

# Climate Change



## ENVIRONMENT



### Policy and Concept

#### ● Social background

Countries are carrying out actions against climate change aiming to achieve their greenhouse gas reduction targets under the Paris Agreement, which sets the framework for climate change mitigation.

The Japanese government pledged in October 2020 to achieve carbon neutrality by 2050. Moreover, at the climate change summit in April 2021, it announced a greenhouse gas reduction target of 46% below fiscal 2013 levels by fiscal 2030, and the Strategic Energy Plan and the Plan for Global Warming Countermeasures are being reviewed to achieve these targets.

<Addressing TCFD Recommendations>

In May 2019, our Company declared our support for the recommendations of the Task Force on Climate-related Financial Disclosures or TCFD\*.

Recognizing the size of the impacts that our Group business activities have on the global environment, we declare our support for the TCFD Recommendations to “analyze and disclose business risks and opportunities originating in climate change over the medium and long terms in order to reduce risks of financial market destabilization.”

Refer to page 25 of the Integrated Report for details about scenario analysis, etc.

\* TCFD was established by the Financial Stability Board, which is an international agency that has central banks, financial regulatory authorities and other organizations from major countries as members. In total, 2435 organizations around the world, including financial institutions, businesses and governments, declared their support for the TCFD Recommendations as of August 31, 2021.

#### ● Targets and efforts to achieve them

The Kansai Electric Power Group declared “Zero Carbon Vision 2050” in February 2021. Our Group, as a leading company of zero-carbon energy, is aiming for carbon neutrality throughout the entirety of its business activities including power generation by 2050. In addition, we will mobilize its resources to support decarbonization not only in the economic activities of our customers, but also across society as a whole. Specifically, we are making best efforts to decarbonize power generation by promoting renewable energy sources to the fullest degree such as offshore wind power, maximizing nuclear power with priority given to safety, as well as working to shift to power generation using zero-carbon fuels (hydrogen, ammonia, etc.) for thermal power. Efforts are also underway to electrify society and encourage the efficient use of electricity, addressing both supply and demand sides, with technical evaluations and demonstrations conducted to establish a hydrogen supply chain, etc. While pursuing these efforts, our immediate commitment is to stay at the top position for the amount of zero-carbon electricity generated in Japan, and to reduce CO<sub>2</sub> emissions associated with our domestic power generation by 50% below fiscal 2013 levels by fiscal 2025. We are also advancing our development to increase the installed capacity of renewable energy to 6 million kW in the 2030s. Furthermore, as a member of the Electric Power Council for a Low Carbon Society (ELCS), which was established by a consortium of electric companies including the Company, we are contributing to the ELCS initiatives as well by working on these Group endeavors..

### Goals

#### ● Advancing efforts to control CO<sub>2</sub> emissions

- Keep the top spot for the amount of zero-carbon power generation in Japan
- Halve CO<sub>2</sub> emissions associated with power generation in Japan in FY 2025 (compared to FY 2013)

#### ● Continuing safe and stable operation of nuclear power plants

- Operation of nuclear power plants with top priority placed on safety

#### ● Further development and utilization of renewable energy

- Achieve 6 million kW of installed capacity by 2030s (2 million kW or more new development in Japan and abroad)

#### ● Maintaining and improving the thermal efficiency of thermal power plants

- Benchmark indicators\* (A: 1.00, B: 44.3%)

\* Indicators based on the benchmark system of the Law Concerning the Rational Use of Energy

#### ● Reducing transmission and distribution loss

- To be maintained and reduced

#### ● Promoting use of innovative forms of energy among customers and communities

- Contribute to making energy use by customers and society more sophisticated

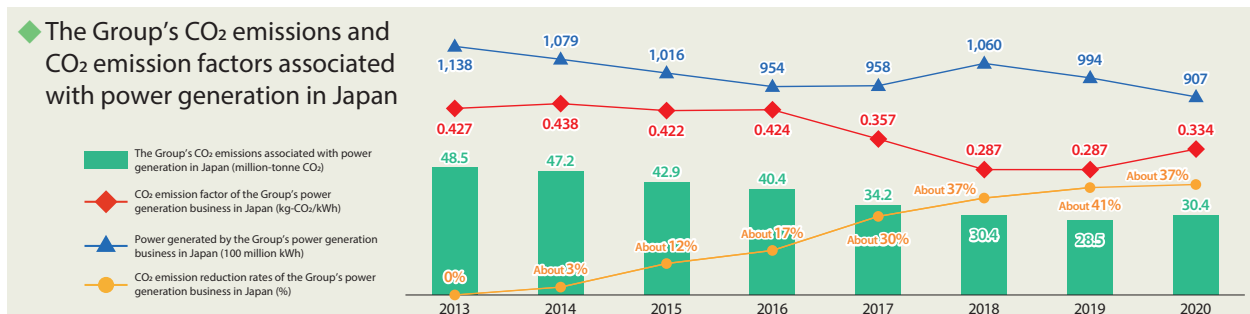
#### ● Limiting SF<sub>6</sub> emissions (calendar year basis) (gas recovery rate upon inspection/removal of equipment)

