Environmental Data 2017

Kansai Electric Power

power with heart

Environmental accounting (KEPCO)

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.

FY2016 assessment

Environmental conservation costs

For environmental conservation costs, investments were about 12 billion yen, 3 billion less than the previous fiscal year. Due to PCB processing costs and other cost reduction efforts, expenses were about 20 billion yen, which is about 2 billion yen less than the previous fiscal year.

Environmental conservation costs (100 million yen)

Category	Investment		Expenses		Major Items
	FY2015	FY2016	FY2015	FY2016	
1. Global environmental conservation costs (CO_2 reductions, etc.)	13.3	8.5	2.2	1.9	SF_6 gas collection
2. Local environmental conservation costs	134.0	109.0	49.6	46.8	
(1) Measuring/monitoring environmental impact	0.9	1.9	9.6	11.4	Radiation control and measurement, air quality concentration measurement, marine area surveys
(2) Pollution control (air pollution, water contamination, oil leakage, etc.)	133.1	106.8	32.5	27.6	Air pollution control measures, water contamination prevention measures
(3) Nature conservation	0.0	0.0	7.5	7.8	Revegetation
3. Costs to build a circular economy	3.7	3.4	155.5	140.5	
(1) Industrial waste processing, recycling	3.7	3.3	80.0	65.7	Industrial waste processing, PCB processing
(2) General waste processing, recycling	0.0	0.0	0.1	0.1	Paper recycling
(3) Radioactive waste processing	0.0	0.0	75.4	74.7	Low-level radioactive waste processing
(4) Green purchasing	0.0	0.1	0.0	0.0	Research-related work
4. Environmental management costs	0.0	0.0	1.3	1.1	Environmental reports
5. R&D costs	0.0	0.2	4.8	4.3	Load leveling, environmental conservation, energy savings and recycling, natural energy
6. Other costs	0.4	0.0	0.3	0.2	Research Laboratory repairs
Total	151.4	120.7	213.7	194.9	
Total capital investment during the period	2,541	2,324	-	-	

Operating expenses during period	-	-	26,597	24,499	

Note: Based on the Environmental Reporting Guidelines (FY2012 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.

Effects of environmental conservation

Despite the reduced utilization ratios of nuclear power and hydroelectric power and other negative factors compared to the previous fiscal year, the CO_2 emission intensity was approximately the same as the previous fiscal year. This result was due to the increased utilization rate of high-efficiency natural gas power generation equipment at the Himeji No. 2 Power Station and the beginning of natural gas use at the Aioi Power Station as well as the increased use of renewable energy using a feed-in tariff system and other efforts for carbon reduction.
Moreover, the SOx and NOx emission intensities improved over the previous fiscal year as a result of the reduction in the ratio of the amount of power generated by units that burn only oil and do not have desulfurization equipment installed among the entire amount of thermal power generation.

Environmental conservation effects

Category	Item (unit)		FY2015	FY2016	Year-on-year change
1. Global environmental conservation	CO_2 emissions (before carbon credits)	(10,000 t-CO_2)	6,487	6,179	-308
	CO_2 emissions intensity (before carbon credits)	(kg-CO_2/kWh)	0.509	0.509	0
	CO_2 emissions (after carbon credits)	(10,000 t-CO_2)	6,331	5,989	-342
	CO_2 emissions intensity (after carbon credits)	(kg-CO_2/kWh)	0.496	0.493	-0.003
2. Local environmental conservation	Air pollution control				
	SOx emissions	(t)	4,735	3,635	-1,100
	SOx emissions intensity	(g/kWh)	0.055	0.043	-0.012
	NOx emissions	(t)	7,397	6,528	-869
	NOx emissions intensity	(g/kWh)	0.085	0.077	-0.008
	Landscape integration				
	Revegetation area	(1,000 m^2)	3,512	3,425	-87
3. Building a circular economy	Industrial waste and other emissions	(1,000 t)	670	708	38
	Recycling rate for industrial waste, etc.	(%)	99.9	99.7	-0.2
	Low-level radioactive waste processing	(Rods)	-6,021	-2,598	3,423

Note: CO_2 emissions: including from power supplied by other companies; SOx and NOx emissions: only KEPCO-generated power; CO_2 emissions coefficient: by amount of power sold; SOx and NOx emissions coefficient: by amount of power generated by KEPCO thermal power plants

