



TEPCO

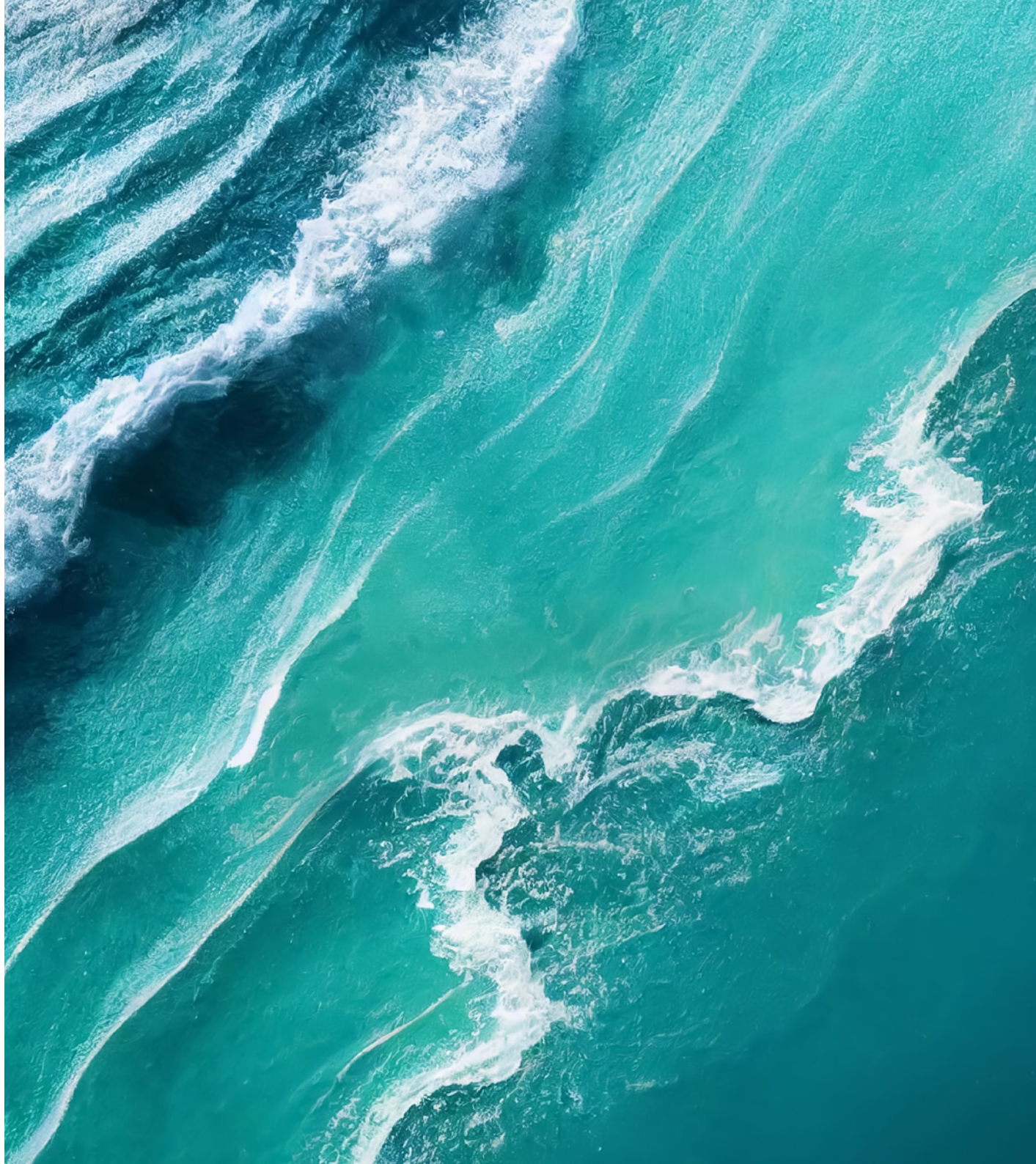
TCFD REPORT 2023
TRANSITION PLAN

Introduction

Responding to climate change over the medium to long term is one of the important management issues for TEPCO Group, which is responsible for stable energy supply. Similar to future predictions of climate change, it is difficult to accurately predict possible social changes and the impact on TEPCO Group's business environment in the future. Through highly accurate risk assessment and analysis, we aim to avoid or reduce future losses, find new business opportunities, and realize sustainable corporate management.

In April 2019, TEPCO Holdings became the first domestic energy company to endorse the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). TEPCO Group's medium-term business plans use forward-looking scenario analysis based on these recommendations when assessing whether resilience to disasters can be ensured from a long-term perspective.

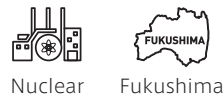
Information disclosure in accordance with the TCFD Recommendations has been published in the "TEPCO Integrated Report", and we organize the related information and publish this report as TEPCO Group's "Transition Plan".



TEPCO Group At a Glance

TEPCO
Tokyo Electric Power Company Holdings
(HD)

Holding Company



TEPCO
TEPCO Fuel & Power
(FP)

Fuel & Thermal Power
Generation Company



Business support and
management of our fuel and
power generation company, JERA

TEPCO Power Grid
(PG)

General Power Transmission
and Distribution Company



TEPCO
TEPCO Energy Partner
(EP)

Electricity Retail Company



Electricity and gas retail

TEPCO
TEPCO Renewable Power
(RP)

Renewable Energy Power
Generation Company



Operating revenue
Approx. **¥7.7** trillion

Operating income (loss)
Approx. **¥-228.9** billion

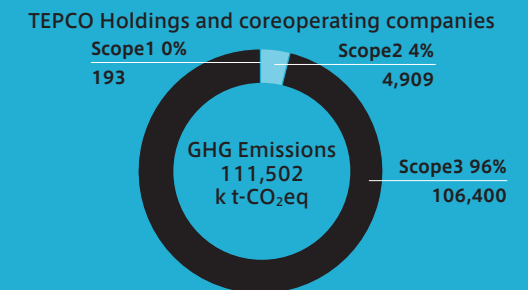
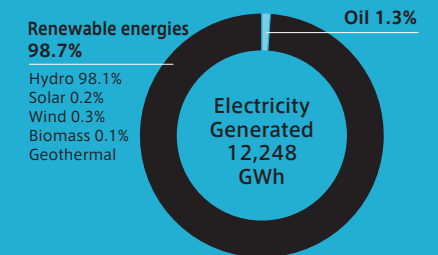
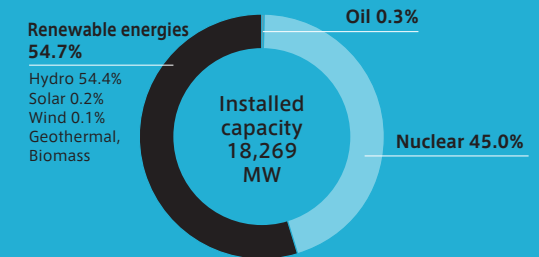
Gross power sales
242.8 TWh

Employees
38,027 people

Consolidated Subsidiary
71 companies

as of March, 2023

TEPCO Holdings and all of consolidated subsidiary companies



Japan's Energy Situation

Japan, which is the main area of business for the TEPCO Group, has little coal, oil, and natural gas resources. Japan has always had a low energy self-sufficiency rate, but in conjunction with the shutdown of nuclear power stations in FY2021 Japan's energy self-sufficiency rate fell quite low to 13.3%. Japan's basic energy policy aims to improve Energy Security and Economic Efficiency while remaining Environmentally Friendly and prioritizing Safety (S+3E).

Area (2023)

377,975 km²

Population (2023)

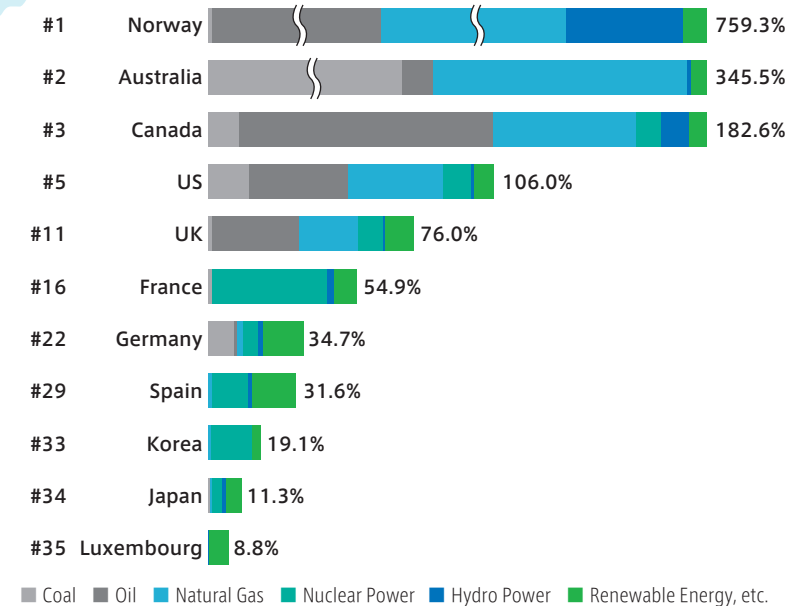
124.6 million

Real GDP (FY2022)

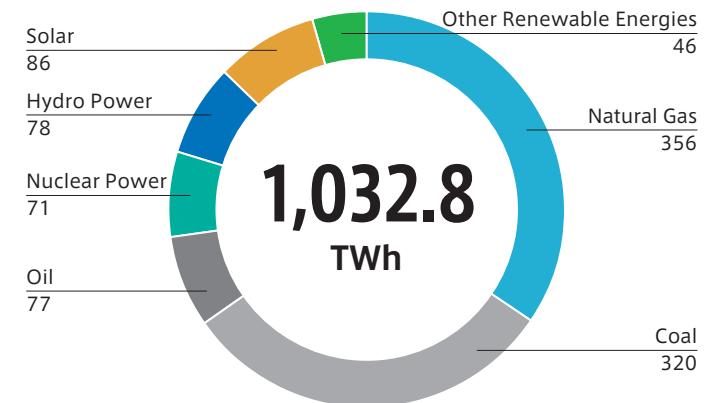
¥549.2 trillion

Source: Geospatial Information Authority of Japan, Statistics Bureau of Japan and Cabinet Office

Primary Energy Self-sufficiency Rates of Major Countries (2020)



Japan's Electricity Generated and Energy Sources (FY2021)



Source: Comprehensive Energy Statistics, Agency for Natural Resources and Energy

Carbon Neutrality Strategies

TEPCO Group

Business Structure Reforms to Achieve Balancing Long-term Stable Supply and Carbon Neutrality

(28th April, 2022)

Recently, the external environment is changing drastically, including the global situation related to energy and market conditions for resources. As it is TEPCO's mission to continue stable supply for our customers under the such situation, we will do our utmost to secure supply capacity (kW) and fuel (kWh). To do so, we will closely coordinate with the national government and the Organization for Cross-regional Coordination of Transmission Operators, Japan (OCCO) and exert all efforts of the TEPCO Group with cooperation from our customers and stakeholders.

