

# Climate Change Scenario Analysis (Disclosure based on TCFD Recommendations)



## Foreword

The J-POWER Group has positioned striking a balance between “stably supplying energy” and “addressing climate change” as its priority management challenge in order to do its part for the realization of a sustainable society. To address this priority challenge, in February 2021, we released the J-POWER “BLUE MISSION 2050” as our action plan aimed at achieving carbon neutrality and a hydrogen society by 2050.

In addition to agreeing with the recommendations formulated by the Task Force on Climate-related Financial Disclosures (TCFD), the Group is pursuing the disclosure of information

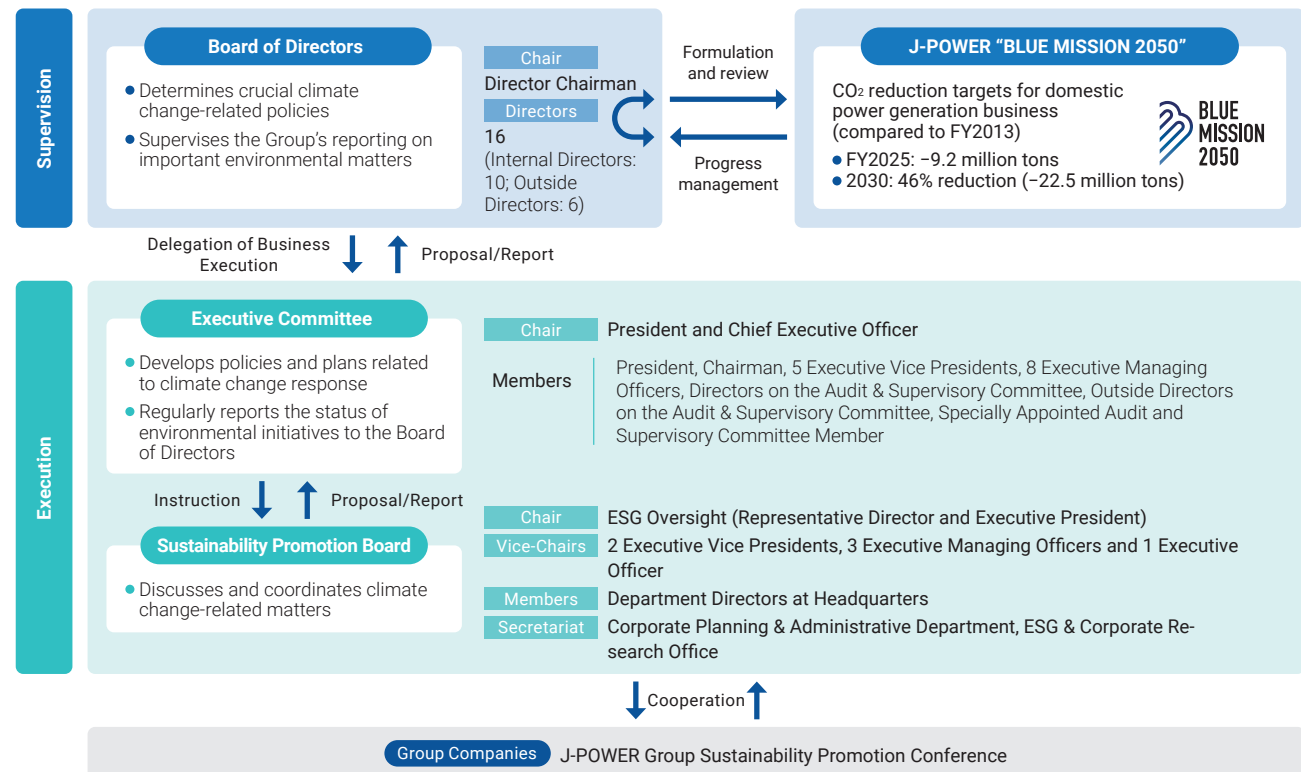
in line with “governance,” “strategy,” “risk management” and “indicators and targets” pertaining to climate change-related risks and opportunities, whose disclosure is recommended by TCFD.

The figures in this scenario analysis have the potential to fluctuate due to various conditions that include the state of operation of power generation facilities and the external environment. As such, they have been simplified and calculated under certain suppositions solely for the purpose of ascertaining the sense of scale of the impact involved.

## Governance: Framework

The Group has identified “response to climate change” as one of its material issues. Important matters pertaining to such response are determined by the Board of Directors. Additionally, the Group has established a sustainability promotion framework supervised by the ESG Oversight (currently the President and Chief Executive Officer), who is appointed by the Board of Directors. In addition to establishing the Sustainability Promotion Board, the Group has also established the J-POWER Group Sustainability Promotion Conference to work towards promoting sustainability, including climate change-related initiatives, for the Group as a whole. The Sustainability Promotion Board convenes three or more times a year to deliberate areas such as strategy, planning and measures related to sustainability in general and risk management. It proposes and reports important matters out of those deliberated to the Board of Directors or the Executive Committee.

### Governance framework related to climate change



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### Governance: Deliberation Status and Officers' Compensation

Since the establishment of J-POWER "BLUE MISSION 2050" in February 2021, the Board of Directors of J-POWER has been monitoring the progress of initiatives by management, receiving feedback through dialogues with shareholders and other stakeholders, and appropriately identifying changes in the business environment (including policy and international conditions), and discussing updates and revisions to the contents of the plan every year.

In FY2023 all Board members, including Independent Outside Directors, held several active discussions on whether our 2030 CO<sub>2</sub> reduction target set in February 2021 is at an appropriate level in light of the nationally determined contribution (NDC) of Japan as a party to the Paris Agreement. From the discussions, we decided to raise the 2030 reduction target (1.3 million tons) in May 2023 based on the progress made in expanding mixed combustion of biomass and establishing a joint venture for the social implementation of carbon capture and storage (CCS) in Japan, expansion of renewable energy introduction and the actual reduction in CO<sub>2</sub> emissions from coal-fired power generation.

More recently, following repeated discussions to develop a strategy for the transition of our thermal power operations, the directions for the transition of individual power stations were formulated and disclosed to lay out a more concrete vision to achieve the reduction target.

### Officers' Compensation

From the viewpoint of sustainability management, the Board of Directors decided to introduce five material issues including response to climate change as non-financial targets for the evaluation of performance-linked compensation.

The Company's five material issues, which are the benchmarks for performance-linked compensation, are supply of energy, response to climate change, respect for people, engagement with local communities, and enhancement of our business foundation. KPIs for addressing climate change include numerical targets for renewable energy development and CO<sub>2</sub> reduction targets.

#### ● Matters (related to climate change) determined at the Board of Directors

FY2020	• Formulation of J-POWER "BLUE MISSION 2050"
FY2021	• Formulation of Basic Policy on Sustainability • Identification of material issues
FY2022	• Setting of CO <sub>2</sub> reduction target for FY2025
FY2023	• Raising of CO <sub>2</sub> emission reduction target for 2030 • Introduction of non-financial targets (material issues) in the evaluation of performance-linked compensation for executives
FY2024	• Disclosure of transition direction of thermal power operations in Japan

#### ● Matters reported to the Board of Directors

Domestic and overseas trends on climate change issues
Basic policy regarding Green Transformation (GX) League
Disclosure policy based on TCFD Recommendations
Actual CO <sub>2</sub> emissions (Scopes 1–3)
Dialogue with external stakeholders regarding climate change
ESG evaluation
Progress of ESG-related initiatives
[Opinion exchange meetings with Outside Directors] Exchanged views with Outside Directors on climate change themes such as IEA WEO2023 & COP28

#### ● Officer Compensation System

	Compensation type	Compensation details	Percentage (estimate) in the compensation package
Fixed Compensation	Fixed monthly salary	Fixed monthly salary is a fixed amount of monetary compensation calculated based on the position of each Director	70%
	Performance-linked compensation	① <b>First indicator</b> Evaluation factor Degree of achievement of consolidated ordinary income Range 0% minimum to 200% maximum ② <b>Second indicator</b> Evaluation factor Comprehensive evaluation* of material issues (KPIs) Range 0% minimum to 120% maximum ③ <b>Payment calculation</b> Weight of evaluation factors Evaluation factor for first indicator × 90% + Evaluation factor for second indicator × 10%	20%
	Stock-based compensation	Introduced as an incentive for the Company's long-term growth based on the characteristics of the Company's business content and business development.	10%

\*See p.12-13 of Integrated Report 2024 for details of the targets (KPIs) for material issues and results of initiatives.