Economic benefits from environmental conservation measures

Economic benefits increased approximately 600 million 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)

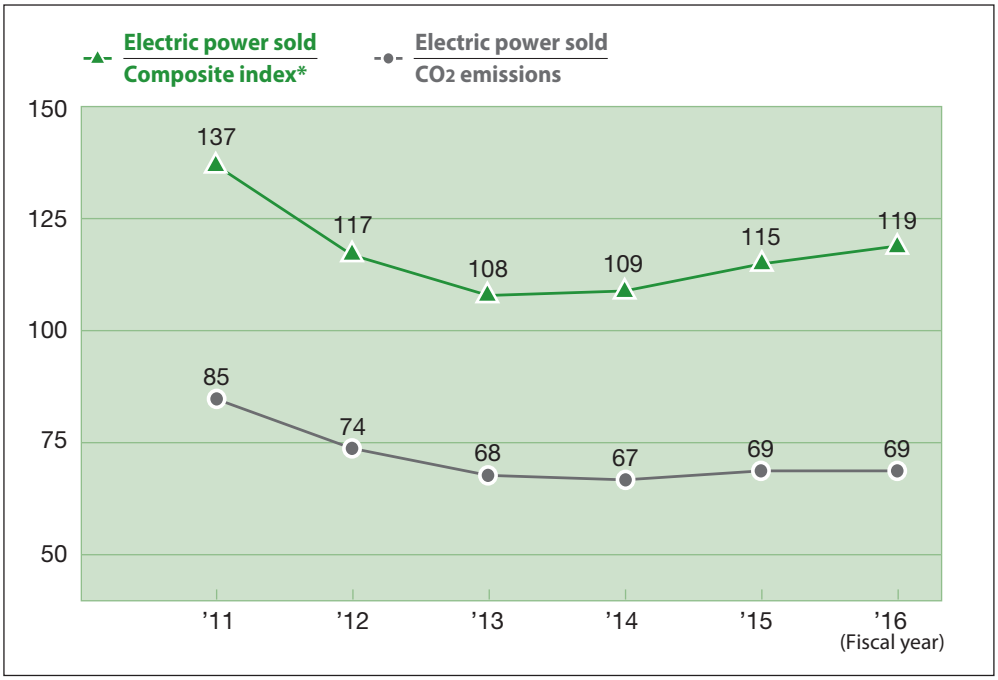
Category		FY2015	FY2016	Major Items
Revenue	Operating revenues from recycling, etc.	17.2	23.2	Gain on sale of disused articles (recycling)
Cost savings	Cost savings from reuse and recycling, etc.	0.1	0.1	Cost savings from the purchase of recycled items
Total		17.3	23.3	

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 2016 include scores of 119 for electric power sold/composite index, which is an increase of 4 points from the previous fiscal year, and 69 for electric power sold/CO_2 emissions, which is roughly the same. Main factors for this included reductions in CO_2, SOx and NOx emissions intensities and a decrease in fuel consumption.

Environmental efficiency graph



* Composite index = Environmental load of emissions [CO_2, SOx and NOx emissions, landfill disposal of industrial waste] + Resource consumed [Oil, coal, LNG]

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 accounting in group companies

Environmental accounting figures are totaled for group companies represented on the Group Environmental Management Committee in FY2016, composed of 18 companies.

Environmental conservation costs (million yen)

Category	Major Items	Investment		Expenses	
		FY2015	FY2016	FY2015	FY2016
Costs for pollution control	Air, water and soil pollution prevention	6.3	4.5	32.1	35.9
Costs for resource recycling	General and industrial waste processing and recycling	-	0.0	724.5	723.8
Costs for management activities	Environmental protection efforts, environmental education and related activities at business places and in their neighborhoods	0.1	-	182.8	205.0
Costs for community activities	Contributions to and support of environmental protection activities and environmental protection organizations outside the company	-	-	11.2	0.7
Costs for research and development	Research and development of products, for example, that contribute to environmental protection	-	-	10.6	3.0
Costs related to environmental damages	Natural restoration, damage compensation, etc.	-	-	0.3	0.3
Other costs		-	-	0.3	0.1
Total		6.5	4.5	961.8	968.7

Environmental conservation effects (physical effects)

