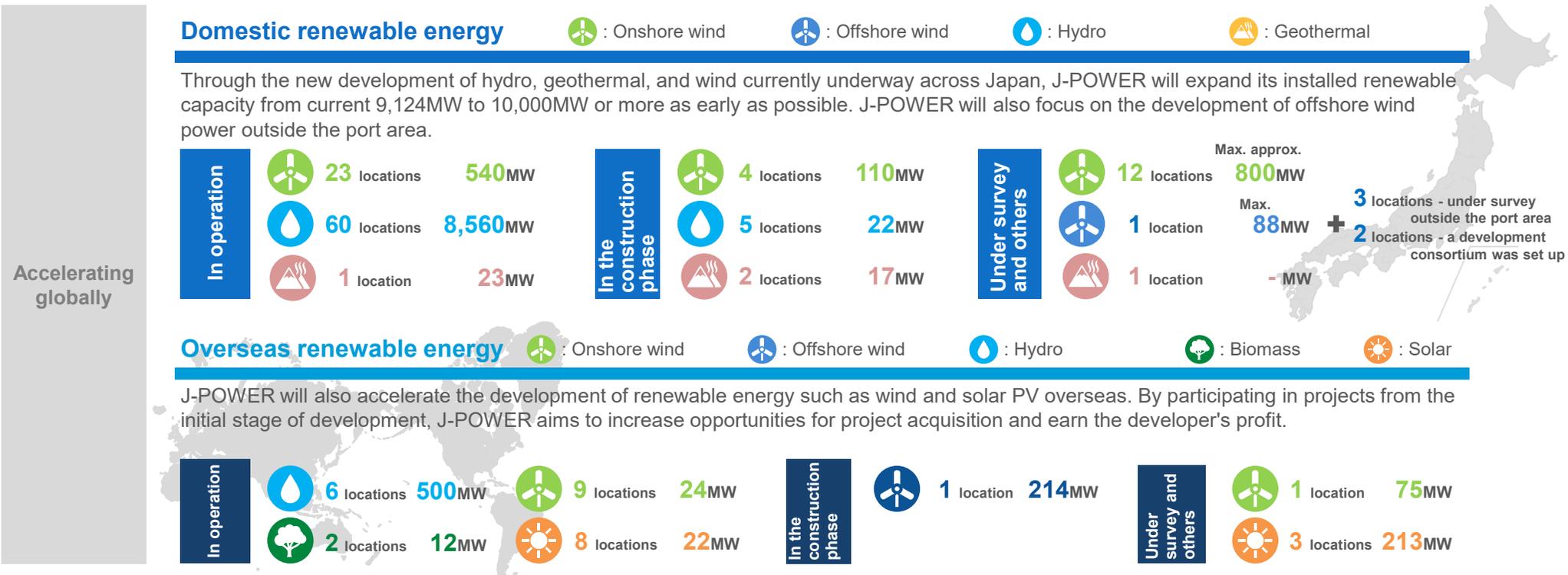
FY2021-FY2023

Action 1

Accelerating the Development of CO₂-Free Power Sources

J-POWER will further accelerate the new development of renewable energy globally by preferentially allocating investment and increasing personnel.

While steadily promoting the Ohma Nuclear Power Plant Project, J-POWER will also contribute to enhancing wide-area power networks.



Accelerating globally

Steady promotion

Nuclear power

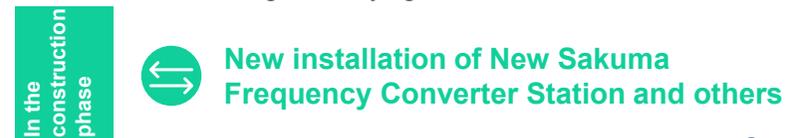
A large-scale CO₂-free and semi-domestic power source which contribute to solving climate change issues and ensuring Japan's energy security through supporting the nuclear fuel cycle by using MOX fuel throughout the reactor.



Contributing to expanding renewable energy

Transmission and transformation*

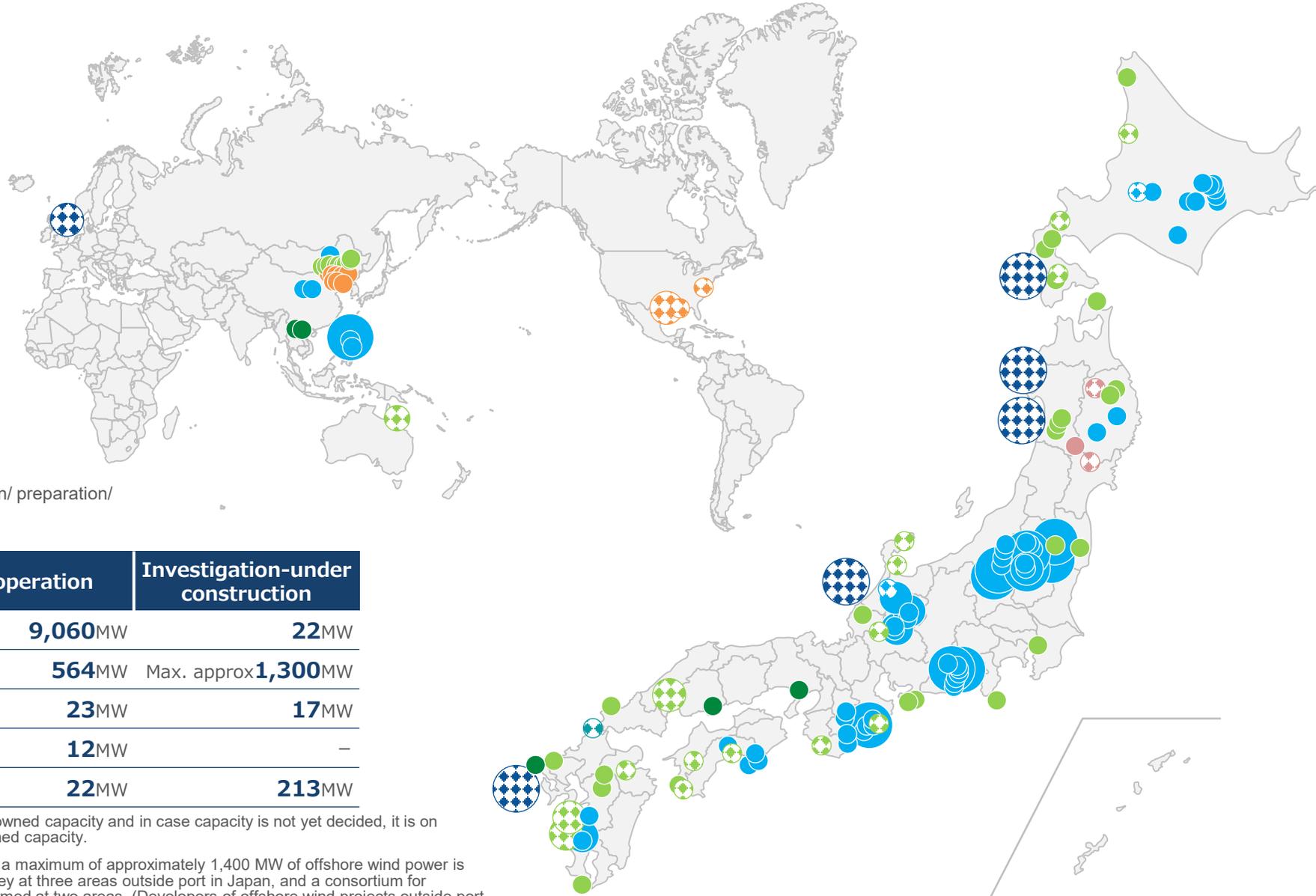
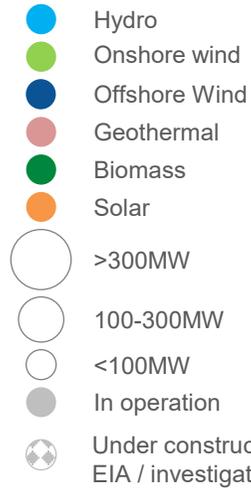
J-POWER will pursue business opportunities to enhance power networks that will support the mass introduction of renewable energy. J-POWER will also work on strengthening resilience considering intensifying natural disasters.