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### Governance: Skills Matrix

J-POWER has indicated the roles and obligations of its Board of Directors in Article 18 of the Basic Policy on Corporate Governance as follows:

- i) Setting the broad direction of management plans, etc.
- ii) Establishing an environment that supports risk-taking by the management
- iii) Carrying out effective supervision of the management from an independent and objective standpoint

Skill sets are selected based on these roles and obligations under the Group's Corporate Philosophy to address the five material issues selected as important social issues (supply of energy, response to climate change, respect for people, engagement with local communities, and enhancement of our business foundation)

To fully leverage the professional perspectives and distinguished knowledge of officers, the areas they can contribute in particular in the Company's management are marked with ○ following the discussion with each officer.

Position	Name	Corporate management and management strategy	Financial strategy and accounting	Legal affairs, risk management, and governance	Human resources strategy and diversity	Sustainability	DX and innovations	Sales	Engineering and R&D	Business and project development	Production technology and quality control	International business and Global	Reference
Director Chairman	Toshifumi Watanabe	○	○	○	○	○		○					Nomination and Compensation Committee Member
Director President	Hitoshi Kanno	○	○	○	○	○	○	○		○			Nomination and Compensation Committee Member Chair of Sustainability Promotion Board
Directors	Yoshikazu Shimada					○	○		○	○	○		Department Director of Renewable Energy
	Osamu Hagiwara					○			○	○	○		Department Director of Nuclear Power Business
	Hiroshi Sasatsu					○			○	○	○	○	Vice-Chair of Sustainability Promotion Board
	Isshu Kurata	○	○	○	○	○		○		○			Department Director of Energy Business
	Ryoji Sekine	○	○			○		○		○		○	Department Director of International Business Vice-Chair of Sustainability Promotion Board
	Takaya Nomura					○	○		○	○	○	○	Vice-Chair of Sustainability Promotion Board
	Hideaki Kato	○	○	○		○	○			○			Vice-Chair of Sustainability Promotion Board
	Tomonori Ito <span>Outside</span>	○	○	○	○							○	Nomination and Compensation Committee Member
	John Buchanan <span>Outside</span>	○	○	○	○	○						○	
	Takashi Yokomizo <span>Outside</span>			○	○								Nomination and Compensation Committee Member
Directors Audit & Supervisory Committee Member	Hideo Kimura	○	○		○					○			
	Hiroshi Fujioka <span>Outside</span>		○	○	○								Nomination and Compensation Committee Member
	Kimiko Oga <span>Outside</span>	○			○	○	○	○					
	Shizuo Abe <span>Outside</span>	○				○	○		○		○		

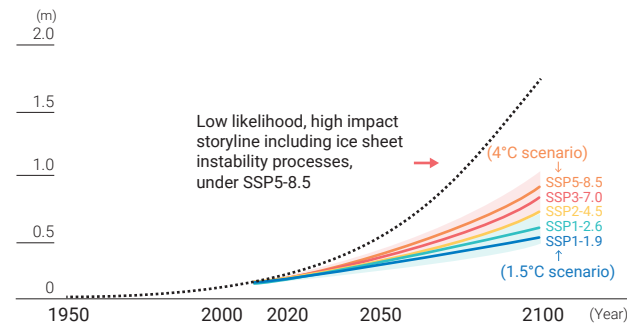
# Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

## Strategy: Risk and Opportunities

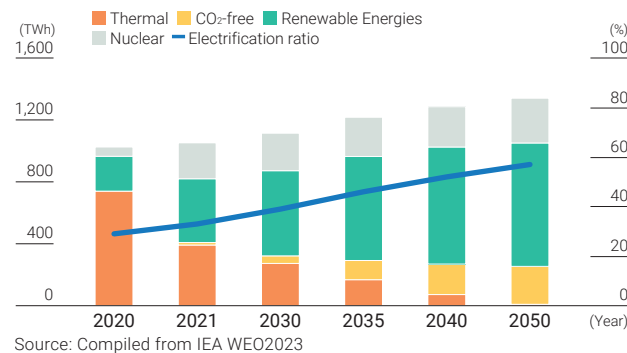
J-POWER Group endeavors to ascertain the variety of risks and opportunities that arise from environmental issues, and pushes forward with initiatives while consistently verifying risks as it strives to bolster competitiveness. We believe that climate change in particular will require measures in the utilization of new technology and a number of other domains, including measures for addressing regulatory reinforcement by national governments. These factors have the potential to exert considerable impact on J-POWER's business domains as well, which will create business-based risk. However, our view is that the ability to appropriately handle that risk will link to the bolstering of our competitiveness and the acquisition of new business opportunities. We have detailed risks related to climate change based on that view and identified risks with a particularly high degree of importance after also factoring in that degree of importance and concern on the part of stakeholders.

In our analysis of risk and opportunities, we assumed two cases: one where temperatures rise by 1.5°C and another by 4°C, and conducted analysis for both. In the former case, we assumed that formidable measures and regulations were enacted, and that in Japan as well, the renewable energy ratio grew by a wide margin, and the decarbonization of electric power progressed at a rapid pace. In the case where temperatures rise by 4°C, where it is assumed that global warming countermeasures will not be thoroughly enforced, it is projected that by the year 2100, the average ground temperature across the globe will rise by at least 4°C, and that average sea levels will rise nearly one meter. There are concerns that if measures to combat climate change are not sufficiently taken, the physical risks of climate disasters in 2050 and beyond in particular will become prominent.

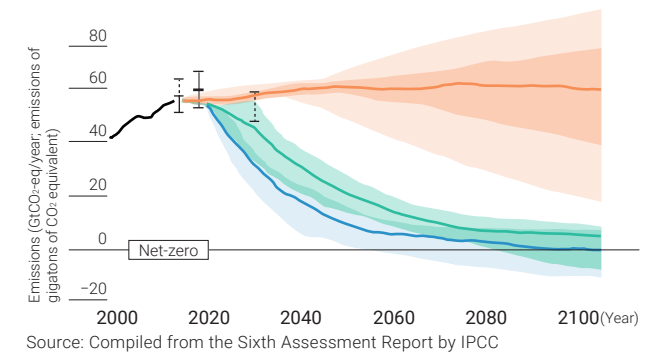
### Sea Level Rise by Scenario



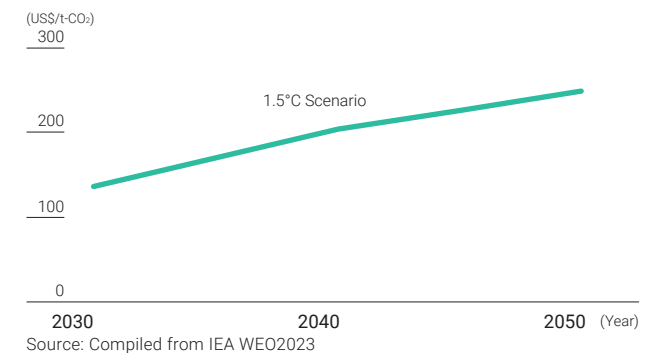
### Power generation volume in Japan, changes in electrification ratio (1.5°C scenario)



### Greenhouse Gas Reduction Pathways by Scenario









### Japan's Carbon Price Outlook



Configured scenarios	Reference scenarios	Scope and period covered	Scenario Description	Results of Scenario Analysis
1.5°C Scenario	<ul style="list-style-type: none"> <li>"World Energy Outlook 2023 (WEO2023)* by the International Energy Agency (IEA) Net Zero Emissions by 2050 Scenario (NZE Scenario), Announced Pledges Scenario (APS Scenario)</li> <li>Sixth Assessment Report by IPCC, etc.</li> </ul>	Japan, in 2050 *For overseas scenarios please see the Column on p. 61.	Scenario in which formidable measures and regulations are enacted, carbon neutrality is achieved by 2050, and the rise in surface temperature is kept to 1.5°C	<ul style="list-style-type: none"> <li>Development of technologies involving hydrogen, ammonia, and other energy sources will be promoted, and thermal power plants using these sources will continue to operate to some extent.</li> <li>Maximum introduction of CO<sub>2</sub>-free power sources such as renewable energy and nuclear power</li> <li>Electrification of the demand side and diffusion of distributed power sources will progress. Total power generation volume will increase with the growth of electrification</li> <li>No significant increase in extreme weather events</li> </ul>
4°C Scenario	<ul style="list-style-type: none"> <li>SSP5-8.5 Scenario of the Sixth Assessment Report by IPCC</li> </ul>		Maximum emission scenario in which climate policies are not introduced due to fossil fuels dependence-based developments	<ul style="list-style-type: none"> <li>Distributed generation becomes widespread, but thermal power plants remain to some extent due to lack of technological alternatives</li> <li>Despite progress in energy conservation and electrification, which are cost-effective with existing technologies, a significant portion of the energy system still relies on fossil fuels</li> </ul>

# Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

## Strategy: Risk and Opportunities

	Division	Risk and opportunity category	Specific examples from the Company	Timing of occurrence			Response strategies							
				Short term	Medium term	Long term								
1.5°C Scenario	Transition risk	Policy, legal system, and regulation risk	<ul style="list-style-type: none"><li>Introduction of carbon pricing</li><li>Regulatory measures aimed at phasing out inefficient coal (book value of aging thermal facilities: 47 billion yen at the end of FY2023)</li></ul>	●	●	●	<ul style="list-style-type: none"><li>Introducing internal carbon pricing and utilizing it upon making investment judgments Standard scenario: \$40/t-CO<sub>2</sub> (referring to WEO2023 STEPS*), Risk scenario: \$90/t-CO<sub>2</sub> (as of 2030) *While keeping in mind the carbon price of \$130/t in 2030 under the 1.5°C (NZE) scenario, when making investment judgments for the meanwhile, we will use an ICP set by referring to the STEPS scenario.</li><li>Competitiveness assessment and phase-out policy development for power plants based on regulatory measures</li></ul>							
		Technology risk	<ul style="list-style-type: none"><li>Thermal power generation facilities that have not taken steps to reduce CO<sub>2</sub> emission becoming stranded assets</li></ul>		●	●	<ul style="list-style-type: none"><li>Reducing or discontinuing the operation of coal-fired thermal power plants while considering their importance in maintaining a steady energy supply; Progressive adoption and extension of emission reduction strategies including mixed combustion of biomass and ammonia and CCS, etc.; Eventual transition to CO<sub>2</sub>-free hydrogen power generation.</li></ul>							
		Market risk	<ul style="list-style-type: none"><li>Changing preference for CO<sub>2</sub>-free electricity</li></ul>		●	●	<ul style="list-style-type: none"><li>Formation of a balanced power supply portfolio (hydroelectric, wind, geothermal, solar, nuclear, CO<sub>2</sub>-free hydrogen power generation)</li><li>Accelerate business expansion by leveraging the strengths as a top runner of renewable energy (Hydroelectric: No. 2, Wind: No. 2 in Japan)</li></ul>							
		Reputation risk	<ul style="list-style-type: none"><li>Corporate image is affected due to CO<sub>2</sub> emissions</li><li>Divestment and/or active engagement by investors</li></ul>	●	●	●	<ul style="list-style-type: none"><li>Steady progress of J-POWER "BLUE MISSION 2050"</li><li>Enhancement of information disclosure regarding climate change and continuous dialogue with stakeholders</li></ul>							
	Opportunities	Resource efficiency	<ul style="list-style-type: none"><li>Developments in low carbon/decarbonization technologies and expansion of opportunities</li><li>Improvement of existing asset value</li></ul>	●	●	●	<ul style="list-style-type: none"><li>Creation of new value through existing assets (upcycling) Short- to medium-term: Promotion of GENESIS Matsushima Plan and NEXUS Sakuma Plan</li><li>Initiatives to reduce CO<sub>2</sub> emissions Short- to medium-term: Expanded introduction of biomass, introduction of mixed combustion with ammonia, realization of CCS Long-term: Development of hydrogen mono-fuel combustion technology, conversion to CO<sub>2</sub>-free hydrogen power generation through CCS</li></ul>							
		Energy sources	<ul style="list-style-type: none"><li>Realization of new businesses pertaining to hydrogen, ammonia, and other energy sources</li></ul>	●	●	●	<ul style="list-style-type: none"><li>Challenges with CO<sub>2</sub>-free hydrogen manufacturing and initiatives geared toward supply Australian brown coal hydrogen project, joint examination of green ammonia manufacturing and negative emission hydrogen manufacturing, etc.</li></ul>							
		Products and services	<ul style="list-style-type: none"><li>Increase in revenues due to expansion of renewable energy</li><li>Provision of services that correspond to consumer and end user needs</li></ul>	●	●	●	<ul style="list-style-type: none"><li>Increase renewable energy power generation in FY2030 by 4.0 billion kWh/year (compared to FY2022)</li><li>Construction and operation of Ohma Nuclear Power Plant</li><li>Direct sales of CO<sub>2</sub>-free electricity and associated environmental value to customers who need CO<sub>2</sub>-free electricity</li></ul>							
Markets		<ul style="list-style-type: none"><li>Increase in electricity sales volume due to progress in electrification</li><li>Growing need for sustainable finance</li></ul>		●	●	<ul style="list-style-type: none"><li><b>Enhancement of our business foundation</b> Allocate investment funds to achieve J-POWER "BLUE MISSION 2050" Strategic investment up to FY2030: 700 billion yen</li><li><b>Diversification of financing (FY2023 Results)</b> 4th J-POWER Green Bonds: 20 billion yen (February 2024) Transition Link Loan: 20 billion yen (September 2023), 10 billion yen (February 2024)</li></ul>								
	Resilience	<ul style="list-style-type: none"><li>Expansion of renewables, distributed power sources and businesses on the consumer side</li><li>Diversification of low-carbon fuels</li><li>Expansion of opportunities for network development conducive to renewable energy introduction</li></ul>	●	●	●	<div><b>Investment results and forecast</b><table><tr><th colspan="2">FY2023 Results</th><th colspan="2">FY2024 Forecast</th></tr><tr><td></td><td><b>About 40%</b> Renewable Energy Power Network Thermal Power Transition</td><td></td><td><b>About 55%</b> Renewable Energy Power Network Thermal Power Transition</td></tr></table></div>	FY2023 Results		FY2024 Forecast			<b>About 40%</b> Renewable Energy Power Network Thermal Power Transition		<b>About 55%</b> Renewable Energy Power Network Thermal Power Transition
FY2023 Results		FY2024 Forecast												
	<b>About 40%</b> Renewable Energy Power Network Thermal Power Transition		<b>About 55%</b> Renewable Energy Power Network Thermal Power Transition											
4°C Scenario	Physical risk	Acute risk	<ul style="list-style-type: none"><li>Facility damage caused by extreme weather such as torrential rain disasters, forest fires, cold waves and heat waves. Water shortage in power plants Negative impact on sales of 240 million yen per day should operation of a thermal power plant (1 million kW) be obstructed</li></ul>		●	●	<ul style="list-style-type: none"><li>Carrying out revisions of BCP based on updated knowledge as appropriate</li><li>Response to water risk Risk assessment and management utilizing WRI Aqueduct (3.0)* *A global standard assessment tool for water risk developed by the World Resources Institute (WRI).</li></ul>							
		Chronic risk	<ul style="list-style-type: none"><li>Assumes negative impact on facilities caused by prolonged rises in average temperatures, changes in rainfall and rises in sea surface Thermal power generation facilities: 110 billion yen, Hydroelectric power generation facilities: 75 billion yen *Calculated by multiplying the current book value of thermal and hydroelectric facilities with the rate of 0.296 for damage by 0.5 m sea-level rise and 0.189 for flooding damage, respectively.</li></ul>			●								



## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Strategy: Scenario analysis toward carbon neutrality in 2050: Japan as a whole

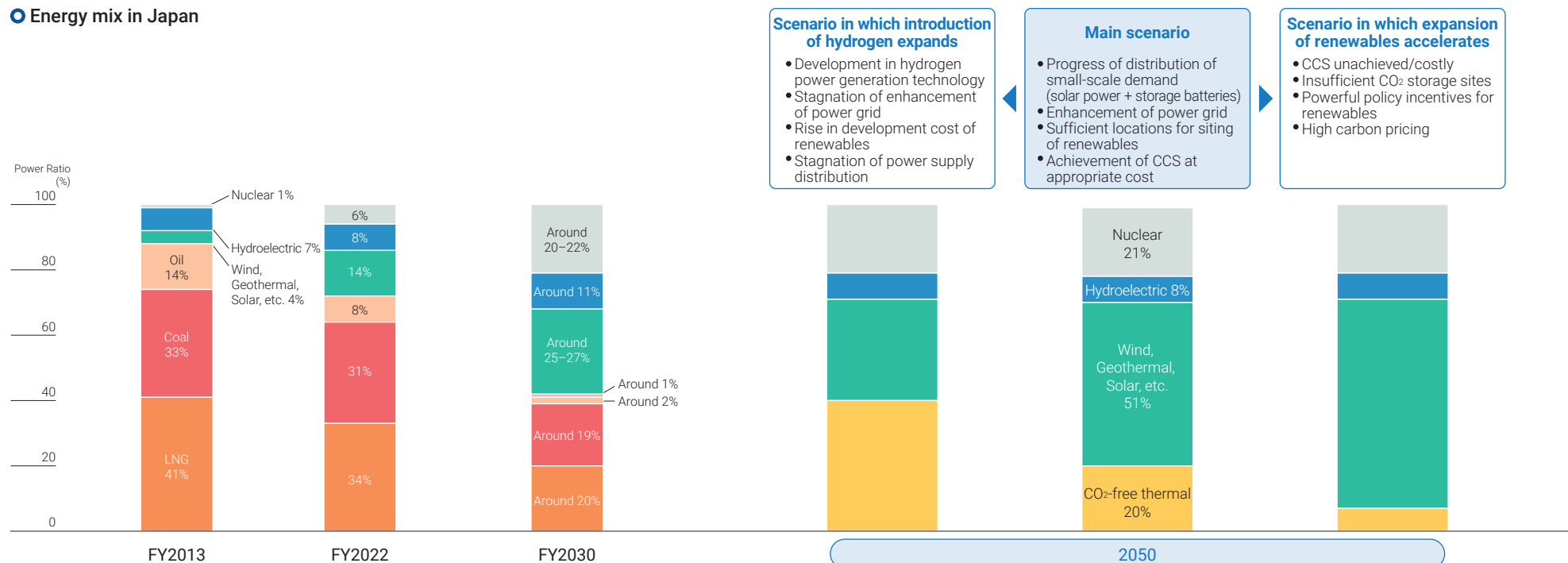
The J-POWER Group performed climate change scenario analysis for Japan as a whole, based on the 1.5°C scenario advocated in the Paris Agreement, which pursues efforts to limit the average temperature increase at the end of this century to less than 1.5°C above pre-industrial levels. The 1.5°C scenario dictates that CO<sub>2</sub> emissions must essentially be kept to zero (carbon neutrality) by 2050. IEA's WEO2023 NZE 1.5°C scenario does not lay out the energy mix in 2050 in Japan. We therefore have adopted the APS scenario under WEO2023 as the main scenario for our scenario analysis, since it projects the energy mix in 2050 in Japan, which is assumed to have achieved carbon neutrality by then. The power source composition for FY2030 is based on the Japanese government's Sixth Strategic Energy Plan.

