

Kansai Electric Power's Global Environmental Action Report 2002

A Well-Balanced Environmental Today and Tomorrow

Service areas of Japan's ten electric power companies



System Map (As of March 31, 2002)



Legend

- Hydropower station
- Thermal power station (□ including under construction)
- Nuclear power station
- Substation
- ▲ Switching Station
- Converter Station
- 500 kV transmission line
- 275-187 kV transmission line
- X Tie point with other power companies
- Kansai Electric's service area

Outline of Japan's ten major power companies (as of March 31, 2002)

	Capital (billions of yen)	Number of customers (thousands)	Maximum power demand (MW)	Annual power sales (millions of kWh)	Annual revenue from power sales (billions of yen)	Number of employees	System capacity (MW)			
							Hydro	Fossil	Nuclear	Total
Hokkaido Electric Power Co.	114	3,791	5,297	28,848	515	6,275	1,245	3,500	1,158	5,903
Tohoku Electric Power Co.	251	7,567	14,125	72,500	1,289	13,245	2,452	11,451	2,174	16,077
Tokyo Electric Power Co.	676	26,991	64,300	275,540	4,988	40,725	8,519	34,548	17,308	60,375
Chubu Electric Power Co.	374	10,106	27,500	120,858	2,117	18,312	5,213	23,401	3,617	32,231
Hokuriku Electric Power Co.	117	1,973	5,508	24,986	404	5,439	1,812	4,406	540	6,758
Kansai Electric Power Co.	489	12,889	33,060	139,779	2,471	25,567	8,130	17,687	9,768	35,585
Chugoku Electric Power Co.	185	5,144	12,002	53,605	893	11,053	2,884	8,015	1,280	12,179
Shikoku Electric Power Co.	145	2,854	5,925	25,768	458	6,629	1,125	3,730	2,022	6,877
Kyushu Electric Power Co.	237	8,130	17,061	75,327	1,328	14,191	2,371	11,707	5,258	19,336
Okinawa Electric Power Co.	7	758	1,478	6,889	137	1,550	-	1,676	-	1,676
Total	2,599	80,203	182,378	824,100	14,604	141,436	33,752	120,121	43,125	196,998

Message from the President

In this 10th year since the Rio Earth Summit of 1992, Japan has finally begun the real challenge of fulfilling its commitment to reducing greenhouse gas emissions by 6% of the 1990 levels, by adopting a new "Prospectus on the Promotion of Countermeasures to Global Warming" in March and ratifying the Kyoto Protocol in June.

With two oil crises and other trying experiences under its belt, Japan is well ahead of the world in energy conservation today, meaning that the task of attaining the greenhouse reduction target set forth in the Kyoto Protocol will be very difficult. To attain the set target, all members of society -- businesses, residents and governments - must each recognize the role they play and make a concerted effort to reduce the load they place on the environment. Our company, too, must stake an even more aggressive challenge to resolving environmental problems and continue these efforts so as to produce steadfast results.

Kansai Electric has long contributed to the development and prosperity of society by delivering a stable and inexpensive supply of electricity. Additionally, we have always anticipated the demands of the times and made the utmost effort to improve issues of public interest on the national level, to note global environmental problems and energy security. In particular, with regards to global environmental problems, we are safely and stably generating nuclear power and have

aggressively developed a "New ERA Strategy" of comprehensive measures against global warming. As a result of these efforts, we have the lowest level of unit CO₂ emissions (per 1 kWh of energy used) amongst Japan's power companies today.

As for the situation in the electric power industry, the speed of reform has further increased since the partial liberalization of power retailing in March 2000. An onslaught of new players have filed into the marketplace and competition has escalated between differing forms of energy.

As the electric power industry enters a period of all-out competition, Kansai Electric is providing customers with new levels of reliability and satisfaction by meeting their diversity of needs not only with electricity but other products and services of the Kansai Electric Power Group. At the same time, we are strengthening our profitability and corporate structure in an effort to build a "strong company" that will survive the competition.

Despite the drastic changes in our business environment, it is still our duty as an energy company to protect the "environment" and deliver a stable supply of "energy". And, let us add to that our own "economic" viability. Simultaneously achieving these "3 E's" of "environment", "energy" and "economic" viability is the condition placed on our future sustainable development. Fully conscious of our situation, Kansai Electric will pursue the "best mix" of these "3 E's", voluntarily and aggressively address local and global environmental problems, and develop business activities that will help build a recycling-based society, in order to maintain your trust.