- 97% (upon inspection)
- 99% (upon removal)

## Efforts

### Our Group's CO<sub>2</sub> emissions associated with power generation in Japan

Our Group's CO<sub>2</sub> emissions associated with power generation in Japan amounted to about 30.4 million tonnes in fiscal 2020; emissions have been declining since fiscal 2013 when the target was set. As a "leading company in achieving a zero-carbon energy," we are committed to safely and stably operating Takahama Nuclear Power Station Units 3 and 4 and Ohi Nuclear Power Station Units 3 and 4 while developing and promoting renewable energy. Our efforts have resulted in a reduction in CO<sub>2</sub> emissions of about 40% from fiscal 2013 levels.



### Continuing safe and stable operation of nuclear power plants

Since nuclear power generation emits no CO<sub>2</sub>, it is an important source of energy that prevents global warming. With understanding of residents of local communities, we continue the safe and stable operation of plants that have resumed operation and restart plants as soon as the safety is confirmed by appropriately responding to examinations of the Nuclear Regulation Authority. We will also keep independently and continuously promoting safety measures that exceed regulatory requirements.

### Maintaining and improving the thermal efficiency of thermal power plants

We continuously undertake measures related to facilities and operation, working to reduce the amount of fuel used and suppress CO<sub>2</sub> emissions by maintaining and improving thermal efficiency.

Our Himeji No. 2 Power Station, one of our largest natural gas-fired thermal power plants, employs a combined-cycle power generation with advanced 1,600°C class gas turbines. We are working to suppress CO<sub>2</sub> emissions by increasing thermal efficiency to about 60%, which is the highest global standard, and reducing the amount of fuel used. Moreover, at Units 1 and 3 of the Aoi Power Station, in addition to the heavy oil and crude oil we had been using, we began using natural gas, which is less expensive and better for the environment, in 2016.

### Demonstration project of CO<sub>2</sub> Capture System at the Maizuru Power Station

We are setting up a pilot scale plant at the Maizuru Power Station to demonstrate an energy-saving CO<sub>2</sub> Capture (separation and recovery) System (40 t-CO<sub>2</sub>/day). This joint project with Kawasaki Heavy Industries, Ltd. and the Research Institute of Innovative Technology for the Earth (RITE) is scheduled to start operation in fiscal 2022, where exhaust combustion gases from coal-fired thermal power plants will be captured for separation and recovery of CO<sub>2</sub>. There are growing needs to develop and leverage energy-saving CO<sub>2</sub> capture technologies, as CO<sub>2</sub> emissions from industrial plants are thought to cause global warming. The CO<sub>2</sub> capturing method with solid sorbent to be demonstrated in this project is expected to achieve significant reduction of energy consumption in CO<sub>2</sub> capture, compared with conventional methods. This method is anticipated to represent promising next-generation capturing technology, and the demonstration project is the first case of this method being used in Japan at a thermal power plant.

We are committed to leveraging our accumulated expertise in pursuing this project, reducing CO<sub>2</sub> emissions and building a low-carbon society.

### Encouraging efficient energy use

With the goals of realizing energy conservation, cost cutting and CO<sub>2</sub> reduction for our customers and society, we are offering high-efficiency systems that utilize renewable energy sources and heat pump technologies, as well as proposing effective operation procedures. We are also providing total support for energy management to customers and other members of society and undertaking activities that serve these purposes, including the services for visualizing energy use.

The solution offered to residential customers is "total electric conversion," which, through efficient use of energy, can make our lives more comfortable and convenient. Specific products and services include an energy-efficient hot water supply system (EcoCute), safe, comfortable and convenient electric appliances (IH cooking heaters, etc.), and power consumption visualization (Hapi e-Miruden). The internet-based service Hapi e-Miruden monitors the amount and rate of electricity and gas consumed. By entering data on utility costs the system can automatically indicate the total household CO<sub>2</sub> emissions while providing useful information, such as tips on energy conservation according to registered equipment or power consumption patterns.

