

Efforts Based on Our CSR Action Principles Progressive Approach to Environmental Problems

CSR Action Principles

As a provider of energy services that are closely connected with the environment, the Kansai Electric Power Group fully recognizes the scale of the impact its business activities have on the global environment. Accordingly, we will strive to alleviate the environmental burden accompanying our business activities, and seek to be a world-class corporation in terms of safeguarding the environment. Furthermore, we will proactively contribute to the development of a sustainable society through progressive initiatives that target the creation of an ever better environment.

Kansai Electric Power Group Environmental Action Plan

Our Group formulated the Kansai Electric Power Group Environmental Action Plan, which comprises three pillars: Initiatives contributing to the emergence of a low-carbon society; initiatives contributing to the emergence of a society committed to recycling; and initiatives that form a trusted, environmentally advanced corporation. These initiatives have helped the entire Group contribute to the emergence of a sustainable society.

Building a sustainable society

Initiatives contributing to the emergence of a low-carbon society

- Lowering the carbon intensity of electric power
- Contribution to energy efficiency, cost savings, and reduced CO₂ emissions for customers and communities
- Building the Kansai Electric Power smart grid
 Developing advanced technologies
- Pursuing initiatives outside Japan

Initiatives that form a trusted, environmentally advanced corporation

 Promoting community environmental protection measures (air pollution control, water pollution control, management of hazardous chemicals, and preservation of biological diversity) Promoting environmental communication
Promoting environmental management

Initiatives contributing to the emergence of a society committed to recycling

- Promoting the "3 R's" in an effort to achieve zero emissions
- Promoting safe, reliable, and complete disposal of PCB wastes
- Promoting green procurement

Promoting environmental management on a Groupwide basis

In an effort to reduce environmental impacts and environmental risks, we have begun establishing an environmental management promotion system across the entire Group. Kansai Electric Power has established an Environmental Board within its CSR Promotion Council. For the Group, we have established the Kansai Electric Power Group Environmental Management Committee, and are working to develop Eco Action measures and implement Check and Review, as well as comply with environmental law and other regulations.

Environmental Management Promotion System of the Kansai Electric Power Group



Status overview of our business activities and environmental load (FY 2014)

Input

F	Fuels for power generation					
ation	Coal	4,034 thousand t (dry coal weight)				
genei	Heavy oil	332 thousand kL				
power	Crude oil	4,240 thousand kL				
ermal	LNG (liquefied natural gas)	8,824 thousand t				
Fuels for thermal power generation	Wood pellets	17 thousand kL (heavy oil equivalent)				
	Other	0.1 thousand kL (heavy oil equivalent)				
Fue	ls for nuclear	– tU				

power generation (weight of pre-irradiation uranium)

Water for power generation				
Industrial water	4.31 million m ³			
Clean water	2.05 million m ³			
River water, groundwater, etc.	0.40 million m ³			
Seawater (desalinated)	2.45 million m ³			

Resources				
Limestone	79 thousand t			
Ammonia	15 thousand t			

	Office			
Office electricity		80 GWh		
Office water		0.46 million m ³		
Printer paper		839 t		
e fuels	Gasoline	2.6 thousand kL		
Vehicle fuels	Diesel oil	0.5 thousand kL		



Output

eleased into	atı	mosphere	
(carbon dioxide)*		41 million t-CO2 .29 million t-CO2)**	
20 (nitrous oxide)*** 29 thousand t-CO			
sulfur hexafluoride)***	** 57 thousand t-CO2		
(sulfur oxides)	5,635 t		
(nitrogen oxides)		8,221 t	
urchased from other e missions taking carb	electri	c power companies	
eleased into	o wa	ater areas	
D emissions		18 t	
al effluents	4.8	39 million m ³	
Badioact	ive	waste	
	- 1		
		(200 L drums)	
jeneration (generated	amoui	nt – reduced amoun	
Industrial	was	ste, etc.	
al emissions		699 thousand t	
Recycling		697 thousand t	
Reduction in intermediate treatment		0.6 thousand t	
Final disposal		1.2 thousand t	
Recycling rat		99.8%	
CO ₂ emission	ns r	esulting	
		48,945 t-CO2	
(0.523 kg-CO2/k)		41,575 t-CO2	
	3)	166 t-CO2	
Vehicle fuels (Gasoline: 2.32 kg-CO ₂ /L) (Diesel oil: 2.58 kg-CO ₂ /L)		7,204 t-CO2	
emission coefficient for	office e	electricity consumptic	
Custo	m	ers	
Electric power sold 134.5 TWh			
	sulfur hexafluoride)*** (sulfur oxides) (sulfur oxides) (uldes CO: originatin richased from other e missions taking carb CO: conversion Released intra DD emissions al effluents Radioact Note: Ste generated* generated* al emissions Recycling Reduction in intermediate treatme Final dispose Recycling rat CO: emissions Coffice electric (0.523 kg-CO:/kX Office water (0.36 kg-CO:/mX Office in 2.38 kg-CC res in parentheses are mission coefficient for- ts carbon credit office	(carbon dioxide)*** (70 (nitrous oxide)*** 29 sulfur hexafluoride)*** 57 (sulfur oxides) 57 (carbon oxides) 57 (sulfur oxides) 57 (sulfur oxides) 58 (superstein (generated at moute step generated* 1 (superstein (generated at moute step generated at moute step generated at treatment 1 Final disposal Recycling rate C2: emissions C (superstein at emissions 1 Office electricity 1 (0.523 kg-C0:2/kWh) 0 Office fuels: 2.32 kg-C0:/l)	

