



CSR Action Principles

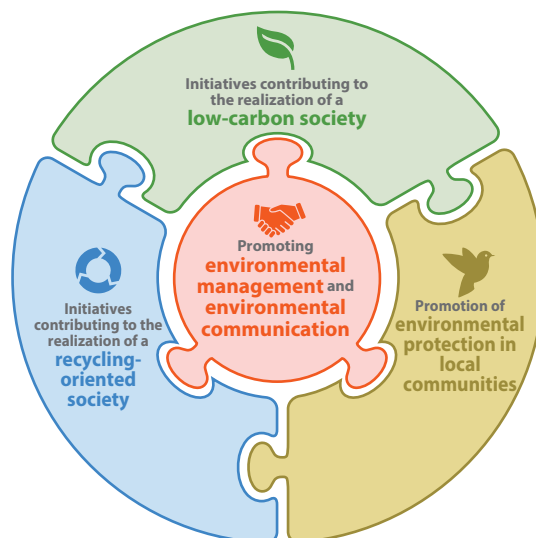
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Proactive Approach with a View to Creating Ever Better Environment

As a provider of energy services that are closely connected with the environment, the Kansai Electric Power Group fully recognizes the scale of impact its business activities have on the global environment and therefore will strive to alleviate the environmental burden and environmental risks accompanying our business activities. Furthermore, we will aspire for creating ever better environment and contribute proactively to the development of a sustainable society through provision of products and services having lesser environmental impact.

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, the Kansai Electric Power Group is taking on the initiatives contributing to the emergence of a low-carbon society and a society that is committed to recycling as well as the promotion of community environmental protection measures. In order to be a corporate group that is trusted by society, we are also striving to promote environmental management and environmental communication.



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 CO₂ emissions reductions for customers and society
- Overseas activities
- Technical development efforts
- Value chain efforts
- Efforts to reduce other greenhouse gases in addition to CO₂



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

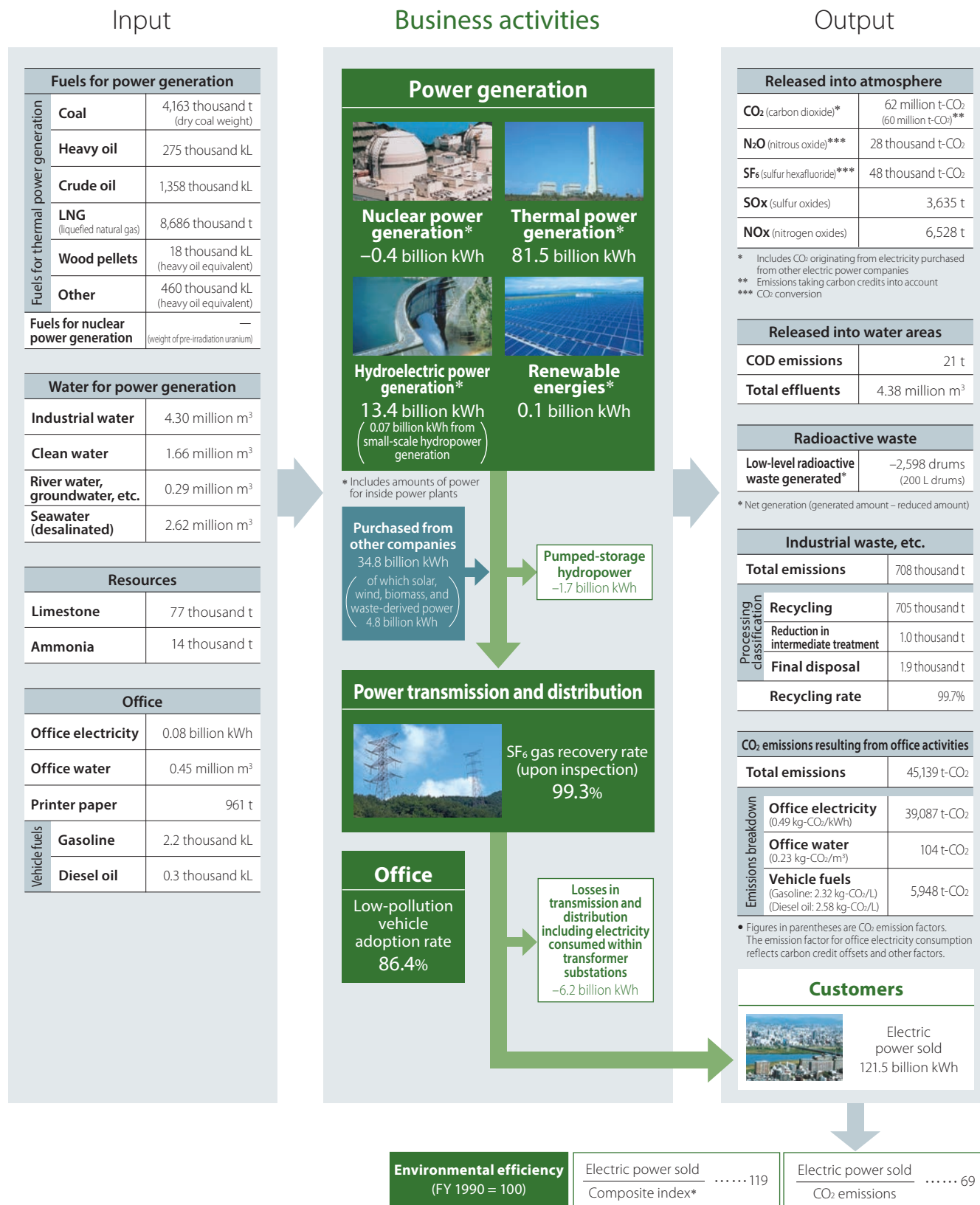


Promoting environmental management and environmental communication

- 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

2 Proactive Approach with a View to Creating Ever Better Environment

Status overview of our business activities and environmental load (FY 2016)



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.