According to IEA projections, by the year 2050, total variable renewable energy (VRE) as represented by solar and wind power will be 70% of total power in the EU and the U.S. Conversely, in 2050 Japan, VRE and total renewable energy are projected at 40% and 60%, respectively, with nuclear power accounting for 20% and the remaining 20% comprised of hydrogen/ammonia and thermal power + CCS. We believe this is because electric power systems in Japan are interconnected in tandem rather than mesh-shaped like their Western counterparts, leaving them with weak cross-regional interconnection capacity and poor versatility and flexibility. In addition, there are also constraints on the introduction of VRE due to the lack of appropriate sites for it, and therefore from the perspective of stable supply, making it necessary to provide

supply and adjustment capacity through CO<sub>2</sub>-free thermal power generation.

Note that the actual environment in the year 2050 may not take the shape of the assumptions under this main scenario, as there are many uncertainties involved including progress of innovation. Given that, we also analyzed scenarios in which preconditions related to renewables and thermal power generation were modified, which are believed to be areas where the Group will be particularly impacted.

#### Energy mix in Japan



## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

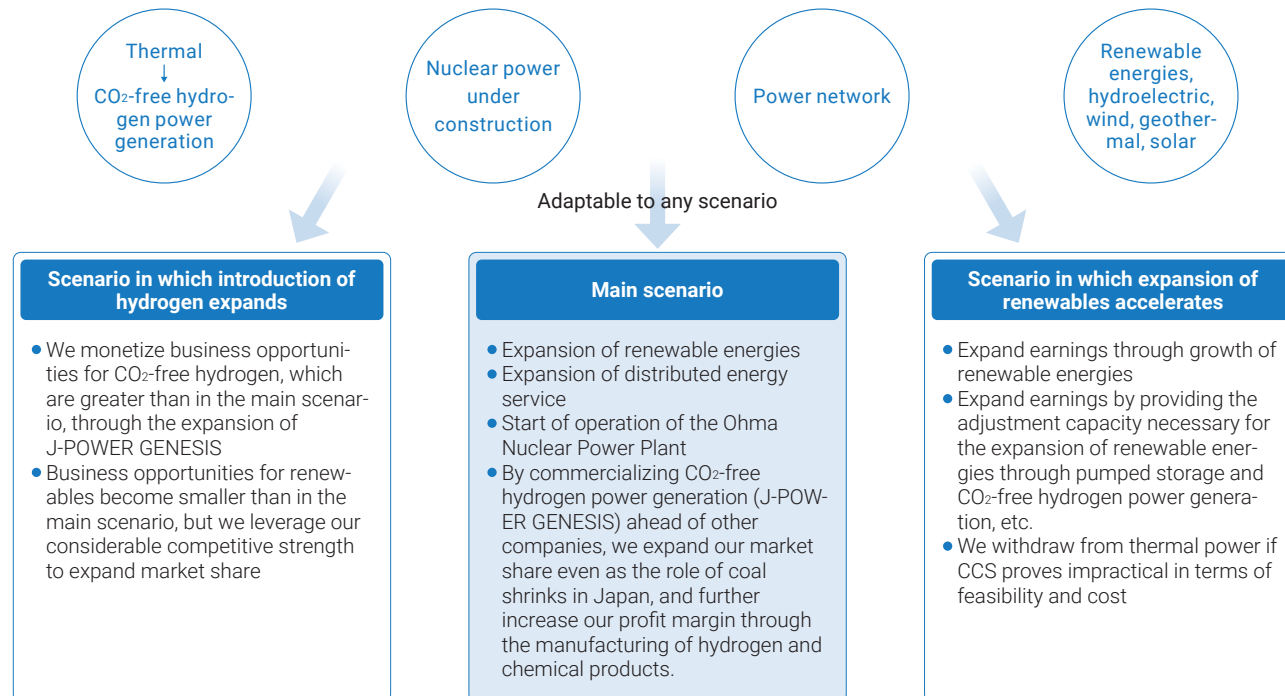
### Strategy: Scenario analysis toward carbon neutrality in 2050: J-POWER Group

Based on the scenario analysis of Japan as a whole on the previous page, power generators, including the J-POWER Group, will need to focus on developing renewable energy sources to achieve carbon neutrality in 2050, approx. 30 years from now, while also converting coal- and gas-fired power generation eventually to CO<sub>2</sub>-free hydrogen from the perspective of stable supply. We believe it to be economically sound to convert to CO<sub>2</sub>-free hydrogen by making gradual capital investments (upcycling) in the latest innovations while utilizing existing power plant infrastructure that is being depreciated. We also believe that upcycling is an important means of sustainably using developed renewable energy.

The Group has formed and operated a well-balanced power source portfolio consisting of renewable energies

(hydroelectricity, wind, geothermal, and solar) and thermal power, and has also accumulated a wealth and wide range of technologies and expertise in nuclear power construction and the development of CO<sub>2</sub>-free hydrogen production and generation technologies. Therefore, by accelerating the expansion of renewable energy and flexibly upcycling existing power generation facilities while keeping an eye on the progress of innovation and economic trends, we can respond to not only the main scenario of Japan's energy mix in 2050, but also the scenario in which expansion of renewables accelerates and the scenario in which introduction of hydrogen expands.

#### ● The extensive and wide-ranging technologies and knowledge of the J-POWER Group



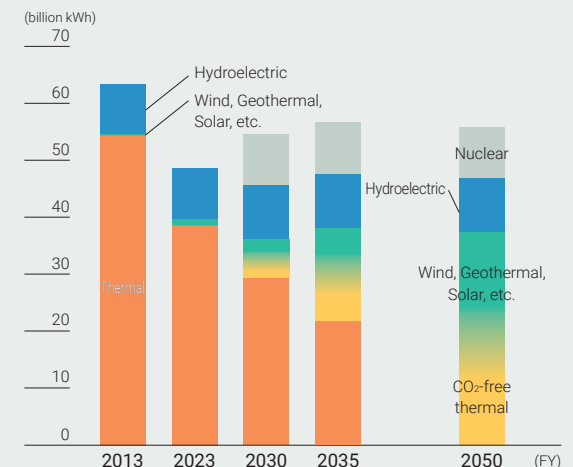
### Column

#### Projected Electricity Generated by J-POWER

Based on the above scenario analyses and our transition strategy, J-POWER "BLUE MISSION 2050," we have projected the transition of our power generation volume to carbon neutral by 2050 with certain assumptions. In FY2023, approx. 80% of the power generated in Japan was thermal power. 2050 will see the expansion of renewable energy\*, which is a priority for development, as well as the addition of nuclear power generation. We will continue to reduce or eliminate thermal power generation, while taking into consideration its role in ensuring a stable supply. We will gradually introduce and expand measures to reduce CO<sub>2</sub> emissions, such as mixed combustion (biomass and ammonia) and CCS, and eventually convert to CO<sub>2</sub>-free hydrogen power generation.