*The power networks enhancement is an initiative of J-POWER Transmission

Action 1

Development Status of Renewable Energy



	In operation	Investigation-under construction
Hydro	9,060MW	22MW
Wind	564MW	Max. approx 1,300MW
Geothermal	23MW	17MW
Biomass	12MW	—
Solar	22MW	213MW

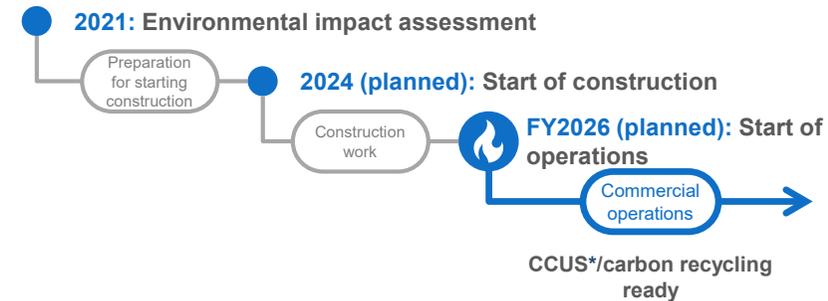
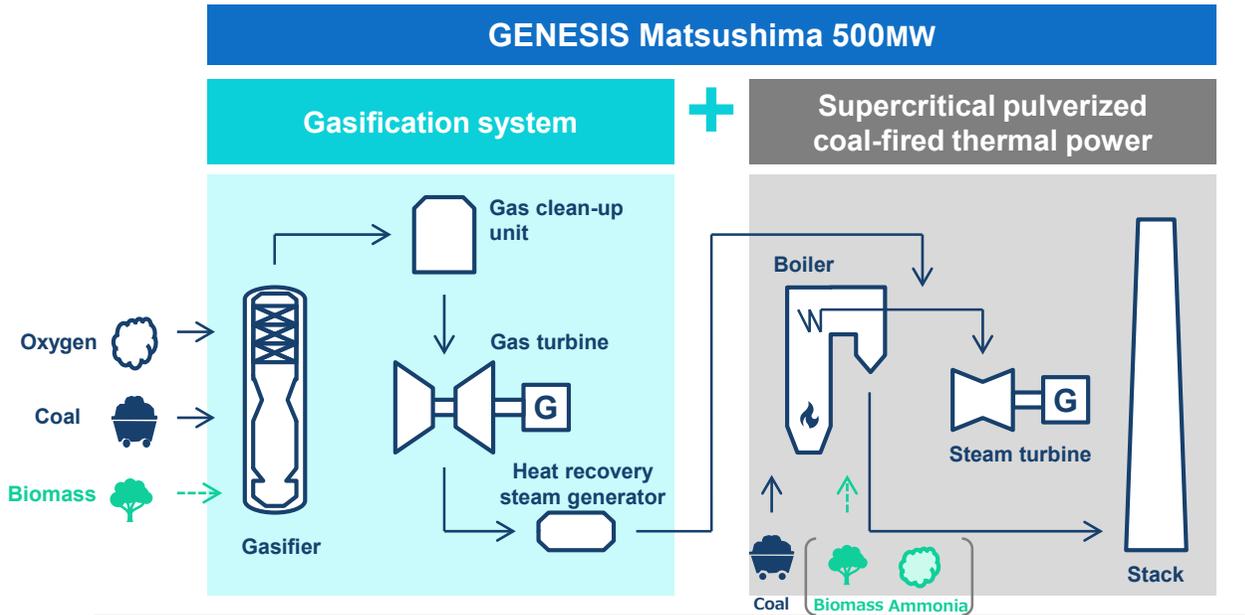
- Output is calculated on owned capacity and in case capacity is not yet decided, it is on estimated maximum owned capacity.
- In addition to the above, a maximum of approximately 1,400 MW of offshore wind power is under development survey at three areas outside port in Japan, and a consortium for development is being formed at two areas. (Developers of offshore wind projects outside port area in Japan are decided by bidding after each sea area is designated as a promoting area. The output of joint projects with other companies is assumed maximum equipment output without considering equity.)
- In addition to the above, biomass is being co-fired at Takasago Thermal Power, Takehara Thermal Power New Unit 1 and Matsuura Thermal Power

Action 2

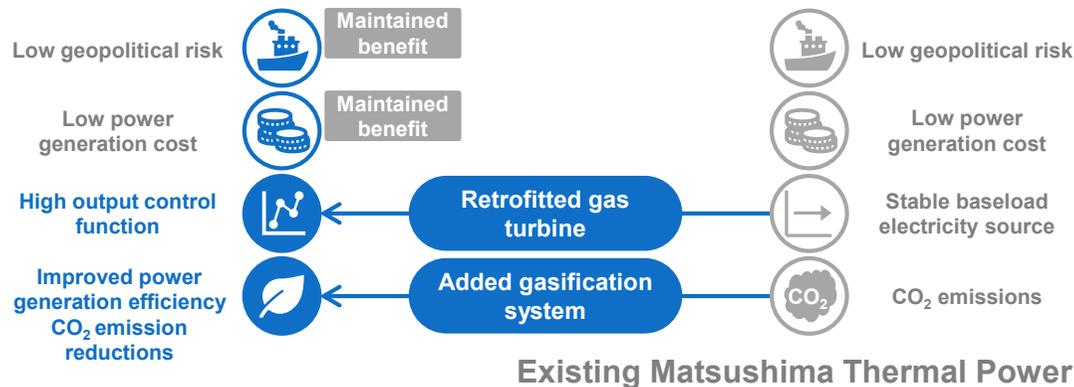
Upcycling Existing Thermal Power Plants – GENESIS Matsushima

J-POWER will take the first step in CO₂-free hydrogen power generation at the Matsushima Plant that paved the way for using imported coal after the oil crisis.

J-POWER will realize reducing environmental impacts as early as possible by applying new technologies to the existing assets in an economically viable way while maintaining a stable power supply.