Category	Items (unit)	FY2015	FY2016
Environmental management	ISO or other external certifications (locations)*	45	45
Global and local environmental conservation	CO_2 emissions (10,000 t-CO_2)	14	12
	SOx emissions (t)	0.4	0.4
	NOx emissions (t)	25	29
Building a circular economy	Industrial waste emissions (1,000 t)	97	115

* Cumulative to end of fiscal year

Economic benefits from environmental conservation effects (million yen)

Category		FY2015	FY2016
Revenue	Business income from recycling	1,223.9	896.5
Cost savings	Cost savings from re-use and recycling, etc.	0.2	0.2
Total		1,224.1	896.7

Environment-related data

Initiatives contributing to the realization of a low-carbon society

Fiscal year			2012	2013	2014	2015	2016	Unit
CO_2 emissions (before adjustment)*1			7,280	7,325	7,141	6,487	6,179	10,000 t-CO_2
CO_2 emissions (after adjustment)*2			6,731	7,251	7,029	6,331	5,989	10,000 t-CO_2
CO_2 emissions coefficient (end use) (before adjustment) (by amount of electric power sold)*3			0.514	0.522	0.531	0.509	0.509	kg-CO_2/kWh
CO_2 emissions coefficient (end use) (after adjustment) (by amount of electric power sold)*3			0.475	0.516	0.523	0.496	0.493	kg-CO_2/kWh
Reference	Global CO_2 emissions*4		316	321	324	-	-	100 million t-CO_2
	Japan's CO_2 emissions*5		12.96	13.12	12.65	12.27	-	100 million t-CO_2
	Electric power industry*6	CO_2 emissions (before carbon credits, etc.)	4.94	4.94	4.70	4.44	-	100 million t-CO_2
		CO_2 emissions (after carbon credits, etc.)	4.17	4.93	4.69	4.41	-	
		CO_2 emissions coefficient (before carbon credits, etc.) (by amount of electric power sold)	0.569	0.567	0.553	0.534	-	kg-CO_2/kWh
		CO_2 emissions coefficient (after carbon credits, etc.) (by amount of electric power sold)	0.481	0.567	0.552	0.531	-	
Greenhouse gases other than CO_2		N_2O (dinitrogen oxide)*7	2.8	2.6	2.9	2.7	2.8	10,000 t-CO_2
		SF_6 (sulfur hexafluoride)*7	5.3	4.9	5.0	4.4	4.8	10,000 t-CO_2
Utilization rate of nuclear power facilities*8			17.7	10.9	0.0	1.0	0.0	%
Net thermal efficiency of thermal power facilities*9			44.2	44.6	46.5	46.6	47.6	%
Total energy use*10			733,617,156	765,923,443	760,782,346	701,315,529	675,113,029	GJ
Thermal fuel consumption		Coal	4,237	3,890	4,034	3,871	4,163	1,000 t
		Heavy oil	178	289	332	193	275	1,000 kL
		Crude oil	5,375	6,044	4,240	3,366	1,358	1,000 kL
		LNG	7,377	7,729	8,824	8,319	8,686	1,000 t
		Wood pellets	19	19	17	18	18	1,000 kL (equivalent in heavy oil)
		Other	0.4	0.2	0.1	0.6	460	1,000 kL (equivalent in heavy oil)
Fuel for nuclear power generation (weight of pre-irradiated uranium)			-	-	-	61	-	tU
Hydroelectric power station replacement			0	10	0	2,744	0	kW
Power distribution loss rate*11			5.9	5.1	5.4	5.2	5.5	%
SF_6 gas emissions								
●Upon inspection			0.3	0.2	0.1	0.1	0.1	t
●Upon removal			0	0	0	0	0	t
SF_6 gas collection rate								
●Upon inspection			99.2	99.1	98.8	99.1	99.3	%
●Upon removal			99.4	99.4	99.5	99.2	99.6	%
State of development and introduction of new energy sources (Cumulative by fiscal year end at KEPCO facilities)*12			10,849	11,357	11,815	11,000	11,000	kW
●Solar power generation			10,696	11,204	11,662	11,000	11,000	
●Wind power generation			153	153	153	0	0	
●Fuel cell batteries			1	0	0	0	0	
Energy and resource savings (Office division)		Office electricity use*13	83	85	79	78	80	GWh
		Everyday water use*13	538	473	461	424	454	1,000 m^3
		Vehicle fuel costs	10.35	10.44	10.73	11.13	11.13	km/L
		Vehicle fuel use (gasoline)	2.8	2.7	2.6	2.3	2.2	1,000 kL
		Vehicle fuel use (diesel)	0.5	0.5	0.5	0.3	0.3	1,000 kL
		Copier paper use	995	873	839	908	961	t
Low-pollution vehicle introduction rate*14			87.2	87.5	86.1	86.2	86.4	%
CO_2 emissions from office activities*15		Office electricity	3.9	4.4	4.2	3.9	3.9	10,000 t-CO_2
		Everyday water	0.01	0.01	0.01	0.01	0.01	10,000 t-CO_2
		Vehicle fuel	0.8	0.7	0.7	0.6	0.6	10,000 t-CO_2