\*Our wind power generation capacity is assumed to expand in pace with the expansion of wind's share in Japan's overall generation capacity under the APS scenario.

#### ● J-POWER Group's Electricity Generation Trends and Forecasts



## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Column

### Strategy: Scenario analysis toward carbon neutrality in 2050: J-POWER Group's major overseas thermal power generation facilities

In its international business, the J-POWER Group is working to improve the investment efficiency of existing assets and advancing into new business segments, conscious of profit scale and profitability and to build a profit base on a short-, medium- and long-term perspective.

Countries have announced their nationally determined contributions toward carbon neutrality. None of them, however, have committed to a single path, and instead presented

multiple scenarios in their vision to carbon neutrality. They share other commonalities in their vision such as further promotion of renewable energy, electrification, hydrogen use, utilization of CCS and that they all rely on future innovations. The J-POWER Group will also continue to invest in decarbonization and develop renewable energy in line with the respective decarbonization policies of each country in which we operate.

NDC (Nationally Determined Contribution)	
2030	<b>30%</b> reduction (compared to BAU) (40% reduction with international support)
2050	Carbon neutrality
2065	Net-zero GHG emissions

  
Thailand

#### J-POWER Group's power generation facilities and initiatives

- 11 gas-fired and 2 biomass power plants (longest active PPA: 2040)
- Aiming to replace with high-efficiency gas-fired power plants
- Expansion of renewable energy through rooftop solar business

  
Indonesia

NDC (Nationally Determined Contribution)	
2030	<b>31.89%</b> reduction (compared to BAU) (With international support: 43.2% reduction)
2060	Net-zero emissions

#### J-POWER Group's power generation facilities and initiatives

- 1 coal-fired facility (Batang Power Plant) (longest active PPA: 2047)
- This highly efficient power plant is not subject to early discontinuation or emissions trading at this point, but initiatives to further reduce carbon emissions will be considered.
- Development of renewable energies, provision of decarbonization solutions

BAU: Business As Usual (without special measures)

  
United States

NDC (Nationally Determined Contribution)	
2030	<b>50-52%</b> reduction (compared to FY2005 levels)
2050	Net-zero emissions

#### J-POWER Group's power generation facilities and initiatives

- 10 gas-fired and 1 Jet Fuel (Simple Cycle) power plants (longest active PPA: 2035)
- Mixed combustion of hydrogen at Jackson thermal power plant (study phase)
- Development of renewable energy including large-scale solar power generation and transition to a power supply portfolio centered on renewables



## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Transition plan to achieve goal of carbon neutrality in 2050: J-POWER “BLUE MISSION 2050”

#### Realizing a carbon-neutral, hydrogen society (the value we provide to society)

The J-POWER Group has formulated the J-POWER “BLUE MISSION 2050” to accelerate its efforts to address climate change. We are steadily working to achieve a carbon neutral, hydrogen-based society by promoting the three pillars of expanding CO<sub>2</sub>-free power sources; push for zero-emission power sources; and stabilization and enhancement of the electric power network.

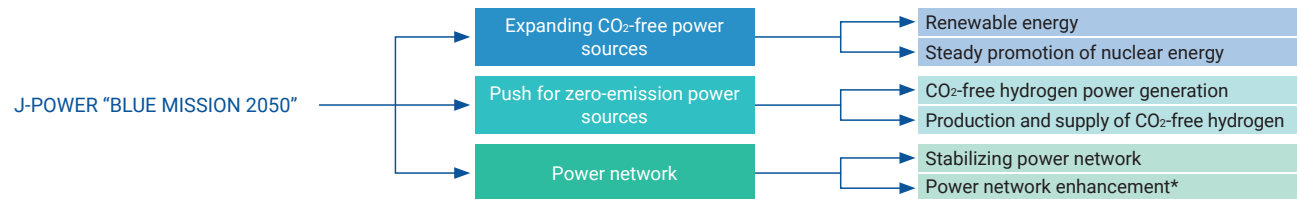
The Company has been engaged in hydroelectric, thermal, wind, and geothermal power generation, transmission, and transformation business upholding our mission to “meet people’s needs for energy without fail, and play our part in the sustainable development of Japan and the rest of the world.” To achieve this mission, we aim to further develop the comprehensive technological capabilities and balanced portfolio that we have cultivated over the years, and will approach our work from various angles.

With an eye toward 2050, we will take on the challenge of incrementally achieving carbon neutrality in our power generation business. As a milestone, we aim to reduce CO<sub>2</sub> emissions by 9.2 million tons in 2025 and 46% in 2030 compared to the FY2013 level.

\*For further details on J-POWER “BLUE MISSION 2050,” see p.21 of 2024 Integration Report

We will contribute to the sustainable development of Japan and the rest of the world by balancing stable energy supply and efforts to fight climate change.

#### The three pillars of J-POWER “BLUE MISSION 2050”



#### J-POWER “BLUE MISSION 2050” Roadmap

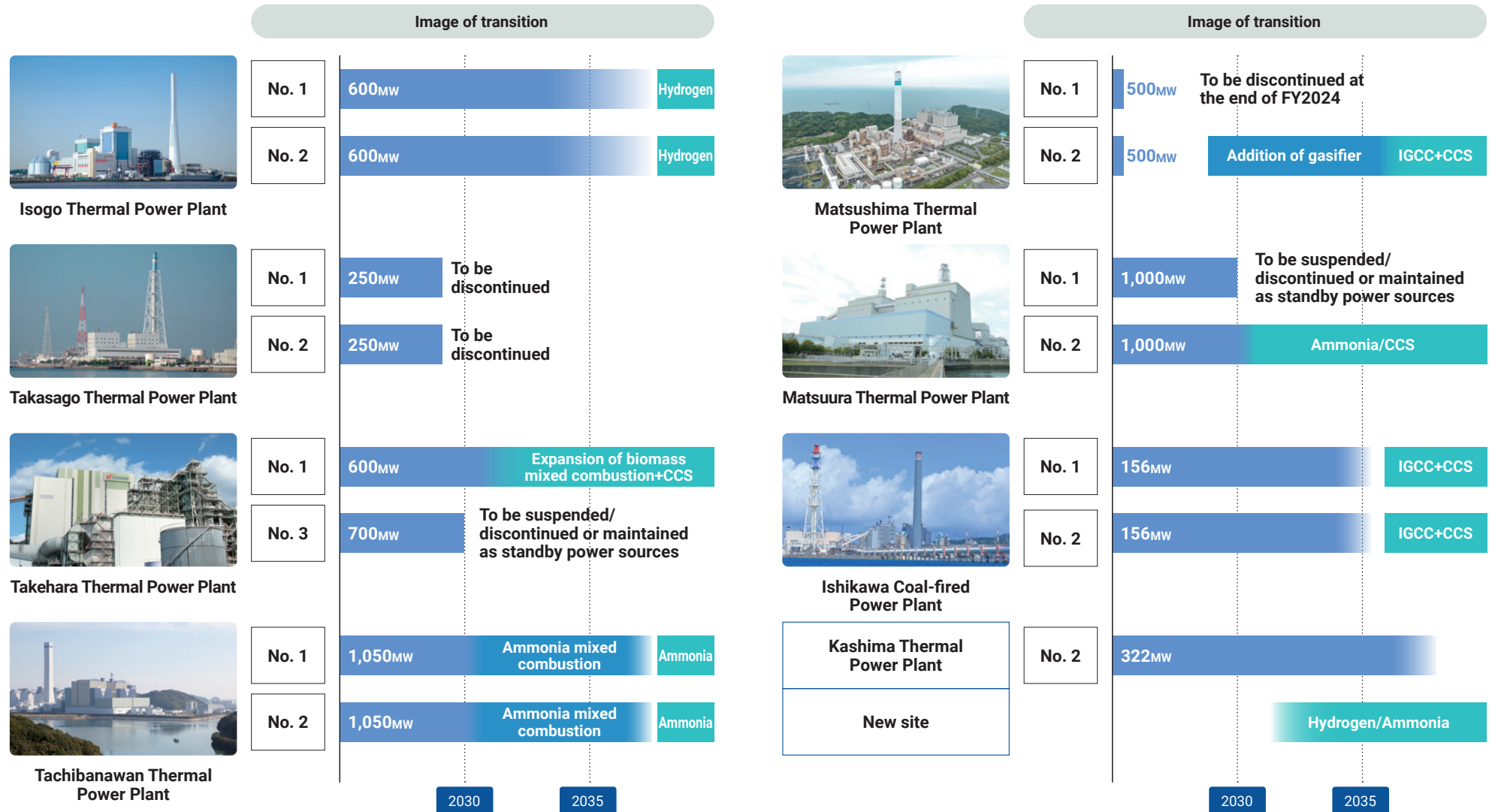
CO <sub>2</sub> emission reduction target of domestic power generation business (compared to FY2013)		-9.2 million tons	-22.5 million tons -46%	Realization of carbon neutrality Net-zero emissions	
		2025	2030	2040	2050
Expanding CO <sub>2</sub> -free power sources	Renewable energy	Increase of domestic power generation volume by 4.0 billion kWh Global development of new renewable energy projects		Additional new developments, upcycling of existing facilities and maximum use of existing assets	
	Nuclear	Construction and start of operations at Ohma Nuclear Power Station			
Push for zero-emission power sources	Domestic coal-fired power	Gradual phase-out of aging power plants	CO <sub>2</sub> reduction initiatives (Expansion of biomass mixed combustion, introduction of ammonia mixed combustion, etc.)		
	CCS	Development of business environment, design and construction of facilities		Injection and storage	Achieve CO <sub>2</sub> -free thermal power generation (Hydrogen, ammonia, IGCC+CCS, biomass mixed combustion +CC, etc.)
	Hydrogen power generation	Demonstration tests in Japan	Upcycling (adding gasifiers to existing assets)		
	Fuel production (CO <sub>2</sub> -free hydrogen)	Feasibility study on overseas production	Utilization in other industries		
Power network	Stabilization	Hydroelectric power generation, improvement of load tracking performance by upcycling (adding a gasifier to existing assets), and expansion of distributed energy service			
	Reinforcement*	Completion of reinforcement of the New Sakuma Frequency Converter Station, etc.		Contribution to power network enhancement	