- Note 1: This table contains non-consolidated figures for Kansai Electric Power Co., Inc. only.
- Note 2: Totals may not sum due to rounding.
- Note 3: Thermal power generation figures do not include biomass power generation.
- * Composite index = CO₂, SOx, NOx, and landfill disposal of industrial waste +Oil, coal, LNG • In calculations starting in FY 2007, we are using the LIME2 integrated coefficient developed by the National
- Institute of Advanced Industrial Science and Technology. The amount of CO₂ emissions shown takes carbon credits into account.

Environmental load caused by

Composite index*

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Resources consumed-

CO2 emissions

Eco Action (annual targets and results)

		Ini	tiatives and Results	Related
	Item	Initiative	Result	page
	Initiatives contributing to the emergence of a low-carbon society			
	Promoting "safety first" operations at nuclear power plants	To conform to new regulatory requirements, to promote voluntary safety measures, and to respond appropriately to examinations by the Nuclear Regulation Authority	Fully conformed to new regulatory requirements. Steadily implemented measures to prevent the recurrence of the accident at Mihama Nuclear Power Station Unit 3 and continuously implemented various voluntary safety measures. Regarding examinations by the Nuclear Regulation Authority, implemented measures related to our application for approval of nuclear reactor installations and upgrades for Units 3 & 4 of the Takahama Nuclear Power Station and received the approval. We also implemented appropriate measures to determine the design-basis earthquake ground motion for Units 3 & 4 of the Ohi Nuclear Power Station. Reference: Facility utilization rate 0.0% (non-operating result)	40 41
ess activities	Maintaining and improving the thermal efficiency of thermal power plants (lower heating value base)	To implement ongoing measures at existing thermal power generation facilities and operations while maintaining or improving thermal efficiency. To undertake the upgrading of the Himeji No. 2 Power Station to a combined-cycle power generation facility.	Undertook construction and accelerated the upgrading of the Himeji No. 2 Power Station facilities. Reference: Thermal efficiency 46.5%	41
om our busi	Development and dissemination of renewable energy	To promote development and adoption of renewable energy	 Renewable energy development: 3 locations, 36,500 kW* Renewable energy purchased: 2.85 billion kWh 	41 42
Main environmental initiatives arising from our business activities	Promoting use of innovative forms of energy among customers and communities	To introduce smart meters in order to increase customer awareness of energy conservation and a wider range of needs. To expand the Hapi e-Miruden service.	Smart meters introduced: 1,400,000/yr Hapi e-Miruden service: 1,130,000 subscribers in total	43 44
onmental ir	Limiting SF ₆ emissions (calendar year basis) (gas recovery rate upon inspection/removal of equipment)	To continue appropriate implementation of a recovery system	98.8% (upon inspection) 99.5% (upon removal)	-
vir	Initiatives contributing to the emer	rgence of a society committed to recycling		
Main er	Proper processing of PCB wastes	To process all PCBs by the legal deadline (March 2027)	Reference: Processed volume (cumulative total) Low-concentration PCBs: 77,000 kL (completed processing of stored portion in June 2013) High-concentration PCBs: 4,064 units**	46
	Initiatives that form a trusted, environmentally advanced corporation			
	Maintaining sulfur oxide (SOx) and nitrogen oxide (NOx) emission levels proportional to the volume of power generated (emissions intensity)	To seek to maintain one of the world's lowest emissions (emissions intensity) levels through the appropriate operation of sulfur scrubbers and nitrogen scrubbers	Sought to maintain emissions (emissions intensity) levels proportional to the volume of power generated through the appropriate operation of sulfur scrubbers and nitrogen scrubbers, use of low sulfur thermal fuel, improvement of combustion methods, and other efforts. Reference: Emissions intensity SOx: 0.052 g/kWh (overall) Thermal: 0.059 g/kWh NOx: 0.076 g/kWh (overall) Thermal: 0.086 g/kWh	47



 Tahara No. 4 Wind Power Station (6,000 kW, commenced operation in May)
 Wakasa Takahama Solar Power Station (S00 kW, commenced operation in November)
 Awaji Kifune Solar Power Station (utility service; 30,000 kW, commenced operation in December)
 Electric equipment such as high-voltage transformers and capacitors **

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Initiatives contributing to the emergence of a low-carbon society

Efforts to reduce CO₂ emissions

In the past, Kansai Electric Power has undertaken efforts to reduce CO₂ emissions through nuclear power generation; maintaining or enhancing the thermal efficiency of thermal power generation facilities; and developing renewable forms of energy.