GENESIS Matsushima



J-POWER GENESIS

An initiative for realizing carbon neutrality, with a view to CO₂-free hydrogen power generation in the future

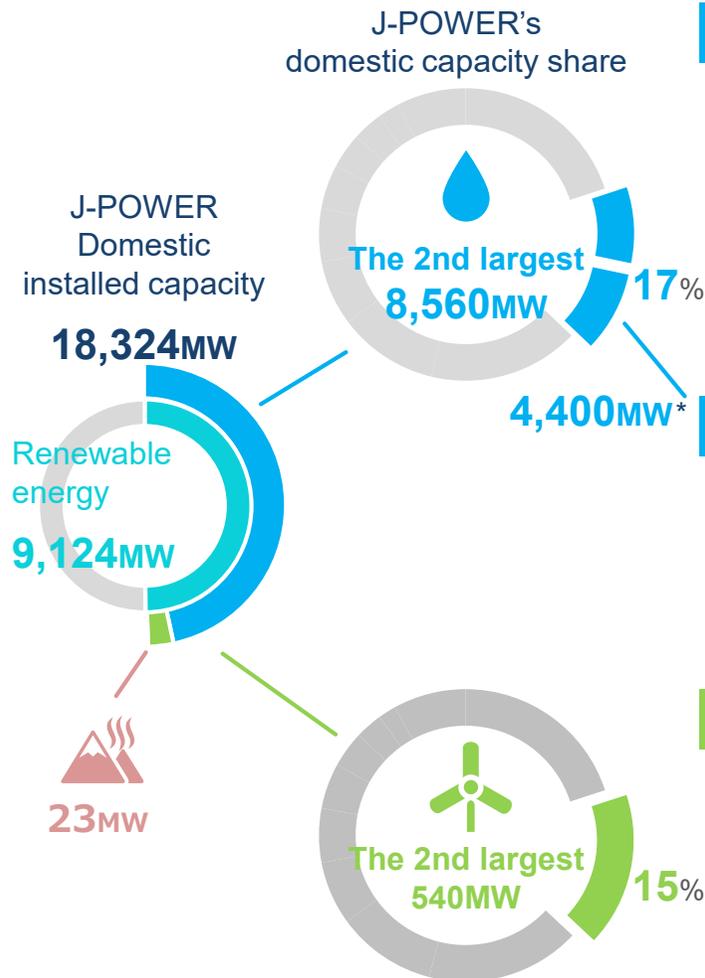
(See Appendix for details)

Action 2

Upcycling Renewable Energy

The history of J-POWER's renewable energy development spans 70 years, making the company Japan's top runner with a significant output share.

J-POWER will maximize the value of renewable energy resources by leveraging the knowledge and information it has gained from the construction, maintenance and operation of renewable energy power generation for many years.



Impoundment hydroelectric power

In addition to repowering using the latest water turbines and generators, J-POWER will study the introduction of upcycling that makes the most of abundant water resources to large-scale impoundment hydroelectric power plants whose equipment is aging, such as the Sakuma Hydropower Plant.

J-POWER will also strive to strengthen resilience against intensifying natural disasters through collaboration with local communities and concerned parties.

FY2025 target: **300 million kWh/year** increase of total power generation (compared to FY2017)

Large-scale pumped storage hydroelectric power



This system has a generation output equivalent to a large thermal power generator, functioning as a large-scale storage battery in two ways: absorbing surplus electricity and supplying electricity in power shortage. To support the mass introduction of renewable energy, J-POWER will continue to improve the value of this system as the capability to balance power supply and demand.

Repowering to the latest large wind turbines

Repowering wind turbines approaching the end of their equipment life to the latest large wind turbines could realize the increase in total power generation while reducing environmental impacts by decreasing the number of wind turbines.

Repowering Tomamae Wind Villa Power Station

Wind turbine capacity	1.5MW, 1.65MW	4.3MW
Units of wind turbines	19 units	8 units

About 50% increase of the electric power generation

Increased output
Increased power generation



The latest water turbines and generators

High output control function



Maintained benefit

Strengthened resilience against natural disasters

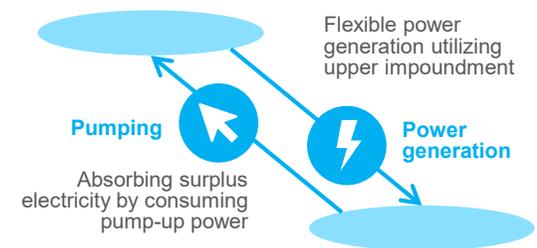


Cooperation with local communities and concerned parties

Effective utilization of river maintenance flow



Development of small hydroelectric power



Increased electric power generation



Extended project period



The latest large wind turbines

Reduced environmental impacts



Semi-permanent energy



Maintained benefit

* This figure does not include impoundment hydroelectric power provided with a pumping function

Action 3

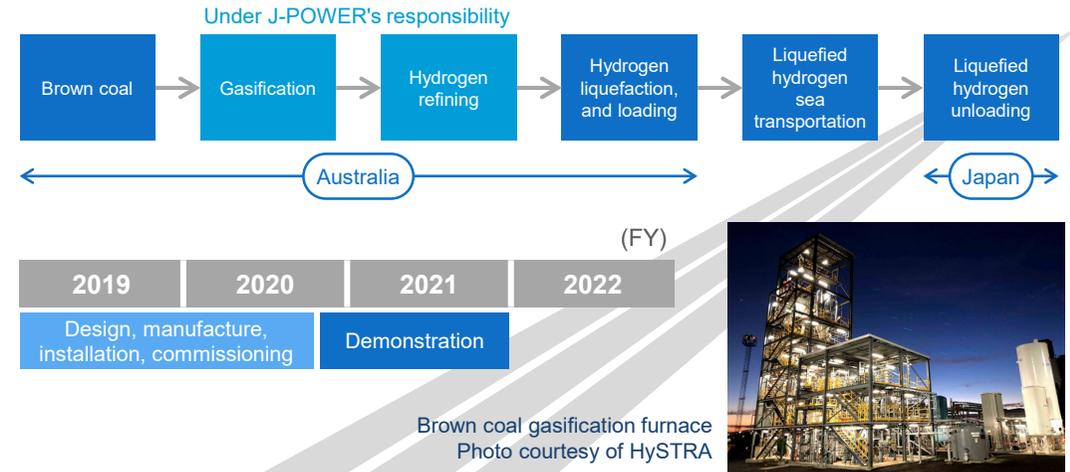
Challenges to New Business Areas

As the social and economic structure changes due to the transition to carbon neutrality and innovation, J-POWER aims to expand its business domains by challenging new business areas.