On the other hand, it is necessary to reduce the dependence on fossil fuels in the mid to long-term in order to fundamentally solve such energy security issues. TEPCO will also promote carbon neutralization of our existing electricity business (zero-emission thermal power, hydro power, nuclear power, wind power, etc.). Additionally, we will aim to build a new strong and flexible power system by combining a locally produced and locally consumed system that originates from the customer's energy resources. In order to realize this, we will boldly take on the challenge of creating a new business model and new added values in the form of locally produced and locally consumed facility services, while utilizing our resources to the fullest and forming alliances with other companies.

Under the basic recognition that a shift away from dependence on fossil fuels will also contribute to long-term stable supply, TEPCO will proactively promote carbon neutral initiatives with our customers to meet the expectations of the society, utilizing our comprehensive knowledge and technologies from power generation and supply to the way facilities and electricity are used by customers. We will contribute to realizing a safe and sustainable society through the shift of the energy structure, while fulfilling our responsibility to Fukushima.

Carbon neutrality declaration

FY2030 goals





Reduce CO₂ emissions originating from the sale of power to 50% of FY2013 levels*

2050 goals

Reduce CO₂ emissions originating from the supply of energy to net-zero

* Scope 1, 2 and 3 emissions are from the sale of power;
Scope 1 and 2 emissions are compared to FY2019 levels

Disclosure in line with TCFD Recommendations

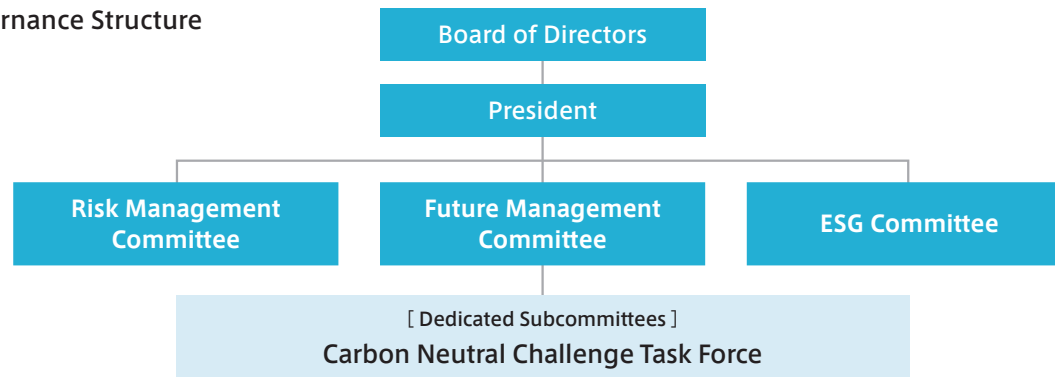
TCFD Recommendations	Recommended Disclosures	Contents	Page
 Governance	a) Describe the board’s oversight of climate-related risks and opportunities. b) Describe management’s role in assessing and managing climate-related risks and opportunities.	• Governance structure	P5
		• Executive basic remuneration and performance-linked remuneration	P5
		• Main reports and deliberations by the Board of Directors	P5
 Strategy	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term. b) Describe the impact of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning. c) Describe the resilience of the organization’s strategy, taking into consideration different climate-related scenarios, including a 2° C or lower scenario.	• Outline of a roadmap to carbon neutrality	P6
		• Assumptions for 2050	P7
		• Scenario analysis	P8
		• Financial impact of risk and opportunities	P9
 Risk Management	a) Describe the organization’s processes for identifying and assessing climate-related risks. b) Describe the organization’s processes for managing climate-related risks. c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization’s overall risk management.	• Risk management process	P10
		• Risks and opportunities	P11
		• Transition risks	P12
		• Physical risks	P13
 Metrics and Target	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process. b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks. c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	• GHG reduction target	P14
		• GHG emissions	P15
		• Roadmap to carbon neutrality	P16
		• GHG reductions	P17
		• Related metrics	P18
		• TEPCO GHG Data	P19

Governance

The TEPCO Group believes that the handling of ESG, including climate change risks and opportunities, is an important management issue, and as such the Board of Directors has selected an officer to be in charge of ESG. The ESG Officer report quarterly on the status of business operations to the Board of Directors, and the Board of Directors shall supervise climate change risks and opportunities by, for example, examining the progress of strategies, action plans, and performance target achievement. Furthermore, with the President serving as Chairman, the ESG Committee shall regularly meet to discuss climate-related issues and shall coordinate with the Future Management Committee and the Risk Management Committee. The Board of Directors, etc., engages in vigorous discussions about important topics.

From FY2023, CO₂ emission reduction achievements shall be added as a KPI to the productivity-linked remuneration indicator for executives.

Governance Structure



Chairman of the Board

Yoshimitsu Kobayashi



Chairman of Risk Management Committee, Future Management Committee and ESG Committee

Tomoaki Kobayakawa
Representative Executive Officer, President



ESG Officer

Hiroyuki Yamaguchi
Representative Executive Officer, Executive Vice President, Chief Financial Officer (CFO)



Executive basic remuneration and performance-linked remuneration

Remuneration type	Payment base	Indicators	Payout rate
Basic remuneration	The amount is based on his/her specific rank, whether he/she holds the power to represent the Company and his/her job description.	—	—
Productivity-linked remuneration	The proportion is set based on his/her specific rank, whether he/she holds the power to represent the Company and his/her job description. The amount is determined according to results of the Company and personal performance.	Company performance Company performance based on the business plan (consolidated ordinary income prior to deductions for the amount of special burden based on the Nuclear Damage Compensation and Decommissioning Facilitation Corporation Act) and CO ₂ emission reduction performance.	0~145%
		Personal performance Based on cost reduction indicators for each department being overseen and other KPI	

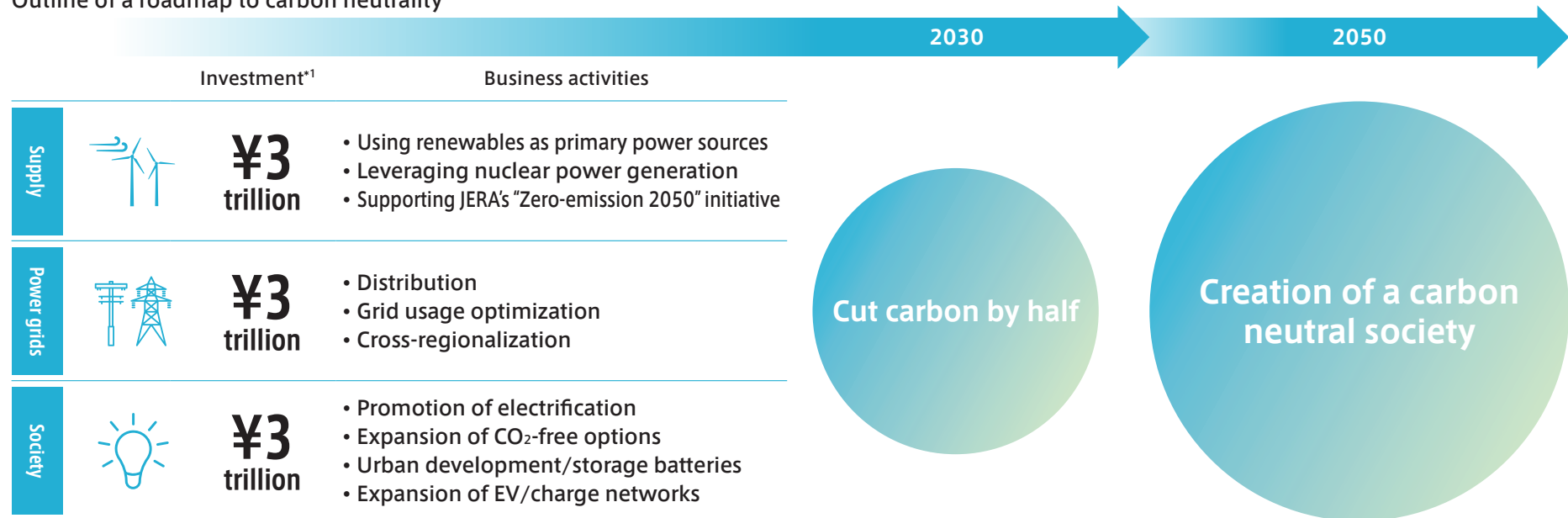
Main reports and deliberations by the Board of Directors

- Status of initiatives to develop carbon neutrality solutions
- Report on the monitoring of JERA
- Status of implementation of countermeasures for various natural disasters
- Deliberations on how to use renewables as primary power sources

Strategy

The TEPCO Group has formulated a roadmap to carbon neutrality for the three areas of supply (zero-emission power), power grids (symbiosis between large-scale power sources/large-volume transmission and locally-produced/locally-consumed power sources), and society (electrification of end-use consumption), and will achieve sustainable growth along with society.

Outline of a roadmap to carbon neutrality



*1 On the assumption that we will form alliances, our investment target is more than three times the "maximum of ¥3 trillion by FY2030" put forth in the 4th Comprehensive Special Business Plan.

Carbon Neutrality Strategies

In order to create value based on carbon neutrality and preparedness, we shall leverage nuclear power, which is a non-fossil fuel power source, and develop renewable energies, such as hydro and offshore wind power, as we transition from the sale of electricity (MWh) to the customer facility services business.

Target

FY2030

CO₂ emissions originating from the sale of power
50% reduction (of FY2013 levels)*²

*² Scope 1, 2 and 3 emissions originating from the sale of power. Scope 1 and 2 emission reductions are compared to FY2019 levels.