As a result of the extended shutdown of nuclear power plants and accompanying increase in thermal power generation since fiscal 2011, our CO₂ emissions have also increased. After accounting for carbon credits, our CO2 emissions for fiscal 2014 were 0.523 kg-CO₂/kWh*.

The Federation of Electric Power Companies of Japan, which includes Kansai Electric Power and other power producers & suppliers, adopted a voluntary framework with the goal of achieving a CO₂ emissions factor of 0.37 kg-CO₂/kWh for fiscal 2030 for all its electricity businesses. We will continue to promote a variety of efforts to reduce CO2 emissions, particularly through the use of nuclear power, while prioritizing safety.

* Provisional value: the official actual value is released by the national government according to the Act on Promotion of Global Warming Countermeasures.

Effect of nuclear power generation

Unlike thermal power generation fueled

by hydrocarbons such as coal, oil, and

natural gas, nuclear power generation

emits no CO₂; it is a method of power

generation that contributes greatly to

the large drop in the availability of

increased thermal power generation.

extreme consequence, the release of tens of millions of tonnes of CO2

We therefore believe that nuclear

power, generated with an emphasis on

safety, will be a very important source of power from the perspective of

global warming while ensuring energy

security and economic growth in the

environmental issues, preventing

nuclear power generation and

The shutdown of nuclear power generation facilities has resulted in an

annually.

future.

CO2 emission control. Since the Great East Japan Earthquake, CO2 emissions have risen significantly with

on controlling CO₂ emissions

♦ Changes in CO₂ Emission Factor, etc.



Values result from the GHG Emissions Accounting, Reporting, and Disclosure System as mandated by the Act on Promotion of Global Warming Countermeasures. Emission factors for FY 2011 and beyond after adjustment account for exclusions reflecting carbon credits as well as environmental value adjustments based on the purchasing system for surplus solar power and the feed-in tariff (FIT) for renewable energy.

♦ Changes in Nuclear Power Utilization Rate and CO₂ Emissions

-D- Amount of CO₂ emissions (million t-CO₂)

Amount of power generated (TWh)



 CO₂ emissions values shown do not include value of carbon credits or other factors.
 The amount of power generated since FY 2010 (generating end) is the amount of power generated by our company and purchased from other companies; the amount generated in FY 2009 (generating end) excludes power purchased from other companies

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Lowering electric power's carbon intensity

In addition to our efforts to support the restart of our nuclear power stations, we will continue to increase the efficiency of our thermal power plants and promote the development and adoption of renewable energy. In this way, we will strive to lower the carbon intensity of the electric power we provide to our customers.

Nuclear power generation prioritizing safety

Since nuclear power generation emits no CO₂, it is an important source of energy that does not contribute to global warming. Kansai Electric Power is responding appropriately to the Nuclear Regulation Authority (NRA) to achieve a quick restart of our plants with safety assurances and with the

understanding of residents of our local communities. As well, we are further enhancing safety by continuing to promote autonomous measures that exceed regulatory requirements.

Maintaining and enhancing the efficiency of our thermal power plants

Kansai Electric Power is working to maintain or improve thermal efficiency in order to reduce the use of fossil fuels and thereby CO₂ emissions through the ongoing pursuit of appropriate measures in our thermal power generation facilities and operations. We undertook to convert the Himeji No. 2 Power Station, one of our largest natural gas-fired thermal power plants, to a combined-cycle power plant* with advanced 1,600°C class gas turbines. We completed the

Development and dissemination of renewable energy

Like nuclear power, renewable forms of energy such as hydroelectric power, solar power, and wind power emit no CO₂ when generating power, making them effective energy sources for preventing global warming. Currently, Kansai Electric Power is developing about 100,000 kW of power generation, including expanded output at our existing hydroelectric power plants, development of small and medium-scale hydroelectric power generation plants, and construction of solar and wind power plants. We are also promoting the adoption of this energy by accommodating a system of feed-in tariff of renewable energy.

In short, by utilizing a good balance of varied energy sources, we are helping to lower the carbon intensity of electric power.

The electricity generated by solar and wind power fluctuates with the weather over a short time, however. This can result in an unstable frequency, and any electricity that remains surplus to demand negatively affects the quality of electricity. Furthermore, the cost of power generation rises because the utilization rate of the power facilities is low; moreover, because the energy density of such sources is low, a much larger area and larger facilities are required for power station construction. We are promoting initiatives to overcome the issues of stability of supply and cost of power generation as we seek to expand and promote the adoption of renewable energy.

