Environmental data 2019

Kansai Electric Power

power with heart

Reporting Coverage

■Reporting coverage of Kansai Electric Power and its 79 consolidated subsidiaries (as of the end of March 2019)

（1）Specific data of environmental impact including electricity consumption in an office is grasped and reported in this report

⇒ **97.6%**

<Explanation>

It represents the ration of companies that are performing Eco-Action among 79 consolidated subsidiaries (ratio of sales).

・<Calculation Method>

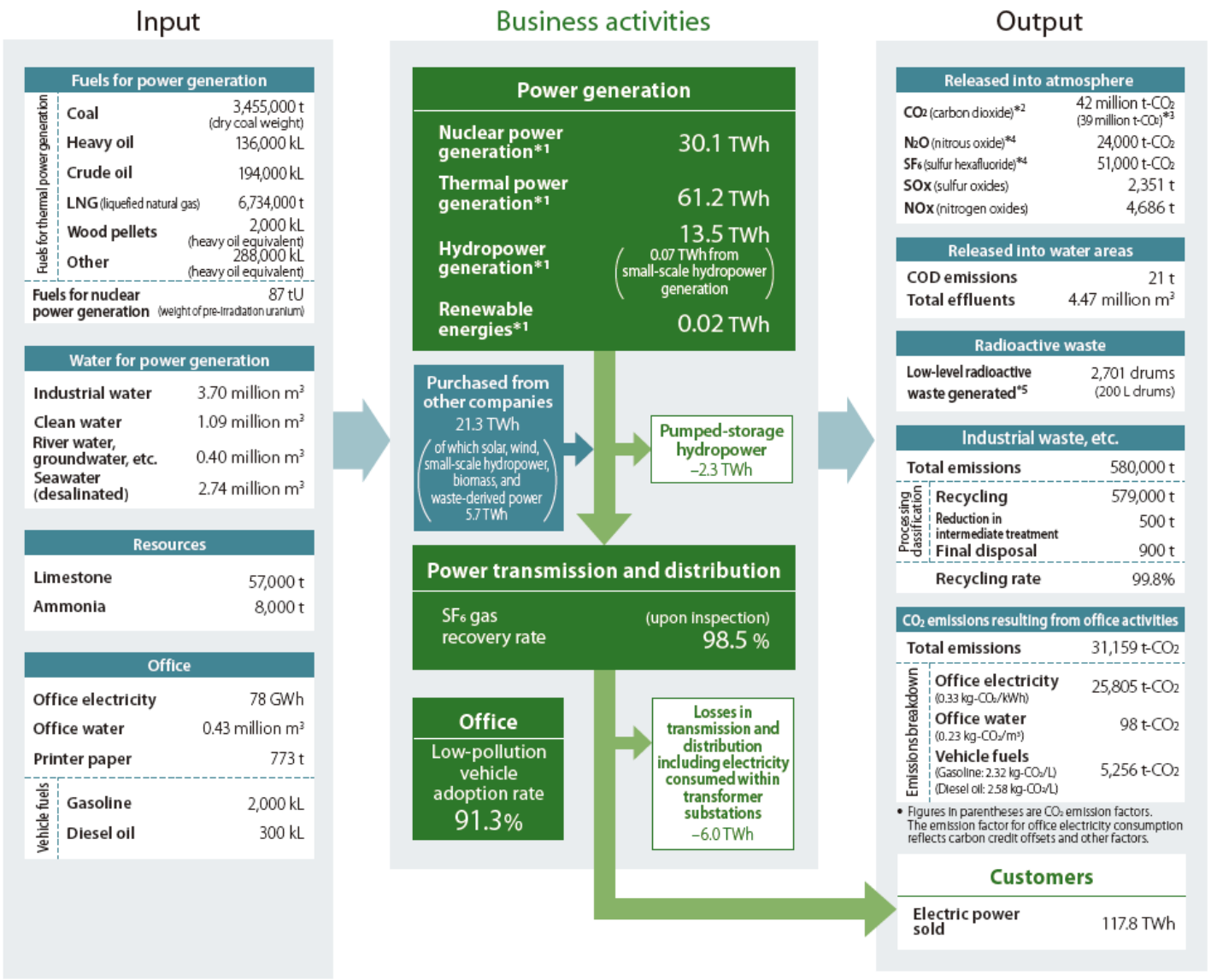
$$\frac{\text{(Sales of Kansai Electric Power in FY 2018) + (Sales of 41 consolidated subsidiaries in FY 2018 that are performing Eco-Action as of the end of March 2019)}}{\text{(Sales of Kansai Electric Power in FY 2018) + (sales of 79 consolidated subsidiaries in FY 2018)}}$$

＊Eco-Action

It is the environmental action plan including the reducing office electricity consumption and office water consumption

＜Data＞

Status overview of our business activities and environmental load



Note1:This table contains non-consolidated figures for Kansai Electric Power Co., Inc only.
Note2:Totals may not sum due to rounding.
Note3:Thermal power generation figures do not include biomass power generation.

*1 Includes amounts of power for inside power plants
*2 Includes CO_2 originating from electricity purchased from other electric power companies
*3 Emissions taking carbon credits into account
*4 CO_2 conversion
*5 Net generation (generated amount – reduced amount)

Environmental accounting （KEPCO ①）

KEPCO has introduced environmental accounting both on a non-consolidated basis and for group companies to clarify the costs of environmental conservation in our business activities and the benefits achieved.

FY2018 assessment（Environmental conservation costs）

For environmental conservation costs, investments were about 4 billion yen, about 5 billion less than the previous fiscal year. Due to industrial waste processing costs and other cost reduction efforts, expenses were about 17 billion yen, which is about 1.5 billion yen less than the previous fiscal year.

Environmental conservation costs (100 million yen)

Category	Investment		Expenses		Major items
	FY2017	FY2018	FY2017	FY2018	
1. Global environmental conservation costs (CO_2 reductions,etc.)	3.4	0.1	0.7	4.9	SF_6 gas collection
2. Local environmental conservation costs	87	39	44	41	
(1)Measuring/monitoring environmental impact	4	1	12	16	Radiation control and measurement, air quality concentration measurement, marine area surveys
(2)Pollution control(air pollution, water contamination, oil leakage, etc.)	83	37	23	16	Air pollution control measures, water contamination prevention measures
(3)Nature conservation	0	0	8.1	8.0	Revegetation
3. Costs to build a circular economy	1.2	1.3	134.7	117.4	
(1)Industrial waste processing, recycling	1.2	1.2	63.9	53.9	Industrial waste processing, PCB processing
(2)General waste processing, recycling	0	0	0.1	0.1	Paper recycling
(3)Radioactive waste processing	0	0	70.7	63.4	Low-level radioactive waste processing
(4)Green purchasing	0.1	0.1	0	0	Research-related work
4. Environmental management costs	0	0	0.8	0.7	Environmental reports
5. R&D costs	0.2	0.1	3.0	4.4	Load leveling, environmental conservation, energy savings and recycling, natural energy
6. Other costs	0	0	0.2	0.2	Research Laboratory repairs
Total	91.3	40.0	183.5	168.0	
Total capital investment during the period	2,954	3,693	–	–	
Operating expenses during period	–	–	25,185	26,632	

Note: Based on the Environmental Reporting Guidelines (FY2005 version) issued by the Ministry of the Environment. Depreciation is not calculated into expenses. Composite costs are tallied proportionally by one of three methods: (1)calculation of differences; (2) proportional division based on rational criteria; (3) proportional division based on criteria of expediency. Costs involved in generating nuclear power are calculated with the sum of individual measures to protect the environment taken as environmental conservation costs (radiation control and measurement, low-level radioactive waste processing, etc.). Figures may not add up due to rounding off.

Environmental accounting （KEPCO ②）

FY2018 assessment（Effects of environmental conservation）

CO_2 emissions intensity is expected to improve greatly compared to the previous fiscal year. As a “low carbon” leader, from fiscal 2017 through fiscal 2018, we resumed operation of Takahama Units 3 and 4 and Ohi Units 3 and 4, which had been confirmed to be safe, one after the other, and we have continued to endeavor for their safe and stable operation. These efforts contributed to greatly improving our CO_2 emissions coefficient.

Furthermore, we reduced SOx and NOx emissions intensities compared to the previous fiscal year through the appropriate use of sulfur scrubbers and nitrogen scrubbers and other efforts.