*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 After adjustment figures include deductions that reflect CO_2 credits as well as environmental value adjustments based on the purchasing system for surplus solar and the purchasing system for total amounts of renewable energy in the CO_2 emissions amounts.
CO_2 emissions amount = CO_2 emissions amount (before adjustment) + feed-in tariff adjustment CO_2 emissions amount, etc.

*3 CO_2 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

*4 Global CO_2 emissions: IEA "CO_2 Emissions From Fuel Combustion" 2015 Edition

*5 Japan's CO_2 emissions: Source: Greenhouse Gas Inventory Office of Japan (Center for Global Environmental Research, National Institute for Environmental Studies)

*6 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.)

*7 Published in FY2010 results; figures are CO_2 equivalents

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

*9 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

*10 Figures reported to the government based on the Act on the Rational Use of Energy. (Fossil fuel used, purchased electricity, purchased heat)

*11 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

*12 Actual figures for FY2014 include equipment used by the company.

*13 The scope for calculation of office electricity use and everyday water use has been revised.

*14 Rate of introduction of low-pollution vehicles = No. of low-pollution vehicles purchased ÷ Total no. of vehicles × 100

*15 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

Source: Ministry of the Environment, Summary of Energy & Economic Statistics

Initiatives contributing to the realization of a recycling-oriented society

Fiscal year		2012	2013	2014	2015	2016	Unit
Amount of Industrial Waste and Other Emissions		790.9	747.1	698.6	670.2	707.9	1,000 t
●Soot particles (Heavy/crude oil ash, coal ash, etc.)		509.7	477.1	474.3	443.8	480.6	
●Sludge (Desulfogypsum, wastewater processing sludge, etc.)		172.6	156.9	143.2	141.9	141.1	
●Cinders		33.9	29.7	27.4	28.8	28.0	
●Demolition debris (Waste concrete utility poles, etc.)		18.1	19.3	20.6	23.8	18.3	
●Metal scraps		27.1	42.4	21.7	20.6	28.9	
●Glass/ceramic scraps (Thermal insulation scraps, insulator scraps, etc.)		2.6	2.7	2.5	2.2	2.6	
●Waste oil		8.5	3.4	2.4	2.2	2.4	
●Waste plastic		1.3	1.2	1.0	0.8	0.8	
●Other		17.0	14.5	5.1	6.0	5.4	
Amount of industrial waste for landfill disposal		0.9	1.3	1.2	0.9	1.8	1,000 t
●Glass/ceramic scraps (Thermal insulation scraps, insulator scraps, etc.)		0.08	0.11	0.12	0.10	0.33	
●Sludge (Wastewater processing sludge, etc.)		0.55	0.73	0.74	0.47	0.34	
●Demolition debris		0.04	0.09	0.11	0.03	0.02	
●Cinders		0.0	0.0	0.0	0.0	0.0	
●Waste plastic		0.07	0.23	0.07	0.09	0.07	
●Metal scraps		0.06	0.10	0.05	0.10	0.55	
●Other		0.07	0.06	0.13	0.14	0.52	
Industrial waste recycling rate*1		99.9	99.8	99.8	99.9	99.7	%
Low-concentration PCB industrial waste Amount processed*2 (utility pole transformers)	Insulating oil	7.7	7.7	7.7	7.7	-	10,000 kL
	Transformer cases	18.6	20.6	22.7	Approx. 24 (after processing)	-	10,000 units

*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.