Development of hydroelectric power generation

Kansai Electric Power is implementing a construction plan for the Dashidaira Power Station (540 kW maximum output; scheduled to start operation in December 2015) to be driven by maintenance flow from its Dashidaira Dam in Unazukiupgrading of all six units in March 2015, seven months earlier than the initially planned, while ensuring safety. This will increase the thermal efficiency of this power plant from 42% to 60%, among the highest efficiency levels in the industry, thus contributing to significant reductions in our CO₂ emissions.

* A power plant with high thermal efficiency that generates electricity through a gas turbine as well as a steam turbine utilizing the waste heat of the gas turbine

machi, Kurobe-shi, Toyama. Through this project, we expect to reduce CO₂ emissions by about 940 tonnes annually.



Solar power development

In Seika-cho, Kyoto, the Keihanna Solar Power Station (1,980 kW) operated by Kanden Energy Solution Co., Inc. ("Kenes") has been in continuous operation since December



Keihanna Solar Power Station

2013. Under construction are the Arida Solar Power Station (30,000 kW; scheduled to begin operation in October 2015) in Arida, Wakayama prefecture and the Shiso Solar Power Station (1,980 kW; scheduled to begin operation in September 2016) in Shiso, Hyogo prefecture. Including these, our Group operates solar power plants in nine locations in total, resulting in a total expected reduction in CO₂ emissions of 26,000 tonnes/year.

Wind power development

In the city of Tahara, Aichi prefecture, Kenes' Tahara No. 4

Wind Power Station (6,000 kW [2,000 kW x 3 units]) has been in continuous operation since May 2014. Together with the Awaji Wind Power Station (12,000 kW), our Group operates wind power stations in two locations, which reduces our CO₂ emissions by about 18,000 tonnes/year in total.



Tahara No. 4 Wind Power Station

Development of biomass power generation

Our Group is planning a wood pellet biomass fuel project in collaboration with Hyogo Prefecture, the City of Asago, the Hyogo Prefectural Federations of Forest Owners' Cooperative Associations, and Hyogo Midori Kosha (Green Public Corporation). The Federations of Forest Owners' Cooperative Associations and Green Public Corporation will collect, transport, and process the chips using wood obtained from forest thinning operations. Kenes will use these pellets to operate a wood mono-fuel combustion biomass power plant with expected output of 5,600 kW. When it begins operating on schedule during fiscal 2016, we expect to reduce our annual CO₂ emissions by 22,000 tonnes.



Developing advanced technology

By making use of our specialized technical capabilities as an electric company, we are contributing to the emergence of a low-carbon society. Specifically, we are developing breakthroughs in energy management, green innovation, and system operation and control, among other advanced technologies.

Research and development in preparation for large-scale photovoltaic power generation

Kansai Electric Power is conducting research on the mass introduction of photovoltaic power generation, whose output fluctuates with weather conditions. For example, we are researching the influence of mass photovoltaic power output—particularly shifting output—on the power grid; predicting the output of photovoltaic power generation systems until the following day; and making highly accurately sameday predictions of output changes several hours ahead and adjusting the operation of the power grid to reflect it. In addition, we are working on research and development of a supply/demand control system that maintains the power grid at a fixed frequency by charging or discharging batteries with appropriate management of any residual charge. We are also conducting research to evaluate the safety and service life of batteries used on the grid. In this way, we are contributing to the adoption of photovoltaic power generation and are contributing to the emergence of a low-carbon society.

Hot water supply & heating system using commercial heat pump and heat from sewage

In February 2014, working in collaboration with Osaka City University, Sogo Setsubi Consulting Co., Ltd., and Chuo Fukken Consultants Co., Ltd., Kansai Electric Power developed a hot water supply & heating system incorporating a 30 kW–500 kW commercial heat pump that draws heat from sewage. Currently, most commercial heat pump systems use air as the heat source, but this system uses untreated sewage water running in a sewage pipe as the heat source. As a result, the operating cost for heating and hot water supply is expected to decline about 70% compared with the conventional method. We believe that, in the future, we can contribute to the emergence of a low-carbon society by encouraging our customers to adopt this system for hotels, hospitals, social welfare facilities, and bath facilities.



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Contributing to energy conservation, cost reductions and CO₂ emissions reductions by customers and society

By enabling customers to use energy efficiently and comfortably, we are contributing to increased energy efficiency, lower costs, and reduced CO_2 emissions for customers and society. We are also promoting energy conservation and CO_2 emissions reductions at our workplaces.

Energy management activities

To minimize energy use, costs, and CO₂ emissions, we offer a wide range of appropriate products and services, including renewable energy sources and high-efficiency systems utilizing heat pump technology. We thus provide customers and society at large with support for total energy management.