Eco Action (annual targets and results)

Self-evaluation key ○: Target achieved △: Mostly achieved ×: Not achieved —: No evaluation

Main environmental initiatives arising from our business activities	Item		Targets	Fiscal 2016 results	Self-evaluation	Future efforts	Related page
	Initiatives contributing to the realization of a low-carbon society						
	Advancement of efforts to control CO ₂ emissions		About 0.37 kg-CO ₂ /kWh* for the entire electric power business by fiscal 2030	Electric Power Council for a Low Carbon Society (fiscal 2015): 0.531 kg-CO ₂ /kWh* Our company (fiscal 2016) 0.49 kg-CO ₂ /kWh***	—	● By steadily implementing various efforts toward the realization of a low carbon society, contribute to achieving the objective in the Low Carbon Society Realization Plan of the Electric Power Council for a Low Carbon Society (strive for an emission factor of about 0.37 kg-CO ₂ /kWh* for the entire electric power business by fiscal 2030)	49 50 51
	Operating nuclear power plants that make safety the top priority		Advance efforts to operate nuclear power plants that make safety the top priority	We advanced safety promotion measures that conform to new regulatory requirements, responded suitably to judgments of the Nuclear Regulation Authority, and made efforts to gain the understanding of society.	○	● Advance measures that conform to new regulatory requirements as well as independently and continuously pursue various safety measures to further increase safety as expected. ● In addition to seeking to receive the understanding of society and resume operation of plants quickly, strive for safe and stable operation.	49 50
	Maintaining and improving the thermal efficiency of thermal power plants (lower heating value base)		Maintain and improve thermal efficiency	Thermal efficiency 47.6%	○	● Steadily maintain and improve thermal efficiency through appropriate facility management and highly-efficient facility operation.	50
	Making efforts for renewable energy development		Development and promotion of renewable energy (Development goal: about 500,000 kW by 2030)	● Renewable energy development: 2 locations, 7,580 kW total*** Cumulative total: 107,724 kW ● Renewable energy purchased: 4.83 billion kWh	○	● Contribute to the promotion and increase of renewable energy sources through active efforts for their development and by steadily enabling their incorporation into power grids	50 51
	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 promote devices and services that contribute to making energy use by customers and society more sophisticated. ● Smart meters deployed: 1.95 million Cumulative total: 7.5 million ● Number of Hapi e-Miruden subscribers: 420,000/year Cumulative total: 2,031,000	○	● Promote the adoption of smart meters and the popularization and expansion of Hapi e-Miruden, to contribute to increasing customer energy conservation awareness and meet a wide range of needs.	52 53
	Limiting SF ₆ emissions (calendar year basis) (gas recovery rate upon inspection/removal of equipment)		97% (upon inspection) 99% (upon removal)	99.3% (upon inspection) 99.6% (upon removal)	○	● Implement steady SF ₆ gas recovery through the appropriate operation of recovery equipment, for example.	10
	Initiatives contributing to the realization of a recycling-oriented society						
	Maintaining industrial waste recycling rate		99.5%	99.7%	○	● Advance efforts that contribute to the realization of a recycling-oriented society, including efforts toward the achievement of zero emissions.	55
Proper processing of PCB wastes		Process the entire amount within the legal time limit	Amount of high-concentration PCB processed (cumulative total): 4834 units*****	○	● Process the entire amount reliably and safely within the legal time limit based on appropriate management of the PCB waste that we possess.	55	
Promotion of environmental protection in local communities							
Maintaining sulfur oxide (SO _x) and nitrogen oxide (NO _x) emission factors		SO _x ----- NO _x	Maintain the lowest levels in the world	Overall: 0.037 g/kWh Thermal: 0.043 g/kWh ----- Overall: 0.067g/kWh Thermal: 0.077g/kWh	○	● Seek to maintain one of the world's lowest emission levels (emission factors) through the appropriate operation of sulfur scrubbers and nitrogen scrubbers, etc.	56

Office energy and resource conservation activities	Item	Reducing office electricity consumption	Reducing office water consumption	Improving fuel efficiency of company vehicles	Reducing copy paper consumption
	Change after FY 2000 (extract)	(million kWh) 120 100 80 60 2010 2015 2016 (FY)	(thousands of cubic meters) 600 500 400 300 200 2010 2015 2016 (FY)	(km/L) 12.0 11.0 10.0 9.0 2010 2015 2016 (FY)	(t) 1,200 1,000 800 600 2010 2015 2016 (FY)

* Amount of CO₂ emissions per unit of electricity use (sales)

** This value is provisional. Based on the Act on Promotion of Global Warming Countermeasures and other factors, the actual value of the CO₂ emission factor will be officially announced by the country.

*** ① Yamazaki Solar Power Plant (1,980 kW) started operation in November, ② Asago Biomass Power Plant (5,600 kW) started operation in December

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

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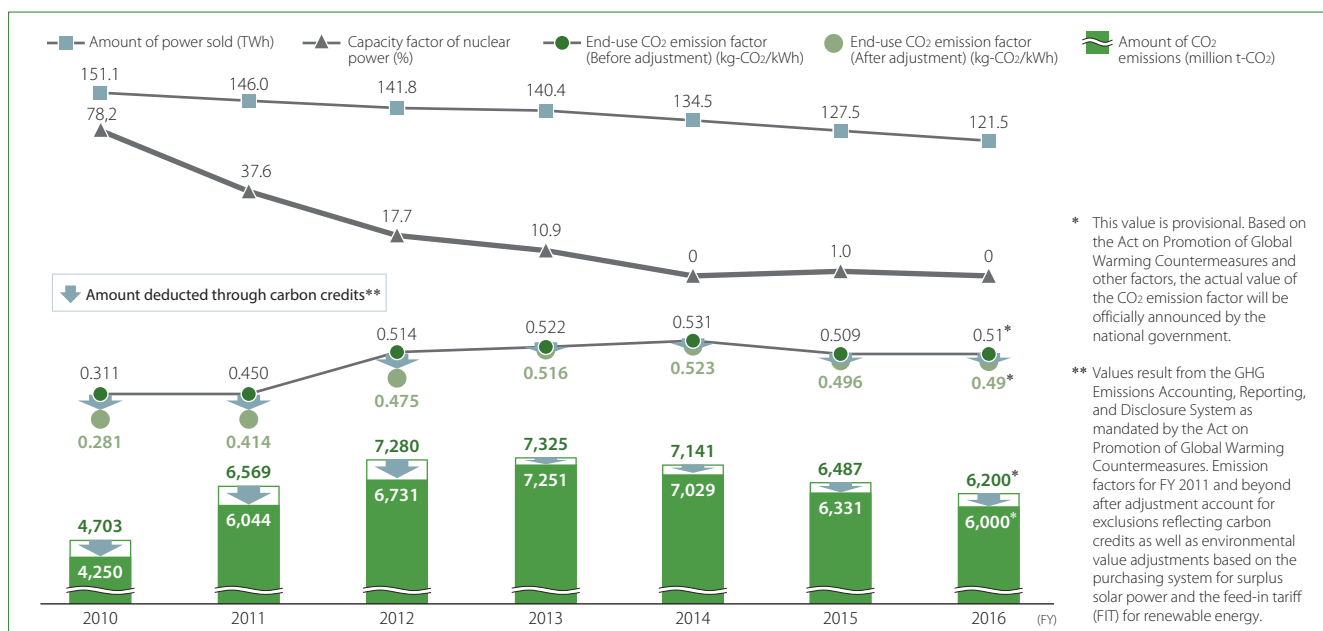
Initiatives contributing to the realization of a low-carbon society