Effects of environmental conservation

Category	Item (unit)		FY2017	FY2018	Year-on-year change
1. Global environmental conservation	CO_2 emissions (basic)	(10,000t-CO_2)	5,000	4,200	▲ 800
	CO_2 emissions intensity (basic)	(kg-CO_2/kWh)	0.44	0.35	▲ 0.09
	CO_2 emissions (after adjustment)	(10,000t-CO_2)	4,800	3,900	▲ 900
	CO_2 emissions intensity (after adjustment)	(kg-CO_2/kWh)	0.42	0.33	▲ 0.09
2. Local environmental conservation	Air pollution control				
	SOx emissions	(t)	2,734	2,351	▲ 383
	SOx emissions intensity	(g/kWh)	0.039	0.037	▲ 0.002
	NOx emissions	(t)	5,402	4,686	▲ 716
	NOx emissions intensity	(g/kWh)	0.077	0.074	▲ 0.003
	Landscape integration				
	Revegetation area	(1,000 m^2)	0	0	0
3. Building a circular economy	Industrial waste and other emissions	(1,000 t)	654	580	▲ 74
	Recycling rate for industrial waste, etc	(%)	99.9	99.8	▲ 0.1
	Low-level radioactive waste processing	(Rods)	1,451	2,701	1,250

Note: CO_2 emissions: including from power supplied by other companies; CO_2 emissions coefficient: by amount of power sold(after adjustment CO_2 emission factors include deductions that reflect CO_2 credits and other deductions, as well as environmental value adjustments based on the purchasing system for surplus solar and the purchasing system for total amounts of renewable); SOx and NOx emissions: only KEPCO-generated power; SOx and NOx emissions coe cient: by amount of power generated by KEPCO thermal power plants

Environmental accounting （KEPCO ③）

FY2018 assessment（Economic benefits from environmental conservation measures）

Economic benefits decreased approximately 0.5 billion yen from the previous year due to a reduction in results from efforts that lead to cost savings.

Economic benefits from environmental conservation measures (100 million yen)

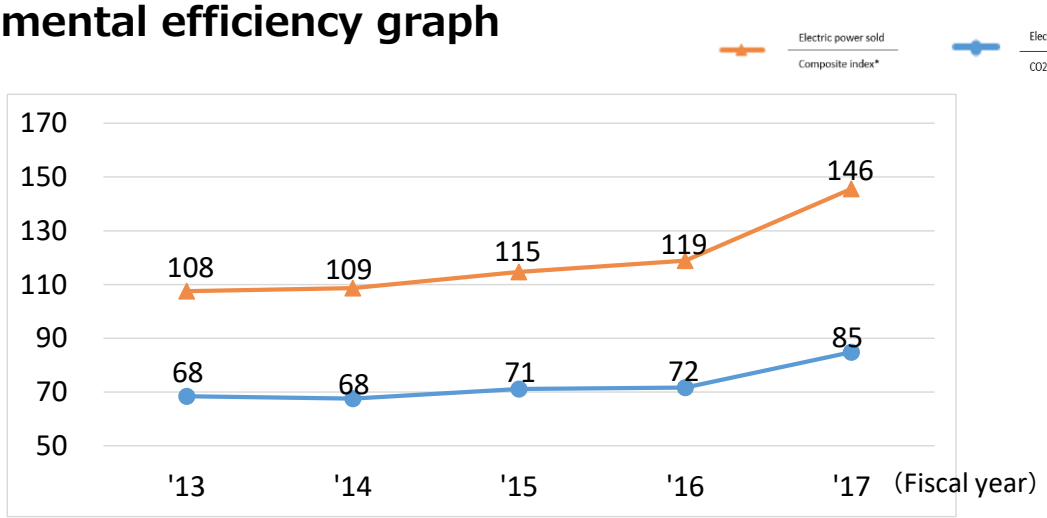
Category		FY2017	FY2018	Major Items
Revenue	Operating revenues from recycling, etc.	39.9	34.8	Gain on sale of disused articles(recycling)
Cost savings	Cost savings from reuse and recycling, etc.	0.1	0.1	Cost savings from the purchase of recycled items
Total		40.0	34.9	

Environmental efficiency

Environmental efficiency (with FY1990 as the base year) is calculated to indicate the relationship between environmental load and economic value.

Environmental efficiency for fiscal 2018 include scores of 181 for electric power sold/composite index, which is an increase of 35 points from the previous fiscal year, and 107 for electric power sold/CO_2 emissions, which is an increase of 23 points from the previous fiscal year. Main factors for this included reductions in CO_2, SOx and NOx emissions intensities and a decrease in fuel consumption accompanying the resumption of nuclear power plant operation.

Environmental efficiency graph



Note: LIME2 integration coefficients developed by the National Institute of Advanced Industrial Science and Technology have been used for calculations since fiscal 2007.

Environmental accounting (group companies)

Environmental conservation costs (million yen)

Category	Major Items	Investment		Expenses	
		FY2017	FY2018	FY2017	FY2018
Costs for pollution control	Air, water and soil pollution prevention	-	-	35.4	32.5
Costs for resource recycling	General and industrial waste processing and recycling	1.1	0.9	947.2	738.3
Costs for management activities	Environmental protection efforts, environmental education and related activities at business places and in their neighborhoods	0	0	131.4	129.9
Costs for community activities	Contributions to and support of environmental protection activities and environmental protection organizations outside the company	-	-	4.9	7.6
Costs for research and development	Research and development of products, for example, that contribute to environmental protection	-	-	6.4	11.0
Costs related to environmental damages	Natural restoration, damage compensation, etc.	-	-	0.3	0.3
Other costs		-	-	0.1	0.1
Total		1.1	0.9	1,125.6	919.7

Environmental conservation effects (physical effects)

Category	Items (unit)	FY2017	FY2018
Global and local environmental conservation	CO_2 emissions (10,000 t-CO_2)	34	29
	SOx emissions (t)	0.3	0.3
	NOx emissions (t)	24	18
Environmental management	ISO or other external certifications(locations)*	95	98
Building a circular economy	Industrial waste emissions (1,000 t)	181	136

Economic benefits from environmental conservation effects (million yen)

Category	Major Items	FY2017	FY2018
Revenue	Business income from recycling	1,206.5	1,133.8
Cost savings	Cost savings from re-use and recycling, etc.	0.1	0.0
Total		1,206.6	1,133.8

Environment-related data

○Initiatives contributing to the realization of a low-carbon society

Fiscal year		2014	2015	2016	2017	2018	Unit
Total direct GHG emissions (Scope1)*1*2		4,571	4,180	3,949	3,281	2,866	10,000 t-CO_2
Indirect greenhouse gas emissions from energy purchased and consumed (Scope2)*1*3		1.0	1.0	1.0	1.0	0.6	10,000 t-CO_2
Other indirect greenhouse gas emission amounts*1*4		—	1.4	1.4	860.9	800.1	10,000 t-CO_2
	Category 1*5	—	—	—	129.6	123.2	10,000 t-CO_2
	Category 2*6	—	—	—	80.0	102.6	
	Category 3*7	—	—	—	648.9	572.3	
	Category 4*8	—	0.1	0.1	0.1	0.1	
	Category 5*9	—	1.3	1.3	1.2	1.1	
	Category 6*10	—	—	—	0.3	0.3	
	Category 7*11	—	—	—	0.8	0.6	

＊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 The direct greenhouse gas emission amounts (scope 1) are totals of direct greenhouse gas emissions (CO_2, SF_6 and N_2O from energy) reported (for the business) in accordance with the Warming Countermeasures Act and CO_2 emissions from vehicle fuel not included in this reporting.
＊3 The indirect greenhouse gas emission amounts (scope 2) are totals of CO_2 emissions from electricity and heat purchased from others among those reported (for the business) in accordance with the Warming Countermeasures Act as indirect CO_2 emissions.
＊4 Indirect emissions not covered by Scope 1 or Scope 2(emissions by other companies related to the business activities of the subject company)
＊5 Price of purchased goods and services × Emission Factor [t-CO_2 /million yen]
＊6 Price of capital goods [million yen]×Emission Factor 3.30 [t-CO_2 /million yen]
＊7 Fuel consumption × Emission Factor [t-CCO_2/each unit] ＋ expenses for power purchased by other operators × Emission Factor
＊8 Fuel consumption × Emission Factor [t-CO_2/each unit]
＊9 Waste disposal volume × emission factor ＋ fuel consumption × emission factor
＊10 number of employees × emission factor
＊11 (City classification-based) Σ (Number of employees × business days × emission factor)