Serving residential customers

We provide energy conservation consulting services, including Home Eco Diagnosis, a service offered in conjunction with the Ministry of the Environment. We also offer Hapi e-Miruden, a web-based tool that displays customer energy consumption. Through this and other useful services, we are promoting smarter use of electric power by our customers.

Serving corporate customers

We provide our customers with support for total energy management according to customer needs and offer advice regarding optimal energy systems and their application. In addition, we work with other Group companies to offer a range of services including 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 CO₂ emissions.

Hapi e-Miruden power consumption monitor

Customers can access our Hapi e-Miruden site where they can monitor their electric power use in graphic form. They can also review their electric power consumption and resulting CO₂ emissions and view their ranking among other users. In addition, the "household environmental account book" calculates total household CO₂ emissions once oil and gas rates are entered. This information can be used for management of overall energy consumption.

Publishing energy-efficiency information via website and brochure

Through our Hapi e-Life navi website and brochure, we are helping our customers implement energy-efficiency methods more effectively. These introduce intelligent ways to use electric power as well as energy-saving methods that customers can employ in their homes.

Energy management at business locations

We have been employing energy management measures at business locations since FY 2007. We can now measure energy use by application and time of day, which allows us to review and implement effective energy-efficiency measures. In FY 2014, we succeeded in reducing energy consumption by 51% compared with FY 2006, the year prior to the launch of these initiatives.

Primary Energy (Electricity) Consumption Intensity at Business Locations Employing Energy Management



• Electricity consumption is corrected for air temperature.

From FY 2011 to 2014, the reduction achieved through energy conservation is included.
18 business locations employing energy management, as of March 2015

Use of electric and hybrid vehicles

Electric vehicles offer superior environmental performance because they emit only about 70% of the CO₂ emissions of gasoline-powered vehicles when the electricity used for charging is accounted for. We make use of electric and plug-in hybrid vehicles to promote the emergence of a lowcarbon society and reduce the CO₂ emissions attributable to our business operations.

Technological developments for constructing the Kanden Smart Grid

The Kansai Electric Power Group aims to contribute to the emergence of a low-carbon society and better usability for customers through the construction of a smart grid (next-generation electricity transmission and distribution network).

What is the "Kansai Electric Power Smart Grid"?

Our Group has positioned the smart grid as a key to achieving an efficient, high quality, reliable electricity transmission and distribution system, employing advanced information, communications, and storage battery technologies to achieve a low-carbon society and a better energy environment for customers without sacrificing the stability of the basic power grid.

Meeting the challenges of large-scale renewable energy use

With large-scale or focused introduction of renewable energy, including solar power, into the electric power grid, the stability of the power grid can be compromised. Therefore, Kansai Electric Power is promoting R&D of countermeasure technologies, including systems for evaluating such impact, development of advanced voltage controls, and electricity supply and demand control technologies incorporating storage batteries.

Usability improvements for customers

Smart meter introduction efforts

As of the end of fiscal 2014, we had introduced 4 million smart meters capable of finely monitoring electric power

consumption. In the future, we will implement a plan to introduce such meters for households and all other customers receiving low-voltage power by fiscal 2022. We believe that this allows for more efficient facility configuration based on electric power use patterns as well as enhanced energy consulting services to customers.

Collaborating with customers to stabilize supply-demand balance

As a means of reducing peak power use when the supply of electric power is low, we are developing measures such as requesting load adjustment through aggregators* for customers using building energy management systems (BEMS) capable of adjusting loads by controlling building air conditioning, lighting, and other systems.

* A BEMS aggregator is a management administrator that provides energy management support services by installing a cloud-connected central control system for customers who have introduced a BEMS; it also introduces BEMS into small and medium-size buildings.

Promoting graphic representation of energy use

We offer the web-based Hapi e-Miruden service, which charts energy use. By enhancing and disseminating such services, we are supporting energy efficiency, cost savings, and reduction of CO_2 emissions.



Overseas activities

We are implementing a wide range of initiatives outside Japan in an effort to devise solutions to global environmental issues and other global problems by applying the technical capabilities, knowledge, and expertise we have gained through our years of operation as an electric power supplier.



Group initiatives outside Japan

Power generation projects outside Japan

We are constructing the 47,000-kW Rajamandala Hydroelectric Power Station in Java, Indonesia, which utilizes the drop between the upper and lower power stations of the Citarum River. Because this hydroelectric station requires the water discharged from a peak correlating dam power station located in the upper reaches of the river, it can substitute for some of the thermal power provided during peak load times; therefore, it is expected to help reduce CO₂ emissions. Currently, construction is under way with start-up scheduled for May 2017.

In addition, Kansai Electric Power and other companies purchased shares in Singapore's Senoko Energy Pte Ltd in 2008. This company's facilities were updated and the Senoko Power Station's oil-fired steam thermal power plant, with a total capacity of 750 MW (250 MW x 3 units), was converted to combined-cycle natural gas turbines with a total capacity of 860 MW (430 MW x 2 units) in 2012. This power project will benefit the environment by contributing to efficient energy use and will result in major reductions in CO₂ emissions.