Efforts to reduce CO₂ emissions

Our company joined the Electric Power Council for a Low Carbon Society, and the industry as a whole is seeking to achieve an emission factor of about 0.37 kg-CO₂/kWh (user-end) by fiscal 2030. We will continue to advance efforts to suppress CO₂ emissions, including the utilization of nuclear power generation with the most emphasis on safety, the maintenance and improvement of the thermal efficiency of thermal power plants, and the development of renewable energies. In addition, with a long-term perspective, we will contribute to the realization of a low carbon society by promoting electrification in society.

Despite the negative factors such as the lower capacity factor of nuclear power and hydroelectric power than the previous year, we expect the fiscal 2016 CO₂ emission factor to be about 0.49 kg-CO₂/kWh* (after adjustments), which is approximately the same as the previous fiscal year. This result will be due to the efforts for CO₂ emission reduction, such as the increased capacity factor of Himeji No.2 Power Station performed as high-efficiency natural gas power station, the beginning of generation by natural gas at the Aioi Power Station and the increased introduction of renewable energy via a feed-in tariff system.

Changes in CO₂ emission factor, etc.



Effect of nuclear power generation on CO₂ emission reduction

Nuclear power can greatly contribute to CO₂ emission reduction because it does not emit CO₂ during the generation unlike fuel power which uses fossil fuels such as coal, oil and natural gas.

After the great East Japan Earthquake (in fiscal 2010), the amount of CO₂ emission and CO₂ emission factor of our company increased significantly due to the increased fuel power generation caused by drastic decline of the capacity factor of nuclear power. CO₂ emission factor has a strong correlation with the capacity factor of nuclear power, which means that CO₂ emission factor increases when capacity factor of nuclear power decreases.

Although we have continued to improve the thermal efficiency of fuel power plants in recent years, our CO₂ emission factor has been much higher level than those before the Great East Japan Earthquake (fiscal 2010). Thus the impact of suspension of nuclear power generation is extremely large.

We believe that nuclear power generation putting the most

emphasis on safety will continue to be an extremely important from the point of view of energy security, economy, and environment including global warming.

Comparisons with values before the Great East Japan Earthquake

	Fiscal 2010	Fiscal 2016	Rate of increase/decrease
Ratio of nuclear power generation (%)	78.2	0	-78.2%
Amount of power from thermal power generation (billion kWh)	76.6	114.4	+49.3%
CO ₂ emission factor (after adjustment) (kg-CO ₂ /kWh)	0.281	0.49*	+74.4%

* This value is provisional. Based on the Act on Promotion of Global Warming Countermeasures and other factors, the actual value of the CO₂ emission factor will be officially announced by the national government.

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 improving the thermal efficiency of thermal power plants and further increasing natural gas use

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 are working to suppress the amount of CO₂ emissions by increasing thermal efficiency to about 60%, which is the highest global standard, and reducing the amount of fuel used.

Moreover, at Units 1 and 3 of the Aioi Power Station, in addition to the heavy oil and crude oil we had been using thus far, we began using natural gas, which is less expensive and better for the environment. Unit 1 began in May and Unit 2 began in August 2016.

* Combined cycle power generation: Power is generated with gas turbines and the heat emitted from this is used to generate power with steam turbines for overall power generation with high thermal efficiency.

Development and promotion 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. As a unified group, we are making efforts that include improving the output of existing hydroelectric power stations and building solar and wind power generation plants. As of March 2017, we have announced the development and planning of about 110,000 kW of generation capacity. We will continue to work proactively for the development of diverse energy sources, including offshore wind power generation and geothermal electric power generation, both inside and outside our jurisdiction. 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. As a result, the frequency remains unstable, and power generated in excess of demand can have an effect on 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.

Solar power development

In November 2016, Kanden Energy Solution Co., Inc. (Kenes) began operation of the Yamazaki Solar Power Station (1,980 kW output) in Shiso City, Hyogo Prefecture. Our corporate group has solar power generation plants in a total of nine locations. They effectively reduce CO₂ emissions by a total of about 27,000 tons per year.



Yamazaki Solar Power Station

Solar power stations
(9 locations)
Reduction in CO₂ emissions
About **27,000**
tonnes/year

Development of hydroelectric power generation

The Dashidaira Power Station (520 kW maximum output) has been continuing operation in Unazuki, Kurobe City, Toyama Prefecture since November 2015. Water is released from the Dashidaira Dam, which is owned by our company, to protect the scenery and otherwise maintain the river environment downstream. This power plant uses this water to generate power.



Dashidaira dam

Dashidaira dam
Reduction in CO₂ emissions
About **850**
tonnes/year

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Wind power development

In the city of Tahara, Aichi Prefecture, Kenes' Tahara No. 4 Wind Power Station (6,000 kW [2,000 kW × 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 reduce our CO₂ emissions by about 19,000 tonnes/year in total.