This is the 10th edition of our Global Environmental Action Report since its launch in 1993. I sincerely appreciate your understanding and support, and promise that we will continue to constructively provide information in the future in order to gain your further understanding. Please read this report and let us know any ideas or advice you might have.



Yohsaku Fuji
President and Director
The Kansai Electric Power Co., Inc.

A handwritten signature in black ink that reads "Yohsaku Fuji".

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Outline of Global Environmental Action Report

Policy on Environmental Preservation (promotion system)

We have continually worked to strengthen our structure of policies with regard to the environment. Beginning with the adoption of the Five Basic Principles of the Action Plan for Global Environmental Considerations in fiscal 1990, we have since adopted a number of other such codes of practice and specific plans of action. In fiscal 2001 we adopted the Eco Action plan as a concrete action plan and are continuing to work toward environmental preservation.

In 1995, in particular, we adopted the New Era Strategy as a set of measures against global warming, to which we are taking a comprehensive approach.

Environmental Protection Targets and Performance

The Eco Action plans basically set numerical targets from the perspective of reducing emission of greenhouse gases and effectively utilizing energy. Performance is then reflected on targets set for ensuing years and activities are improved accordingly. Kansai Electric also is working hard to develop and upgrade our environmental accounting as a tool for obtaining the best quantitative understanding of our overall environmental load and implementing efficient and effective environmental measures.

Environmental Management

The company has always worked to educate its employees so that we would be able to conform to the ISO14001 standard, and we are constantly making every effort to strengthen our internal system of environmental management and to be able to conform to the ISO14001 standard based on the concept of TQM (Total Quality Management). We are also working to communicate with all our stakeholders through various publications such as this.

Response to Global Environment Problems

We are promoting our New Era Strategy as a comprehensive set of measures on dealing with global warming problems. Our operations are centered on electricity produced by nuclear power. At the same time as reducing the production of greenhouse gases during the process of supplying energy, we are also working toward the more efficient use of energy throughout society as a whole. Such efforts are being made both at home and abroad.

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Response to Local Environment Problems

We are also working toward regional environmental preservation. While continuing to take measures to prevent air and water pollution, we are also responding by targeting new problems as they arise such as the adoption of measures toward chemical substances.

Projects and Activities for a Recycling-Based Society

Kansai Electric is aggressively promoting the 3 R's initiative and green purchasing in all areas of operation. We are also searching for the best waste handling and treatment solutions from waste generation to final disposal. Recycle rate for fiscal 2001 is a high 87%.

Our Relationship with Society

We are working toward preservation of the environment through exchange and coordination with the people of each area and various organizations. Our aim is to 'Live In Harmony with Local Society'. Therefore, apart from considerations of environmental preservation, we are also concerned with the revitalization of regional areas themselves, care for the aged and work with the physically challenged.

We are also working to create a work environment in which each and every employee will be keen on their work and where they will spontaneously feel the desire to make a contribution to society.

Activities of Kansai Electric Group

Here, at the Kansai Electric Group, we host conferences aimed at enabling various people to share information. These people have been selected from the various companies within the group to sit on the promotion staff of the Related Company for Global Environmental Project. We publish and offer material on what various companies within the group are doing with regard to eco-business in our Eco-Business News. In this and other ways, we are promoting and supporting work toward environmental preservation throughout the entire group.

Environmental protection is an important business topic of the Kansai Electric Group and we are developing activities for that as a group.



Overview of Kansai Electric

Company Name: The Kansai Electric Power Company, Incorporated

Headquarters: 3-3-22 Nakanoshima, Kita-ku, Osaka, 530-8270
TEL: 06-6441-8821
<http://www.kepcoco.jp/>

Date of establishment: May 1, 1951

Capital: 489,320 million of yen (As of March 31, 2002)