Pursuing the potential of CO₂-free hydrogen

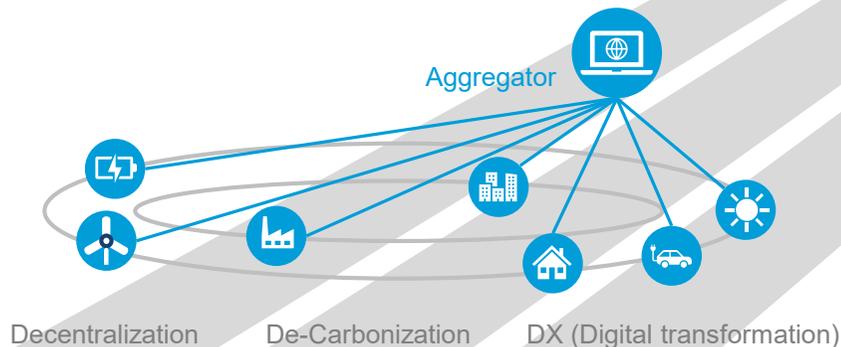
Realizing the use of hydrogen in large quantities and stably would require producing CO₂-free hydrogen from fossil fuels in addition to renewable energy. J-POWER will pursue the possibility of producing CO₂-free hydrogen from coal in Japan and abroad.

In Australia, J-POWER participates in the demonstration test of creating a supply chain for transporting hydrogen produced by brown coal gasification to Japan. J-POWER is responsible for the brown coal gasification and hydrogen refining processes. Upon commercialization in the future, the project will produce CO₂-free hydrogen by storing the CO₂ generated in the hydrogen production process with the help of CCS technology.



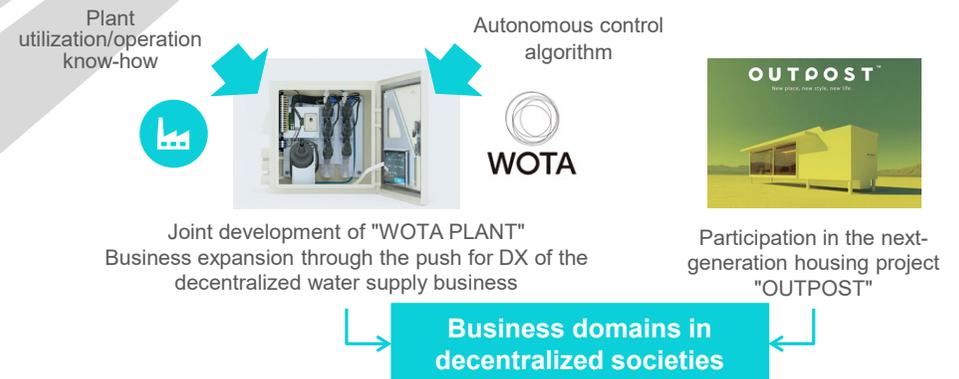
Distributed energy services

As the mass introduction of renewable energy progresses, power output tends to fluctuate rapidly at the mercy of the weather. For this reason, the importance of the power supply and demand balancing capability to compensate for such output fluctuations will increase further. In addition to providing environmental value to consumers through electricity retailing, J-POWER will help ensure and utilize the capability to balance power supply and demand by aggregating the resources owned by the consumers with the help of digital technology.



Accelerating the social implementation of innovation

J-POWER will integrate its asset management know-how with technologies and ideas from start-up companies and others, accelerate the social implementation of those in carbon neutrality and decentralized societies, and try to expand its business to new business domains.



Action 4

Enhancement of Business Foundation

J-POWER will build a foundation to support the initiatives for carbon neutrality while responding to society's requests for a stable power supply and strengthening resilience.

While promoting ESG management, J-POWER will improve its profitability and asset management efficiency.

Promoting ESG management

On April 1, 2021, J-POWER appointed the director in charge and established the management department (ESG & Corporate Research Office) to step up its involvement with ESG management until now and strive to realize sustainable growth.

Environment

- J-POWER "BLUE MISSION 2050"
- Disclosure of climate change scenarios in line with TCFD

Social

- Signing the United Nations Global Compact
- Engagement with the area where the power plant is located

Governance

- Establishing the Nomination and Compensation Committee
- Ensuring diversity in the composition of directors, audit & supervisory board members and executive officers

Human resources

J-POWER will develop human resources that challenge various management issues including carbon neutrality, by fostering a culture in which employees can continue to learn regardless of their generation and supporting the self-sustaining growth of diverse human resources.

J-POWER will meet the diverse needs of individual employees through the realization of flexible working styles. At the same time, J-POWER will create workplaces by ensuring workplace safety and employee health at sufficiently high levels so that diverse human resources can work enthusiastically and promote continuous innovations.

Improving profitability

J-POWER will further accelerate the ongoing efforts to reduce power generation costs and management/indirect department costs, including business process transformation and sophisticated equipment maintenance with the help of digital transformation.

J-POWER will strengthen its profit base that supports transition efforts such as CO2 emission reductions and expanded use of CO2-free power sources.



Improving asset management efficiency

J-POWER will reduce investment in renewal while balancing it with facility reliability. At the same time, J-POWER will try to improve the efficiency of the existing assets by reviewing and replacing owned assets as needed.

Concerning new investment toward transitions, J-POWER will ensure profit commensurate with the risk and cost of capital by screening such investment targets based on the hurdle rate corresponding to the target area and business field.

Developing human resources that challenge various management issues

Creating workplaces to promote continuous innovations

Flexible utilization of human resources

- Allocating human resources in response to changes in the business environment
- Acquiring human resources with diverse capabilities

Continuous self-sustaining learning

- Effective use of OJT and off-the-job training
- Supporting self-sustaining career development, promoting challenges through open recruitment

Ensured safety Health enhancement

- Developing the working environment where safety is the top priority
- Promoting health management

Diverse work styles

- Introducing a 65-year-old retirement age system
- Flexible working hours, working from home