FY2050

CO₂ emissions originating from the supply of energy
Net zero

Progress

CO₂ emissions originating from the sale of power (million t-CO₂)

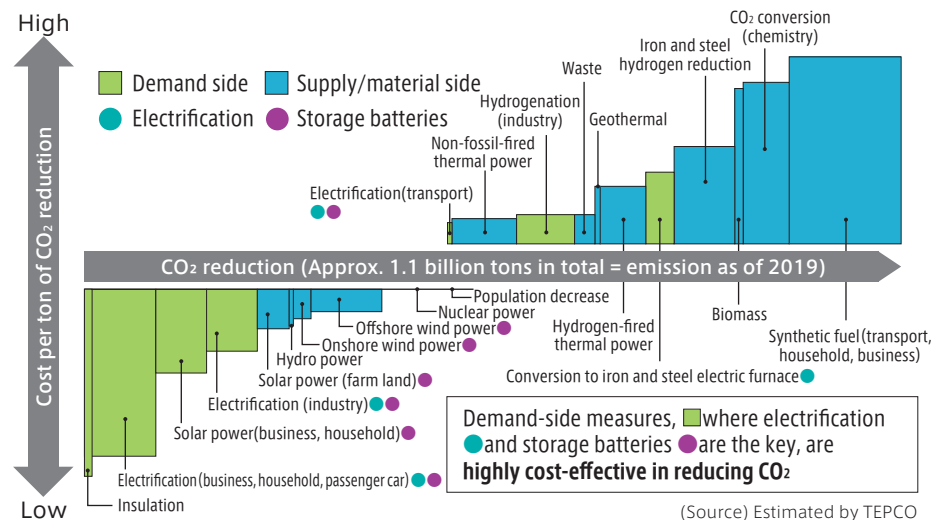
FY2013	FY2022	FY2030
139.2	65.1* ³ (-53%)	69.6 (-50%)

*³ Preliminary values. Approximate 53% (target achieved) reduction due to the effect of increasing the amount of non-fossil certificate procurement to comply with laws/regulations in addition to power source procurement innovations, etc.

Strategy : Assumptions for 2050

TEPCO is conducting multiple scenario analyses, such as 1.5~2° C and 4° C temperature rises. When we analyzed the CO₂ reduction approach to one of the scenarios for creating a carbon neutral society by 2050, we found that “demand-side electrification” was superior in terms of cost effectiveness. Furthermore, as more photovoltaic power and storage batteries are used on the demand-side, we can expect an expansion of private power generation/private consumption, and locally-produced/locally-consumed power.

Marginal abatement cost curve (2050 carbon neutral scenario)



While an expansion of private power generation/private consumption and locally-produced/locally-consumed power has the advantage of improving resilience to disasters, the generated output from photovoltaic and wind power generation fluctuates greatly, which poses the risk of resulting in a mismatch of power and supply. In order to stabilize supply, it is important to combine baseload power sources (hydro/nuclear/geothermal) with power sources for adjusting the supply-demand balance (zero-emission thermal).

In particular, leveraging the ability to store and use energy (storage batteries, hydrogen, etc.) is the key to stable supply. Furthermore, the use of thermal power for which hydrogen/ammonia, etc. countermeasures will not be implemented will be gradually decreased and ultimately replaced with zero-emission thermal and non-fossil fuel power sources (renewable energies/nuclear).

We estimate that Japan, as a whole, needs to invest approximately ¥20 trillion by 2030, and approximately ¥80~¥100 trillion by 2050 if it wants to create a carbon neutral society.

Assumptions for 2050 (all of Japan)



Expansion of locally-produced/locally-consumed energy



Leveraging energy storage
(storage batteries/hydrogen)



Increase in power demand

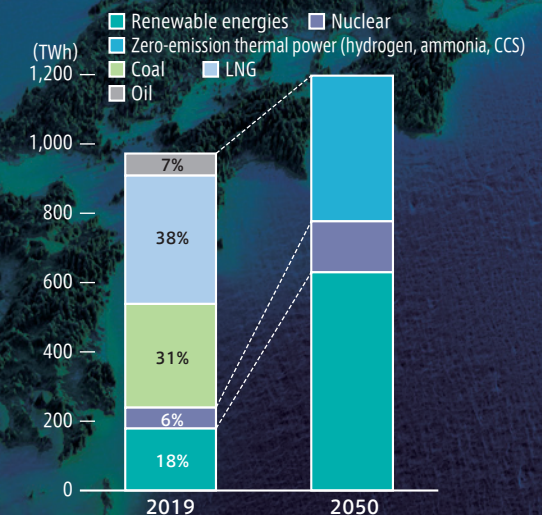
+25% (FY 2021 levels)



Improvement in electrification rate

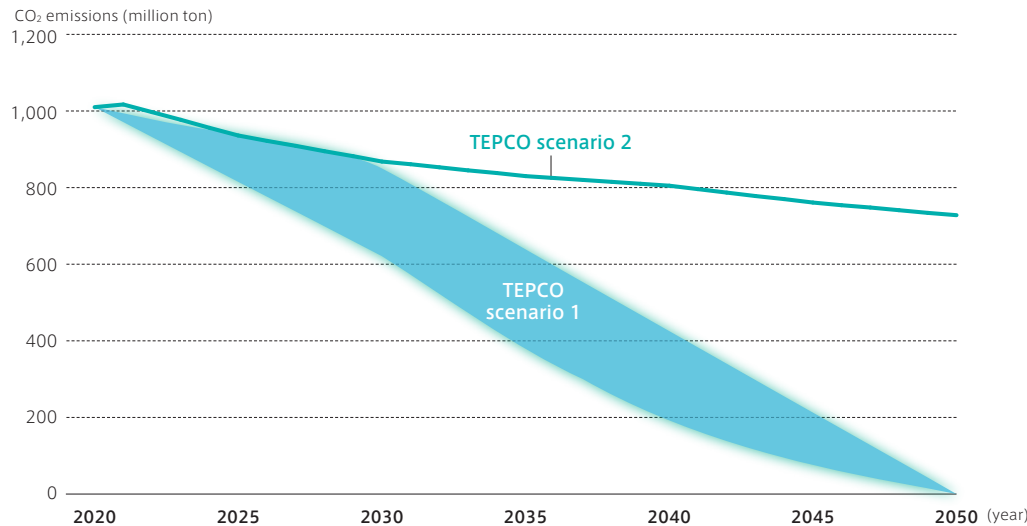
Approx. 1.6 times (26%→42%)

Trends in generated power volume (transmission end)



Strategy : Scenario analysis

In the latest analysis, TEPCO envisions two scenarios selected from multiple reference scenarios. In scenario 1 by which TEPCO aims for carbon neutrality in 2050, electrification on the demand-side, and the spread of distributed power sources, continues. As the use of solar power and storage batteries increases on the demand-side, it is expected that there will be an increase in in-house power generation/in-house consumption, and locally-produced/locally-consumed power. This is effective for improving resilience to disasters. However, there is the risk of mismatched demand and supply due to the large fluctuations in output from solar and wind power. In order to stabilize supply, it is extremely important that we match power sources used for baseloads (hydroelectric/nuclear/geothermal) with power sources for which the supply-demand balance can be adjusted (zero-emission thermal). In particular, the idea of “store and use,” by which energy storage (storage batteries, hydrogen, etc.) is leveraged, is the key to stable supply.



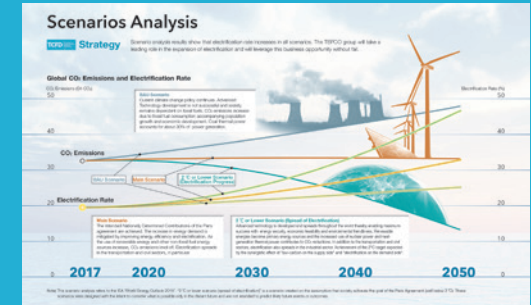
Reference Scenario	Scenario Analysis Results	Scenario Analysis Results
TEPCO Scenario 1 IEA WEO NZE scenario Scenario created by TEPCO 6th Basic Energy Policy	<ul style="list-style-type: none"> As regulations pertaining to climate change become stricter all over the world, technical innovation will occur and spread thereby greatly reducing CO₂. The use of fossil fuels which countermeasures are not implemented will be strictly limited in various fields Temperature rise is kept within the range of approximately 1.5 ~2° C, and natural disasters, such as typhoons, etc., become fiercer, but on a limited scale. 	<ul style="list-style-type: none"> The technological development of hydrogen/ammonia, etc. accelerates and a certain number of thermal power stations that leverage these technologies remain in operation. The use of offshore wind power increases, and operation of a certain number of nuclear power stations is required. Highly cost-effective energy/conservation/electrification progresses demand-side electrification and the spread of distributed power sources progresses (solar power spreads as a package with storage batteries)
TEPCO Scenario 2 IEA WEO CPS	<ul style="list-style-type: none"> Legal regulations pertaining to climate change become stronger in advanced nations only, and innovation, if it occurs, does not spread due to economic incompatibility thereby resulting in slow progress with CO₂ reductions. The global economy, and developing nations in particular, is still dependent to a certain extent on fossil fuels in 2050. Temperature rises approximately 4° C leading to fiercer natural disasters caused by typhoons, etc. 	<ul style="list-style-type: none"> Even though distributed power sources spread, since there are no technical substitute measures, and a certain number of thermal power stations remain in operation. Even if cost-effective energy-conservation/electrification progresses with existing technology, most of the energy systems will still be dependent upon fossil fuels. Electrification on demand-side will progress in households and businesses but limited in transportation and industry.

Previous scenario analysis

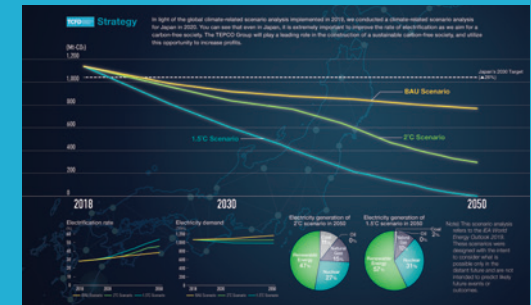
TEPCO Group has been conducting scenario analysis since 2019, when it endorsed the TCFD recommendations, and has disclosed it in our integrated report and website.

[TEPCO Integrated Report](#)

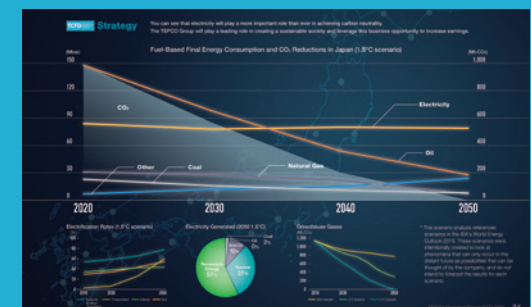
2019



2020



2021



Strategy : Financial Impact of Risks and Opportunities

In light of the analysis of the scenarios, we believe it is important to aim to avoid or mitigate future loss by assessing/analyzing risks that could manifest while at the same time seeking out new business opportunities. We shall therefore implement suitable strategies for dealing with the scenarios and improve our resilience as a company.