Environment-related data

○Initiatives contributing to the realization of a low-carbon society

Fiscal year			2014	2015	2016	2017	2018	Unit
CO_2 emissions (before adjustment)※1,※2			7,141	6,487	6,179	5,018	4,200	10,000 t-CO_2
CO_2 emissions (after adjustment)※2,※3			7,029	6,331	5,989	4,822	3,900	10,000 t-CO_2
CO_2 emissions coefficient (end use)(before adjustment) (by amount of electric power sold)※2,※4			0.531	0.509	0.509	0.435	0.350	kg-CO_2/kWh
CO_2 emissions coefficient (end use)(after adjustment) (by amount of electric power sold)※2,※4			0.523	0.496	0.493	0.418	0.330	kg-CO_2/kWh
Reference	Global CO_2 emissions※5		323	323	–	–	–	100 million t-CO_2
	Japan's CO_2 emissions※6		12.66	12.26	12.06	11.4	–	100 million t-CO_2
	Electric power industry※7	CO_2 emissions (before carbon credits,etc.)	4.70	4.44	4.32	4.11	–	100 million t-CO_2
		CO_2 emissions (after carbon credits,etc.)	4.69	4.41	4.30	4.11	–	
		CO_2 emissions (before carbon credits,etc.) (by amount of electric power sold)	0.553	0.534	0.518	0.497	–	kg-CO_2/kWh
		CO_2 emissions (after carbon credits,etc.) (by amount of electric power sold)	0.552	0.531	0.516	0.496	–	
Greenhouse gases other than CO_2		N_2O (dinitrogen oxide)※8	2.9	2.7	2.8	2.8	2.4	10,000 t-CO_2
		SF_6 (sulfur hexafluoride)※8	5.0	4.4	4.8	4.6	5.1	10,000 t-CO_2
Utilization rate of nuclear power facilities※9			0.0	1.0	0.0	18.0	54.6	%
Net thermal efficiency of thermal power facilities※10			46.5	46.6	47.6	48.3	49.0	%

※1 The amount of CO_2 emissions is the amount produced from consumption of fuel used for power generation by thermal power plants and includes that for power purchased from other companies.
※2 The fiscal 2018 figures are provisional. The actual figures of the CO2 emissions coefficient will be officially announced by the government separately based on the Act on Promotion of Global Warming Countermeasures and other factors.
※3 After adjustment figures reflect, for example, adjustments for environmental value that accompany the feed-in tariff system for renewable energy.
CO_2 emissions amount = CO_2 emissions amount(before adjustment) + feed-in tariff adjustment CO_2 emissions amount,etc.
※4 CO2 emissions coefficient (end use) is the amount of CO_2 emissions per kWh of Kansai Electric Power Company electricity used.
・CO_2 emissions coefficient (end use) (before adjustment) = amount of CO_2 emissions (before adjustment) ÷ electricity sales volume
・CO_2 emissions coefficient (end use) (after adjustment) = amount of CO_2 emissions (after adjustment) ÷ electricity sales volume
※5 Global CO_2 emissions： IEA "CO_2 Emissions From Fuel Combustion" 2015 Edition
※6 Japan's CO_2 emissions： Source： Greenhouse Gas Inventory Office of Japan (Center for Global Environmental Research, National Institute for Environmental Studies)
※7 Sources for CO_2 emissions and CO_2 emission coefficients for the electric power industry are resources from the Industrial Structure Council and materials from the Natural Resources and Energy Working Group of the Electric Power Council for a Low Carbon Society(ELCS).(Through fiscal 2014, the total of results of the Federation of Electrical Power Companies of Japan and volunteering PPS (power producer and supplier) companies are used. In fiscal 2015,the results of 39 companies that undertook business activities that fiscal year among member businesses of the ELCS are used.)
※8 Published in FY2010 results; figures are CO_2 equivalents
※9 Utilization rate of nuclear power facilities = amount of power generated÷(permitted output× calendar hours)×100
※10 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

Environment-related data

○Initiatives contributing to the realization of a low-carbon society

Fiscal year		2014	2015	2016	2017	2018	Unit
Total energy use※11		760,782	701,316	675,113	554,656	550,865	1,000GJ
	Non-renewable fuels purchased and consumed (kWh conversion)	212,641	196,009	188,668	154,892	137,509	GWh
	Steam/heating/cooling and other energy (non-renewable) purchased (kWh conversion)	34.8	34.2	36.1	34.2	33.4	
Total costs of energy consumption※12		1,757,072	1,203,739	985,199	986,834	1,052,099	million yen
Thermal fuel consumption	Coal	4,034	3,871	4,163	4,288	3,455	1,000 t
	Heavy oil	332	193	275	157	136	1,000 kL
	Crude oil	4,240	3,366	1,358	345	194	1,000 kL
	LNG	8,824	8,319	8,686	7,287	6,734	1,000 t
	Wood pellets	17	18	18	16	2	1,000 kL (equivalent in heavy oil)
	Other	0.1	0.6	460	361	288	1,000 kL (equivalent in heavy oil)
Fuel for nuclear power generation (weight of pre-irradiated uranium)		–	61	–	37	87	tU
Hydroelectric power station replacement		0	1,744	1500	500	900	kW
Power distribution loss rate※13		5.4	5.2	5.5	4.4	5.1	%
SF_6 gas emissions		0.1	0.1	0.1	0.1	0.2	t
	● (Repeated) Upon inspection	0.1	0.1	0.1	0.0	0.2	t
	● (Repeated) Upon removal	0.0	0.0	0.0	0.1	0.1	t
SF_6 collection rate							
	●Upon inspection	98.8	99.1	99.3	99.6	98.5	%
	●Upon removal	99.5	99.1	99.6	99.3	99.3	%
Making efforts for renewable energy development	each year	36,500	31,464	9,080	500	3890	kW
	Cumulative total※14	66,890	98,354	107,434	107,934	111,824	
	●Solar power generation	11,662	11,000	11,000	11,000	11,000	
	●Wind power generation	153	0	0	0	0	
	●Fuel cell batteries	0	0	0	0	0	
Energy and resource savings (Office division)	Office electricity use※15	79	78	80	77	78	GWh
	Everyday water use※15	461	424	454	452	425	1,000 m^3
	Vehicle fuel costs	10.73	11.13	11.13	11.31	11.4	km/L
	Vehicle fuel use(gasoline)	2.6	2.3	2.2	2.1	2.0	1,000 kL
	Vehicle fuel use(diesel)	0.5	0.3	0.3	0.3	0.3	1,000 kL
	Copier paper use	839	908	961	809	772	t
Low-pollution vehicle introduction rate※16		86.1	86.2	86.4	90.0	91.3	%
CO_2 emissions from office activities※17	Office electricity	4.2	3.9	3.9	3.3	2.5805	10,000 t-CO_2
	Everyday water	0.01	0.01	0.01	0.01	0.01	10,000 t-CO_2
	Vehicle fuel	0.7	0.6	0.6	0.6	0.5	10,000 t-CO_2

※11 Figures reported to the government based on the Act on the Rational Use of Energy.(Fossil fuel used, purchased electricity, purchased heat)
※12 Power distribution loss rate =[1-{(amount of power sold＋amount of power at transformer substation) ÷(generated and purchased electric power - amount of power at KEPCO power plants)}]×100
※13 Actual figures for FY2014 include equipment used by the company.
※14 The scope for calculation of office electricity use and everyday water use has been revised.
※15 Rate of introduction of low-pollution Vehicles = No. of low-pollution vehicles purchased ÷ Total no. of vehicles×100
※16 CO_2 emissions from office activities = amount of electricity used×CO_2 emissions coefficient after carbon credits, etc.
CO_2 emissions from everyday water use = amount of everyday water used × emissions coefficient
CO_2 emissions from vehicle use = amount of vehicle fuel used × coefficient by type of fuel