\*Strengthening the power network is an initiative of J-POWER Transmission Network Co., Ltd.

## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Direction for thermal power transition in Japan

Based on our BLUE MISSION 2050 roadmap, the J-POWER Group will advance its CO<sub>2</sub> reduction and decarbonization initiatives, while contributing to a stable power supply. This includes phasing out inefficient coal-fired power plants and converting high-efficiency thermal power plants using the optimal technology according to the local characteristics of the site.



\*The plan will be updated, reviewed, and refined as needed based on changes in the assumptions including the Japanese government's GX policy (Strategic Energy Plan, global warming countermeasures, NDC, etc.), power demand-supply situation, power system design, and progress of industry development, etc.

## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Strategy: 2030 Scenario Analysis –J-POWER Group–

As part of our J-POWER “BLUE MISSION 2050,” the J-POWER Group has set a milestone of a 46% reduction in CO<sub>2</sub> emissions by 2030 and a goal of becoming carbon neutral by 2050. These targets are in line with the NDC (Nationally Determined Contribution) made by Japan for the Paris Agreement. The financial impacts and specific initiatives for a 46% reduction are estimated in the 2030 scenario analysis.

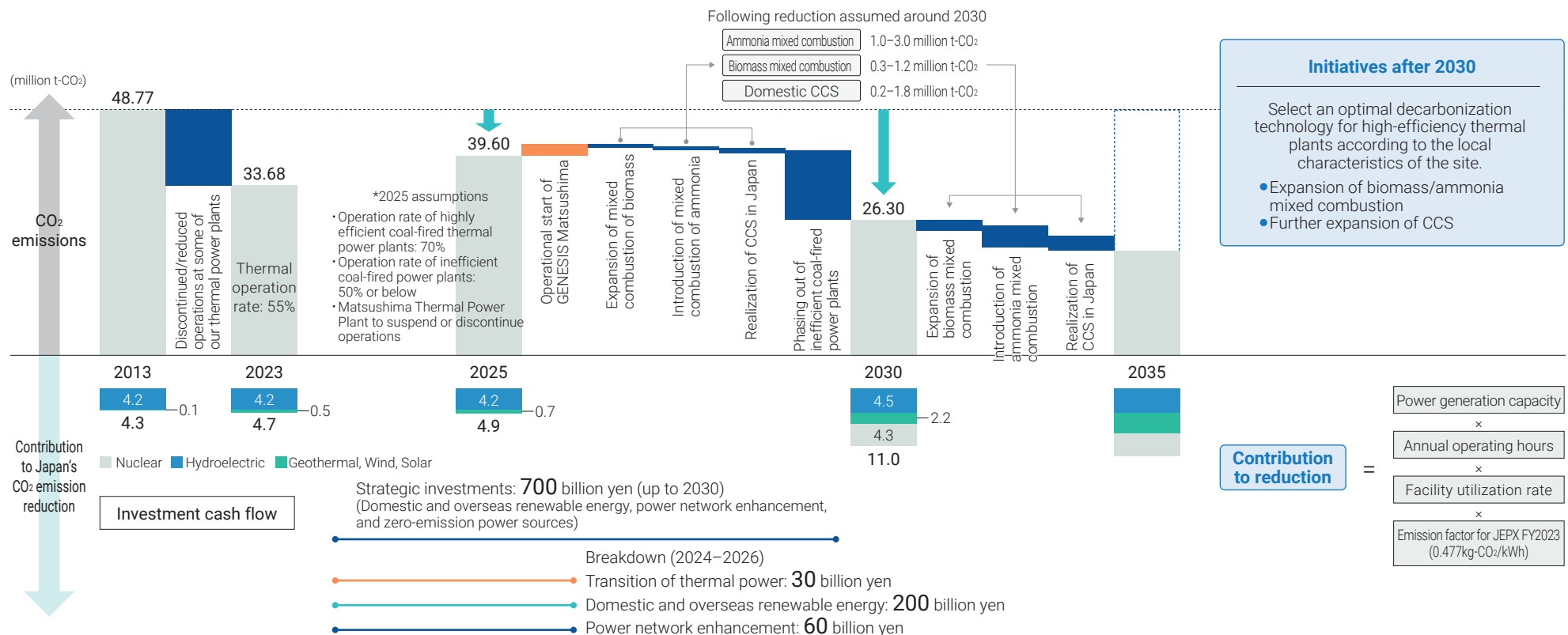
By reducing the use of thermal power, mixed combustion of biomass/ammonia, upcycling existing facilities, and

implementing CCS in Japan, we will gradually reach our CO<sub>2</sub> reduction target by 2030. On the following page, the results of our financial analysis of scenarios based on our reduction targets are shown. We will work to offset the effects of the decrease in thermal power sales through our efforts to increase renewable energy in order to reduce the financial burden of our response to climate change.

We have established a target to increase renewable energy by 4.0 billion kWh compared to FY2022 by FY2030.

If J-POWER develops CO<sub>2</sub>-free power sources like renewable energy, it will replace other thermal power sources in Japan as a whole and help the country lower its CO<sub>2</sub> emissions overall. By 2030, we predict that our CO<sub>2</sub>-free power sources will have contributed to reducing roughly 11 million tons of emissions, growing from about 4.7 million tons in 2023.

### Contribution to Japan's overall CO<sub>2</sub> emission reduction brought by J-POWER's initiatives to achieve CO<sub>2</sub> reduction targets and its CO<sub>2</sub>-free power sources



## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Strategy: 2030 Scenario Analysis—Estimated Financial Impact—

As a result of several steps—the implementation of carbon pricing, support for the development and introduction of CO<sub>2</sub> emission reduction measures, and more—to reach carbon neutrality in 2050, it is anticipated that Japan's energy costs would rise in the future. Although the estimated financial impact contains information that will result in higher expenses, the J-POWER Group will work to control rising energy bills using methods that are economically sound.