Scenario	Envisioned risks/opportunities		Envisioned details	Possibility	Impact	Financial impact (estimated)	Response strategies	
Scenario 1 *1 Approximately 1.5~2° C	Transition	Risk	Market/Service	Conventional power sales business models will see decreases in revenue due to the market need for an increase in distributed power sources and CO ₂ -free electricity	Very likely	Extremely large	If power demand decreases by 1%, electricity rate revenue would decrease by approximately ¥47.1 billion	Business shift to facility services business
			Market/Service	Due to the heightened need for carbon neutrality, investment in the upstream development of fossil fuels is insufficient thereby causing a lack of fossil fuel supply that results in soaring prices	Very likely	Extremely large	The impact of soaring natural resource prices on revenue FY2022 performance: Loss in revenue of approximately ¥277 billion/year	Procurement from non-fossil power sources
			Policy and Legal	Increase in costs caused by energy policy revisions and the strengthening of regulations pertaining to global warming	Possible	Extremely large	Cost of increasing the non-fossil fuel power source procurement rate by 1% Approximate ¥1.1 billion/year cost increase	Utilization of non-fossil power sources, internal carbon pricing
			Technology	In conjunction with the large-scale increase in the use of renewable energies, power quality will decline as output fluctuates due to poor weather and consistent frequency cannot be maintained, etc., thereby hindering stable supply	Possible	Large	Decreases in power supply volume/revenue from power supply obstructions FY2022 consigned transmission supply, etc. net profit: ¥51.1 billion/year	Use of Pumped storage power generation, Demand response, Storage batteries
			Reputation	The company gets a reputation for being passive when it comes to climate change countermeasures due to the large percentage of power procured from thermal power stations	Possible	Small	The cost of procuring power sources that lack economic rationality in order to improve reputation Replacing 100GWh of thermal power with renewable energies: Approximate ¥400 million/year cost increase ³	Disclose more information related to climate
	Opportunity	Energy source	Recommencing operation of nuclear power stations and expanding the company's renewable energies business will reduce the amount of power procured from the thermal power stations of other companies, which is costly, thereby reducing costs	Possible	Extremely large	The recommencement of operation of one nuclear power plant will have a positive impact on annual income of approximately ¥140 billion Net profit forecasts from renewable energy power generation business is on the order of ¥100 billion annually	<ul style="list-style-type: none"> • Recommence operation of nuclear power stations • Develop renewable energy sources 	
		Products and Service	Progress with electrification due to the heightened need for carbon neutrality and new demand from consumers for CO ₂ -free electricity	Possible	Large	Impact on electricity rate revenue if power demand increases 1% Approximate ¥47.1 billion/year increase . Increase in sales from CO ₂ -free options	<ul style="list-style-type: none"> • Enlarge our electricity rate options • Develop, procure renewable energy sources 	
		Resource efficiency	Electric vehicles become prolific due to the increasing demand for carbon neutrality Storage batteries become prolific in conjunction with the use of large amounts of renewable energies	Very likely	Medium	Profit creation from EV businesses and storage battery businesses Will contribute to ¥150 billion/year profit creation from 2030 onward ⁴	Expand EV businesses and storage battery businesses	
Market	Increasing demand for carbon neutrality in developing nations will drive TEPCO's overseas business Heightened need for sustainable finance	Very likely	Medium	Sales from overseas business shall increase thereby creating annual profits of ¥150 billion from 2030 onward ⁴ Capital procurement choices will increase through the issuance of green bonds (Actual results approx. ¥100 billion)	<ul style="list-style-type: none"> • Expand our overseas business • Utilization of sustainable finance 			
Scenario 2 *2 Approximately 4° C	Physical	Risk	Acute	Damage to power facilities by fiercer natural disasters	Possible~ Very likely	Extremely large	Approximately ¥20.8 billion of special loss shall be incurred if the impact is approximately the same as the typhoon in FY2019	<ul style="list-style-type: none"> • Waterproofing of power supply facilities • Appropriate disaster loss reserves • Purchase damage insurance
		Opportunity	Chronic	Fluctuations in rainfall/snowfall impacts hydroelectric power plant operation	Possible	Large	Profits will increase by approximately ¥700 million ³ if 100 GWh of hydroelectric power is replaced with thermal power	Optimal operation through highly accurate weather/flow forecasts
		Resilience	Further increase in demand for preparedness due to fiercer natural disasters	Very likely	Medium	Increase in revenue from urban development that addresses preparedness needs	Expand urban development projects	

*1 Reference scenario: IEA WEO NZE scenario, TEPCO original scenario, The Sixth Strategic Energy Plan *2 Reference scenario: IEA WEO CPS scenario *3 Estimate based on power generation unit cost by the Power Generation Costs Review Working Group *4 Create annual profits of ¥150 billion from 2030 onward in the four new key areas of business of renewable energies, mobility electrification, data/communications, and overseas

Risk Management

The TEPCO Group’s Risk Management Committee strives to avoid the manifestation of serious climate-related risks, and minimize any impact on company operation through quick and suitable response in the event that such risks were to manifest. Furthermore, risk assessments are leveraged when making decisions, such as decisions on key management issues, and discussed by/reported to the Board of Directors.

Risk Management Process



Risk Management Committee

TEPCO has built a risk management system for which the President serves as General Manager and the Chief Risk Management Officer serves as Risk Manager thereby enabling centralized management of TEPCO Group risks during times of normalcy and when risks manifest. In times of normalcy, events that may hinder the achievement of action plan objectives or the business plan-based duty plans of each company are looked at as risks, and risks scenario assessments are revised based on changes to the internal/external environments. These results are used not only to avoid risks, but also for damage control by implementing initial responses to manifested risks, and as important response plans when the company goes into crisis management mode.

ESG Committee

The ESG Committee formulates overall plans for addressing ESG issues, selects important ESG issues pertaining to business strategies, and formulates measures for disclosing information.

Meetings held during FY2022

- Number of times held: 2 times
- Primary topics: Internal carbon pricing, addressing Scope 3 emissions, biodiversity, circular economies, and ISSB Standards, etc.

Future Management Committee

Amidst the changing environment of the power industry, the Future Management Committee discusses visions for energy businesses that will improve the corporate value of the TEPCO Group.

During FY2022, the Carbon Neutral Challenge Task Force, which is a dedicated subcommittee of the Future Management Committee, met a total of 16 times to discuss functions in departments that are required to balance long-term stable supply with carbon neutrality.

Risk Management : Risks and Opportunities

Climate-related risks are classified into "transition risks" and "physical risks." TEPCO Group conducts evaluations based on the probability of occurrence in the "short-term/medium-term" and "long-term". Also, evaluating opportunities in the same way can lead to the creation of new business opportunities.

The TEPCO Group's Risks and Opportunities

		Risks		Opportunities	
		Mid-term (~2030)	Long-term (~2050)	Mid-term (~2030)	Long-term (~2050)
Transition Risks	Policy and Legal	Increased costs caused by stricter regulations		Resource efficiency	Increase the use of electric vehicles Reusing, spreading, and increasing the use of storage batteries
	Technology	Decrease in the quality of power in conjunction with the large-scale introduction of renewable energies	Decrease in the superiority of large-scale power sources in conjunction with the spread of distributed power sources	Energy source	Using nuclear power Developing and expanding the use of renewable energy technologies
	Market	Decrease in revenue of conventional power sales business models	a lack of fossil fuel supply that results in soaring prices	Products and Services	Increased desire by customers to have CO ₂ -free energy Electrification is progressing
	Reputation	There is a tendency for TEPCO be thought of as passive regards to climate change countermeasures	Less acceptance of nuclear power by society	Market	Switch to carbon neutral societies in developing nations Increased desire for Green Bonds, etc.
Physical Risks	Acute	Damage to power supply facilities by typhoons		Resilience	Increased social needs pertaining to disaster prevention
	Chronic		Decreasing the amount of hydroelectric energy produced due to fluctuations in the amount of precipitation		

*The severity of risks is examined by the Risk Management Committee

Financial Impact of Climate-Related Risks and Opportunities

Cost of increasing the non-fossil fuel power source procurement rate by 1%

Approx. **¥1.1 billion/year**

Impact on annual profit/loss from the operation of one nuclear plant

Approx. **¥140 billion**

Damages from typhoons (FY2019 result)

Approx. **¥20.8 billion**

Impact on electricity rate revenue from power demand increase/decrease by 1%

Approx. **¥47.1 billion/year**

Risk Management : Transition Risks

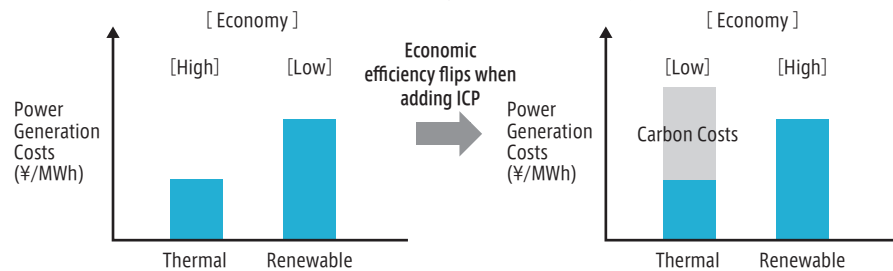
In May 2023, the GX (green transformation) Promotion Act* was passed and Japan plans to introduce growth-oriented carbon pricing (CP) from FY2028. The introduction of CP may have an impact on the TEPCO Group's business, so we set internal carbon pricing (ICP) for every fiscal year until 2050 and use these prices to analyze the impact on revenue and expenditure, and also assess the profitability of investment proposals. Going forward, we shall suitably revise ICP based on CP system trends and leverage ICP as one element when deliberating how to improve corporate value by analyzing predicted impact and reflecting those analysis results in business plans.

* Act on Promoting a Smooth Transition to a Decarbonization and Growth Oriented Economic Structure

Internal carbon pricing (ICP)

In light of the design of the CP system, which is based on the GX Promotion Act, TEPCO foresees that it will be impacted by the fossil fuel surcharge (to take effect in FY2028) and the special operator charge (paid auction) (to take effect in FY2033), which will be introduced as a financial resource from which to redeem GX economy transition bonds, so we set future ICP independently.