Action 4

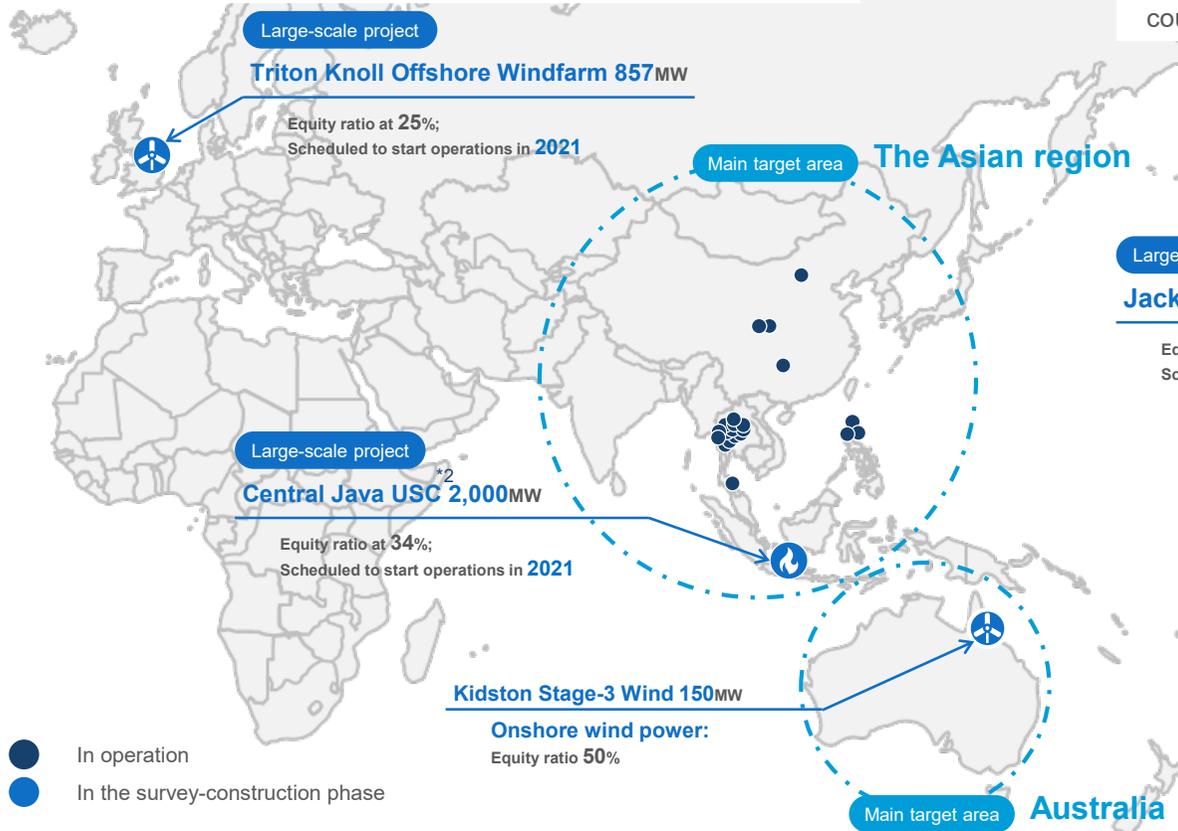
Expanding Overseas Business Foundation

J-POWER's overseas businesses account for 26% of its total power generation capacity and more than 40%*¹ of the segment income, and the growth is expected to continue.

J-POWER will work hard to further expand our business foundation by acquiring new development projects while steadily executing large-scale projects currently under construction.

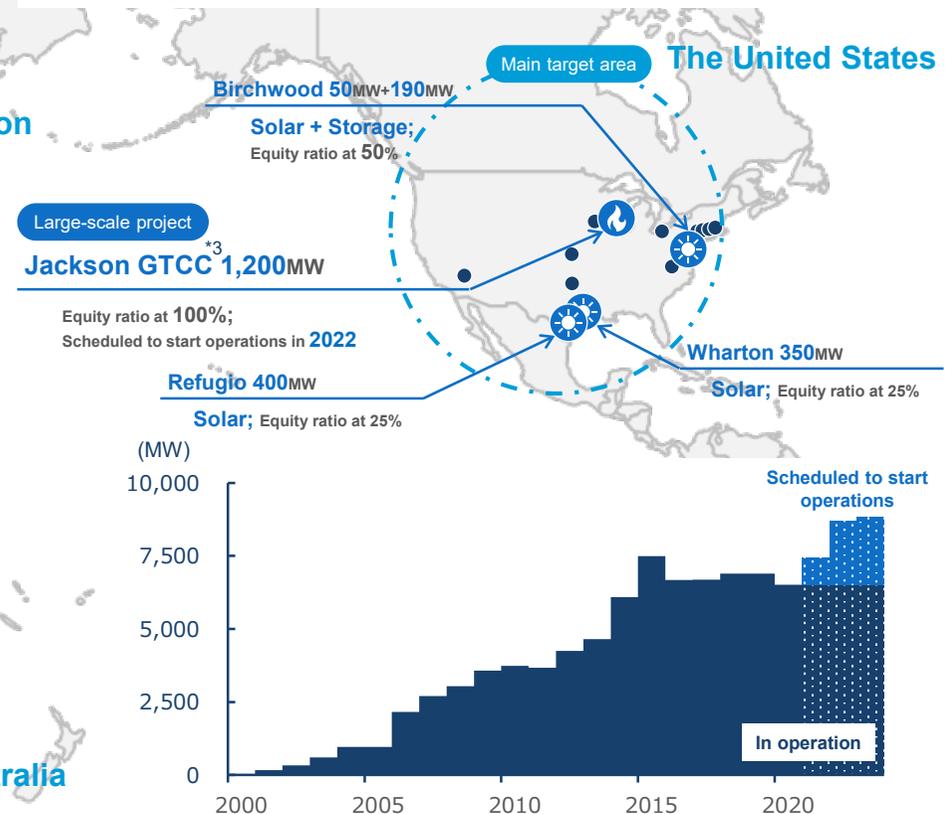
Steadily executing large-scale projects

J-POWER will further expand its profit base by steadily executing each large-scale project currently under construction in Indonesia, the U.K., and the U.S.



Efforts to win greenfield projects

With the U.S., Australia, and the Asian region as main target areas, J-POWER will continue to strive to win greenfield projects, including renewable energy, depending on the development needs in each country/region.



Changes in owned capacity of
J-POWER's overseas businesses 14

*1 3-year average results in FY2018-FY2020: 45.6% *2 USC: Ultra-supercritical coal-fired thermal power *3 GTCC: Gas turbine combined cycle

A photograph of several offshore wind turbines in the ocean under a clear blue sky. The turbines are white with yellow bases. The image is partially obscured by a white diagonal shape on the right side of the slide.

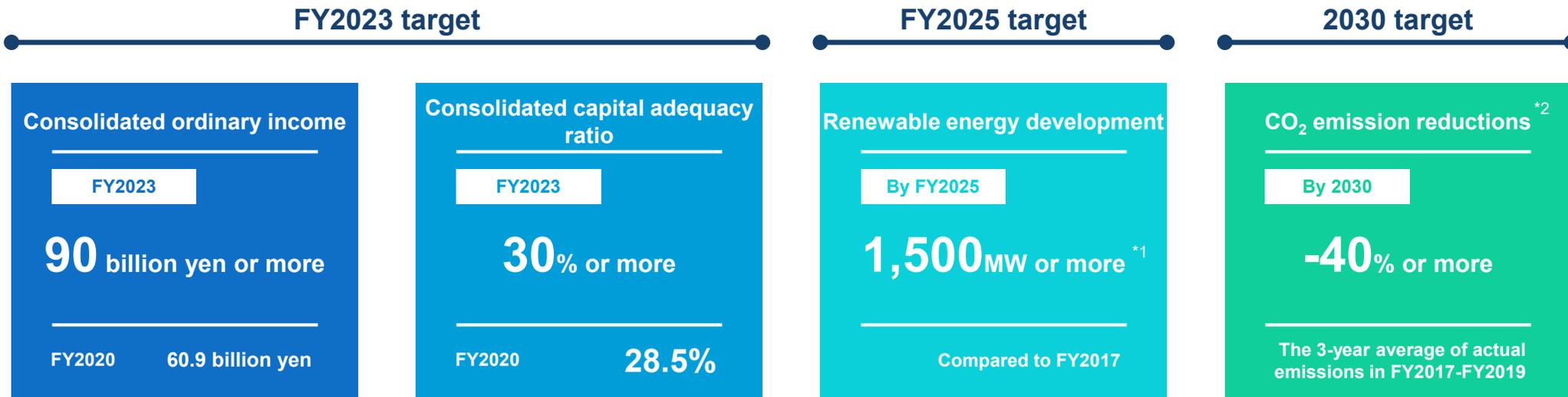
Management Goals and Shareholder Returns

Management Goals and Shareholder Returns

J-POWER will strengthen its profit and financial bases to support transition efforts toward the realization of carbon neutrality.