Corporate social responsibility initiatives

The Global Sustainable Electricity Partnership, whose members comprise the world's leading electric power companies, promotes sustainable energy development. As a member of this partnership, Kansai Electric Power has participated in a range of assistance projects for developing nations and eco-projects, including a small-scale hydroelectric project for Bhutan and a solar power project for Tuvalu and Maldives. Since 2005, we have been holding workshops focusing on the themes of renewable energy and energy conservation. In addition, we are actively engaged in international exchange activities such as concluding information exchange and technical cooperation agreements with electric power companies from various countries.



Rajamandala Hydroelectric Power Generation Project in Indonesia (under construction)



Workshops

Training year	Country	Subject	Theme	
2012	Nepal	Government officials and parties in electricity sector	 Photovoltaic power generation 	
2012 & 2014	Pacific Island Nations	Electric power companies	 Improving energy efficiency Rating systems that contribute to the further adoption of renewable energy 	

Initiatives contributing to the emergence of a society committed to recycling

Efforts to achieve zero emissions

The principal types of industrial waste generated by Kansai Electric Power include coal ash from coal-fired thermal power plants and concrete pole fragments remaining from power grid construction. We have targeted an industrial waste recycling rate of at least 99.5% with the goal of achieving zero emissions*. We achieved a 99.8% recycling rate in FY 2014, which marks the fifth consecutive year that we have reached our target. We are also working to reduce and recycle general waste, such as printer paper, produced by our offices.

The United Nations University first proposed the concept of zero emissions in 1994 with the goal developing a system for the recycling industry that results in zero waste emissions. This system proposes use of waste produced by specific industries as various industrial raw materials.



Changes in Emissions and Recycling Rates for Industrial Wastes

Recycling of coal ash

The coal ash produced by the Maizuru Power Station is recycled for use as a raw material for cement and as a roadbed material. The minute spherical particles found in coal ash are called "fly ash" when in their modified form and, when mixed with concrete, add strength. Fly ash is used as concrete admixture for engineering and construction projects for bridges and the like. Kanden Power Tech is promoting sales of this material.



Main recycling applications

Metal recovery

Roadbed materials

Cement raw materials

Construction materials

Rare metal recover

Fuel

♦ Main Applications of Recycled Industrial Waste, etc.

Recycling rate

99.8%

99.5%

100%

99.5%

100%

99.9%

Type of industrial waste

Metal scrar

Coal ash, heavy oil ash

Waste oi

Polychlorinated biphenyl (PCB) waste processing

Kansai Electric Power complies strictly with the Law Concerning Special Measures Against PCB* Waste and related laws, and promotes safe, reliable disposal based on the special characteristics of the PCB waste involved. Kansai Electric Power uses a range of methods for dealing with the disposal of electrical equipment containing minute amounts of PCBs. We established the Recycling Center for Utility Pole Transformers to render insulating oil and transformer cases harmless and suitable for recycling. At the end of July 2015, we completed processing of stored insulating oil and transformer cases. For other equipment, we are promoting effective processing using technologies from our Group companies. In keeping with government plans, we have commissioned Japan Environmental Storage & Safety Corporation (JESCO) to process waste containing high concentrations of PCB insulating oil.

Initiatives of our Group companies

In July 2013, the Minister of the Environment granted KANDEN GEO-RE Inc. the nation's first authorization for decontamination treatment at its contaminated soil processing facility. The company treats oil contaminated with low concentrations of PCBs in its high-temperature thermal treatment facility (rotary kiln) for purifying contaminated soil. Regarding PCB-contaminated soil, the company acquired a permit under the oil Contamination Countermeasures Law in July 2014 and is now offering decontamination treatment.

In May 2014, the Minister of the Environment granted Kanden Engineering Corporation a decontamination treatment permit for minute amounts of PCBs in discarded electrical equipment; this was the first permit in Japan used for movable solvent-based cleaning technology. The company conducts safe and economical decontamination and treatment without requiring that the contaminated equipment be moved or dismantled.

^{*} Initialism for polychlorinated biphenyl. It is a strong electrical insulator and has been used as an insulating oil in electrical transformers. Because it has an adverse environmental impact, its production and use have been prohibited in principle.



Contaminated soil treatment facility (high-temperature treatment facility) of KANDEN GEO-RE Inc.

Note: Industrial waste recycling rate (%) = (industrial waste emissions – landfill disposal amount) / industrial waste emissions × 100

Initiatives that form a trusted, environmentally advanced corporation

Promotion of community environmental protection measures

Kansai Electric Power has adopted comprehensive efforts to protect the environment of local communities, specifically by addressing air pollution, water contamination, asbestos contamination, and maintenance of biodiversity. We also take appropriate measures to prevent chemical substances from harming people and the environment.