Example of ICP valuation when selecting power source types

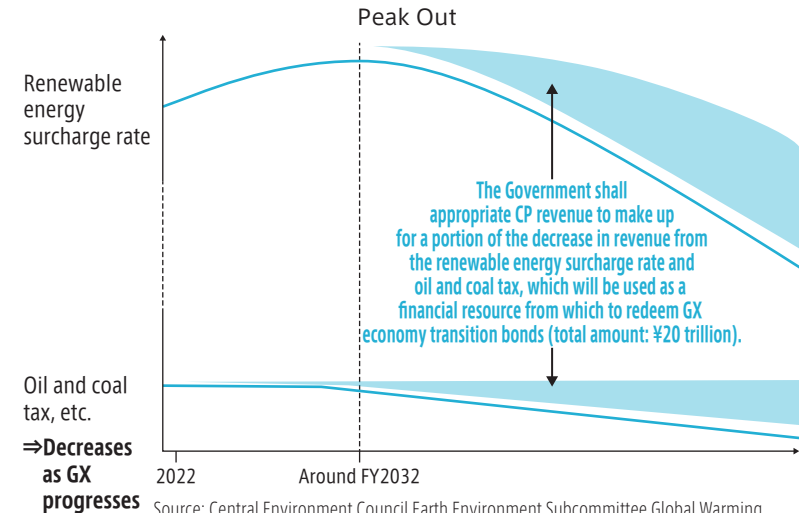


Examples of carbon price levels

Analysis agency	Estimated carbon price per ton of CO ₂ in 2050	Scope
IPCC	Approx. \$200 ~ 1,000	world average
RITE	Approx. \$153 ~ 246	world average
IEA	Approx. \$200 ~ 250	world average
McKinsey	Approx. \$36	within Japan
The Institute of Energy Economics, Japan	Fossil fuel levy : Approx. \$14 ~ 42 Paid auction for ETS: Approx. \$83 ~ 131	within Japan

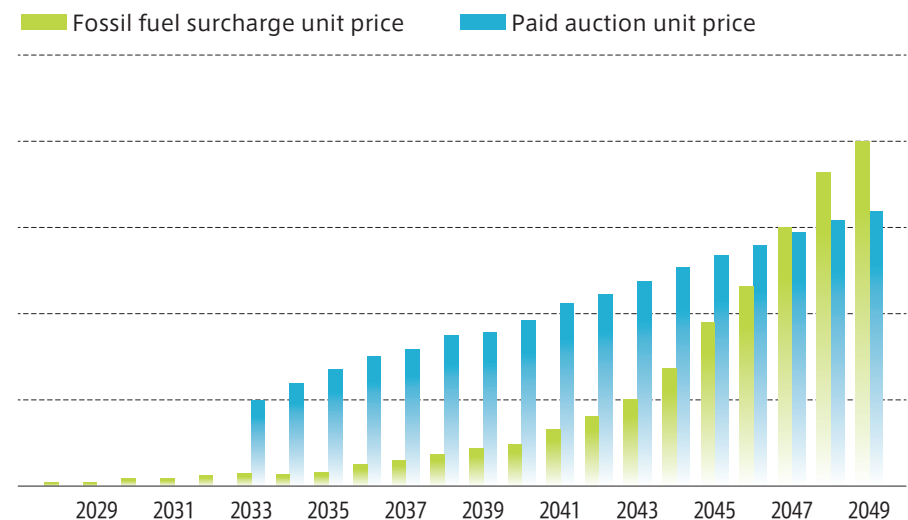
Source : GX Implementation Council (Cabinet Secretariat)

Concept drawing of CP system design



Source: Central Environment Council Earth Environment Subcommittee Global Warming Countermeasure Plan FU Dedicated Committee handouts (May 2023) with additions made by TEPCO

Concept diagram of setting ICP for each fiscal year



Risk Management : Physical Risks

The physical risks associated with climate change include future changes in precipitation and fiercer natural disasters in conjunction with these changes, so it is important to avoid or mitigate the impact that this will have.

Since we predict that natural disasters will become fiercer due to climate change, the TEPCO Group is analyzing how power facility risks will change and implementing both preparatory (facility countermeasures) and reactive (operational countermeasures) countermeasures in order to mitigate the impact/scale of a natural disaster and quickly make repairs to return conditions to normal.

For example, in preparation for actual damage we are formulating countermeasures for operations necessary to eliminate power outages (transmission line grid switchover or power transmission from neighboring substations that are not flooded, etc.), such as formulating countermeasures for the overflowing of the Arakawa-Tone River system, which would have a great impact on the capital region. We've also performed a facility countermeasures/damage impact assessment for rainfall (planned scale) that is only predicted to happen once every 100~200 years. In light of revisions to the Flood Control Act and the fiercer weather we've seen over recent years, we are also formulating countermeasures in preparation for once in 1,000-year rainfall (predicted maximum scale) which will also include rivers other than the Arakawa-Tone River system (however, the countermeasures for hydroelectric power facilities will only cover planned scale rainfall*).

*We have confirmed that the disaster risk for the general public and the risk of hindering supply can be kept quite low.

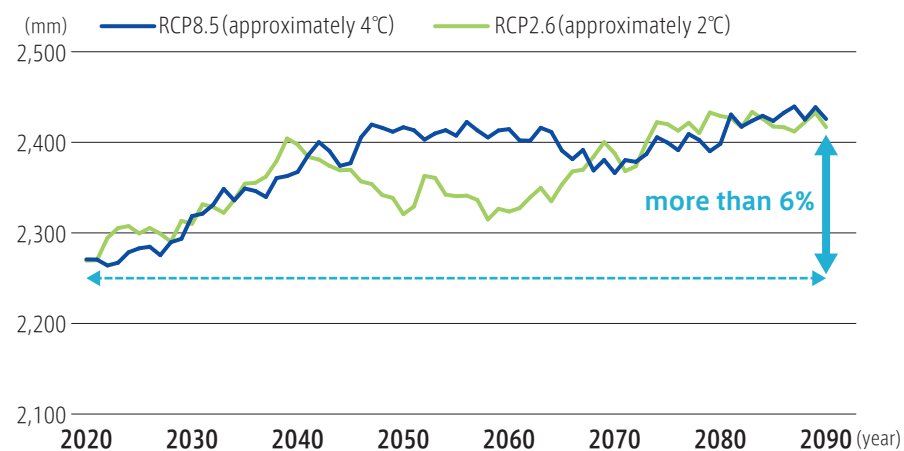
Opportunity assessment

In order to ascertain power generation risks/opportunities for hydroelectric power stations caused by changes in rainfall, we analyzed the changes in annual rainfall for each RCP scenario using four climate models in order to ascertain the power generation risks/opportunities for a typical hydroelectric power station. This analysis only covers a portion of hydroelectric power stations, but in each of the scenarios, we confirmed that around the year 2090, annual rainfall will have risen an average of over 6% more than it is now. When the TEPCO Group analyzed the impact on its hydroelectric power stations in light of these results, we found that while risks pertaining to power station operation will likely increase, for the sample of hydroelectric power stations we looked at, power generation output increased thereby suggesting a positive impact on profit. Going forward, the TEPCO Group shall further engage in climate pattern analysis in order to ascertain the impact of physical risks/opportunities caused by climate change.

Examples of facility countermeasures

Facility category	Flood damage countermeasures
Hydroelectric power facilities	Considering only planned scale specifications, construction of flood banks, installation of drainage pumps, raising equipment farther off the ground, installing equipment to ensure dam communication, and waterproof sealing of buildings (window sealing, closure of cable ducts, etc.)
Power transmission facilities	Aerial electric lines... Changing routes in areas prone to landslides, scouring, etc., strengthening retaining walls and rock walls, etc. Underground electric lines... Optimization of cable head positions
Substation facilities, communications facilities	Raising floors, renovating windows, installing stoplogs at entrances/exits, installing waterproof doors, sealing cable ducts, etc. Outdoor equipment will be raised higher off the ground in principle, but for equipment that is difficult to raise, a combination of waterproofing/water-resistant structures and flood banks will be employed.
Distribution facilities	Converters in the supply transformer room are raised higher off the ground, etc.

Annual estimated rainfall (average for all climate models)



Metrics and Targets

GHG Reduction Target

Base Year 2013

Target Year 2030

2050

-50%

NET ZERO

139.2 million t-CO₂



69.6 million t-CO₂



CO₂ emissions originating from the supply of energy
Net zero

Reduction measures

Scope3 (the sale of power)



Solar power

- Development of energy services using onsite and offsite solar power for corporate customers
- Installation of solar power through electrification packages for households



Geothermal

- Site development mainly in the Kanto region



Nuclear power

- Safety first is enforced in light of the series of incidents that caused great anxiety to the society



Offshore wind power

- Promotion of fixed-bed offshore wind power by increasing competitiveness to win the public bidding process
- Becoming the top runner in Japan by advancing demonstration of floating offshore wind power



Hydro power

- Improved equipment reliability, longer service life and increased power generation by repowering existing power stations



Zero-emission thermal power

- Support for JERA's efforts to eliminate all inefficient coal-fired thermal power plants by 2030 and to achieve zero emissions through mixed burning of ammonia and hydrogen

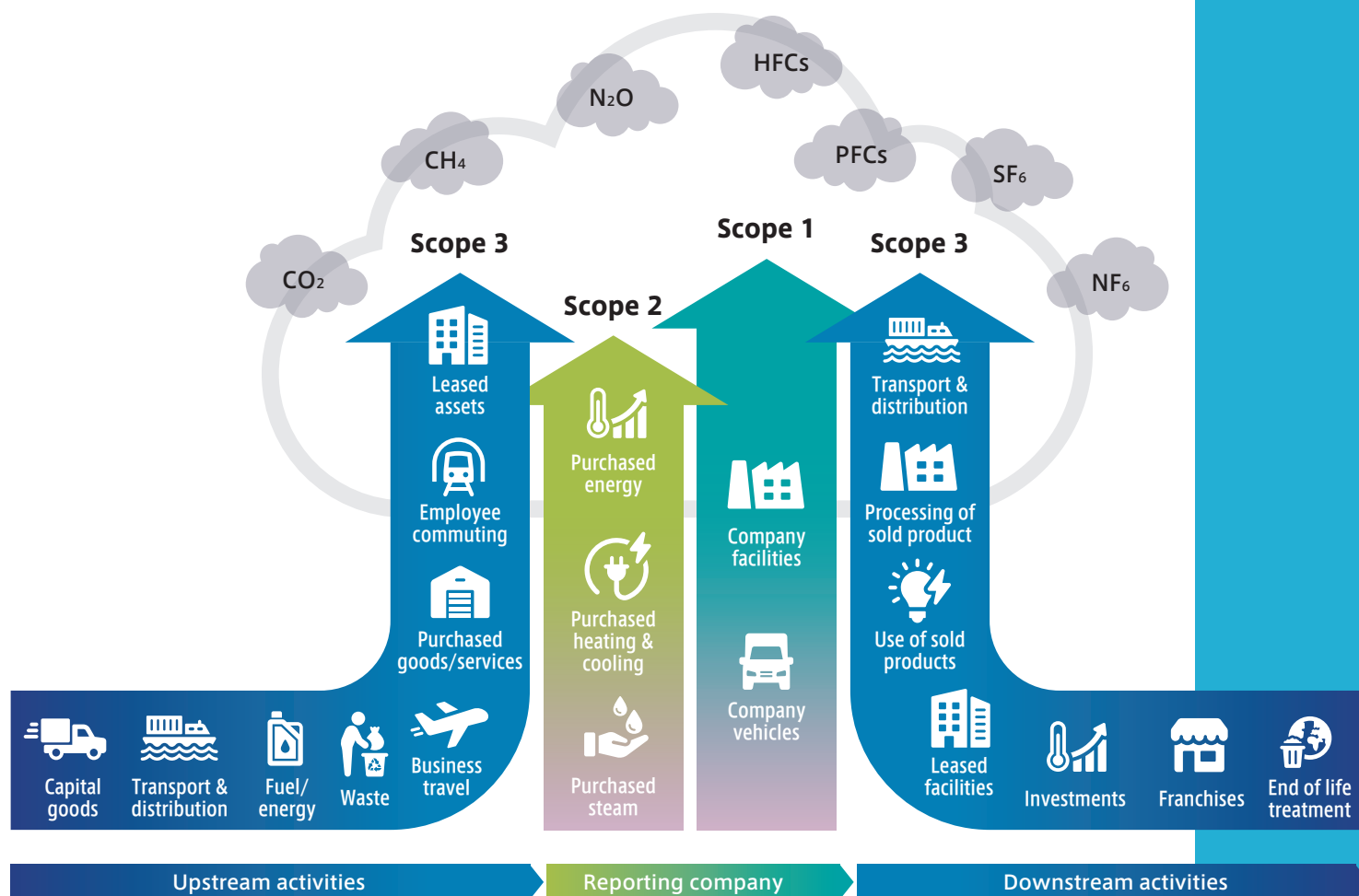
Scope3 (supply chain)