Chairman of the Board of Directors: Yoshihisa Akiyama

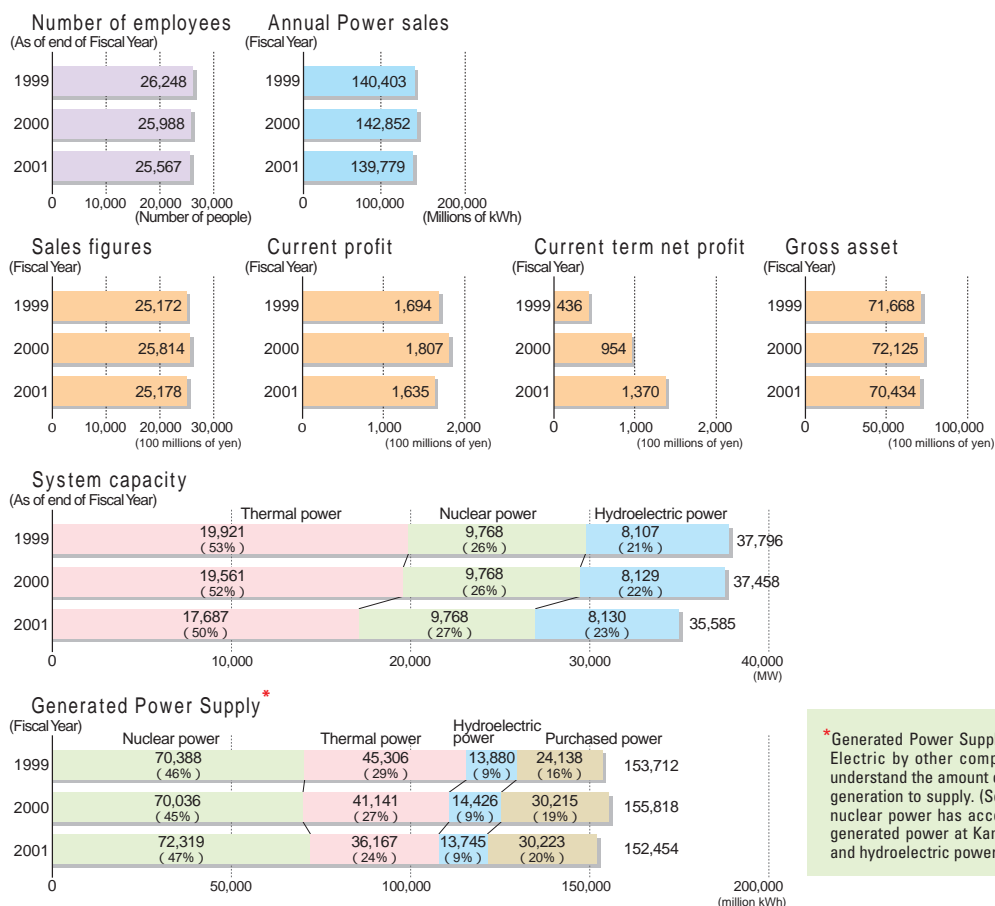
President and Director: Yohsaku Fuji

Business: Electric power industry

Kansai Electric's Service Area: Osaka Prefecture, Kyoto Prefecture, Hyogo Prefecture (excluded in Fukuura, Akou City), Nara Prefecture, Shiga Prefecture, Wakayama Prefecture, Mie Prefecture and portions of Gifu Prefecture and Fukui Prefecture

Japan has ten major private electric utility companies which operate independently. Each company produces and distributes electricity to a specific geographical region of Japan. Kansai Electric's service area is located in the central part of the main island Honshu and covers 28,700 km² (8% of Japan's total land area). This region, generally known as Kansai, includes Osaka, Kyoto, and Kobe and has a population of 21 million, accounting for 16% of the nation's total.

Since its establishment, Kansai Electric has emphasized the development of power sources to meet electricity demand, which has increased with the growth of the Japanese economy. As of March 31, 2002, the company's capacity for hydroelectric power is 8,130 MW, thermal power 17,687 MW, and nuclear power 9,768 MW, making the total capacity 35,585 MW, which is 16 times larger than the initial figure of 2,284 MW in May 1951, when we began operation. Electricity sold in fiscal 2001 amounted to 139,779 million kWh, accounting for 17% of the total power sold in Japan, or the second largest amount in Japan, following the Tokyo Electric Power Co., Inc.



*Generated Power Supply contains power supplied to Kansai Electric by other companies in order to make it easier to understand the amount of power delivered to customers, from generation to supply. (See pg. 12.) In each of the listed years, nuclear power has accounted for more than 50% of all self-generated power at Kansai Electric (total of nuclear, thermal and hydroelectric power excluding purchased power).