Environmental protection measures at power plants

At our power plants, we undertake measures based on laws, local regulations, environmental protection agreements and other rules to reduce air pollution, water contamination, noise, vibrations, and other problems. In addition, we monitor and measure the air and ocean around our power plants and carefully evaluate the environmental effects of our operations on the regional environment to ensure that no problems occur.



Environmental Measures Adopted at Thermal Power Stations

Air pollution prevention measures (NOx, SOx, soot)

Kansai Electric Power has implemented measures aimed at reducing the volume of SOx (sulfur oxides) emitted by our thermal power plants by using low-sulfur fuels, installing sulfur scrubbers, and other measures. To address the issue of NOx (nitrogen oxides), we are taking steps to lower emission levels, such as improving combustion methods and installing nitrogen scrubbers.

As a result, our SOx and NOx emissions per unit of electric power generated are significantly lower than those of the major countries of Europe and North America, remaining among the lowest in the world. In addition, we have installed high-performance electrostatic precipitator that dramatically cut soot emissions.



SOx and NOx Emissions per Unit of Thermal Power Generated of Major Countries and Kansai Electric Power



Conservation of biodiversity

The power station selects nursery stock of suitable local tree species for planting in a dense and mixed manner in order to create a forest that is very close to a natural state in a short period. With this artificial forest, and by exterminating invasive species, we are seeking to create an environment that reflects the area's original biological diversity. In the city of Toyooka, Hyogo, we colored the electric wires to increase their visibility to the stork, a special natural moment, to help prevent these birds from striking these wires when released.



Forest accounts for a guarter of the grounds of the Gobo Power Station. These trees grow to more than 10 meters in height.

Addressing the issue of asbestos

Kansai Electric Power periodically monitors the condition of buildings and facilities identified as containing asbestos and manages them appropriately. We continue to implement carefully planned measures to remove this asbestos and replace it with alternative materials. We will continue to address this issue while observing relevant laws and regulations.

Scope of Use (Buildings and Facilities) of Asbestos (at March 31, 2015)

Blown-in materials containing asbestos		Acoustic insulation, thermal insulation, and fireproofing materials in company buildings; acoustic insulation for transformers	
	Building materials	Fireproofing panels, roofing materials, and flooring for buildings	
	Asbestos-cement pipes	Duct lining for underground lines (transmission, distribution, and communications facilities)	
Asbestos- containing	Thermal insulation	Power generation facilities (thermal power facility, nuclear power facility)	
products	Sealing materials, gaskets	Power generation facilities (thermal power facility, nuclear power facility)	
	Buffers	Suspension insulators for transmission facilities and the like	
	Thickeners	Electric wire for the overhead transmission lines, hydroelectric dams	

Promoting environmental communication

Committed to the proactive release of environmental information and the promotion of a sustainable society, Kansai Electric Power is not only addressing various ecological issues, but also actively working with customers and the regional community to raise environmental awareness.

Community environmental initiatives undertaken in cooperation with local governments

We consider the environment together with the community residents through environmental events hosted by the local government, cleaning campaigns, and environmental education at local schools. We emphasize environmental communication by seeking out residents' opinions about our initiatives.

Initiatives for Kansai Electric Power Group Environment Month

June is Environment Month at Kansai Electric Power Group, a time when our entire Group engages in activities such as community cleanups, tree planting, exhibiting at environmental events, and conducting on-site environmental classes at schools.

Disseminating environmental information through social media

On our website, we offer content such as our "environmental initiatives" section and our Environmental Report. This includes information on our range of varied initiatives toward the emergence of a low-carbon society and a society committed to recycling. In April 2015, we renewed our environmental initiatives section to make it easier to search and understand.

In addition, we produced a short video feature for viewing on YouTube that introduced our tree-planting activity for future generations as well as on-site classes to accommodate today's diverse media environment to promote wider understanding of our Group's initiatives.



"Surely it is not only trees that grow" on YouTube



Exhibition at

environmental event

(Shirahama-cho, Wakayama)

Promoting environmental management

By adopting an environmental management system consistent with ISO 14001 standards, we are taking additional steps to reduce the environmental impact of our business operations through continuous improvements, strictly complying with environmental laws, developing our Eco Action initiative, and enforcing checks and reviews.

In-house incentive system: Featuring Incentive Awards such as the Environmentally Excellent Workplace

We offer incentive awards to recognize our workplaces and Group companies that voluntarily and proactively adopt environmental impact reduction efforts and other environmental initiatives. This approach further expands our environmental initiatives, which includes our Eco Action initiative and our effort to raise the environmental awareness of our employees.