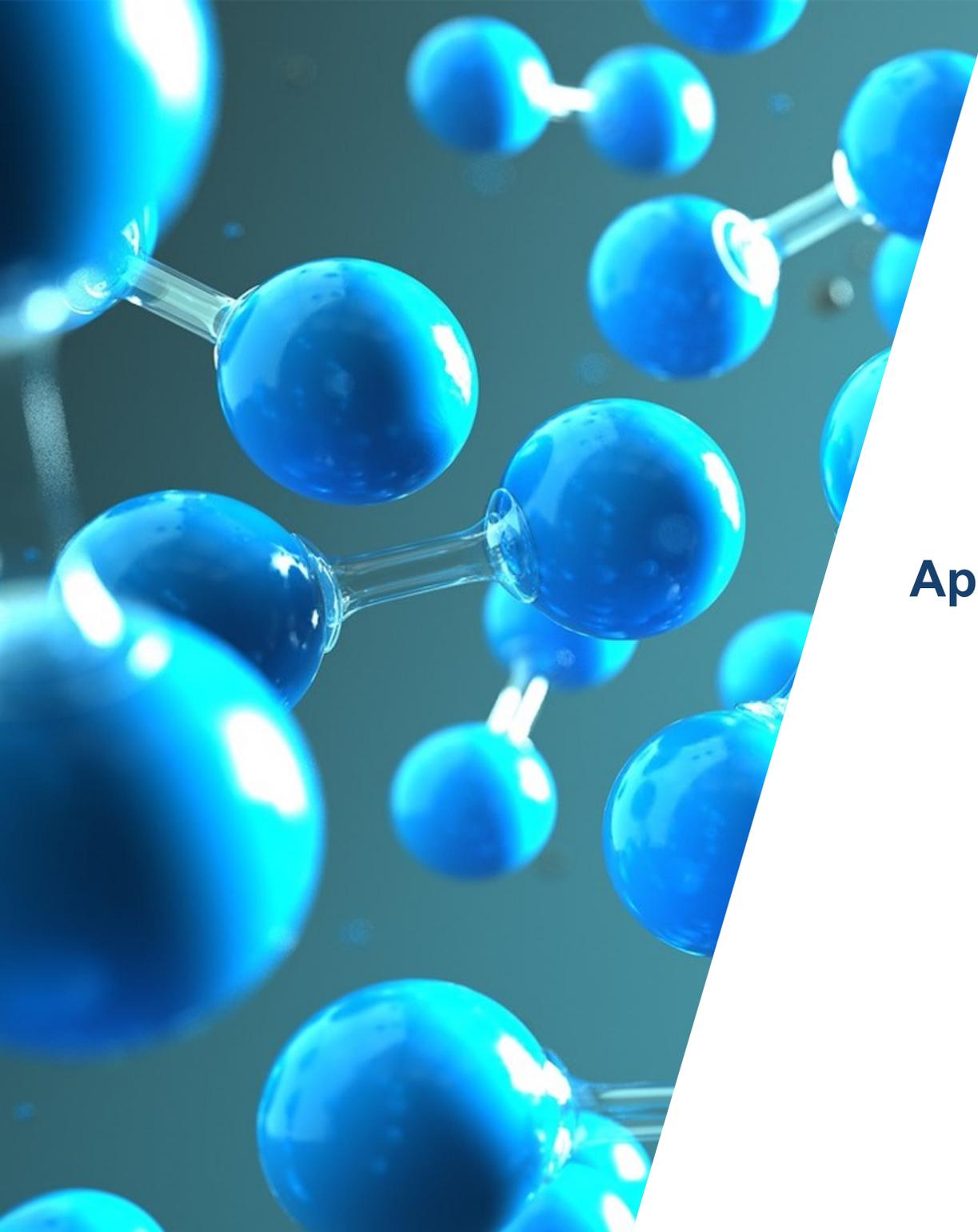
J-POWER will accelerate the development of renewable energy and reduce CO₂ emissions in incremental steps.

Management goals



The basic concept of shareholder returns

J-POWER will strive to enhance stable, ongoing returns to shareholders considering the level of profit, earnings forecasts, and its financial condition with a consolidated payout ratio of around 30%, excluding factors causing short-term profit fluctuations.

A background image of a blue molecular structure with spheres and connecting rods, partially obscured by a white diagonal line.

Appendix

Contributing to the enhancement of power networks*

Introducing massive amounts of renewable energy would need to strengthen the power networks that deliver electricity to places of consumption.

J-POWER will help solve such problems by leveraging a wide range of technologies and knowledge it has cultivated, such as DC transmission lines/undersea cables and frequency converter stations.

Transmission and transformation facilities

J-POWER Transmission owns and operates critical transmission and transformation facilities throughout Japan, including the cross-regional interconnection facilities that interconnect the grids of different electric power companies, contributing to the wide-area operation of Japan's electric power.