#### Financial impact in 2030: According to our reduction target (46% reduction; reduction of 22.5 million tons) (1/2)

	Factors	Calculation details	Impact in value
Thermal power	Phase-out of inefficient coal-fired thermal power plants	<ul style="list-style-type: none"> <li>An estimated 10 billion yen decrease in ordinary profit mainly due to the closure of inefficient coal-fired thermal power plants</li> <li>*In cases where such coal-fired plants are maintained as standby power sources, no additional impact was assumed based on the assumption that institutional support will be provided.</li> </ul>	Decrease in profits of approx. 10 billion yen
	Carbon pricing (CP)	<ul style="list-style-type: none"> <li>Calculated assuming a carbon price of \$40/t in 2030, based on our internal carbon pricing (ICP) standard scenario; Increase in costs of approx. 150 billion yen</li> <li>Predicting the precise impact is challenging due to the expected rise in non-fossil value and associated revenue from CO<sub>2</sub>-free power sources, and the potential for part of the cost to be passed on to power charges</li> <li>Impact on carbon pricing will be regularly reconsidered paying close attention to Japan's energy policies to achieve green transformation (Exchange rate: 1US\$=142 yen)</li> </ul> $\text{Impact on CP} = \text{CP (\$40-tCO}_2\text{)} \times \text{CO}_2 \text{ emissions (26.30 million t-CO}_2\text{)}$	—
	Biomass/ammonia mixed combustion	<ul style="list-style-type: none"> <li>When reducing CO<sub>2</sub> emissions, the application of decarbonization options is deemed beneficial if the following formula holds.</li> <li>Reduction measures to be applied to CO<sub>2</sub> emissions around 3 million tons: <b>CO<sub>2</sub> reduction cost</b> is assumed at 12–54 billion yen.</li> <li>Reduce impact using policy support, etc. Work to make the CO<sub>2</sub> reduction cost to be lower than the CO<sub>2</sub> cost.</li> </ul> $\text{CO}_2 \text{ price} > \text{CO}_2 \text{ reduction cost} - \text{Support system}$	—
	Biomass/ammonia mixed combustion	$\text{2030 CP (yen/tCO}_2\text{)} \times \text{CO}_2 \text{ reduction achieved by using carbon-neutral fuel} > \left( \text{Power generation volume (kWh) using carbon-neutral fuel} \times \left( \text{Cost of mixed combustion with carbon-neutral fuel (yen/kWh)} - \text{Power generation cost using coal only (yen/kWh)} \right) \right) - \text{Policy support}$	
	Introduction of CCS	$\text{CP in 2030 (yen/tCO}_2\text{)} > \left( \text{Separation and capture expenses (yen/tCO}_2\text{)} + \text{Transportation expenses (yen/tCO}_2\text{)} + \text{Storage expenses (yen/tCO}_2\text{)} \right) - \text{Policy support}$	
	GENESIS Matsushima Plan	<ul style="list-style-type: none"> <li>By adding gasification facilities and other equipment to the existing Matsushima Thermal Power Plant and “upcycling” it, we aim to reduce CO<sub>2</sub> emissions by 10% as soon as possible while contributing to a stable supply. We will pursue CO<sub>2</sub>-free hydrogen power generation in the future.</li> <li>Use the Long-Term Decarbonization Power Source Auction to recoup capital expenditures and other fixed costs.</li> </ul>	0
	Reduction in coal-fired thermal power repair expenses and renewal investment	<ul style="list-style-type: none"> <li>Constraining repair expenses and renewal investment for coal-fired thermal power plants prior to reduction of operations anticipated from 2030.</li> <li>Actual repair costs for, as well as investments to replace, coal-fired thermal power will require about 45 billion yen per year, while investment for renewal will require about 20 billion yen per year. We will work to reduce some of these expenses.</li> </ul>	+a

## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Financial impact in 2030: According to our reduction target (46% reduction; reduction of 22.5 million tons) (2/2)

	Factors	Calculation details	Impact in value
CO <sub>2</sub> -free power sources	New development of renewable energies	<ul style="list-style-type: none"> <li>Estimated from the power generation value from new development of renewable energy and non-fossil value</li> </ul> <div style="text-align: center;"> <p>Power generation volume of renewable energies</p> <p>+4.0 billion kWh</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 2px 5px; margin: 0 5px;">FY2022</div> <div style="font-size: 2em; margin: 0 10px;">➔</div> <div style="border: 1px solid black; padding: 2px 5px; margin: 0 5px;">FY2030</div> </div> </div>	Profit increase of 10 billion yen and above
	Expansion of revenues for existing renewable energy	<ul style="list-style-type: none"> <li>Enhance the non-fossil value of existing renewables (10 billion kWh)</li> </ul>	
	Ohma Nuclear Power Station (under construction)	<ul style="list-style-type: none"> <li>The impact of the project has not been included in the financial impact estimation as it is currently under review based on the new regulatory criteria.</li> </ul>	—

### 2030: If aligned with the 1.5°C target of the IPCC Sixth Assessment Report (+2.4 million tons reduction)

We also analyzed the GHG emissions in the 1.5°C pathway as outlined in the IPCC Sixth Assessment Report (AR6). According to the IPCC AR6, the global model pathway for limiting global warming to 1.5°C (>50%) with no or limited overshoot requires emissions reduction of 43% by 2030 and 60% by 2035 against 2019 levels. These targets are equivalent to 51% reduction against 2013 levels in Japan, and when translated to reduction targets of the J-POWER Group, it would require an additional 2.4 million tons of reduction on top of our current 2030 target.

#### IPCC Sixth Assessment Report

43% reduction\* by 2030, 60% reduction by 2035 (compared to 2019)

↓ \*Equivalent to 51% reduction (compared to FY2013) in Japan's NDC  
Converted to our "BLUE MISSION 2050"

24.9 million ton reduction (compared to FY2013) in FY2030  
(an additional reduction of 2.4 million tons)

### Financial impact

#### Additional measures for approx. 500 MW of coal-fired thermal power are needed

Although costs are expected to increase by about 10–44 billion yen, we will try to reduce the impact by making maximum use of an optimal combination of options, policy support, etc.



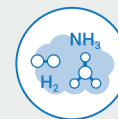
Reduction of operations

AND/OR



Biomass

AND/OR



Hydrogen/ammonia

AND/OR



CCS



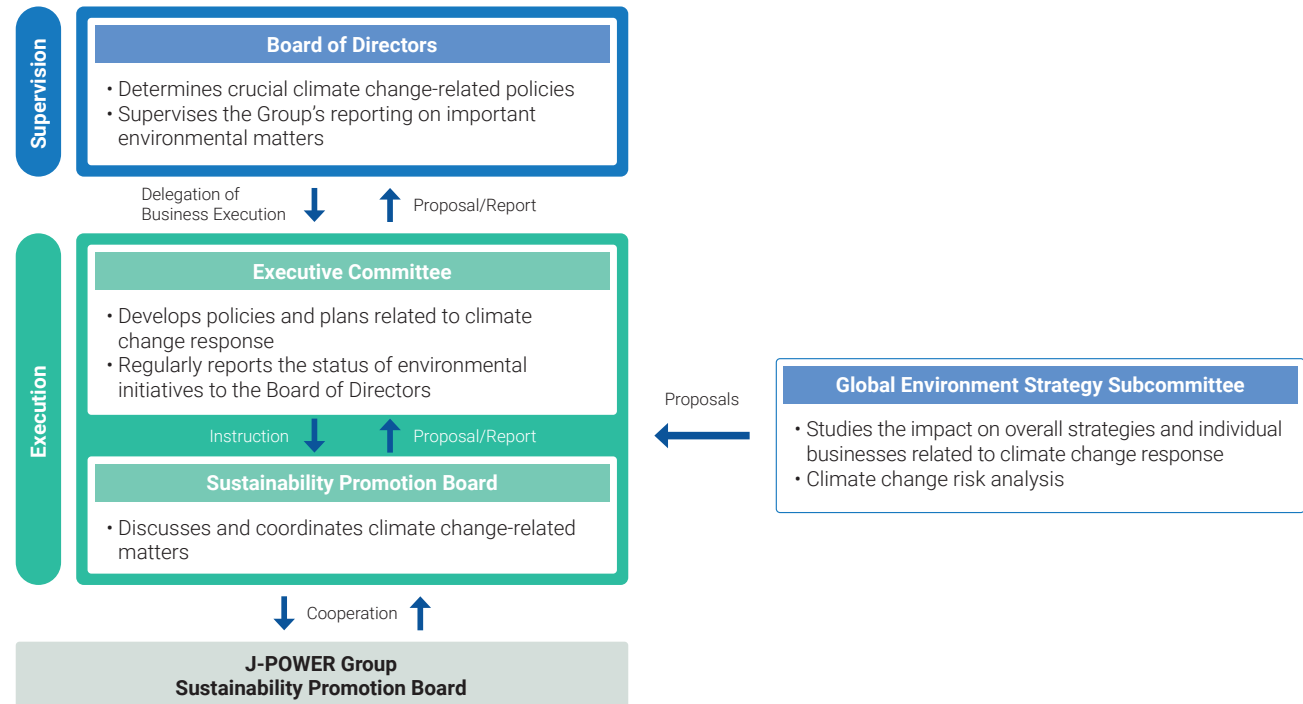
## Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

### Risk Management

The J-POWER Group assesses numerous risks related to corporate activities in order to uphold and enhance its financial soundness and corporate value. The Sustainability Promotion Board analyzes and assesses sustainability issues, including climate change, and discusses mitigation strategies.

Under the Sustainability Promotion Board, the Global Environmental Strategy Subcommittee has been established as a promotion structure to evaluate climate change threats, hold discussions, and make recommendations or reports to the Executive Committee and Board of Directors.

The Board of Directors works to identify risks, including those related to ESG and sustainability, at an early stage by receiving regular reports on the status of business execution and by ensuring mutual checks and balances in the internal decision-making process, discussions at various meetings, and the creation of a crisis management system in accordance with internal regulations. In addition, we are aiming to reduce the effect of losses when they occur while fully understanding and minimizing risks in the execution of company activities, including ESG and sustainability risks.