Environment-related data

○Initiatives contributing to the realization of a recycling-oriented society

Fiscal year	2014	2015	2016	2017	2018	Unit
Amount of industrial waste and other emissions	698.6	670.2	707.9	653.6	580.0	1,000 t
(Repeated) Special controlled industrial waste	3.4	4.0	4.4	5.5	8.3	1,000 t
●Soot particles (Heavy/crude oil ash, coal ash,etc.)	474.3	443.8	480.6	438.3	387.0	
●Sludge (Desulfogypsum,wastewater processing sludge,etc.)	143.2	141.9	141.1	130.3	107.9	
●Cinders	27.4	28.8	28.0	28.6	25.3	
●Demolition debris(Waste concrete utility poles,etc.)	21.0	23.8	18.3	16.5	18.2	
●Metal scraps	21.7	20.6	28.9	29.1	23.9	
●Glass/ceramic scraps(Thermal insulation scraps,insulator scraps, etc.)	2.5	2.2	2.6	1.8	1.3	
●Waste oil	2.4	2.2	2.4	2.2	3.0	
●Waste plastic	1.0	0.8	0.8	0.9	0.9	
●Other	5.1	6.0	5.4	6.0	12.6	
● (Repeated) Amount except for ash, gypsum, and special controlled industrial waste	56.8	58.0	59.4	55.4	56.0	
Amount of industrial waste for landfill disposal	1.2	0.9	1.8	0.9	0.9	1,000 t
●Glass/ceramic scraps (Thermal insulation scraps,insulator scraps,etc.)	0.12	0.10	0.33	0.06	0.09	1,000 t
●sludge(Wastewater processing sludge,etc.)	0.74	0.47	0.34	0.19	0.48	
●Demolition debris	0.11	0.03	0.02	0.03	0.03	
●Cinders	0.00	0.00	0.00	0.00	0.00	
●Waste plastic	0.07	0.09	0.07	0.05	0.10	
●Metal scraps	0.05	0.10	0.55	0.19	0.05	
●Other	0.13	0.14	0.52	0.42	0.14	
● (Repeated) Amount except for ash, gypsum, and special controlled industrial waste	1.19	0.94	1.36	0.52	0.77	
Amount of industrial waste recycling	697.4	669.3	706.1	652.7	579.1	1,000 t
(Repeated) Amount except for ash, gypsum, and special controlled industrial waste	55.6	57.1	58.0	54.8	55.2	1,000t
Industrial waste recycling rate※1	99.8	99.9	99.7	99.9	99.8	%
(Repeated) Ash and gypsum waste recycling rate※1	100	100	100	100	100	%
Low-concentration PCB industrial waste Amount processed※2 (utility pole transformers) Insulating oil	7.7	7.7	–	–	–	10,000kL
Low-concentration PCB industrial waste Amount processed※2 (utility pole transformers) Transformer cases	22.7	about 24	–	–	–	10,000 units
Total net fresh water consumption※3	6.76	6.86	6.25	5.35	5.19	1,000,000 m^3
River water	0.40	0.36	0.29	0.36	0.40	1,000,000 m^3
Groundwater	0.00	0.00	0.00	0.00	0.00	
Total municipal water supplies	6.36	6.50	5.96	4.99	4.79	1,000,000 m^3
Amount of industrial water used (for power generation)	4.31	4.53	4.30	3.85	3.70	1,000,000 m^3
Amount of service water used (for power generation)	2.05	1.97	1.66	1.14	1.09	
Seawater (desalinated)	2.45	2.55	2.62	2.63	2.74	1,000,000 m^3

※1 Industrial waste recycling rate = [(Industrial waste and other emissions - Amount of landfill disposal) ÷ (Industrial waste and other emissions)]×100
※2 Processing at pole-mounted transformer case recycling center was completed in July 2015.
※3 Excluding desalinated seawater

Environment-related data

○Promotion of environmental protection in local communities

Fiscal year		2014	2015	2016	2017	2018	Unit
SOx emissions※1		5,635	4,735	3,635	2,734	2,351	t
SOx emissions intensity (for KEPCO-generated power)※2		0.052	0.046	0.037	0.028	0.022	g/kWh
SOx emissions intensity (by volume of power from thermal power generation)(for KEPCO-generated power)※3		0.059	0.055	0.043	0.039	0.037	
NOx emissions※4		8,221	7,397	6,528	5,402	4,686	t
NOx emissions intensity (for KEPCO-generated power) ※5		0.076	0.072	0.067	0.055	0.043	g/kWh
NOx emissions intensity (by volume of power from thermal power generation)(for KEPCO-generated power)※6		0.086	0.085	0.077	0.077	0.074	
Amount of limestone used		79	74	77	71	57	1,000 t
Amount of ammonia used		15	14	14	10	8	1,000 t
COD emissions※7		18	21	21	18	21	t
Revegetation rate※8 (end of fiscal year)	Thermal power plants	38	37	37	38	38	%
	Nuclear power plants	74	73	71	68	68	
	Electric power offices (substations)	28	28	28	28	28	
Rate of conversion to underground transmission lines (end of fiscal year)		17.1	17.3	17.2	17.3	17.4	%
Rate of conversion to underground distribution lines (end of fiscal year)		10.1	10.2	10.2	10.3	10.3	%

※1 This is calculated from amounts of sulfur in fuel as well as SOx concentrations in gas emissions (measured values) and gas emission volumes. (Some previous fiscal year amounts were calculated from the amount removed by desulfurization equipment.)
※2 SOx emissions intensity (for KEPCO-generated power) = SOx emissions amount÷power generated amount (for KEPCO-generated power)
※3 SOx emissions intensity (by volume of power from thermal power generation (for KEPCO-generated power)) = SOx emissions amount÷volume of power from thermal power generation (for KEPCO-generated power)
※4 This is calculated from Sox concentrations in gas emissions (measured values) and gas emission volumes.
※5 NOx emissions intensity (for KEPCO-generated power) = NOx emissions amount÷power generated amount (for KEPCO-generated power)
※6 NOx emissions intensity (by volume of power from thermal power generation (for KEPCO-generated power)) = NOx emissions amount÷volume of power from thermal power generation (for KEPCO-generated power)
※7 This is calculated from analyzed wastewater concentration values.
※8 Revegetation rate = (Business site revegetation area÷Business site total area)×100

Environment-related data

○Management of chemical substances (PRTR)

Name of targeted chemical substance	Emissions (t/year)				
	2014	2015	2016	2017	2018
2-aminoethanol	0.0	–	–	0.0	–
Asbestos (specified)	0.0	0.0	0.0	0.0	0.0
Ethylbenzene	6.2	12.0	11.0	3.8	4.7
Ferric chloride	0.0	0.0	0.0	0.0	0.0
Xylene	12.0	16.0	17.0	5.4	6.5
HCFC-225	–	0.0	–	–	–
Styrene	–	2.0	1.5	–	–
Dioxins (specified)	0.28 (mg-TEQ/year)	0.54 (mg-TEQ/year)	0.66 (mg-TEQ/year)	0.35 (mg-TEQ/year)	0.065 (mg-TEQ/year)
1,2,4-trimethylbenzene	–	0.0	0.0	1.9	<0.1
Toluene	12.0	11.0	7.2	5.9	4.9
Hydrazine	<0.1	<0.1	<0.1	<0.1	<0.1
n-Hexane	5.9	4.6	0.7	–	–
Benzenes (specified)	2.4	1.9	0.8	0.2	0.1
Boron compound	0.0	0.0	0.0	0.0	–
PCB	–	0.0	0.0	–	0.0
Methylnaphthalene	3.3	3.4	3.2	2.4	1.4
Bromotrifluoromethane	–	–	–	–	0.0
poly(oxyethylene)nonylphenyl ether	–	–	–	–	0.0

Name of targeted chemical substance	Amount moved (t/year)				
	2014	2015	2016	2017	2018
2-aminoethanol	8.9	–	–	4.1	–
Asbestos (specified)	5.1	3.4	1.3	4.7	6.8
Ethylbenzene	0.0	0.0	0.0	0.0	0.0
Ferric chloride	3.0	0.0	0.0	0.0	1.0
Xylene	0.0	<0.1	0.0	0.0	0.0
HCFC-225	–	2.2	–	–	–
Styrene	–	0.0	0.0	–	–
Dioxins (specified)	0.0050 (mg-TEQ/year)	0.000079 (mg-TEQ/year)	0.046 (mg-TEQ/year)	0.039 (mg-TEQ/year)	0.030 (mg-TEQ/year)
1,2,4-trimethylbenzene	–	0.0	0.0	0.0	0.0
Toluene	0.0	0.0	0.0	0.0	0.0
Hydrazine	3.1	3.0	0.9	2.5	0.0
n-Hexane	0.0	0.0	0.0	–	–
Benzenes (specified)	0.0	0.0	0.0	0.0	0.0
Boron compound	6.7	7.3	6.3	8.4	–
PCB	–	13	1.6	–	4.7
Methylnaphthalene	<0.1	0.0	0.0	0.0	<0.1
Bromotrifluoromethane	–	–	–	–	0.0
poly(oxyethylene)nonylphenyl ether	–	–	–	–	0.0

Notes :
- The chart show total values reported in compliance with the PRTR Law
- "0"indicates no emissions or transfers at targeted business site
- "<0.1"indicates less than 0.1 t/year emissions, etc.
- "－" indicates no business sites targeted for totaling
- Significant figures are displayed in two digits