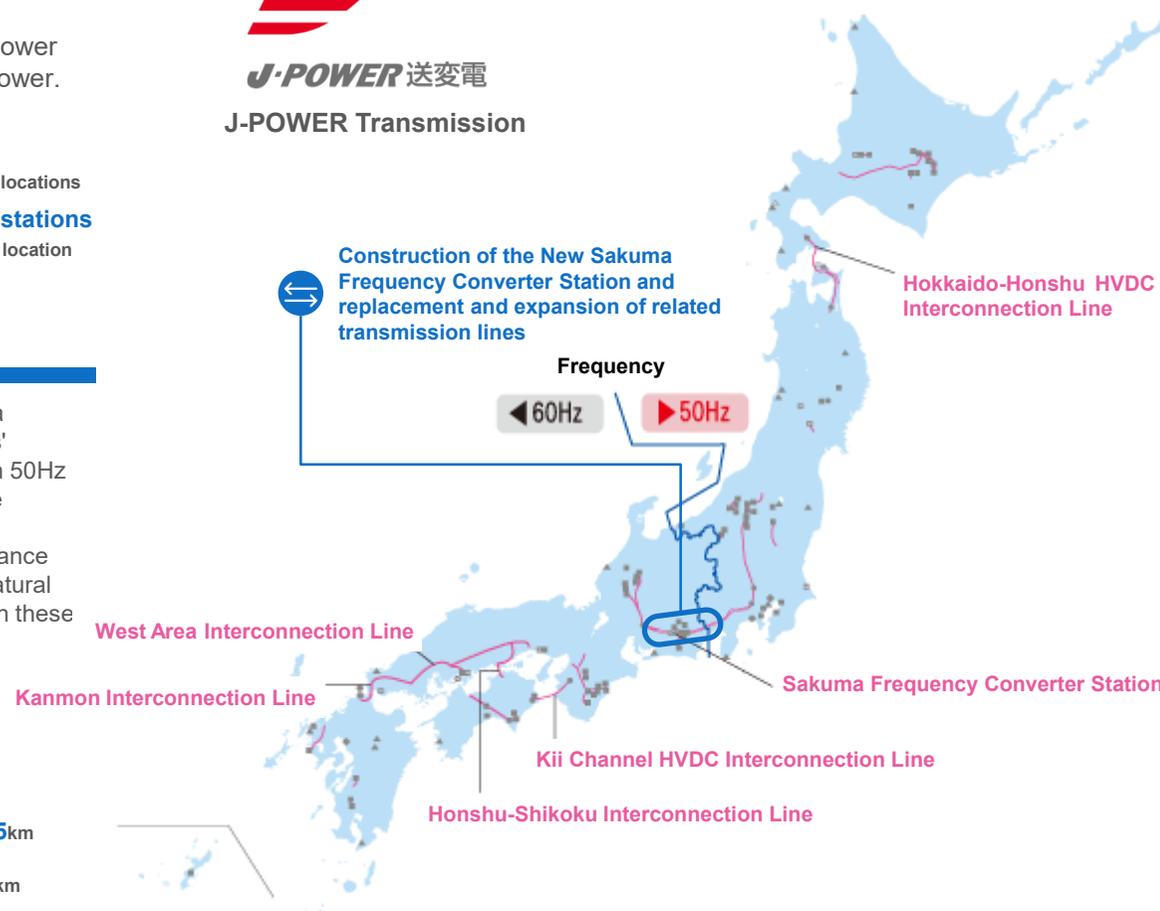
Facilities in operation	Transmission lines	Substations
	Total length: approx. 2,400 km	4 locations
	AC/DC converter stations	Frequency converter stations
	4 locations	1 location

Focused initiatives in the future

J-POWER will steadily promote the replacement/expansion of the New Sakuma Frequency Converter Station and related transmission lines to meet consumers' expectations for enhancing the capability to interchange electric power between 50Hz in eastern Japan and 60Hz in western Japan. J-POWER will continue to pursue business opportunities contributing to strengthening power networks.

Today's most pressing issues also include the need to sophisticate maintenance due to over-aging deterioration and strengthen resilience against intensifying natural disasters. J-POWER will continue to contribute to a stable power supply through these efforts.

In the construction phase	Construction of the New Sakuma Frequency Converter Station and others
	<ul style="list-style-type: none"> - New Sakuma Frequency Converter Station 300MW - Sakuma East Trunk Line Approx. 125km - Sakuma West Trunk Line Approx. 14km



* The power networks enhancement is an initiative of J-POWER Transmission

J-POWER GENESIS Vision

J-POWER's vision of energy supply in a carbon-neutral society

J-POWER GENESIS is a new-generation energy conversion system with coal gasification technology at its core.

Because of its highly scalable system configuration, J-POWER GENESIS produces many products such as electricity and hydrogen from various types of solid fuels.

J-POWER GENESIS

Gasification ENERgy
&
Sustainable Integrated System

[Genesis] formation, origin / [Generator] power generation

Gene in Greek means origin and generate.

* The trademark registration of J-POWER GENESIS is pending

(FY)

2000

2010

2020

2030

2002-2013

EAGLE project

Since FY2002, J-POWER worked on demonstration tests for oxygen-blown coal gasification and CO₂ separation and capture, during which it accumulated necessary technologies.

2016-

Osaki CoolGen Project

Since FY2016, while scaling up the EAGLE project, J-POWER conducted demonstration tests for CO₂ capture, gas turbine operations using higher-concentration hydrogen gas, and integrating fuel cells into the system.

2026(planned)-

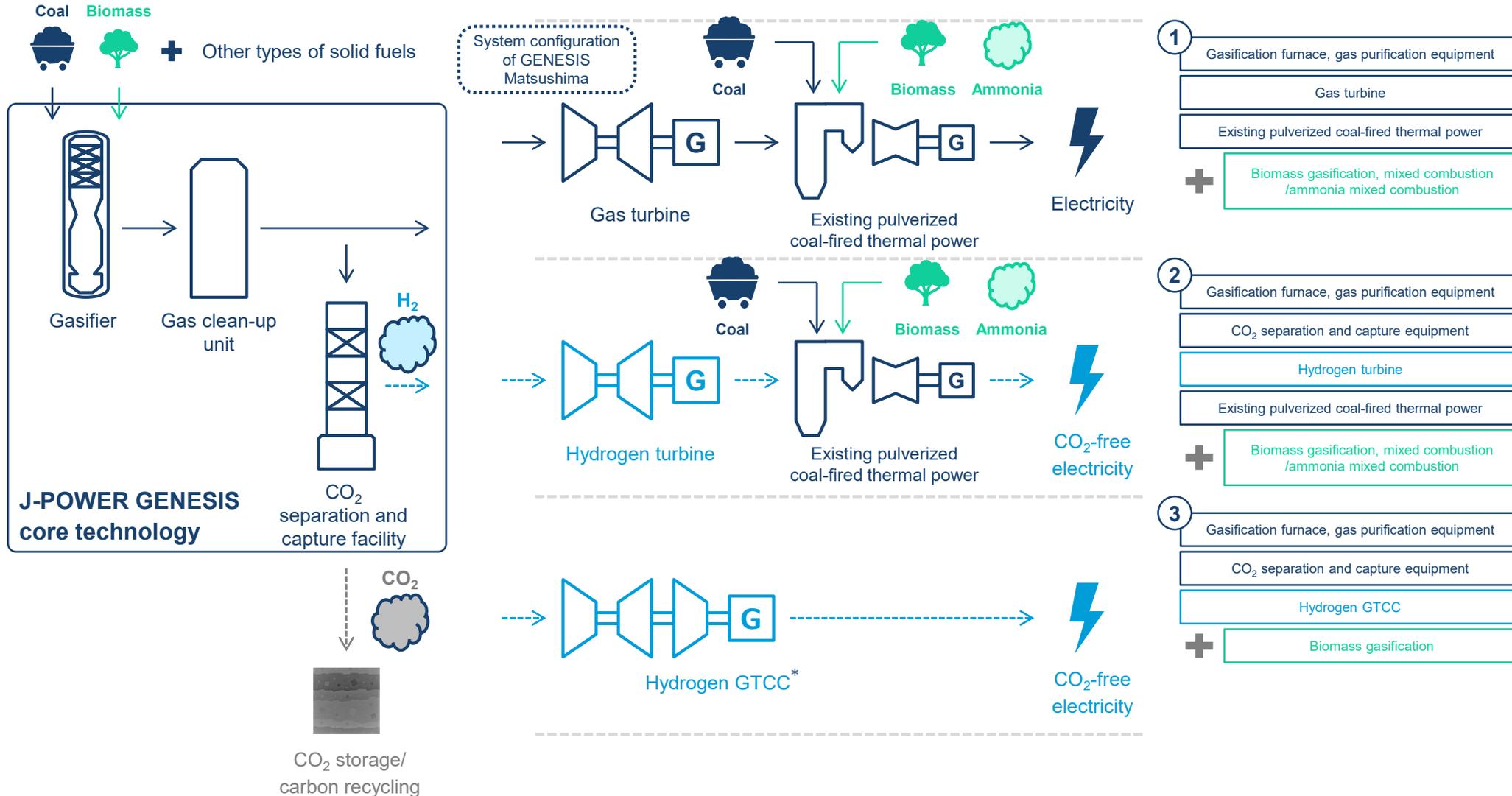
J-POWER GENESIS

With technologies obtained from the Osaki CoolGen Project at its core, J-POWER will work on J-POWER GENESIS to realize carbon neutrality.