We are providing total support for the energy management of our business customers. We offer proposals for energy systems that are optimized to their various needs, including making energy use more efficient, and explain how to operate these systems. We also work with other group companies to provide a range of services such as energy conservation diagnoses and energy management support appropriate to the customer's facility usage patterns. We remain committed to helping our customers minimize their energy consumption, achieve cost savings, and reduce their CO<sub>2</sub> emissions.

## ● Adoption of smart meters

Kansai Transmission and Distribution, Inc. is systematically introducing smart meters. In addition to making amounts of electricity use visible to customers, installing smart meters contributes to the energy conservation of society as a whole, and enables formation of facilities efficiently according to the conditions of electricity use, among other benefits. We have completed installation of smart meters for customers that receive high-voltage and extra-high-voltage electricity, and we plan to install them for every customer that receives low-voltage power by fiscal 2022.

## ● Group companies' renewable energy programs

Kanden Energy Solution Co., Inc. leverages its solar, wind and biomass power plants to decarbonize energy systems. Moreover, as a comprehensive energy business operator, we are promoting distributed renewable energy sources, storage batteries, and energy conservation, particularly by upgrading and standardizing energy management systems, thereby helping customers and society achieve zero-carbon emissions.

### ◆ Major achievements

#### Solar power generation

Arida Solar Power Station (Arida City, Wakayama Prefecture)

The Arida Solar Power Station is the Group's largest solar power station with about 150,000 solar panels installed across a large area.

Power output	29,700 kW
Generated energy	Approx. 31 million kWh/annum (Equivalent to the annual consumption by 10,000 standard households)
CO <sub>2</sub> emission reduction	Approx. 16,000 tonnes/annum*
Total site area	Approx. 45 ha
Commencement	October 2015



#### Wind power generation

Awaji Wind Power Station (Awaji City, Hyogo Prefecture)

While harmonizing with the community, this station operates by utilizing the wind blowing through the hills in northern Awaji City.

Power output	12,000 kW (6 turbines @2,000 kW)
Generated energy	Approx. 20 million kWh/annum (Equivalent to the annual consumption by 6,500 standard households)
CO <sub>2</sub> emission reduction	Approx. 7,000 tonnes/annum*
Commencement	December 2012



\* The reduction in CO<sub>2</sub> emissions was a figure calculated upon commencement of operations.

## ● Performance data

GHG emissions	Unit	FY 2018	FY 2019	FY 2020
Direct greenhouse gas emissions (Scope 1)*1*2	10,000 t-CO <sub>2</sub>	2,865.7	2,663.2	2,857.2
Indirect greenhouse gas emissions (Scope 2)*1*3		0.6	0.5	0.6
Other indirect greenhouse gas emissions (Scope 3)*1*4		3,784.5	3,173.9	3,211.5
Category 1*5		123.2	142.7	159.9
Category 2*6		102.6	129.3	158.8
Category 3*7		3,556.6	2,900.0	2,890.9
Category 4*8		0.1	0.0	0.0
Category 5*9		1.1	1.0	1.0
Category 6*10		0.3	0.3	0.2
Category 7*11		0.6	0.6	0.6
Category 8*12		—	—	—
Category 9*12		—	—	—
Category 10*12		—	—	—
Category 11*12		—	—	—
Category 12*12		—	—	—
Category 13*12	—	—	—	
Category 14*12	—	—	—	
Category 15*12	—	—	—	

\*1 The amount of greenhouse gases emitted in our entire supply chain is calculated in accordance with the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (ver. 2.3) issued by the Ministry of the Environment and the Ministry of Economy, Trade and Industry.

\*2 Direct GHG emissions (Scope 1) refer to emissions (energy-derived CO<sub>2</sub>, SF<sub>6</sub> and N<sub>2</sub>O emissions) reported by electric companies in line with the Law Concerning the Promotion of the Measures to Cope with Global Warming along with CO<sub>2</sub> emissions from transportation fuel use, which are excluded from the reporting obligations. SF<sub>6</sub> emissions, which are factored in, are based on calendar year.

\*3 Indirect GHG emissions (Scope 2) include CO<sub>2</sub> emissions originating from electricity and heat purchased from external corporations, which should be reported by electric operators in line with the Law Concerning the Promotion of the Measures to Cope with Global Warming.