Promotion of environmental protection in local communities

(covers only Kansai Electric Power)

Fiscal year		2012	2013	2014	2015	2016	Unit
SOx emissions*1		6,230	7,089	5,635	4,735	3,635	t
SOx emissions intensity (for KEPCO-generated power)*2		0.054	0.062	0.052	0.046	0.037	g/kWh
SOx emissions intensity (by volume of power from thermal power generation) (for KEPCO-generated power)*3		0.072	0.077	0.059	0.055	0.043	g/kWh
NOx emissions*4		9,448	10,013	8,221	7,397	6,528	t
NOx emissions intensity (for KEPCO-generated power)*2		0.082	0.087	0.076	0.072	0.067	g/kWh
NOx emissions intensity (by volume of power from thermal power generation) (for KEPCO-generated power)*3		0.109	0.108	0.086	0.085	0.077	g/kWh
Amount of limestone used		92	87	79	74	77	1,000 t
Amount of ammonia used		13	14	15	14	14	1,000 t
COD emissions*7		23	27	18	21	21	t
Amount of industrial water used (for power generation)		467	446	431	453	430	10,000 m³
Amount of service water used (for power generation)		203	222	205	197	166	10,000 m³
River water, groundwater		40	42	40	36	29	10,000 m³
Seawater (desalinated)		282	263	245	255	262	10,000 m³
Revegetation rate*8 (end of fiscal year)	Thermal power plants	37	37	38	37	37	%
	Nuclear power plants	77	75	74	73	71	%
	Electric power offices (substations)	28	28	28	28	28	%
Rate of conversion to underground transmission lines (end of fiscal year)		19.5	19.5	17.1	17.3	17.2	%
Rate of conversion to underground distribution lines (end of fiscal year)		10.0	10.1	10.1	10.2	10.2	%

*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

Promotion of environmental protection in local communities

Management of chemical substances (PRTR)

Name of targeted chemical substance	Emissions (t/year)				
	FY2012	FY2013	FY2014	FY2015	FY2016
2-aminoethanol	0	0	0	-	-
Asbestos (specified)	0	0	0	0	0
Ethylbenzene	6.1	6.0	6.2	12.0	11.0
Ferric chloride	0	0	0	0	0
Xylene	11	12	12	16	17
HCFC-225	4.9	3.6	-	0	-
Styrene	-	2.6	-	2.0	1.5
Dioxins (specified)	0.041 (mg-TEQ/year)	0.13 (mg-TEQ/year)	0.28 (mg-TEQ/year)	0.54 (mg-TEQ/year)	0.66 (mg-TEQ/year)
1,2,4-trimethylbenzene	-	-	-	0	0
Toluene	16	14	12	11	7.2
Hydrazine	<0.1	<0.1	<0.1	<0.1	<0.1
n-Hexane	7.3	8.3	5.9	4.6	0.6
Benzenes (specified)	3.0	3.3	2.4	1.9	0.8
Boron compound	0	0	0	0	0
PCB	-	-	-	-	-
Methylnaphthalene	2.7	2.8	3.3	3.4	3.2
Methylenebis (4,1-phenylene) diisocyanate	0	-	-	-	-

Name of targeted chemical substance	Amount moved (t/year)				
	FY2012	FY2013	FY2014	FY2015	FY2016
2-aminoethanol	3.7	5.6	8.9	-	-
Asbestos (specified)	15	2.7	5.1	3.4	1.3
Ethylbenzene	<0.1	0	0	0	0
Ferric chloride	0	0	3.0	0	0
Xylene	0.16	0	0	<0.1	0
HCFC-225	0	0	-	2.2	-
Styrene	-	0	-	0	0
Dioxins (specified)	0.0023 (mg-TEQ/year)	0.0016 (mg-TEQ/year)	0.0050 (mg-TEQ/year)	0.000079 (mg-TEQ/year)	0.04 (mg-TEQ/year)
1,2,4-trimethylbenzene	-	-	-	0	0
Toluene	<0.1	0	0	0	0
Hydrazine	<0.1	<0.1	3.1	3.0	0.9
n-Hexane	0	0	0	0	0
Benzenes (specified)	0	0	0	0	0
Boron compound	9.4	1.1	6.7	7.3	6.3
PCB	-	-	-	-	-
Methylnaphthalene	<0.1	0	<0.1	0	0
Methylenebis (4,1-phenylene) diisocyanate	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 totalling
- Significant figures are displayed in two digits