- Visualization of emission amount related to materials procurement in coordination with the supplier
- Procurement of products with low CO₂ emission

Scope1,2

- Electrification of company vehicles
- Energy-efficient buildings and facilities

Metrics and Targets : GHG Emissions



Scope of CO₂ reduction target

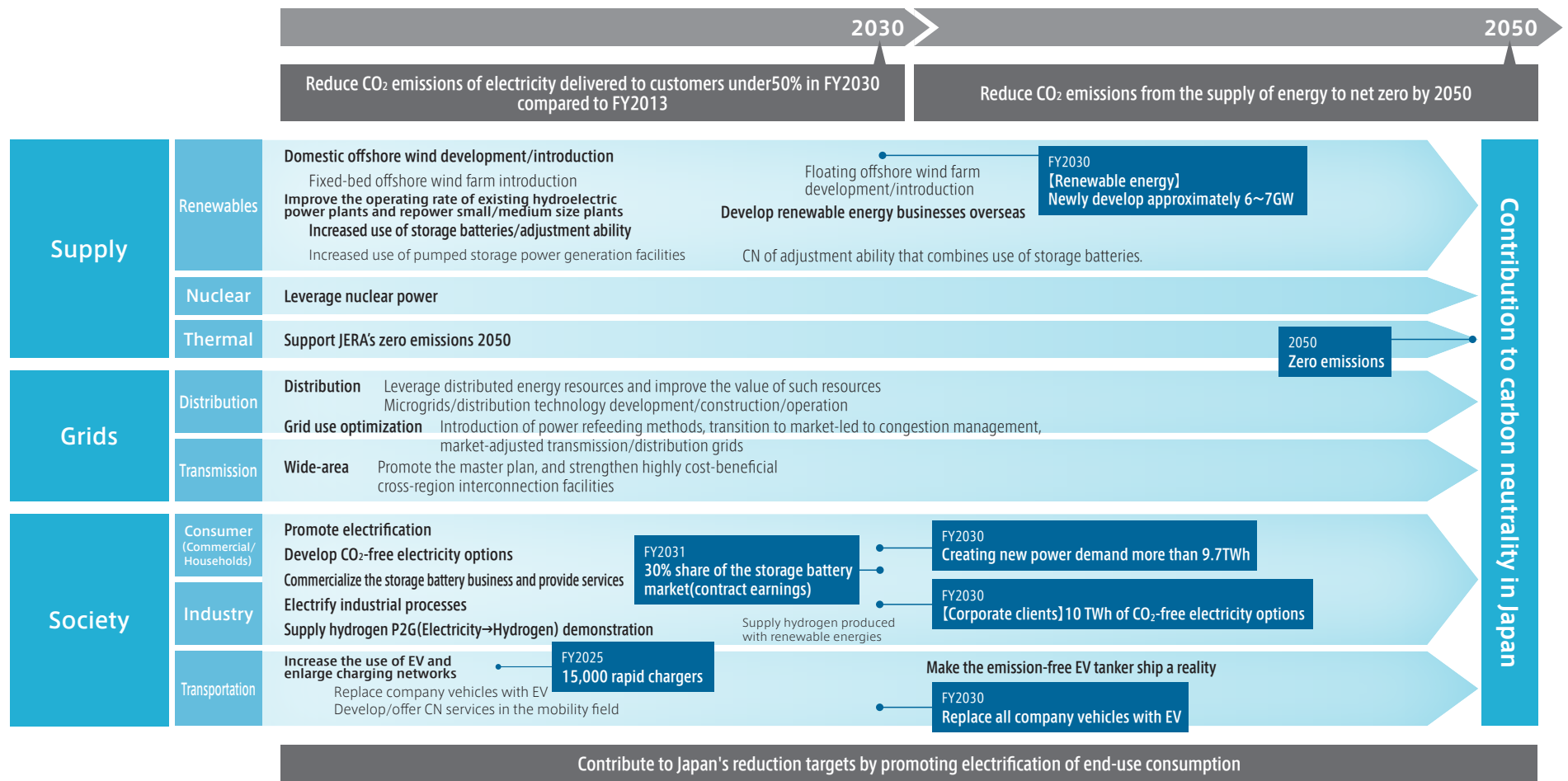
Scope 3 emissions (106,730,000t-CO₂) account for more than 95% of the TEPCO Group's GHG emissions in FY2022 (111,860,000t-CO₂). This is largely due to the completely transferal all of fuel/thermal power businesses to JERA in FY2019. The TEPCO Group's reduction targets include Scope 1 and Scope 2 emissions, which are the Group's direct and indirect emissions, as well as Scope 3 emissions, which are emissions from our supply chain. Our target is to reduce CO₂ emissions originating from the sale of power, which account for the majority of our GHG emissions, by 50% of FY2013 levels by FY2030.

TEPCO Holdings and coreoperating companies

FY2022	[k t-CO ₂ eq]
Scope 1	193
Scope 2	4,909
Scope 3	106,400
CATEGORY 1	2,749
CATEGORY 2	1,988
CATEGORY 3	94,174
CATEGORY 4	0
CATEGORY 5	4
CATEGORY 6	4
CATEGORY 7	10
CATEGORY 8	0
CATEGORY 9	0
CATEGORY 10	0
CATEGORY 11	7,471
CATEGORY 12	0
CATEGORY 13	0
CATEGORY 14	0
CATEGORY 15	0

Metrics and Targets : Roadmap to Carbon Neutrality

In light of the Paris Agreement, the TEPCO Group has set a goal of reducing CO₂ emissions originating from the sale of power to 50% of FY2013 levels by 2030. The group also aims to reduce CO₂ emissions originating from the supply of energy to net-zero by 2050 through achieving a “best mix” of power sources that considers both stable supply and economic feasibility, and innovation.

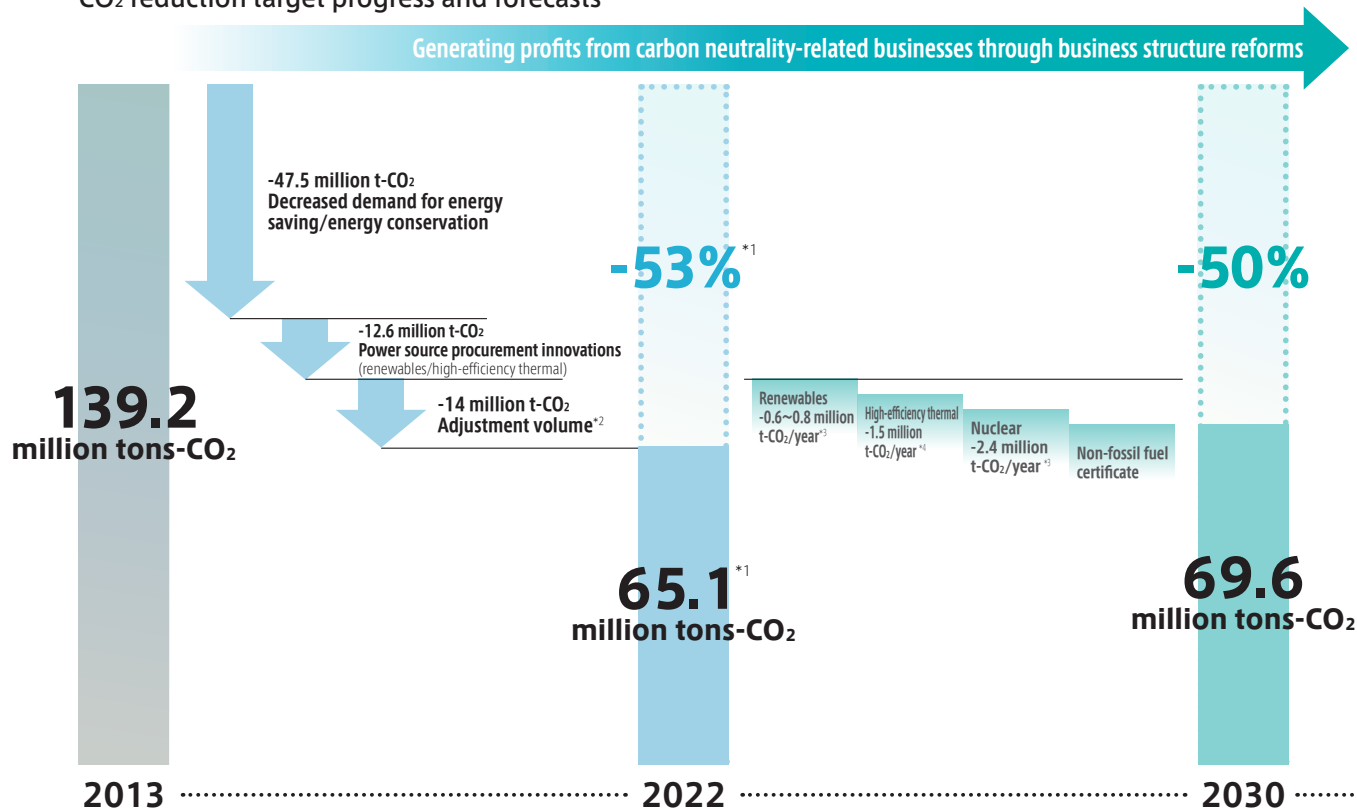


CN: Carbon Neutrality

Metrics and Target : GHG Emission Reduction

In the future, the role that electricity-producing CO₂-free energy will play will grow. In order to turn this into a profit increasing opportunity, the TEPCO Group is transitioning to a business model that focuses on carbon neutrality. In order to achieve our midterm objective of cutting carbon by half by 2030, we are aiming to invest approximately ¥9 trillion in carbon neutrality, under the assumption that we form alliances, and steadily reduce CO₂ emissions while also leveraging our “electricity” strengths in the areas of supply, power grids, and society in order to grow our business and generate profits on the order of ¥450 billion. The TEPCO Group will devote all its resources to contributing to creating a carbon neutral society by 2050.