Environment-related data

○Radioactive substances, radioactive waste

Fiscal year			2014	2015	2016	2017	2018	Unit
Gaseous waste	Evaluated dose values for the public in the vicinity of power plants (inert gases)	Mihama Nuclear Power Station	N.D.	N.D.	<0.001	N.D.	N.D.	Millisieverts※1
		Takahama Nuclear Power Station	<0.001	<0.001	N.D.	N.D.	N.D.	
		Ohi Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
	Evaluated dose values for the public in the vicinity of power plants (iodine)	Mihama Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	Millisieverts※1
		Takahama Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
		Ohi Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
Liquid waste	Evaluated dose values for the public in the vicinity of power plants	Mihama Nuclear Power Station	<0.001	<0.001	<0.001	<0.001	<0.001	Millisieverts※1
		Takahama Nuclear Power Station	<0.001	<0.001	<0.001	<0.001	<0.001	
		Ohi Nuclear Power Station	<0.001	<0.001	<0.001	<0.001	<0.001	
Radioactive gaseous waste discharged (inert gas)		Mihama Nuclear Power Station	N.D.	N.D.	2.7.E+09	N.D.	N.D.	Becquerel※2
		Takahama Nuclear Power Station	2.3.E+08	2.5.E+08	N.D.	N.D.	N.D.	
		Ohi Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
Radioactive gaseous waste discharged (iodine)		Mihama Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	Becquerel※2
		Takahama Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
		Ohi Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
Radioactive gaseous waste discharged (excluding tritium)		Mihama Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	Becquerel※2
		Takahama Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
		Ohi Nuclear Power Station	N.D.	N.D.	N.D.	N.D.	N.D.	
Radioactive solid nuclear waste generated (200-L drums)※4			15,756	14,318	13,750	15,863	11,800	Equivalent in drums
	Mihama Nuclear Power Station		4,888	4,978	4,302	5,000	4,828	
	Takahama Nuclear Power Station		6,368	4,471	5,002	5,722	4,396	
	Ohi Nuclear Power Station		4,500	4,869	4,446	5,141	2,576	
Radioactive solid nuclear waste shrinkage (200-L drums)※5			18,082	20,298	16,348	14,412	9,099	Equivalent in drums
	Mihama Nuclear Power Station		5,710	6,583	4,514	5,424	3,907	
	Takahama Nuclear Power Station		6,152	7,402	6,984	4,354	3,460	
	Ohi Nuclear Power Station		6,220	6,313	4,850	4,634	1,732	
Amount of solid radioactive waste generated-amount of solid radioactive waste reduced (200-L drum can equivalent)※6			-2,326	-5,980	-2,598	1,451	2,701	Equivalent in drums
	Mihama Nuclear Power Station		-822	-1,605	-212	-424	921	
	Takahama Nuclear Power Station		216	-2,931	-1,982	1,368	936	
	Ohi Nuclear Power Station		-1,720	-1,444	-404	507	844	
Radioactive solid nuclear waste cumulative amount stored (200-L drums)※7、8			104,735	98,756	96,159	97,610	100,311	Equivalent in drums
	Mihama Nuclear Power Station		27,491	25,887	25,675	25,251	26,172	
	Takahama Nuclear Power Station		46,832	43,901	41,919	43,287	44,223	
	Ohi Nuclear Power Station		30,412	28,968	28,565	29,072	29,916	

*1 Millisieverts (effective dose): unit indicating the degree of radiation's effect on the human body
*2 Becquerel: Unit of radioactivity (one becquerel is defined as one nucleus decaying per second, representing the rate at which radioactive material emits radiation)
*3 Notes 4-7 are for the storage status at power plants
*4 This is the amount of solid low-level radioactive waste produced in the fiscal year.
*5 This is the total of amount of solid waste with low-level radioactivity reduced through incineration, for example, and transported out of facilities in the fiscal year.
*6 This is the net increase of solid waste with low-level radioactivity calculated by deducting the amount reduced from the amount generated in the fiscal year.
*7 Cumulative amount of low-level solid radioactive waste
*8 Totals might not match due to rounding after conversion to drum equivalent.

Environment-related data

○Promoting environmental management and environmental communication

Fiscal year	2015	2016	2017	2018	Unit
Press releases related to Environmental compliance problems and matters	1	0	0	0	number

Environmental protection records at thermal power plants ①

Item				Sakaiko Power Station	Tanagawa No. 2 Power Station	Nanko Power Station	Miyazu Energy Research Center	Kansai International Airport Energy Center	Maizuru Power Station
Main fuel				L	Heavy/crude oil	L	Heavy/crude oil	Kerosene	Coal
Air quality related	Sulfur oxide	Amount emitted hourly (m3N/h)	Air Pollution Control Law (total amount regulation)	84	–	98	306※1	13	515※1
			Agreed value	–	–	–	112	–	255
			Actual value	–	Stopped	–	Stopped	–	180
		Amount emitted daily (t/d)	Agreed value	10.1	9.3	–	–	–	–
			Actual value	–	Stopped	–	–	–	–
		Amount emitted annually (t/y)	Agreed value	940	3,020	–	$492\times10^3m^3N$	–	$1,523\times10^3m^3N$
			Actual value	–	Stopped	–	Stopped	–	$774.9\times10^3m^3N$
	Nitrogen oxide	Amount emitted hourly (m3N/h)	Air Pollution Control Law (total amount regulation)	625	–	255	–	–	–
			Agreed value	–	–	–	58	–	244
			Actual value	45.8	Stopped	36	Stopped	–	210
		Amount emitted daily (t/d)	Agreed value	7.7	7.2	1.8	–	–	–
			Actual value	2.0	Stopped	1.4	–	–	–
		Amount emitted annually (t/y)	Agreed value	1,420	2,100	400	$244\times10^3m^3N$	–	$1457\times10^3m^3N$
			Actual value	591	Stopped	165	Stopped	–	$1421.8\times10^3m^3N$
	Soot particles	Emission concentration (g/m3N)	Air Pollution Control Law	0.04	0.07	0.03	0.05	0.05	0.1
			Agreed value	0.02	0.02	Not emitted	0.014	–	0.009
			Actual value	<0.002	Stopped	–	Stopped	–※5	0.005
Water quality related	Hydrogen ion concentration index		Water pollution laws and regulations	No.1 drain outlet / No.2 drain outlet: 5.8～8.6	5.8~8.6	5.0～9.0※2	5.0～9.0	–	5.0～9.0
			Agreed value	–	5.8~8.6	–	5.8～8.6	–	5.8～8.6
			Actual value	7.9 / 7.4	Stopped	7.9	6.0～7.9	–	6.2～7.9
	Chemical oxygen demand	Highest concentration (mg/L)	Water pollution laws and regulations	12 / 160	160	–	160	–	160
			Agreed value	–	15	–	15	–	15
			Actual value	1.7 / 1.9	Stopped	–	8.0	–	6.6
		Pollution load amount (kg/d)	Water pollution laws and regulations	388.4	55	–	–	–	–
			Agreed value	–	14	–	20.8	–	22
			Actual value	15.8	Stopped	–	0.7	–	5.71
	Amount of suspended solids	Highest concentration (mg/L)	Water pollution laws and regulations	50	90	600※2	200	–	200
			Agreed value	–	20	–	20	–	15
			Actual value	<5	Stopped	7	1	–	5
	Amount of inclusion of normal hexane extractable substances	Highest concentration (mg/L)	Water pollution laws and regulations	2	3	4※2	5	–	5
			Agreed value	–	1	–	1	–	1
			Actual value	<1	Stopped	<1.0	<0.5	–	<1.0

※1 Regulation in rules for the execution of ordinances to protect and nurture the environment of Kyoto Prefecture
※2 Regulated value of Osaka City sewer ordinance execution rules