Radioactive substances, radioactive waste

Fiscal year			2012	2013	2014	2015	2016	Unit
Gaseous waste	Evaluated dose values for the public in the vicinity of power plants (inert gases)	Mihama Nuclear Power Station	<0.001	N.D.	N.D.	N.D.	<0.001	Millisieverts*1
		Takahama Nuclear Power Station	<0.001	N.D.	<0.001	<0.001	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	5.4E7	N.D.	N.D.	N.D.	2.7E9	Becquerel*2
		Takahama Nuclear Power Station	4.5E8	N.D.	2.3E8	2.5E8	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 liquid 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			10,841	12,372	15,756	14,318	13,750	Equivalent in drums
Mihama Nuclear Power Station			4,209	4,299	4,888	4,978	4,302	
Takahama Nuclear Power Station			4,062	3,649	6,368	4,471	5,002	
Ohi Nuclear Power Station			2,570	4,424	4,500	4,869	4,446	
Radioactive solid nuclear waste shrinkage (200-L drums)*5			12,675	13,972	18,082	20,298	16,348	Equivalent in drums
Mihama Nuclear Power Station			4,750	4,085	5,710	6,583	4,514	
Takahama Nuclear Power Station			4,736	4,893	6,152	7,402	6,984	
Ohi Nuclear Power Station			3,189	4,994	6,220	6,313	4,850	
Amount of solid radioactive waste generated – amount of solid radioactive waste reduced (200L-drum can equivalent)*6			-1,834	-1,600	-2,326	-5,980	-2,598	Equivalent in drums
Mihama Nuclear Power Station			-541	214	-822	-1,605	-212	
Takahama Nuclear Power Station			-674	-1,244	216	-2,931	-1,982	
Ohi Nuclear Power Station			-619	-570	-1,720	-1,444	-404	
Radioactive solid nuclear waste cumulative amount stored (200-L drums)*7, 8			108,662	107,061	104,735	98,756	96,159	Equivalent in drums
Mihama Nuclear Power Station			28,100	28,313	27,491	25,887	25,675	
Takahama Nuclear Power Station			47,860	46,616	46,832	43,901	41,919	
Ohi Nuclear Power Station			32,702	32,132	30,412	28,968	28,565	

*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 (aggregation extent change from Environmental Report 2017)

*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 can equivalent.

Data related to materiality

Note: Among data related to the environment, some environmental performance data related to materiality has received third-party assurance from Deloitte Tohmatsu Sustainability Co., Ltd. to guarantee their reliability.
For details about this third-party assurance, see
http://www.kepco.co.jp/sustainability/kankyou/report/data/pdf/security.pdf [PDF 222.63KB]

Materiality	GRI disclosure item	Effort	Indicator	Objective	Results	
					FY2015 ☑	FY2016
Emissions to atmosphere	305-4	Reduce carbon impact of electricity	CO_2 emissions coefficient (end use) (after adjustment)	(Objective of the Electric Power Council for a Low Carbon Society) about 0.37 kg-CO_2/kWh by fiscal 2030	0.496 kg-CO_2/kWh	0.493 kg-CO_2/kWh

Item	Results		
	FY2014	FY2015 ☑	FY2016
Amount of CO_2 emissions (before adjustment)*1	71,410,000 t-CO_2	64,870,000 t-CO_2	61,790,000 kg-CO_2
Amount of CO_2 emissions (after adjustment)*2	70,290,000 t-CO_2	63,310,000 t-CO_2	59,890,000 kg-CO_2
CO_2 emissions coefficient (end use) (before adjustment)*3	0.531 kg-CO_2/kWh	0.509 kg-CO_2/kWh	0.509 kg-CO_2/kWh
CO_2 emissions coefficient (end use) (after adjustment)*3	0.523 kg-CO_2/kWh	0.496 kg-CO_2/kWh	0.493 kg-CO_2/kWh

The CO_2 emissions amounts and emissions coefficients related to power sold were calculated based on the "GHG Emissions Accounting, Reporting and Disclosure System" of the "Act on Promotion of Global Warming Countermeasures."

*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 After adjustment figures include environmental value adjustments based on the purchasing systems for total amounts of renewable energy in the CO_2 emissions amounts.