### Indicators and Targets: Greenhouse gas (GHG) emissions

J-POWER Group has obtained third-party certification for all of Scopes 1-3 GHG emissions.

★ represents FY2023 data for which the Group has obtained third-party certification.

#### GHG Emissions 3-year Results

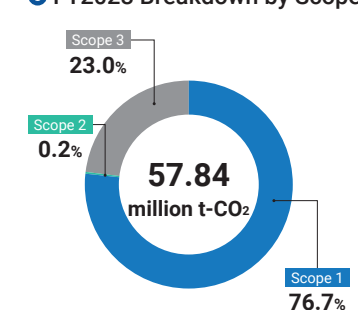
	FY2021	FY2022	FY2023
<b>Scope 1</b>	<b>47.95</b>	<b>48.91</b>	<b>44.39</b>
Domestic power generation business	41.62	40.64	33.68
Overseas power generation business	4.9	7.94	10.27
Other	1.42	0.33	0.43
<b>Scope 2 (Location criteria)</b>	<b>0.14</b>	<b>0.15</b>	<b>0.14</b>
<b>Scope 3</b>	<b>13.60</b>	<b>13.17</b>	<b>13.31</b>
<b>Total</b>	<b>61.68</b>	<b>62.23</b>	<b>57.84</b>

**Scope 1** : Direct greenhouse gas emissions by business operators themselves (burning fuel and industrial processes)

**Scope 2** : Indirect emissions accompanying use of electricity and heat/steam from other companies

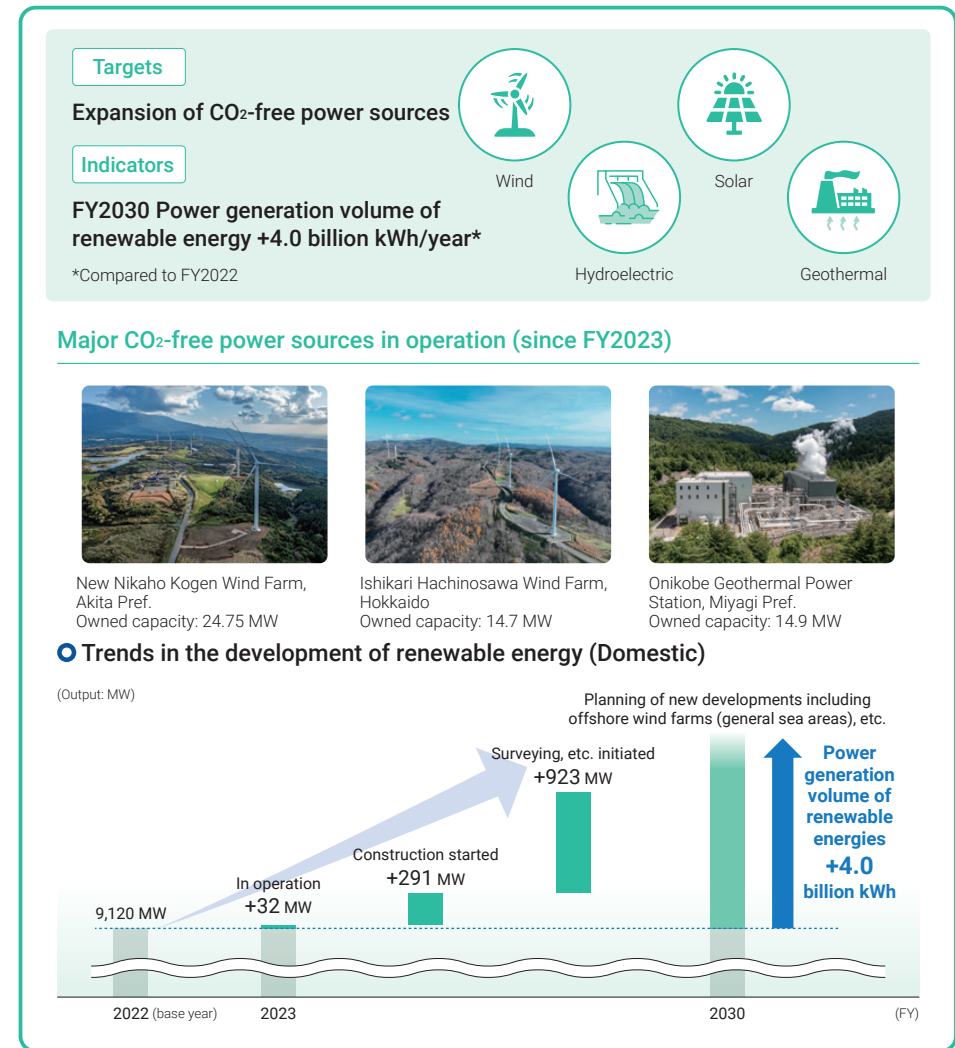
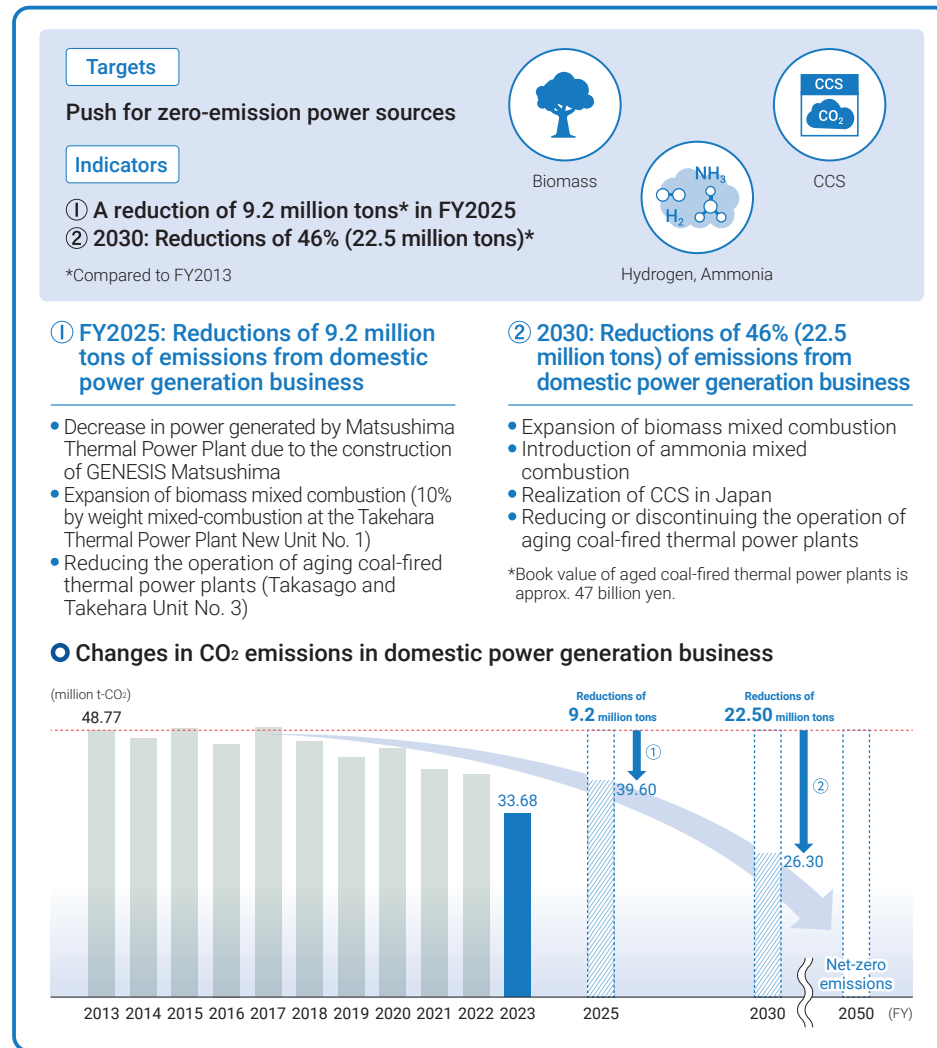
**Scope 3** : Indirect emissions other than Scope 1 and Scope 2 (emissions by other companies related to the activities of the business)

#### FY2023 Breakdown by Scope



# Climate Change Scenario Analysis (Disclosure Based on TCFD Recommendations)

## Indicators and Targets



### Column

#### Relationship between the J-POWER Group's CO<sub>2</sub> reduction results and SBT indicators

The Science Based Targets initiative (SBTi) calls for companies in the power sector to set intensity-based emission targets. The J-POWER Group has set its target based on actual emission volume and is working toward its achievement.

The rate of J-POWER's emissions reduction for the period from FY 2022 (40.64 million tons) to FY 2030 (target of 26.30 million tons) is 4.4%, exceeding the annual reduction rate of 4.2% required by SBTi for a 1.5°C trajectory alignment.