Environmental protection records at thermal power plants ②

Item				Kainan Power Station	Gobo Power Station	Himeji No.1 Power Station 5,6U & GT1,2U	Himeji No.2 Power Station	Aioi Power Station	Ako Power Station
Main fuel				Heavy/crude oil	Heavy/crude oil	LNG	LNG	LNG/ Heavy/crude oil	Heavy/crude oil
Air quality related	Sulfur oxide	Amount emitted hourly (m3N/h)	Air Pollution Control Law (total amount regulation)	646	6,510※3	129	582	2,757※3	2,158※3
			Agreed value	310	184	–	–	165	180
			Actual value	81	130	–	–	5	50
		Amount emitted daily (t/d)	Agreed value	–	–	–	–	–	–
			Actual value	–	–	–	–	–	–
		Amount emitted annually (t/y)	Agreed value	$1,760\times10^3m^3N$	$970\times10^3m^3N$	–	–	$885\times10^3m^3N$	$650\times10^3m^3N$
			Actual value	$7.631\times10^3m^3N$	$24.163\times10^3m^3N$	–	–	$0.65\times10^3m^3N$	$17\times10^3m^3N$
	Nitrogen oxide	Amount emitted hourly (m3N/h)	Air Pollution Control Law (total amount regulation)	–	–	–	–	–	–
			Agreed value	370	110	123.5	463	85	94
			Actual value	38	82	56	97	47	76
		Amount emitted daily (t/d)	Agreed value	–	–	–	–	–	–
			Actual value	–	–	–	–	–	–
		Amount emitted annually (t/y)	Agreed value	$1,970\times10^3m^3N$	$560\times10^3m^3N$	$701\times10^3m^3N$	$2,263\times10^3m^3N$	$390\times10^3m^3N$	$340\times10^3m^3N$
			Actual value	$2.782\times10^3m^3N$	$21.276\times10^3m^3N$	$164.269\times10^3m^3N$	$411\times10^3m^3N$	$52.6\times10^3m^3N$	$44.1\times10^3m^3N$
	Soot particles	Emission concentration (g/m3N)	Air Pollution Control Law	0.07	0.07	0.05	0.05	0.07	0.05
			Agreed value	0.02	0.01	–	–	0.015	0.015
			Actual value	0.003	0.005	–	–	0	0.002
Water quality related	Hydrogen ion concentration index		Water pollution laws and regulations	5.0~9.0	–	5.0~9.0	5.0~9.0	5.0~9.0	5.0~9.0
			Agreed value	5.8~8.6	5.8~8.6	5.8~8.6	5.8~8.6	5.8~8.6	5.8~8.6
			Actual value	6.0~8.0	6.4~7.9	7.1~7.9	6.9~7.7	6.7~7.3	6.3~7.5
	Chemical oxygen demand	Highest concentration (mg/L)	Water pollution laws and regulations	10	–	70	70	70	70
			Agreed value	10	10	15	15	15	15
			Actual value	5.4	6.8	3.1	3.6	5	4
		Pollution load amount (kg/d)	Water pollution laws and regulations	187.7	–	38.8	173.9	67.8	85.5
			Agreed value	50	36.8	15.2	35	18	22.4
			Actual value	7.9	8.7	3.1	13.5	5.2	4.1
	Amount of suspended solids	Highest concentration (mg/L)	Water pollution laws and regulations	40	–	90	90	90	90
			Agreed value	20	20	20	20	20	20
			Actual value	6	1.0	2	2	1	<1
	Amount of inclusion of normal hexane extractable substances	Highest concentration (mg/L)	Water pollution laws and regulations	2	–	5	5	5	5
			Agreed value	2	1	1	1	1	1
			Actual value	<0.1	0.1	0.1	0.2	0.1	<0.5

※3 Regulated K value

Kansai Electric Power Group Environmental Action Policy

Based on our Kansai Electric Power Group CSR Action Charter, as an energy business that has a deep connection to the environment, we are formulating the Kansai Electric Power Group Environmental Action Policy as the environmental management policy to be pursued by our group over the medium and long terms. We are realizing this policy through deliberations by our Environmental Board chaired by our Executive Officer in charge of environmental affairs.

As issues that should be considered in the conduct of our business activities, the Kansai Electric Power Group Environmental Action Policy expresses four main focuses that should be followed in our efforts, including "initiatives contributing to the realization of a low-carbon society."

Initiatives contributing to the realization of a low-carbon society

- Lowering electric power's carbon intensity
- Technological developments for constructing the Smart Grid
- Contributing to energy conservation, cost reductions and CO_2 emissions reductions for customers and society
- Overseas activities
- Technical development efforts
- Value chain efforts
- Efforts to reduce other greenhouse gases in addition to CO_2

Initiatives contributing to the realization of a recycling-oriented society

- Promotion of proactive 3R efforts aimed at zero emissions
- Promoting safe, reliable, and complete disposal of PCB wastes
- Promoting green procurement

Promotion of environmental protection in local communities

- Measures to prevent air and water pollution, etc.
- Efforts to strictly manage and reduce toxic chemicals
- Considering the preservation of biodiversity

Promoting environmental management and environmental communication

- Continuous improvement using environmental management systems based on ISO 14001 systems and strict adherence to laws and regulations
- Active advancement of environmental awareness raising activities with local communities and customers and disclosure of environmental information

Eco Action (FY 2019 published version)

Eco Action (Initiatives contributing to the realization of a low-carbon society)

Item	FY 2018		FY 2019
	Targets	Results	Targets
Advancing efforts to control CO_2 emissions	・About 0.37 kg-CO_2/kWh*1 for the entire electric power business by FY 2030	・Electric Power Council for a Low Carbon Society (FY 2017): 0.496 kg-CO_2/kWh*1 (Our company (FY 2018) 0.33 kg-CO_2/kWh*1, *2)	・Keep the top spot for the amount of CO_2-free power generation in Japan ・Halve CO_2 emissions associated with power generation in Japan in FY 2030 (compared to FY 2013) ・About 0.37 kg-CO_2/kWh for the entire electric power business by FY 2030
Continuing safe and stable operation of nuclear power plants	・Advance efforts to operate nuclear power plants that make safety the top priority	・We continued the safe and stable operation of plants that had resumed operating. ・We implemented safety improvement measures that conform to new regulatory requirements and voluntary efforts for various other safety measures.	Continued
Developing and utilizing renewable energy sources further	・Development and promotion of renewable energy, 500,000 kW (2030)	・Renewable energy development: 3 locations, 3,890 kW*3 (Cumulative total: 111,824 kW) ・Renewable energy purchased: 5.72 billion kWh	・Achieve 6 million kW of installed capacity by 2030s (more than 2 million kW will be newly developed in Japan and abroad)
Contributing to the realization of low carbon societies through overseas power generation businesses	・Increase low carbon power supplies through overseas power generation businesses	・Promotion of hydroelectric power construction: 2*4 Participation in renewable energy investment projects: 2*5 Developing country support efforts under GSEP*6 framework: 1*7	
Maintaining and improving the thermal efficiency of thermal power plants (lower heating value base)	・Maintain and improve thermal efficiency	・Thermal efficiency 49.0%	・Benchmark indicators*8 (A: 1.00, B: 44.3%)
Reducing transmission and distribution loss	・Reduce from current level	・5.05%	Continued
Promoting use of innovative forms of energy among customers and communities	・Contribute to making energy use by customers and society more sophisticated	・We worked to expand use of devices and services that contribute to more sophisticated utilization of energy by customers and society. Smart meters deployed: 1.26 million/year (Cumulative total: 10.58 million), progress rate: about 81%	Continued
Limiting SF_6 emissions (calendar year basis) (gas recovery rate upon inspection/removal of equipment)	・97% (upon inspection) ・99% (upon removal)	・98.5% (upon inspection) ・99.3% (upon removal)	Continued

*1 Amount of CO_2 emissions per unit of electricity use (sales)
*2 This value is provisional. Based on the Act on Promotion of Global Warming Countermeasures and other factors, the actual value of the CO_2 emission factor will be officially announced by the country.
*3 Ako Nishihama Solar Power Station (1,990 kW, began operation in June)
Keihanna Solar Power Station (1,000 kW, began operation in September)
Nagatono Hydropower Plant (900 kW, began operation in June)
*4 Rajamandala Hydroelectric Power Project in Indonesia (47 MW), Nam Ngiep 1 Hydropower Project in Laos (290 MW)
*5 Triton Knoll Offshore Wind Power (857 MW), Moray East Offshore Windfarm (950 MW)
*6 Global Sustainable Electricity Partnership
*7 Hydroelectric power workshop in Nepal
*8 Indicators based on the benchmark system of the Law Concerning the Rational Use of Energy

Eco Action (Initiatives contributing to the realization of a recycling-oriented society)

Item	FY 2018		FY 2019
	Targets	Results	Targets
Maintaining industrial waste recycling rate	・99.5%	・99.8%	Continue
Proper processing of PCB wastes	・Proceed with certainty to achieve processing before the legal deadline	・Amount of high-concentration PCB processed (Cumulative total): 5,241*	Continue

* Number of high-voltage transformers, condensers and other electrical equipment that were subcontracted to the Japan Environmental Storage & Safety Corporation (JESCO).