Tahara No. 4 Wind Power Station

Wind power station (2 locations)
Reduction in CO₂ emissions

About **19,000**
tonnes/year

Development of biomass power generation

In December 2016, Kenes began operation of the Asago Biomass Power Plant (5,600 kW output) in Asago City, Hyogo Prefecture. With the cooperation of the Hyogo Midori Kosha (Green Public Corporation), the Hyogo Prefectural Federations of Forest Owners Cooperative Associations handles unused wood materials from transportation to drying and the manufacture of fuel chips. Kenes uses these fuel chips to generate power. This business scheme conducted with cooperation between government and private interests is the first of its kind in Japan. This is also the first wood biomass fuel specialized power plant for our corporate group. As result, we can expect CO₂ emissions to be reduced by about 18,000 tons/year.



Asago Biomass Power Plant

Asago Biomass Power Plant
Reduction in CO₂ emissions

About **18,000**
tonnes/year

Technical development efforts

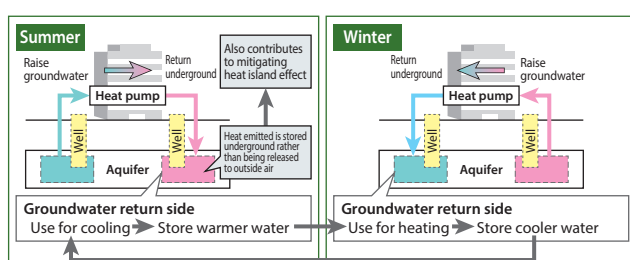
By making use of our specialized technical capabilities as an electric company, we are contributing to the emergence of a low-carbon society. Specifically, we are developing breakthroughs in energy management, green innovation, and system operation and control, among other technologies.

Starting an experimental project to use aquifer thermal energy storage

In October 2016, a research group, which has the Kansai Electric Power Company as its representative, began a test project related to the use of thermal energy from the aquifer* in the Umekita Secondary Temporary Use District. This project is to demonstrate technologies to raise groundwater from the aquifer and utilize the temperature difference for air-conditioning in the summer as well as to store the emitted heat that is generated from this in the aquifer to use as a heat source for heating in the winter. This large-scale demonstration project for using aquifer thermal energy storage to provide air-conditioning for a building of over 10,000 m² is the first of its kind in Japan. This is expected to conserve energy, reduce CO₂ emissions and mitigate the heat island effect. In addition, this project also seeks to suppress electric power demand peaks by using electricity at night to cool water and store it in the aquifer for use during the day.

* An aquifer is an underground layer that contains large amounts of groundwater. Since the underground temperature does not change throughout the year at depths greater than 10–15 m, it is cooler than the outside air in the summer and warmer in the winter.

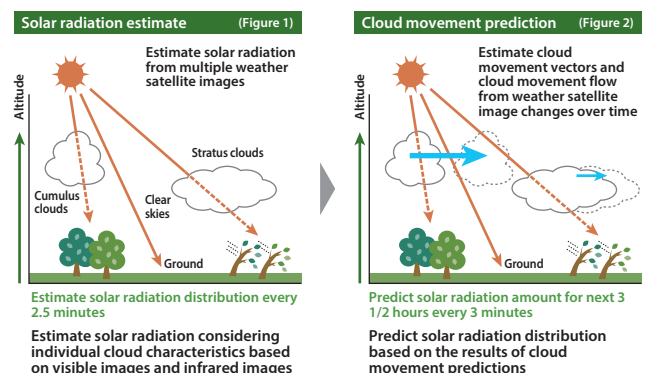
Overview of demonstration project for aquifer thermal energy storage use



Apollon solar power short-time forecasting system

In preparation for the high-volume adoption of solar power generation, which varies in output according to the weather, we developed the Apollon solar power short-time forecasting system together with the Meteorological Engineering Center, Inc. from fiscal 2012–2014. The Apollon system analyzes the characteristics of clouds from cloud images captured by weather satellites and estimates the solar radiation strength on the Earth's surface (Figure 1). In addition, it predicts the movement of clouds by analyzing changes in clouds over time shown in weather satellite images (Figure 2) and predicts the amount solar radiation in three-minute intervals for 1 km grid units up to 3 1/2 hours ahead. By utilizing predicted solar radiation amounts, fluctuations in solar power generation output can be predicted in advance, allowing stable control of supply and demand. In this way, our company is contributing to the popularization of solar power, and seeking to build a low-carbon society.

Predicting solar radiation for 3 1/2 hours (in 3-minute intervals) from a weather satellite image



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

By enabling customers to use energy efficiently and comfortably, we are contributing to increased energy efficiency, lower costs, and reduced CO₂ emissions for customers and society. We are also promoting energy conservation and CO₂ emissions reductions at our workplaces.

Encouraging efficient energy use

With the goals of realizing energy conservation, cost cutting and CO₂ reduction for our customers and society, we are offering high-efficiency systems that utilize renewable energy sources and heat pump technologies, as well as proposing effective operation procedures, for example. In addition, we are providing total support for energy management to customers and other members of society and undertaking activities that serve these purposes, including offering Hapi e-Miruden and other services that allow customers to see energy use and participating in regional demand response empirical testing.

Serving residential customers

Starting with the Home Eco Diagnosis service, which is offered in coordination with the Ministry of the Environment, we are undertaking energy conservation consulting activities that respond to customer needs. Moreover, the Hapi e-Miruden Service, which allows people to see the status of their electricity use on the Internet, shows amounts of CO₂ emissions compared to amounts of electricity used and related rankings. In addition, we are providing other information related to energy conservation and have established "environmental household account books" in which users can input gas and kerosene charges to check their total household CO₂ emissions. In these ways, we are advancing a variety of efforts that contribute to helping customers conserve energy, cut costs and reduce CO₂ emissions.