- CO_2 emissions amount (after adjustment) = CO_2 emissions amount (before adjustment) + feed-in tariff adjustment CO_2 emissions amount

*3 The CO_2 emissions coefficient (end use) shows 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

■ Items related to supply-chain emission amounts

GRI disclosure item	Item	Results	
		FY2015	FY2016 ☑
305-1	Direct greenhouse gas emission amounts (scope 1)*4	41,800,000 t-CO_2	3,9490,000 t-CO_2
305-2	Indirect greenhouse gas emission amounts (scope 2)*5	10,000 t-CO_2	10,000 t-CO_2
305-3	Other indirect greenhouse gas emission amounts*6 (related to scope 3, categories 4 and 5)	36,000 t-CO_2	25,000 t-CO_2

These are calculated based on the "GHG Emissions Accounting, Reporting and Disclosure System" in the "Act on Promotion of Global Warming Countermeasures" (hereafter "Warming Countermeasures Act") and the "Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain" (Ministry of the Environment and Ministry of Economy, Trade and Industry).
The amount of supply chain emissions is the total amount of greenhouse gas emissions generated along with business activities throughout the supply chain of a business. It is comprised of direct emissions (scope 1), indirect emissions from energy sources (scope 2) and other indirect emissions (scope 3).

*4 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.

*5 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.

*6 For other indirect greenhouse gas emission amounts (scope 3, categories 4 and 5), contracted transportation amounts were extracted from the reporting (of the shippers) in accordance with the Warming Countermeasures Act. They were mainly calculated using the ton-kilometer method.

Materiality	GRI disclosure item	Effort	Indicator	Objective	Results	
					FY2015	FY2016 ☑
Emissions to atmosphere	305-7	Prevent atmospheric pollution	SOx emissions intensity (thermal power)	Maintain the lowest levels in the world	0.055 g/kWh	0.043 g/kWh

Item	Results	
	FY2015	FY2016 ☑
SOx emissions*7	4,735 t	3,635 t
SOx emissions intensity (for KEPCO-generated power)*8	0.046 g/kWh	0.037 g/kWh
SOx emissions intensity (by volume of power from thermal power generation (for KEPCO-generated power))*9	0.055 g/kWh	0.043 g/kWh

*7 This is calculated from amounts of sulfur in fuel as well as SOx concentrations in gas emissions (measured values) and gas emission volumes.

*8 SOx emissions intensity (for KEPCO-generated power) = SOx emissions amount ÷ power generated amount (for KEPCO-generated power)

*9 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)

Materiality	GRI disclosure item	Effort	Indicator	Objective	Results	
					FY2015	FY2016 ☑
Emissions to atmosphere	305-7	Prevent atmospheric pollution	NOx emissions intensity (thermal power)	Maintain the lowest levels in the world	0.085 g/kWh	0.077 g/kWh

Item	Results	
	FY2015	FY2016 ☑
NOx emissions*10	7,397 t	6,528 t
NOx emissions intensity (for KEPCO-generated power)*11	0.072 g/kWh	0.067 g/kWh
NOx emissions intensity (by volume of power from thermal power generation (for KEPCO-generated power))*12	0.085 g/kWh	0.077 g/kWh

*10 This is calculated from NOx concentrations in gas emissions (measured values) and gas emission volumes.

*11 NOx emissions intensity (for KEPCO-generated power) = NOx emissions amount ÷ power generated amount (for KEPCO-generated power)

*12 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)

Materiality	GRI disclosure item	Effort	Indicator	Objective	Results	
					FY2015	FY2016 ☑
Wastewater and waste matter	306-2	Reduce environmental impacts from waste	Amount of high-concentration PCB processed*13	Process the entire amount within the legal time limit	4,763 units	4,834 units

*13 Processing results (cumulative total) for electrical equipment that contains PCBs (polychlorinated biphenyls), including high-voltage transformers and condensers, for processing subcontracted to the Japan Environmental Storage & Safety Corporation (JESCO)

Materiality	GRI disclosure item	Effort	Indicator	Objective	Results	
					FY2015	FY2016 ☑
Wastewater and waste matter	306-2	Reduce environmental impacts from waste	Amount of low-level radioactive waste produced*16	Steadily implement reduction measures	-6,021 units	-2,598 units

Item	Results	
	FY2015	FY2016 ☑
Amount of solid radioactive waste generated (200 L-drum can equivalent)*14	14,318 units	13,750 units
Amount of solid radioactive waste reduced (200 L-drum can equivalent)*15	20,339 units	16,348 units
Amount of solid radioactive waste generated – amount of solid radioactive waste reduced (200 L-drum can equivalent)*16	-6,021 units	-2,598 units

*14 This is the amount of solid low-level radioactive waste produced in the fiscal year.

*15 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.

*16 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.