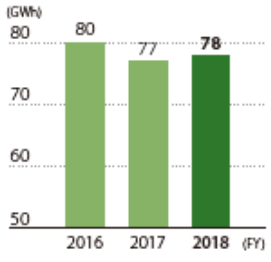
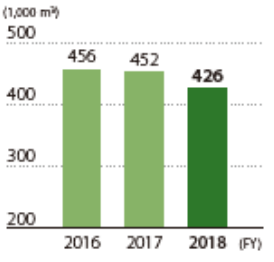
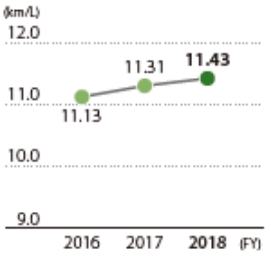
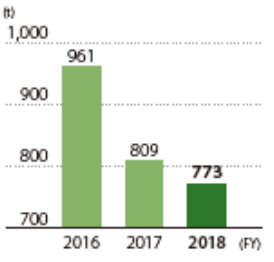
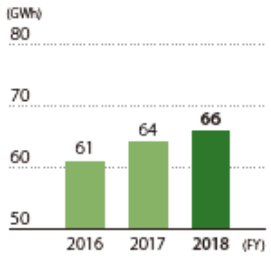
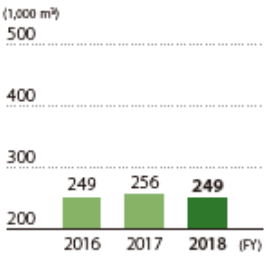
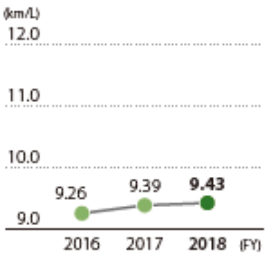
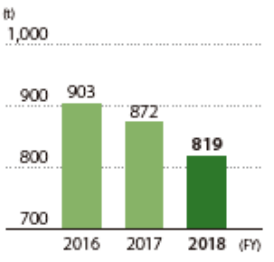
Eco Action (Promotion of environmental protection in local communities)

Item	FY 2018			FY 2019
	Targets		Results	Targets
Maintaining sulfur oxide (SOx) and nitrogen oxide (NOx) emission factors	SOx	Maintain one of the world's lowest emission levels	・Overall: 0.022 g/kWh ・Thermal: 0.037 g/kWh	・Emission factors: maintain the lowest levels in the world ・Emissions: strictly adhere to agreed values at each power plant
	NOx		・Overall: 0.043 g/kWh ・Thermal: 0.074 g/kWh	

Eco Action (FY2019 published version)

【 Group-wide Items】

Office energy and resource conservation activities (Group-wide items)

Item	Reducing office electricity consumption	Reducing office water consumption	Improving fuel efficiency of company vehicles	Reducing copy paper consumption
Targets	Reduce by 1% or more from previous year	Reduce as much as possible	Improve as much as possible	Reduce as much as possible
Record of results: Main company				
Record of results: Group companies*				

* Calculated for 42 companies for each FY 2016–2018.

Eco Action results (FY2014～FY2018)

Item		2014	2015	2016	2017	2018
Advancing efforts to control CO_2 emissions	CO2 emission factor (end use) (after adjustment) (by amount of electric power sold) ※1,※2	0.523kg CO_2/kWh	0.496kg CO_2/kWh	0.493kg CO_2/kWh	0.418kg CO_2/kWh	0.33kg CO_2/kWh
Developing and utilizing renewable energy sources further	Renewable energy development	3 locations 36,500kW	2 locations 30,220kW	2 locations 7,580kW	1 location 500kW	3 locations 3,890kW
	Renewable energy purchased	2.85billion kWh	4.00 billion kWh	4.83billion kWh	5.85 billion kWh	5.72 billion kWh
Contributing to the realization of low carbon societies through overseas power generation businesses	Promotion of hydroelectric power construction	-	-	-	2	2
	Participation in renewable energy investment projects	-	-	-	1	2
	Developing country support efforts under GSEP framework	-	-	-	2	1
Maintaining and improving the thermal efficiency of thermal power plants(lower heating value base)	Thermal efficiency※3	46.5%	46.6%	47.6%	48.3%	49.0%
Reducing transmission and distribution loss	transmission and distribution loss rate※4	5.4%	5.2%	5.5%	4.4%	5.1%
Promoting use of innovative forms of energy among customers and communities	Smart meters deployed	1.4million/year	1.6million/year (cumulative 5.55 million)	1.95million/year (cumulative 7.5 million)	1.82million/year (cumulative 9.32 million) progress rate : about 72%	1.26million/year (cumulative 10.58 million) progress rate : about 81%
Limiting SF_6 emissions(calender year basis)(gas recovery rate upon inspection/remival of equipment)	Upon inspection	98.8%	99.1%	99.3%	99.6%	98.5%
	Upon removal	99.5%	99.1%	99.6%	99.3%	99.3%
Maintaining industrial waste recycling rate	Industrial waste recycling rate※5	99.8%	99.9%	99.7%	99.9%	99.8%
Proper processing of PCB wastes(before the legal dead line)	Amount of high-concentration PCB processed(cumulative total)※6	4,064	4,763	4,834	5,073	5,241
Maintaining sulfer oxide（SOx）emission factors	SOx emissions factor (for KEPCO-generated power)※7	0.052g/kWh	0.046g/kWh	0.037g/kWh	0.028g/kWh	0.022g/kWh
	SOx emissions factor (by volume of power from thermal power generation)(for KEPCO-generated power)※8	0.059g/kWh	0.055g/kWh	0.043g/kWh	0.039g/kWh	0.037g/kWh
Maintaining nitrogen oxide（NOx）emission factors	NOx emissions factor (for KEPCO-generated power) ※9	0.076g/kWh	0.072g/kWh	0.067g/kWh	0.055g/kWh	0.043g/kWh
	NOx emissions factor (by volume of power from thermal power generation)(for KEPCO-generated power)※10	0.086g/kWh	0.085g/kWh	0.077g/kWh	0.077g/kWh	0.074g/kWh

※1 The fiscal 2018 figures are provisional. The actual figures of the CO2 emissions coefficient will be officially announced by the government separately based on the Act on Promotion of Global Warming Countermeasures and other factors.
※2 CO2 emissions coefficient (end use) (after adjustment) = amount of CO2 emissions (after adjustment) ÷ electricity sales volume
※3 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
※4 Power distribution loss rate =[1-{(amount of power sold＋amount of power at transformer substation)÷(generated and purchased electric power - amount of power at KEPCO power plants)}]×100
※5 Industrial waste recycling rate = [(Industrial waste and other emissions - Amount of landfill disposal)÷(Industrial waste and other emissions)]×100
※6 number of high-voltage transformers, condensers and other electrical equipment that were subcontracted to the Japan Environmental Storage & Safety Corporation (JESCO)
※7 SOx emissions factor (for KEPCO-generated power) = SOx emissions amount÷power generated amount (for KEPCO-generated power)
※8 SOx emissions factor (by volume of power from thermal power generation (for KEPCO-generated power)) =SOx emissions amount÷volume of power from thermal power generation (for KEPCO-generated power)
※9 NOx emissions factor (for KEPCO-generated power) = NOx emissions amount÷power generated amount (for KEPCO-generated power)
※10 NOx emissions factor (by volume of power from thermal power generation (for KEPCO-generated power)) =NOx emissions amount÷volume of power from thermal power generation (for KEPCO-generated power)

Low carbon target

We announced the following environmental targets in the Kansai Electric Power Group Medium-term Management Plan (2019-2021).

Low carbon target in the Kansai Electric Power Group Medium Management Plan (2019-2021)

・ We will seek to achieve 600 million kW of renewable installed capacity by 2030s, of which more than 200 million kW will be newly developed in Japan and abroad.

・We will keep the top spot for the amount of CO_2-free power generation in Japan, and halve CO_2 emissions associated with power generation in Japan in FY2030 (compared to in FY2013) .

Biodiversity policy ①

■Policies related to business activities that consider the conservation of biodiversity

At the Kansai Electric Power Company, as an electric company, we are advancing efforts based on the "Biodiversity Action Guidelines by the Japanese Electric Utility Industry" established by the Federation of Electric Power Companies of Japan. In addition, as the Kansai Electric Power Group, we also recognize the importance of biodiversity, and we are undertaking "business activities that consider preservation of biodiversity" as stipulated in our Environmental Action Policy. In the installation and alteration of power plants in areas with important biodiversity, we avoid and minimize impacts on the natural environment and biodiversity as well as investigate restoration through compensation as necessary in accordance with environmental impact assessment acts.

Biodiversity Action Guidelines by the Japanese Electric Utility Industry

From the past, we have endeavored to minimize impacts on biodiversity and sustainably utilize the benefits derived from biodiversity in our electric power business. Now, we have established Biodiversity Action Guidelines by the Japanese Electric Utility Industry to clarify the direction of these efforts.
Based on these guidelines, we seek to undertake sustainable business activities as we appreciate the benefits of nature.

Action Philosophy: As an electric company, we appreciate the benefits of nature and seek to undertake sustainable business activities.