\*4 Indirect emissions not covered by Scope 1 or Scope 2 (emissions from other corporations related to the business activities of the company concerned)

\*5 Product/service price (purchased or obtained) × emission intensity

\*6 Capital goods price × emission intensity

\*7 Fuel consumption × emission intensity + electricity purchased externally × emission factor

\*8 Fuel consumption × emission intensity

\*9 Waste disposal volume × emission intensity + fuel consumption × emission intensity

\*10 Number of employees × emission factor

\*11 (City classification-based) Σ (number of employees × operating days × emission intensity)

\*12 Not applicable because of specific to our business

The Group's CO <sub>2</sub> emissions and their factors associated with power generation in Japan	Unit	FY 2018	FY 2019	FY 2020
CO <sub>2</sub> emissions*1	10,000 t-CO <sub>2</sub>	3,040	2,850	3,040
CO <sub>2</sub> emission factor (at the generation end) (per power generation output)*2	kg-CO <sub>2</sub> /kWh	0.287	0.287	0.334

\*1 CO<sub>2</sub> emissions refer to those produced by fuel combustion at the Group's thermal power plants in Japan.

\*2 CO<sub>2</sub> emission factor (at the generation end) corresponds CO<sub>2</sub> emissions per kWh of the Group's domestic power generation business

• CO<sub>2</sub> emission factor (at the generation end) = CO<sub>2</sub> emissions of the Group's domestic power generation business ÷ amount of power generated

CO <sub>2</sub> emissions and retail emission factors of our Company	Unit	FY 2018	FY 2019	FY 2020
CO <sub>2</sub> emissions (before adjustment)*1	10,000 t-CO <sub>2</sub>	4,153	3,844	3,702
CO <sub>2</sub> emissions (after adjustment)*2		3,936	3,594	3,583
CO <sub>2</sub> emission factor (energy used) (before adjustment) (per amount of electric power sold)*3	kg-CO <sub>2</sub> /kWh	0.352	0.340	0.362
CO <sub>2</sub> emission factor (energy used) (after adjustment) (per amount of electric power sold)*3		0.334	0.318	0.350

\*1 CO<sub>2</sub> emissions refer to those produced by fuel combustion at the thermal power plants and include those for power purchased from other corporations.

\*2 Adjusted CO<sub>2</sub> emissions include the environmental value adjustments under the surplus solar power purchasing system and the renewable energy feed-in tariff system.

• CO<sub>2</sub> emissions = CO<sub>2</sub> emissions (before adjustment) + CO<sub>2</sub> emissions (after feed-in tariff adjustment, etc.)

\*3 CO<sub>2</sub> emission factor (energy used) corresponds CO<sub>2</sub> emissions per kWh of the Kansai Electric Power Co., Inc. electricity used.

• CO<sub>2</sub> emission factor (energy used) (before adjustment) = CO<sub>2</sub> emissions (before adjustment) ÷ amount of electric power sold

• CO<sub>2</sub> emission factor (energy used) (after adjustment) = CO<sub>2</sub> emissions (after adjustment) ÷ amount of electric power sold

\*1,2,3 The results for FY 2020 are provisional; the actual CO<sub>2</sub> emission factor will be officially announced by the government in accordance with the Law Concerning the Promotion of the Measures to Cope with Global Warming, etc.

Greenhouse gases other than CO <sub>2</sub>	Unit	FY 2018	FY 2019	FY 2020
N <sub>2</sub> O (dinitrogen oxide)*1	10,000 t-CO <sub>2</sub>	2.4	2.3	2.3
SF <sub>6</sub> (sulfur hexafluoride)*1*2		5.1	3.8	4.0

\*1 The results were first made public in fiscal 2010. CO<sub>2</sub> equivalent

\*2 SF<sub>6</sub> emissions are based on the calendar year.

Utilization rate of nuclear power facilities and net thermal efficiency of thermal power facilities	Unit	FY 2018	FY 2019	FY 2020
Utilization rate of nuclear power facilities*1	%	54.6	48.4	28.0
Net thermal efficiency of thermal power facilities*2		49.0	48.6	47.8

\*1 Utilization rate of nuclear power facilities = amount of power generated ÷ (permitted output × calendar hours) × 100

\*2 Net thermal efficiency of thermal power facilities = (amount of power transmitted × quantity of heat per kWh) ÷ total amount of input heat (lowest heat value standard) × 100

Energy consumption	Unit	FY 2018	FY 2019	FY 2020	
Total energy consumption*	1,000 GJ	492,321	460,063	494,045	
Thermal fuel consumption	Coal	1,000 t	3,455	3,305	3,254
	Heavy oil	1,000 kL	136	48	210
	Crude oil		194	30	218
	LNG		1,000 t	6,734	6,502
	Wood pellets	1,000 kL (heavy oil equivalent)	2	0.2	4
	Other	288	202	298	
Fuels for nuclear power generation (weight of pre-irradiation uranium)	tU	87	52	77	

\* These figures are reported to the government in accordance with the Act on the Rational Use of Energy. (Fossil fuel consumption, purchased electricity, and purchased heat)