CO₂ reduction target progress and forecasts



^{*1} Preliminary data ^{*2} Allotment of an amount corresponding to the value of renewable energy feed-in tariff system surplus non-fossil fuel value or adjustment in conjunction with the purchase of non-fossil fuels certificates. ^{*3} Per 1 GW (from FEPC's "Energy and the Environment 2022")

^{*4} Annual CO₂ reductions if power is procured from sources for which thermal heat efficiency has increased more than 1%

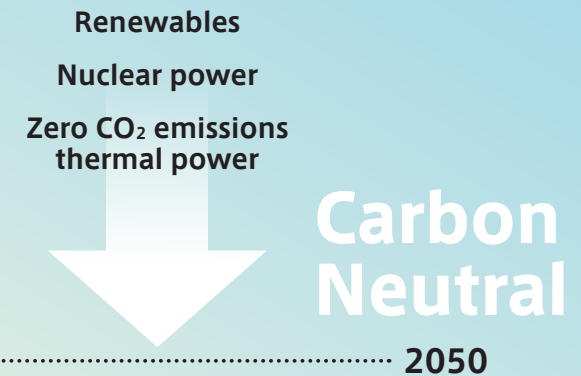
Achieving CO₂ reduction targets

The TEPCO Group aims to reduce CO₂ emissions originating from the sale of power by 50% of FY2013 levels by the year FY2030.

We saw an approximate 53% reduction^{*1} during FY2022 and achieved our target, but this is because we increased procurement of non-fossil fuel certificates to comply with law^{*5} in addition to power source procurement innovations.

From FY2023 onward, we shall strive to achieve our FY2030 50% reduction target by leveraging renewable energies, nuclear power, and non-fossil fuels certificates.

^{*5} In accordance with the Act to Advance Energy Supply Structures, the Government evaluates and publicly discloses the non-fossil fuel power ratio target achievement status (certificate procurement obligation) of retail operators, etc. (electricity supply volume for the previous fiscal year exceeds 500 GWh), and during Phase 1, which covers the fiscal years 2020-2022, the three-year achievement status will be evaluated.



Metrics and Targets : Climate-Related Metrics

Cross-Industry, Climate-Related Metric Categories

	Metric Category	Example Unit of Measure	TEPCO Group	
GHG Emissions	Absolute Scope 1, Scope 2, and Scope 3; emissions intensity	MT of CO ₂ e	Scope 1, 2 and 3 emissions (t-CO ₂ e) Emissions intensity of electricity sales (kg-CO ₂ /kWh)	111,502 kt-CO ₂ e (FY2022) 111,857 kt-CO ₂ e (FY2022:consolidated) 0.376kg-CO ₂ /kWh (FY2022:adjusted)
Transition Risks	Amount and extent of assets or business activities vulnerable to transition risks	Amount or percentage	Internal combustion power plant, transmission facility, substation facility and distribution equipment	Book value: ¥3,787,927 million
Physical Risks	Amount and extent of assets or business activities vulnerable to physical risks	Amount or percentage	Nuclear, hydro, other renewables and internal combustion power plant, transmission facility, substation facility and distribution facility	Book value: ¥35,125,622 million
Climate-Related Opportunities	Proportion of revenue, assets, or other business activities aligned with climate-related opportunities	Amount or percentage	Installed capacity, generated electricity and power portfolio in retail business	Using renewables as primary power sources Leveraging nuclear power generation and high-efficiency thermal power generation
Capital Deployment	Amount of capital expenditure, financing, or investment deployed toward climate-related risks and opportunities	Reporting currency	Investment a maximum of ¥3 trillion in carbon neutrality in each of the areas of supply, power grids, and society	Supply : Non-fossil fuel power source-related businesses Grids : Power grid-related businesses Society : Businesses involved in the local production/consumption of energy
Internal Carbon Prices	Price on each ton of GHG emissions used internally by an organization	Price in reporting currency, per MT of CO ₂ e	Analyzing the impact on revenue and expenditure, and also assess the profitability of investment proposals	Setting ICP for each fiscal year based on the GX Promotion Act (see p.12)
Remuneration	Proportion of executive management remuneration linked to climate considerations	Percentage, weighting, description, or amount in reporting currency	CO ₂ emission reduction achievements shall be added as a KPI to the productivity-linked remuneration indicator for executives	Productivity-linked remuneration Payout rate : 0~145%

Source: 2021 TCFD Implementing Guidance, Table A2.1

Metrics and Target : TEPCO GHG Data

TEPCO Holdings and coreoperating companies

(TEPCO Holdings, TEPCO Fuel & Power, TEPCO Power Grid, TEPCO Energy Partner, and TEPCO Renewable Power)

	UM	FY2020	FY2021	FY2022	GRI
Direct greenhouse gas emissions (Scope 1) ^{*1}					
Total direct emissions (Scope 1) ^{*2}	ktCO ₂ eq	190	★192	193	305-1
CO ₂ emissions from electricity production and other activities	ktCO ₂	120	118	119	
CO ₂ emissions from vehicles (gasoline and diesel)	ktCO ₂	7	7	6	
Total other CO ₂ eq emissions	ktCO ₂ eq	63	67	68	
N ₂ O	ktCO ₂ eq	1	1	1	
HFCs ^{*2}	ktCO ₂ eq	3	3	6	
SF ₆ ^{*3}	ktCO ₂ eq	59	63	61	
Other emissions volume					
N ₂ O	t	3	3	3	
SF ₆ ^{*3}	t	2.6	2.8	2.7	
SF ₆ recovery rate					
In equipment inspections	%	>99.5	99	>99.5	
In equipment removal	%	>99.5	99	99	
Fluorocarbon emissions					
Leaked volumes based on the Act on Rational Use and Appropriate Management of Fluorocarbon	ktCO ₂ eq	5	6	9	
Indirect greenhouse gas emissions (Scope 2) ^{*4}					
Total of Scope2,market based ^{*5}	ktCO ₂ eq	5,205	5,753(☆)	4,909	305-2
Total of Scope2,location based ^{*6}	ktCO ₂ eq	5,207	5,744(☆)	4,888	
In offices, hydroelectric and thermalelectric plants					
Related to energy purchased from the grid (Scope 2, location based) ^{*5}	ktCO ₂ eq	469	465	481	
Related to energy purchased from the grid (Scope 2, market based) ^{*6}	ktCO ₂ eq	471	456	461	
Related to technical losses from distribution and transmission network ^{*7}	ktCO ₂ eq	4,736	5,288	4,427	
Other indirect greenhouse gas emissions (Scope 3, per GHG protocol) ^{*8}					
Total of Scope 3	ktCO ₂ eq	110,119	102,116	106,400	305-3
Category 1 Purchased goods and services ^{*9}	ktCO ₂ eq	1,236	1,670	2,749	
Category 2 Capital goods	ktCO ₂ eq	1,906	1,758	1,988	
Category 3 Fuel- and energy-related activities (not included in Scope 1 or Scope 2) ^{*10}	ktCO ₂ eq	101,402	★91,342	94,174	
Category 4 Upstream transportation and distribution	ktCO ₂ eq	0	0	0	
Category 5 Waste generated in operations	ktCO ₂ eq	2	3	4	
Category 6 Business travel	ktCO ₂ eq	4	4	4	
Category 7 Employee commuting	ktCO ₂ eq	11	10	10	
Category 8 Upstream leased assets	ktCO ₂ eq	0	0	0	
Other (upstream)	ktCO ₂ eq	0	0	0	
Category 9 Downstream transportation and distribution	ktCO ₂ eq	0	0	0	
Category 10 Processing of sold products	ktCO ₂ eq	0	0	0	
Category 11 Use of sold products ^{*11}	ktCO ₂ eq	5,559	★7,329	7,471	
Category 12 End-of-life treatment of sold products	ktCO ₂ eq	0	0	0	
Category 13 Downstream leased assets	ktCO ₂ eq	0	0	0	
Category 14 Franchises	ktCO ₂ eq	0	0	0	
Category 15 Investments	ktCO ₂ eq	0	0	0	
Other (downstream)	ktCO ₂ eq	0	0	0	
Scope 1 and 2					
Market based	ktCO ₂ eq	5,395	5,945	5,102	
Location based	ktCO ₂ eq	5,397	5,936	5,082	
Scope 1, 2 and 3					
Market based	ktCO ₂ eq	115,514	108,061	111,502	
Location based	ktCO ₂ eq	115,516	108,052	111,481	

TEPCO Holdings and all of consolidated subsidiary companies

	UM	FY2020	FY2021	FY2022	GRI
Direct greenhouse gas emissions (Scope 1)					
Total direct emissions (Scope 1)	ktCO ₂ eq	203	203	205	305-1
Indirect greenhouse gas emissions (Scope 2)					
Total of Scope2,market based	ktCO ₂ eq	5,229	5,777	4,926	305-2
Total of Scope2,location based	ktCO ₂ eq	5,231	5,773	4,905	
In offices, hydroelectric and thermal electric plants					
Related to energy purchased from the grid (Scope 2, market based)	ktCO ₂ eq	493	489	498	
Related to energy purchased from the grid (Scope 2, location based)	ktCO ₂ eq	495	485	478	
Related to technical losses from distribution and transmission network	ktCO ₂ eq	4,736	5,288	4,427	
Scope 1 and 2					
Market based	ktCO ₂ eq	5,432	5,980	5,131	
Location based	ktCO ₂ eq	5,433	5,976	5,110	
Other indirect greenhouse gas emissions (Scope 3, per GHG protocol)					
Total of Scope 3 ^{*12}	ktCO ₂ eq	-	-	106,727	

Sales (TEPCO Energy Partner)