> Incentive award ceremony for Environmental Excellent Workplace Award in fiscal 2014



Observance of laws and regulations

In fiscal 2014, we experienced phenomena that exceeded the agreed environmental conservation levels: the temperature difference between the intake seawater used to cool the steam and the discharge water exceeded the regulatory limits as a result of shellfish, seaweed and other waterborne objects flowing into the Nanko Power Station in large quantities following a typhoon. After discovering this, we immediately reported it to the relevant governmental authorities. Kansai Electric Power is taking thorough measures to prevent a recurrence of this type of incident. Going forward, we will ensure strict compliance with environmental laws.

Environmental management activities of our group companies

Our Group companies carry out environmental initiatives, including those targeting reduced environmental impacts. Eco Action, a common initiative of our Group companies, is a concrete action plan that is formulated every year. The Environmental Management Committees of the Kansai Electric Power Group also conduct a check-and-review process.

Item	Results for	FY 2014		Evaluation (Reasons for increase/reduction)	
nem	FY 2013*	Targets	Results*		
Reducing office electricity consumption	55.5 GWh	Continuing energy conservation efforts	0.74% increase from previous year 55.9 GWh	Despite the energy conservation efforts of individual offices, Group consumption of electricity increased slightly year-on-year due to business expansion.	
Reducing office water consumption	269,000 m³	Reduce as much as possible	2.84% reduction from previous year 261,300 m ³	As a result of water conservation efforts at individual offices, year-on-year Group water consumption declined overall.	
Improving fuel efficiency of company vehicles	8.94 km/L	1% or more improvement compared to the previous fiscal year	2.62% improvement relative to previous year 9.18 km/L	Because each Group company worked diligently to observe practices such as eco-frien driving and reduced idling and implemented efforts to improve mileage through the introduction of energy-efficient vehicles, overall Group fuel efficiency improved compare with the preceding year.	
Reducing printer paper consumption	978.8 t	Reduce as much as possible	1.04% decrease compared with the previous fiscal year 968.6 t	Despite an overall expansion in the number of business locations and an increase in work volume, efforts to reduce the use of paper, such as printing on both sides of a sheet and digitizing conference materials, Group use of paper declined overall year-on-year.	
Green procurement of printer paper	87.7% green procurement rate	100% green procurement rate	1.01% decline compared with the previous fiscal year 86.7%	Because of an increase in the work volume of business locations not yet implementing green procurement, the overall Group green procurement rate decreased over the previous year. Nonetheless, about 90% of Group companies were able to achieve 100% green procurement.	

♦ Eco Action: Kansai Electric Power Group Company Concrete Action Plans

* The calculation of results covers 46 companies in FY 2013 and FY 2014

Some initiatives of the Kansai Electric Power Group

Our Group has undertaken a variety of environmental initiatives by combining the technological capabilities of individual companies and the management resources of our entire Group.

The General Environmental Technos Co., Ltd.

Offering measurement of radioactive substances for safety and peace of mind (with Japan's first automatic measuring device)

The General Environmental Technos Co., Ltd. is an integrated engineering company encompassing the environment, civil engineering, and construction. It engages in a variety of initiatives that employ the expertise it has developed over the years. Recently, the company designed and fabricated a custom system for automatically measuring radioactive substances and in March 2015 installed it in the Koyama Water Purification Plant managed by the Futaba District Water Service Conglomerates in Naraha-machi, Fukushima. This company's goal is to accelerate the return of former residents of Fukushima prefecture to their homes. The company inspects the quality of life-sustaining tap water through regular monitoring of the Koyama Water Purification Plant and is thus working to ensure safety.

This system, which utilizes the company's proprietary technology to the full, automatically measures the density of radioactive substances in tap water hourly and displays the results on a monitor for greater peace of mind. Currently, the company is welcoming inquiries for other applications and is considering diversification of the system.

The Kanden L & A Co., Ltd.

Developing Technology for Use with Used Insulators

The Kanden L & A Co., Ltd. recycles industrial waste with a focus on used insulators. Conventionally, scrap insulators have been limited to use as a roadbed material after crushing because of the sharp edges that remain. However, we collaborated with Kanden L & A in developing a grinder that eliminates such sharp edges; as a result, crushed insulators can now be used as landscaping stone* for residential use. Furthermore, Kanden L & A is conducting research on new recycling uses in cooperation with Kinki University. Asphalt pavement that incorporates dust (generated as a by-product during grinding) as a component represents a new product has been shown to decrease road surface temperatures in the summertime by more than 20 degrees Celsius (in comparison with conventional tarmac) under prescribed conditions. This product is expected to contribute to environmental conservation as a countermeasure against the heat island effect.

* At the FY 2014 3Rs Promotion Merit Awards hosted by the 3Rs Promotion Council, Kanden L & A and Kansai Electric Power were awarded the Chairman's Prize.

Insulator waste after



Automatically detects presence of radioactive substances and displays results on a monitor.

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Insulator before crushing



Insulator waste after grinding

Example of household application