■ Providing information related to energy conservation through Hapi e-Miruden



Serving corporate customers

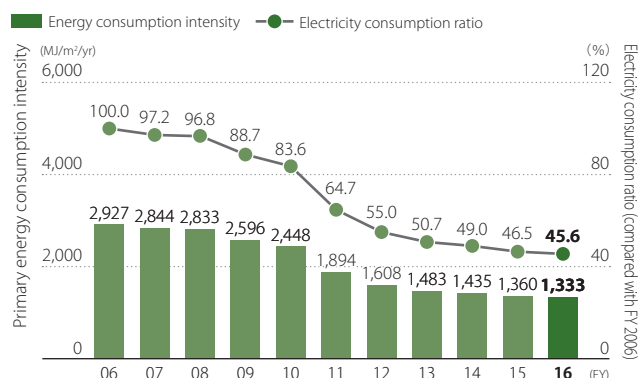
We provide our customers with support for total energy management according to customer needs and offer advice regarding optimal energy systems and their application. In addition, we work with other Group companies to offer a range of services including energy conservation diagnoses and energy management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

Energy management at business branches

We have been employing energy management measures at business locations since fiscal 2007. In our efforts, we measure the amount of electricity used by application and by time period for buildings in order to investigate and implement effective energy conservation means.

Through energy management at business locations, we achieved a **54% reduction** compared to fiscal 2006

■ Primary energy (electricity) consumption intensity at business branches employing energy management



Notes:
 • Electricity consumption is corrected for air temperature.
 • From FY 2011 to 2015, the reduction achieved through energy conservation is included.
 • 20 business locations employing energy management, as of March 2016

Kansai Electric Power Hospital Winner of the Director General of the Agency for Natural Resources and Energy Prize of the 2016 Energy Conservation Grand Prizes

In January 2017, the Kansai Electric Power Hospital received this prize because of high evaluations of its design with thorough energy conservation in its 2015 rebuilding and approaches taken in conserving energy since the start of its utilization. We succeeded in reducing the amount of primary energy consumption by floor area 37% compared to conventional large-scale hospitals.

In addition, the Kansai Electric Power Hospital also received the Osaka City Mayoral Award of the 2016 Osaka Environmentally Friendly Architecture Awards in December 2016.



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Technological developments for constructing the 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 “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

We have completed installing smart meters, which have communication functions and can measure and record the amount of electricity a customer uses every 30 minutes, in factories, office buildings and other customers that receive high-voltage and extra-high-voltage electricity. We will also continue converting them to remote reading by fiscal 2020. In

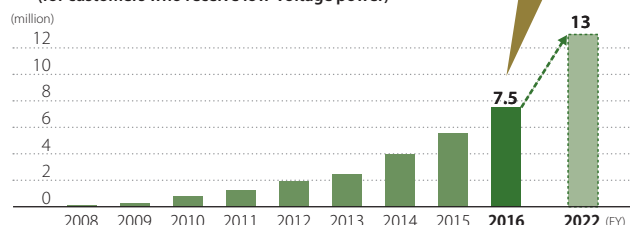
addition, we had installed 7.5 million units, which is more than half, for households and other customers that received low-voltage electricity, by the end of fiscal 2016. We will advance our plan to ready them for every customer by fiscal 2022.

Among the many benefits, installing smart meters contributes to the energy conservation of society as a whole, enables flexible handling of various rate options, makes meter reading work more efficient, and enables formation of efficient facilities according to the conditions of electricity use. Through this endeavor, which leads the nation, we are improving usability for customers by promoting measures that allow them to see their energy use. We are supporting their efforts to conserve energy, cut costs and reduce CO₂ emissions with services such as the Hapi e-Miruden Service (residential), which allows people to see the status of their electricity use, and the Electricity Usage Notification service (business).

Number of smart meters installed
(for customers who receive low-voltage power)

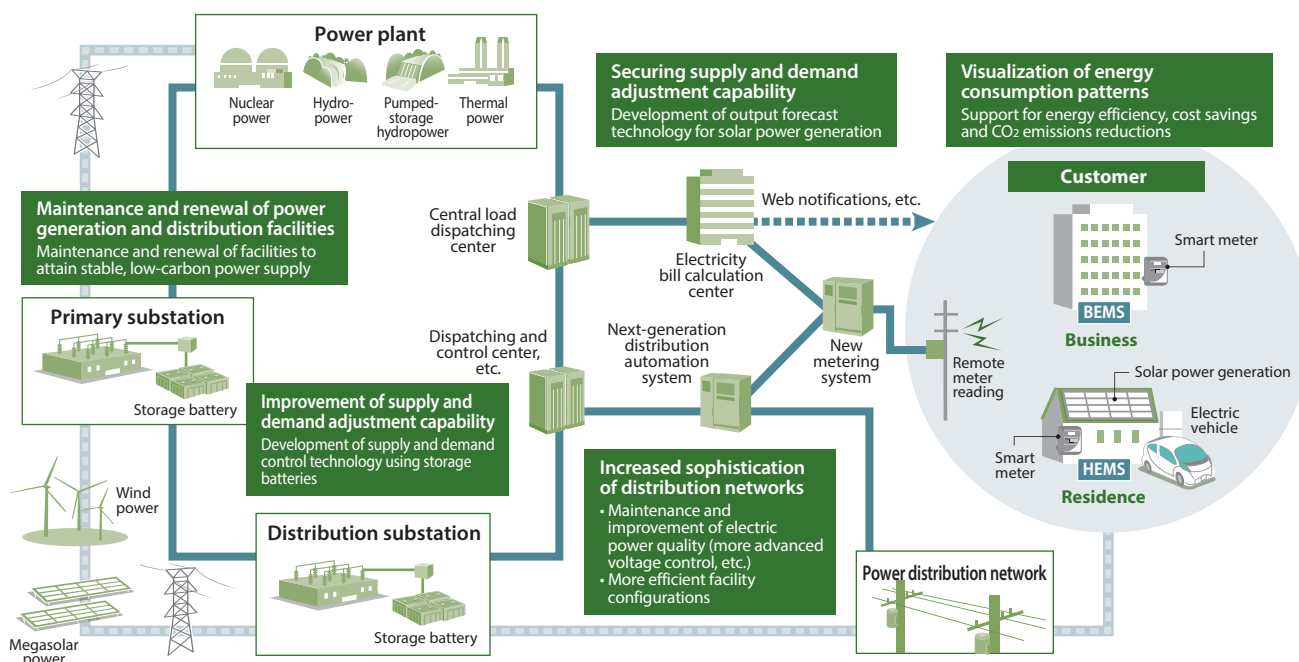
About **7.5** million
(About 58% adoption rate)

Number of smart meters installed
(for customers who receive low-voltage power)



Constructing the Smart Grid

Power grid Communication lines for electric power General communication network



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.