J-POWER will combine the technology to convert the gas generated from coal into hydrogen and CO₂ and the technology for separating and capturing CO₂ from the mixture. It would make CO₂-free hydrogen power generation possible in the future.

Scalability of J-POWER GENESIS

Because the J-POWER GENESIS system is excellent in scalability, J-POWER will realize carbon neutrality by combining the core technology cultivated in the Osaki CoolGen Project with new technologies and existing assets while flexibly responding to the changes in the business environment.



* GTCC: Gas turbine combined cycle

Effects of J-POWER GENESIS

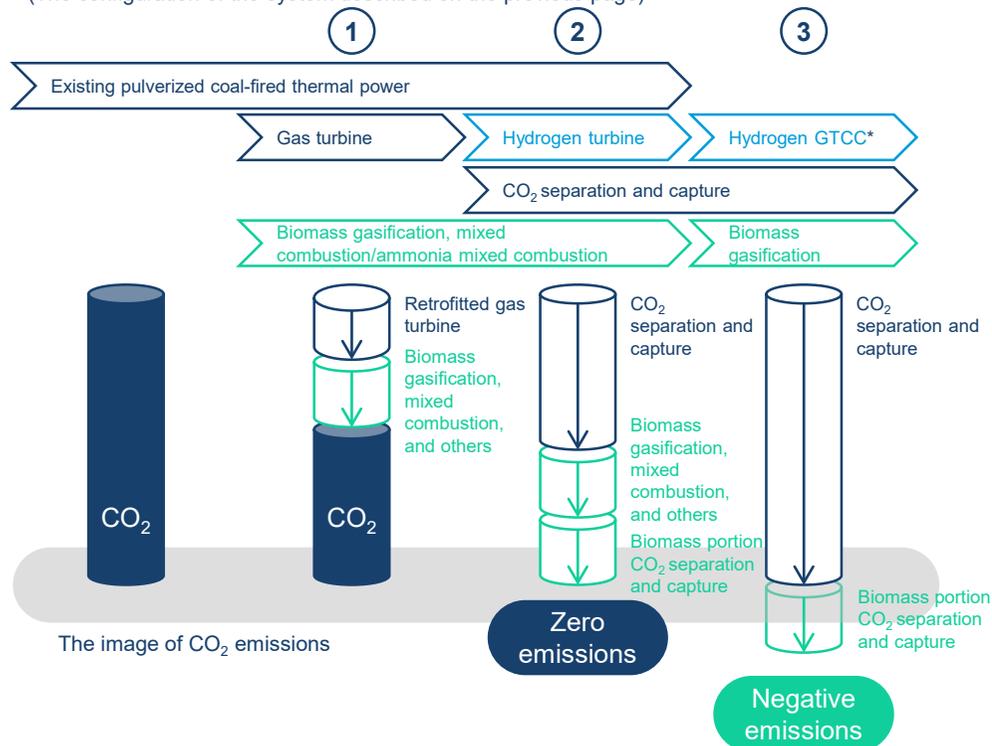
J-POWER will realize negative CO₂ emissions by reducing environmental loads in incremental steps and combining mixed gasification of coal with biomass and CO₂ separation and capture in the future. At the same time, J-POWER will help realize the mass introduction of renewable energy by leveraging the high operability and flexibility of output control functions and others.

CO₂ emission reductions

J-POWER GENESIS will reduce CO₂ emissions in incremental steps on account of system scalability and decrease environmental loads.

If you use biomass fuels with CO₂ in the atmosphere solidified through photosynthesis, separate/capture the CO₂ generated by biomass combustion, and store it into the ground, you can reduce CO₂ in the atmosphere. If this mechanism works, you can make negative CO₂ emissions possible. You can obtain this merit because coal is a solid fuel.

(The configuration of the system described on the previous page)

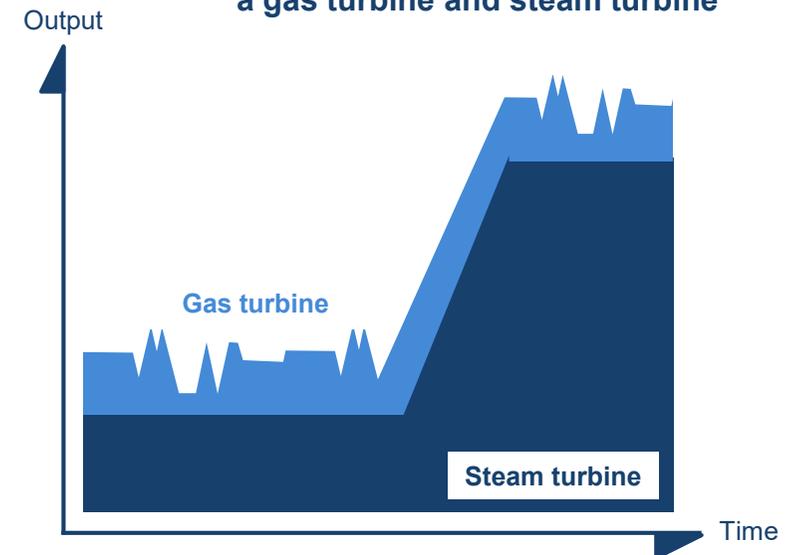


Improving output control functions

Flexible operations of the steam turbine at an existing pulverized coal-fired power plant and the gas turbine in a gasification system would enable operations in a broader load range than the pulverized coal-fired power generator alone. At the same time, this system has higher levels of output control functions. If you scale up this system to hydrogen GTCC, you can expect an output control speed exceeding natural gas-fired thermal power.

For this reason, this system will help realize the mass introduction of renewable energy whose output is unstable.

The image of output control by a gas turbine and steam turbine



* GTCC: Gas turbine combined cycle

Contribution to SDGs

J-POWER's mission

We will meet people's needs for energy without fail

Sharing value with stakeholders

End users

Business partners

Shareholders and investors

Local communities

Employees

Nature and environment

Contribution to SDGs





This material contains statements that constitute forward-looking statements, plans for the future, management targets, etc. relating to the Company and/or the J-POWER group. These are based on current assumptions of future events, and there exist possibilities that such assumptions are objectively incorrect and actual results may differ from those in the statements as a result of various factors.

Furthermore, information and data other than those concerning the Company and its subsidiaries/affiliates are quoted from public information, and the Company has not verified and will not warrant its accuracy or appropriateness.