I. Seek the supply of power that considers global scale environmental impacts, including global warming, which affects biodiversity

① Recognize the importance of biodiversity and the benefits of nature, and consider the impacts of the installation and operation of facilities on ecosystems and communities in Japan and abroad.
② Strive to reduce CO2 emissions intensity by, for example, increasing the use of nuclear power and renewable energy sources as well as improving the thermal efficiency .
③ Strive to reduce emissions of greenhouse gases in facility construction, procurement, transportation, and the like.

II. Steadily implement environmental preservation measures that contribute to biodiversity while endeavoring in activities that contribute to society

④ Appropriately identify and analyze impacts on biodiversity from business activities and strive to preserve biodiversity.
⑤ Strive to contribute to society through environmental preservation activities, including greening efforts that are suitable to local characteristics.

III. Work toward the formation of a recycling-oriented society that is conducive to biodiversity

⑥ Continue 3R (reduce, reuse and recycle) activities, including the effective use of resources and the reduction of final waste disposal, and strive for the preservation of biodiversity and sustainable use of resources.

IV. Endeavor to use technologies and conduct research and development that contribute to biodiversity

⑦ Promote the use of technologies and the conduct of research and development that contribute to the sustainable use and preservation of biodiversity.

V. Along with advancing coordination related to biodiversity with local communities, widely publicize and share information about efforts for biodiversity.

⑧ Promote cooperation with local people, local governments, research institutes and other stakeholders.
⑨ Work to publicize and share easy-to-understand information about business activities that consider biodiversity.

VI. Promote voluntary activities that deepen social awareness related to biodiversity

⑩ Work toward making environmental education for employees.
⑪ Contribute to increasing the awareness of society about biodiversity.

Biodiversity policy ②

Efforts for Biodiversity Action Guidelines by the Japanese Electric Utility Industry II-④
As an effort in fiscal 2018, we conducted surveys of important biodiversity sites around power plants (nuclear, thermal, renewable energy and hydroelectric power) using the World Database on Protected Areas, and verified locations that qualify as natural protected areas (IUCN categories I–VI).

As a result, we confirmed that nine hydroelectric power plants in the Kurobe River watershed are considered category II.

In the area around the Kurobe Dam, we have already been undertaking protection of native species, for example, to protect the natural environment. We will continue to advance sustained efforts for this purpose in the future.

■ Protecting native species around Kurobe Dam

Electric buses run along the Tateyama Kurobe Alpine Route that connects Nagano Prefecture and Toyama Prefecture. Along with not emitting exhaust gases, these vehicles rarely startle animals with their sound because they run extremely quietly.

Kurobe Dam, which is situated in a national park, receives one million visitors annually. At Ogizawa Station, which is the entrance to the Nagano Prefecture side, the seeds of plants that do not naturally grow in Kurobe sometimes get brought over on the soles of the shoes of tourists. Thus, seed removal mats have been placed at the station ticket gates to prevent the influx of non-native species. The removed seeds are collected with a vacuum cleaner and incinerated.

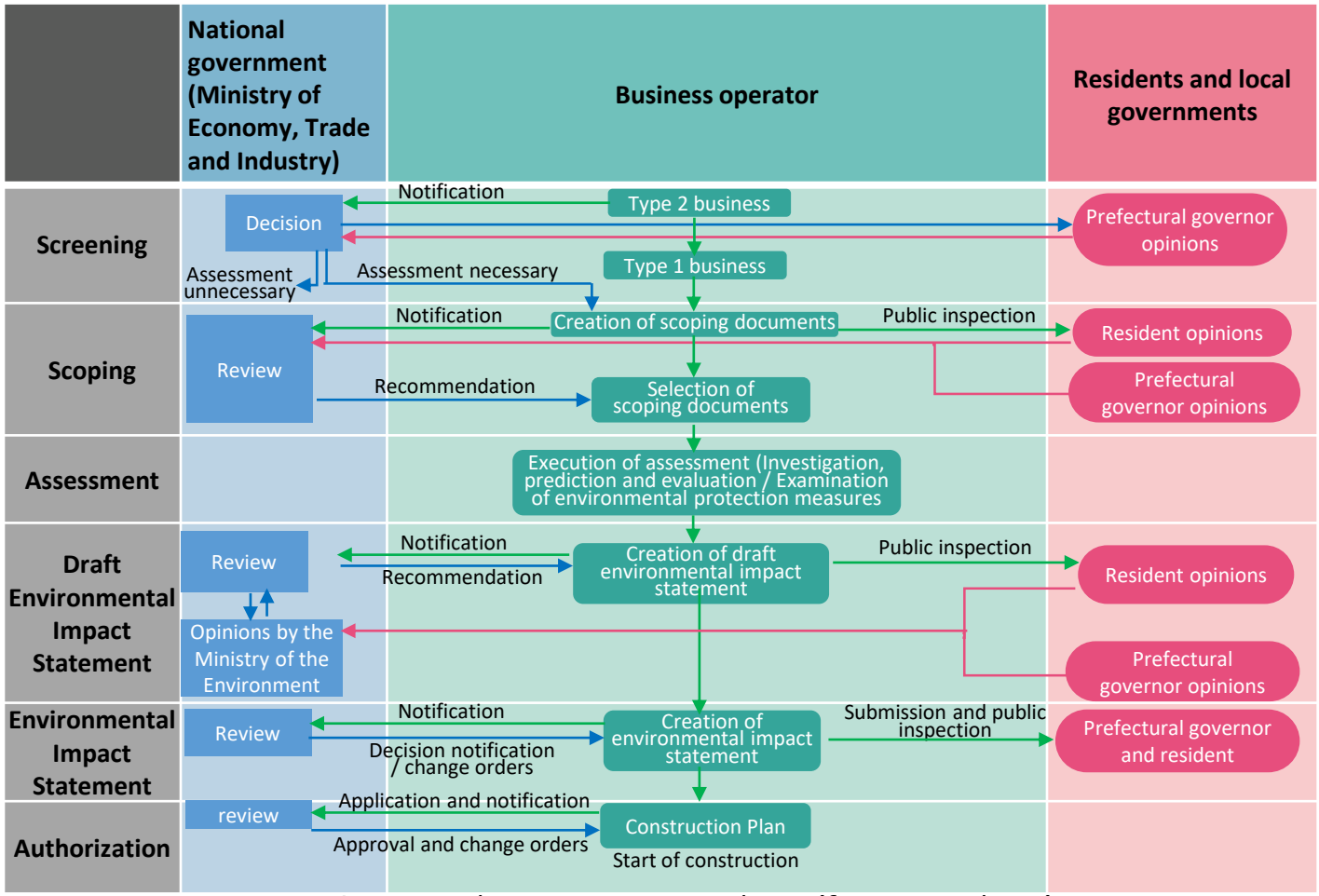
Seed-removing floor mat

Biodiversity policy ③

Examples of specific efforts related to Biodiversity Action Guidelines by the Japanese Electric Utility Industry II-④

Execution of environmental impact assessment
An environmental impact assessment system estimates and evaluates impacts on the environment of business activities and investigates necessary countermeasures before the execution of large-scale development projects. In Japan, the system based on the Environmental Impact Assessment Law stipulates subject business survey items, procedure protocols, and other requirements.

In suitably implementing environmental impact assessment for power plant construction (including new and expansion) in the electric power business, along with utilizing the extensive knowledge that we had accumulated before the establishment of this law, we are, for example, listening to the opinions and recommendations of local residents, regional organizations and the national government. Furthermore, through environmental protection measures based on the opinions of experts and others, we are making efforts to minimize impacts on the natural environment and biodiversity as well as restore natural environments.



Environmental assessment procedures (for power plants)

Biodiversity policy ④

Examples of specific efforts related to Biodiversity Action Guidelines by the Japanese Electric Utility Industry V-⑧

Natural forest creation

In order to make forests that are similar to nature at power plants in short amounts of time, we are trying to create environments that protect the original biodiversity of the region by selecting cultivated tree saplings that are suited to the region, and planting different species densely in close proximity.

Moreover, in order to maintain natural forests, as we look to the guidance of experts, we are undertaking continuous efforts to preserve biodiversity, including measures to further diversify species and eliminate invasive species.

Protecting oriental white storks

In Toyooka City, Hyogo Prefecture, released oriental white storks, which are designated a Special Natural Treasure in Japan, sometimes make their nests on utility poles and steel towers. Not only are there concerns about accidents, but there are also fears that storks could be electrocuted. For these reasons, we patrol carefully, removing nests as quickly as possible and conducting measures to discourage them from coming near utility poles in cooperation with the University of Hyogo and the Hyogo Park of the Oriental White Stork. In these ways, we are both protecting the storks and maintaining the safety and stability of the power supply.

Power lines with colored markers

Storks nesting on top of a utility pole

Oriental white storks being raised