Contributing to the development of renewable energy sources

Our company is setting up infrastructure and working to reduce global environmental impacts by participating in GSEP* efforts, including small-scale hydroelectric power generation in the kingdom of Bhutan, solar power generation at Tsubaru, and a solar ice project on Dhiffushi Island in the Republic of Maldives (DSIP).

On Dhiffushi Island, in order to regulate the amount of power generated by solar and the amount of electricity used, an ice machine was installed instead of a storage battery. This ice is supplied for the fishing business, which is a principal industry on the island. This has received great attention as a model project that could be developed on other islands and in other countries. Our company has also worked to promote it publicly. Moreover, we will conduct monitoring over five years in order to confirm that, for example, the equipment we transferred stays in good condition and the power system is stabilized.

* GSEP stands for "Global Sustainable Electricity Partnership." Comprised of 10 major electric power companies from eight countries, including Japan, the USA and France, in this organization leaders from each company exchange ideas about the development of sustainable energy sources, climate change problems and other global issues related to the electric power business as a whole.



Solar power generation facility that we transferred to Dhiffushi Island in the Maldives

Republic of Maldives
Solar power generation
Reduction in CO₂ emissions

About **50** tonnes/year

Workshops held in Pacific island nations

Among GSEP efforts, we have been holding workshops for the Pacific Power Association. We have been conducting these continuously since 2005 and have held 14 so far on themes that include renewable energy sources and energy conservation.

In 2017, we held lectures with "renewable energy grid connections" as the theme in Fiji (March) and in Guam (June). In addition to explaining issues related to the popularization of renewable energy sources and measures to handle them, we also introduced the latest efforts of our company, including the Apollon solar power short-term forecasting system and smart grids.

In these ways, our company is contributing to the resolution of global environmental problems through technology transfers and personnel cultivation programs related to the various issues faced by island nations.



Participants and teachers at the workshop held in Fiji



Explanation of our corporate activities to students gathered from Pacific island nations

Energy Globe Award received

The DSIP was selected as the most outstanding project in the Maldives in the Energy Globe Awards (2017), which is given to excellent environmental projects around the world. This project was highly evaluated for reasons that include the economic benefits brought by the ice machine to the local community and residents, the fact that no waste is generated by a storage battery for storing excess power and that the project could easily be reproduced on other islands.



Value chain efforts

We are working to introduce and utilize high-efficiency LNG ships.

Fuel value chain

We are advancing the introduction of LNG ships with excellent energy conservation performance. Following the LNG EBISU and the LNG JUROJIN, which are already in service, we completed the LNG FUKUROKUJU in fiscal 2016. These ships use a new type of steam turbine that reheats steam. This secondary use of steam that has already been used once realizes fuel reductions of about 25% compared to previous ships with the same forms. Moreover, utilizing the latest heat resistance systems, these ships achieve an

LNG evaporation rate of 0.08% per day, which is the lowest level in the world, making them outstanding in terms of both environmental and economic performance.

LNG FUKUROKUJU
Fuel consumption
(compared to previous
ships with the same forms)

About **25%** less



LNG FUKUROKUJU

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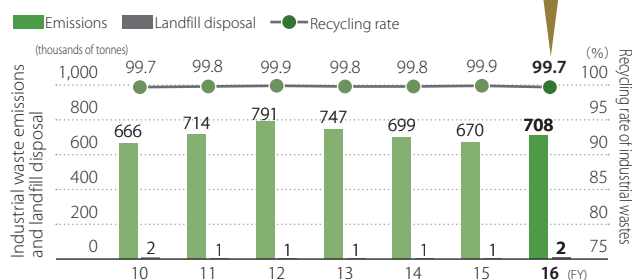
Initiatives contributing to the realization of a recycling-oriented society

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 99.7% recycling rate in fiscal 2016, which marks the seventh 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.

Industrial waste recycling rate
99.7%

Changes in emissions and recycling rates for industrial wastes



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

Main applications of recycled industrial waste, etc.

Type of industrial waste	Recycling rate	Main recycling applications
Metal scraps	98.1%	Metal recovery
Demolition debris (Waste concrete utility poles, etc.)	99.7%	Roadbed materials
Soot (Coal ash, heavy oil ash, etc.)	100%	Cement raw materials
Sludge (Desulfogypsum, wastewater processing sludge, etc.)	99.8%	Construction materials
Cinders (Coal ash, heavy oil ash, etc.)	100%	Rare metal recovery
Waste oil	99.9%	Fuel

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 Corporation is promoting sales of this material.

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.

* PCB: 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.

Initiatives of our group companies

The Kanden L & A Co., Ltd. developed a technology to recycle used insulators into stone materials for gardening, for example, by rounding corners with grinding machines. At the FY 2015 Awards for Resources Recirculation Technologies and Systems, this technology received the Award of the Director-General of the Industrial Science and Technology Policy and Environment Bureau. Furthermore, together with a road company this company has developed an environmentally-friendly paving material that suppresses road surface temperature increases. This is done by injecting and filling the fine powder from the grinding into gaps in the asphalt mixture. They received a patent in July 2016. Moreover, Kanden Engineering Corporation received the first permit in Japan from the Minister of the Environment in May 2014 for disposal treatment of low-concentration PCBs in discarded electrical equipment by using mobile solvent-based decontamination equipment. It has been conducting safe and economical decontamination treatments that do not require moving or dismantling contaminated equipment. In the future, our corporate group will continue contributing to the realization of a recycling-oriented society.