	UM	FY2020	FY2021	FY2022	GRI
Electricity volumes	GWh	192,866	177,118	173,089	
CO ₂ related electricity sales					
Adjusted emissions intensity ^{*13}	kg-CO ₂ /kWh	0.441	0.451	0.376	
Basic emissions intensity	kg-CO ₂ /kWh	0.447	0.457	0.457	
Adjusted emissions ^{*14}	ktCO ₂	85,100	79,900	65,100	
Basic emissions	ktCO ₂	86,300	80,900	79,100	
Gas volumes	kt	2,100	2,710	2,720	

- ^{*1} Emissions of greenhouse gases released directly into the atmosphere from emission sources within organizational boundaries. Calculated, in principle, with the emission intensity specified in the GHG emissions accounting, reporting, and disclosure system administered by Japan's Ministry of the Environment, based on the Act on the Rational Use of Energy and the Act on Promotion of Global Warming Countermeasures. However CO₂ emissions from vehicles are included in Scope 1.
- ^{*2} Emissions due to the fluorocarbon emissions are not included in total direct emissions (Scope 1).
- ^{*3} The value for calendar year (from January 1 to December 31).
- ^{*4} Emissions due to the use of electricity, heat and steam supplied by others.
- ^{*5} "Market based" emissions are emissions which are calculated based on the emissions intensity of each electricity retail company. Calculated by using the adjusted emissions intensity for each electricity retail company and the emissions intensity of heat and steam specified in the Act on Promotion of Global Warming Countermeasures.
- ^{*6} "Location based" emissions reflect the average emissions intensity of grids.
- ^{*7} The emission intensity for general transmission/distribution operators has been converted into a transmission-end emission intensity and it multiply the transmission/distribution loss volume calculated from transmission/distribution loss rate.
- ^{*8} Indirect greenhouse gas emissions from business Approach to calculation
We follow major guidelines have been published: "Corporate Value Chain (Scope 3) Accounting and Reporting Standard(GHG protocol)"
"Green Value Chain Platform (Japanese Ministry of the Environment website, which provides Scope 3 emissions calculation methods and models)"
- ^{*9} The aggregation scope of performance data from FY2022 onward has been expanded to include all purchased products/services.
- ^{*10} Emissions due to the extraction, production and transportation of fuel resources for power generation.
Calculated by multiplying the electricity sold with the emissions coefficient specified in the emissions coefficients database for the calculation of GHG emissions throughout the supply chain available from Japan's Ministry of the Environment.
- ^{*11} Emissions associated with the electricity purchased from outside the TEPCO Group. Calculated by multiplying the electricity purchased from outside the TEPCO Group by the emissions intensity of the TEPCO Group company that sells electricity and that for power transmission and distribution operators.
- ^{*12} Emissions associated with the use of city gas we sell. Calculated by multiplying the city gas sold (in calorific value) by the emissions intensity specified in the GHG emissions accounting, reporting, and disclosure system administered by Japan's Ministry of the Environment.
- ^{*13} The aggregation scope of performance data from FY2022 onward has been expanded to include all consolidated subsidiaries.
- ^{*14} Adjusted emissions intensity is the value after adjustment of feed-in tariff scheme for renewable energy based on the Act on Promotion of Global Warming Countermeasures.

JERA (a company accounted for using the equity method) is an important supply chain for achieving the TEPCO Group's carbon neutrality declaration. As a shareholder, the TEPCO Group shall provide suitable support and supervision to enable the steady implementation of JERA's Zero-emission 2050 project and the continual improvement in JERA's corporate value.

In this section, we will use a Q&A format to answer questions of great interest to TEPCO shareholders and investors based upon questions we received from them.

What is the relationship between the TEPCO Group's FY2030 target and JERA's CO₂ emissions?

Since the TEPCO Group's FY2030 target pertains to CO₂ emissions originating from the sale of power, this will include the CO₂ originating from power sold to customers after purchase from JERA. However, CO₂ emissions from the sale to customers of electricity generated by JERA by other retailers is not included in the TEPCO Group's target. The reason for this lies with the greenhouse gas calculation/reporting/disclosure system of the Act on the Promotion of Global Warming Countermeasures. Furthermore, while CO₂ from electricity purchased from JERA by the TEPCO Group constitute Scope 1 emissions for JERA, the same emissions constitute Scope 3 emissions for the TEPCO Group.

As a shareholder, how is the TEPCO Group providing advice and governance to JERA in regards to ESG issues?

One of the members on JERA's Board of Directors is from the TEPCO Group, and once a quarter, TEPCO Fuel & Power, which is also a shareholder, monitors ESG issues pertaining to JERA's Zero-emission 2050 project, in addition to financial information. Upper management of the companies also remain in close communication.

Do you think hydrogen and ammonia co-firing at JERA's thermal power stations will go as smoothly as planned? What will you do if there are problems?

JERA is engaging in independent technological development and demonstrations on actual equipment in preparation to use hydrogen and ammonia. The plan is to gradually increase the amount of power generated from hydrogen/ammonia in order to quickly adopt this technology, and currently, things are proceeding as planned.

In the event of problems with using hydrogen/ammonia, we believe renewables and storage batteries, etc., which are necessary to be able to make adjustments as the scale of use of renewables increases, will become more important, so as part of "JERA Zero CO₂ Emissions 2050", many resources are being devoted to promoting the development of offshore wind power and other renewables, and the use of storage batteries.

Will not the introduction of hydrogen/ammonia as fuel be extremely costly?

The primary costs related to hydrogen/ammonia co-firing come from the costs to renovate facilities, such as burners, gas turbines, and tanks, etc., and also the cost of procuring hydrogen and ammonia as fuel.

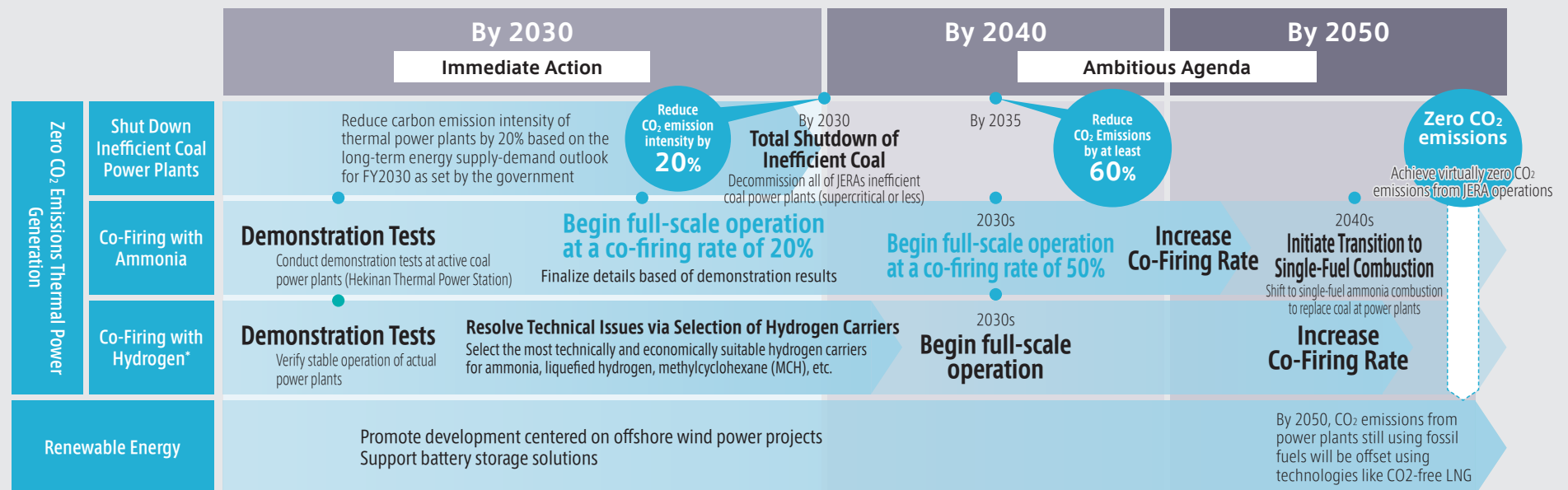
The Japanese Government is looking into creating various systems for supporting the introduction of hydrogen/ammonia in Japan (long-term decarbonization power source auctions, etc.), and JERA plans to take advantage of these mechanisms. Furthermore, building a supply chain is necessary to reduce the procurement cost of hydrogen/ammonia, so JERA is working with leading companies in Japan and overseas to construct a supply chain.

Considering the global trend towards carbon neutrality, won't JERA's thermal power stations become stranded assets that will eventually have a fatal impact on operations?

In order to handle uncertainty in the future business environment, JERA is ensuring strategy flexibility and resilience by formulating plans for developing new power sources and holding onto existing power sources upon examining multiple scenarios related to the future power market environment, including the risk of shrinking business opportunities for thermal power sources.

While considering future power demand and price competitiveness in the power market, JERA aims to maximize revenue and avoid developing/owning unprofitable thermal power sources (so-called, "stranded assets") while replacing existing aging assets with cutting-edge high-efficiency facilities.

JERA's mission is to provide cutting-edge solutions to the world's energy problems. In order to contribute to creating a sustainable society, JERA shall complete the mission and reduce CO₂ emissions from domestic/overseas businesses to zero by 2050. JERA's zero-emission 2050 goal assumes the steady development and economic rationality of decarbonization technology as well as government policy that matches our objectives. JERA is leading the way to the development of decarbonization technology and ensuring economic rationality.



This roadmap will evolve incrementally, adapt to changes in government policy and other relevant conditions, and be revised as needed. * We are also considering the use of CO₂-free LNG.

JERA Environmental Target 2030

JERA is actively working to reduce CO₂ emissions. For domestic operations, we will achieve the following by FY2030:

- ▶ Decommission all inefficient coal power plants (supercritical or less) and conduct demonstration tests of mixed combustion with ammonia at high-efficiency (ultra-supercritical) coal power plants
- ▶ Promote the development of renewable energy centered on offshore wind power projects and work to further improve the efficiency of LNG thermal power generation
- ▶ Reduce carbon emission intensity of thermal power plants by 20% based on the long-term energy supply-demand outlook for FY2030 as set by the government

JERA Environmental Target 2035

JERA aims to reduce CO₂ emissions from domestic operations relative to FY2013 by at least 60% by FY2035 through the following initiatives:

- ▶ Strive to develop and adopt renewable energy in Japan given expanded adoption under the national government's 2050 carbon neutral policy
- ▶ Commit to reducing carbon emission intensity from thermal power generation by promoting hydrogen and ammonia co-firing

JERA Zero CO₂ Emissions 2050 for Its Business in Japan" and the JERA Environmental Targets are premised on steady advances in decarbonization technology, economic rationality, policy consistency, and the business climate under which these goals will be realized.



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TEPCO Group ESG

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November, 2023

TEPCO

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