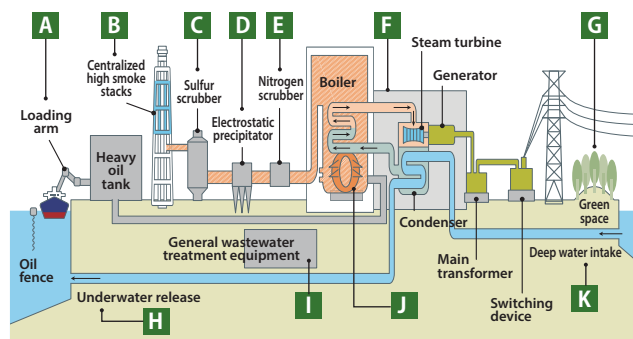
Kanden Engineering Corporation PCB cleaning equipment

Promotion of environmental protection in local communities

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

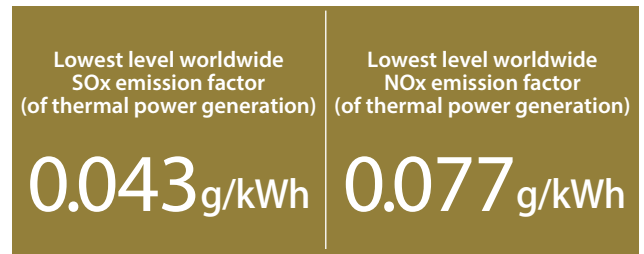
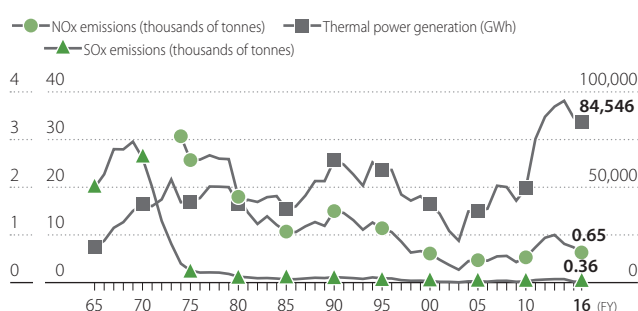


- A** Oil leakage prevention
- B** Ground-level density reduction measures
- C** Removal of sulfur oxides
- D** Removal of dust
- E** Removal of nitrogen oxides
- F** Noise prevention
- G** Afforestation
- H** Heated water discharge measures
- I** Drainage treatment
- J** Low-sulfur fuel
- K** Heated water discharge measures

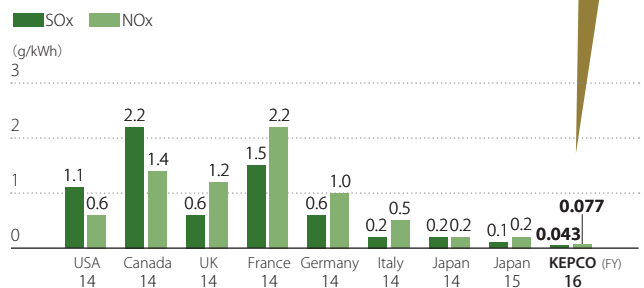
Air pollution prevention measures (SOx, NOx, soot)

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 precipitators that dramatically cut soot emissions.

Thermal power generation and SOx and NOx emissions



SOx and NOx emission factors for thermal power generation of major countries and Kansai Electric Power



Source:
Overseas data: OECD StatExtracts, IEA ENERGY BALANCES 2016
Japan figures: Federation of Electrical Power Companies of Japan (10 electric power companies and Electric Power Development Co., Ltd.)

Handling chemicals

We regularly monitor the status of buildings and equipment that contain asbestos and systematically advance the removal of asbestos and replacement with non-asbestos products. In these ways, we are managing asbestos suitably as we strictly abide by related laws, regulations and other rules.

Moreover, in addition to abiding by the PRTR (Pollutant Release and Transfer Register) Law, we are working to manage toxic chemicals strictly and to reduce them based on our "Guidelines for Managing Chemicals Subject to PRTR."

Scope of use (buildings and facilities) of asbestos (at March 31, 2017)

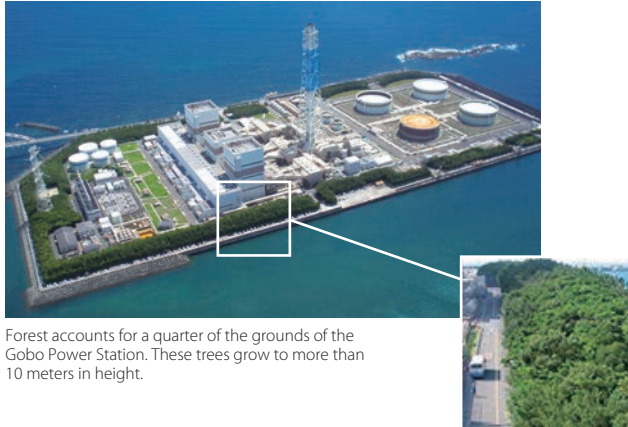
Blown-in materials containing asbestos		Acoustic insulation, thermal insulation, and fireproofing materials in company buildings; acoustic insulation for transformers
Asbestos-containing products	Building materials	Fireproofing panels, roofing materials, and flooring for buildings
	Asbestos-cement pipes	Duct lining for underground lines (transmission, distribution, and communications facilities)
	Thermal insulation	Power generation facilities (thermal power facility, nuclear power facility)
	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

2 Proactive Approach with a View to Creating Ever Better Environment

Conservation of biodiversity

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.



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



Stork building nest on utility pole

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.

Promoting environmental management and environmental communication

Promoting environmental communication

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. 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.



Planting bitter melon with local elementary school students (Higashi Osaka City, Osaka Prefecture)

Environmental communication on our website

In order to have even more customers learn about our company's approaches to efforts for the environment, we are publishing information about our various efforts, starting with reducing carbon for electricity, waste recycling and communication about the environment in each region on our "Efforts for the Environment" web page. We are also releasing content related to environmental education.



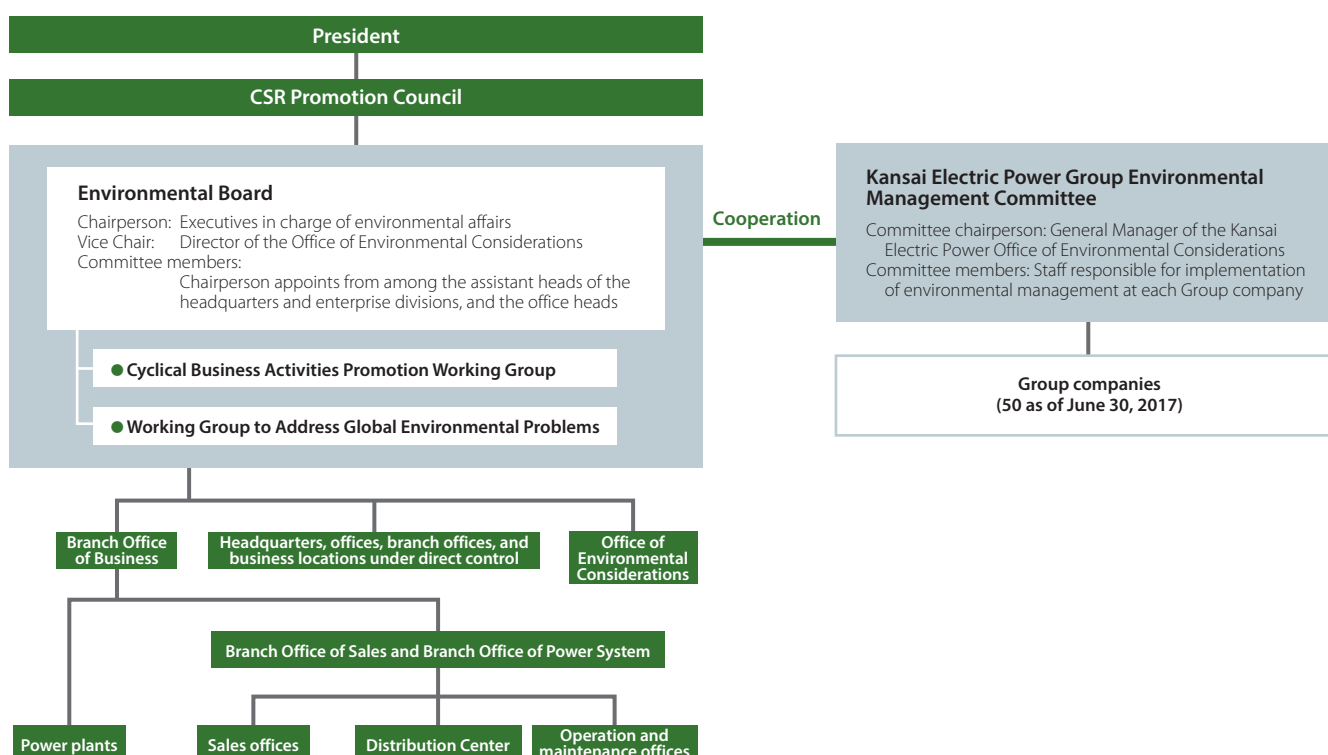
Efforts for the environment web page

Promoting environmental management

Promoting environmental management on a Group wide basis

In our corporate group, our company and our group companies have been unified in efforts to reduce environmental impacts and environmental risks, and we have built environmental management systems that incorporate the approaches of ISO 14001. 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



Eco Action: Kansai Electric Power Group Company Concrete Action Plans

Item	Results for FY 2015*	FY 2016		Evaluation (Reasons for increase/reduction)
		Targets	Results*	
Reducing office electricity consumption	57.8 GWh	Continuing energy conservation efforts	60.5 million kWh (4.7% increase)	At every company, we made efforts to conserve energy in offices, but the total amount used grew over the previous fiscal year due to increased amounts of work, expanded building floor space, the inclusion of more workplaces in the coverage and other factors.
Reducing office water consumption	254,900 m ³	Reduce as much as possible	248,700m ³ (2.4% reduction)	Even though some companies had increased usage due to water service equipment malfunctions, we were able to reduce the overall amount of use from the previous fiscal year thanks to efforts in every company to conserve water in offices.
Improving fuel efficiency of company vehicles	9.05 km/L	Increase as much as possible	9.26 km/L (2.3% increase)	Even though some companies had worse fuel efficiency due to increases in city driving and short travel distances, our fuel efficiency improved compared to the previous fiscal year because each company has strictly enforced the practices of "eco" driving and stopping the engine when idling, as well as adopted vehicles with high fuel economy, for example.
Reducing printer paper consumption	959.2 t	Reduce as much as possible	906.4 t (5.5% reduction)	Even though some companies used more because their work volume increased, the amount decreased compared to the previous fiscal year as a result of thorough efforts at each company, including the use of double-sided copies and other paper reduction efforts.

* The calculation of results covers 42 companies in FY 2015 and FY 2016. Parentheses () show comparisons with the previous fiscal year.

2 Proactive Approach with a View to Creating Ever Better Environment**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. —**Investigations conducted for the protection and management of “Nara deer,” a Special Natural Monument**

The General Environmental Technos Co., Ltd. protects and manages wild animals. They received the task of advancing the protection and management of “Nara deer,” which have been designated a Special Natural Monument and live within Nara Park. Their environmental and civil engineering divisions have coordinated to contribute to the entire project, from site investigations to the creation of a protection and management plan to the installation of fences that deter the deer as a way to manage them. As one of these efforts, they attached GPS data loggers to three female Nara deer that live in Nara Park in order to investigate their behavior. They utilized GPS devices made by NTT DoCoMo for the GPS data loggers, so it is possible to check information about their locations on computers and smartphones. In addition, they used a geographical information system (GIS) to analyze location information so they could clarify daily and seasonal behaviors, making valuable data for advancing the protection of the “Nara deer.”



Nara deer wearing GPS data logger

— Kanden Power-Tech Corp. —**Selling “electrodeless lamps,” an energy-saving light source that lasts even longer than LEDs**

Kanden Power-Tech Corp. has started handling electrodeless lamps, which use an energy-saving lighting technology that can replace LEDs, and is providing this new type of light to customers. “Electrodeless lamps,” as the name suggests, do not have electrodes. Instead, they put an energy-conserving structure into use by creating a space where magnetism can work to efficiently generate light. As a result, they provide energy conservation efficiency equivalent to LEDs. Compared to mercury lamps, they reduce energy consumption about 60%. In addition to being expected to have a high CO₂ reduction effect, they have long lives, so the number of replacements is low and costs can be greatly reduced. Moreover, the soft light produced is easy on the eyes, reducing the negative characteristics of LED light such as having “too much glare” and “dark and unpleasant shadows.” They will continue working to increase the popularization of products that are easy on the environment, starting with energy-conserving products.



Electrodeless lamp