Management Policy

Mid-Term Management Policy - In order that "customers will choose the Kansai Electric brand"

In order to adapt to the circumstances following the start of partial liberalization in the power retailing market, Kansai Electric adopted a Mid-Term Management Policy in April 2000 that will guide the company over the ensuing five years. In line with this Mid-Term Management Policy, Kansai Electric will continue to innovate business on our existing know-how, technology and human resource foundations and seek new ways to grow in the 21st century, in order that "customers will choose the Kansai Electric brand".

Our Underlying Principle of Business

Business at Kansai Electric is strongly rooted in the principles of coexistence and co-prosperity. This is why we have always sought to increase our value as a company on a base of customer trust and satisfaction. Those ideals hold as true as ever as we plot a path of future growth and development. Accordingly, in this age of heightened competition in the energy market, we will continue to stand by our belief that "the customer comes first" and strengthen our commitment to the customer by injecting "competitiveness" into all operations.

In the half a century since our founding, Kansai Electric has contributed to the prosperity of society by providing a stable supply of high quality energy. We have also addressed issues of national interest, to note energy security and global environmental problems, with an energy mix of half nuclear power generation. Now, within a framework of partial liberalization, we will continue our response to these issues, while working harder to build a business based on fairness and transparency. We want to grow as a company that customers and investors can trust and will choose.

Important Areas of Action

1

Strengthening products and services

- (1) Increase efforts to raise the level of customer service.
- (2) Build and develop a product menu to meet diversified needs of customers.
- (3) Develop competitive electric equipment.
- (4) Promote efforts to deliver a stable supply of good electricity to customers.
- (5) Promote business activities of low environmental load.
- (6) Quickly adapt to technological innovation such as decentralized power sources.
- (7) Strengthen brand strategy.

2

Increasing sales strength

- (1) Ensure the safety of nuclear power.
- (2) Gain greater understanding of nuclear power generation.
- (3) Establish a nuclear fuel cycle.
- (4) Secure locations for new power plants.

5

Dealing firmly with issues of public interest, particularly those related to nuclear energy (i.e., global environmental problems, energy security, etc.)

3

Strengthening cost competitiveness

4

Strengthening of overall power as a group

Business Restructuring and Personnel Development for Policy Promotion

- 1 Promote business restructuring through IT use.
- 2 Promote autonomy in business management.
- 3 Develop personnel to think and act voluntarily and responsibly.
- 4 Create a lively work environment.

Reaching for Higher Targets

Since 2000, Kansai Electric has been strengthening company environmental protection activities through a new environmental-specific action plan -- Eco Action. Eco Action is based on the Five Basic Principles of the Action Plan for Global Environmental Considerations that outlines our environmental policy and the Global Environmental Action Plan that lays out our plan of action.

Under Eco Action 2001, we voluntarily and aggressively developed activities in all areas of the company and resultantly attained the targets we had set for ourselves at the beginning of the year.

Here below are some feature activities from fiscal 2001.

Feature Activities from Fiscal 2001

1. ISO14001 acquisition

pg.19

Our efforts to improve our environmental management systems were objectively evaluated, resulting in ISO14001 external certification for the Sakaiko power station and 5 other plants.

2. Improved environmental accounting

pg.14

Performance in fiscal 2001 was tabulated based on the 2000 Environmental Report Guidelines of the Ministry of the Environment and, for the first time, environmental efficiency was assessed from the relationship of environmental performance and financial performance.

3. Reduced CO₂ emissions

pg.27

As a result of our New Era Strategy * with its core of nuclear power promotion, source CO₂ emissions per power consumption (sold) were 0.26 kg-CO₂/kWh, the lowest of Japan's power companies.

*For more information on our New Era Strategy, see pg. 27.

4. Support for the Kansai Green Power Fund

pg.35

Kansai Electric constructively supported the Kansai Green Power Fund that aims to promote the spread of wind and solar power generation, with aid for the 4,500 kW Taikoyama wind power farm in Kyoto Prefecture and 5 solar power plants for a total capacity of 100 kW.

5. New overseas undertakings to prevent global warming

pg.48

As early projects for the future Kyoto Mechanism *, Kansai Electric newly took part in an efficiency improvement project for the Garbadani Power Plant in Georgia ("basic studies for joint project implementation" sponsored by the New Energy and Industrial Technology Development Organization [NEDO]) and a rehabilitation project for the Binga Hydropower Plant in the Philippines ("studies of global environment and plant rehabilitation project" sponsored by the Japan External Trade Organization [JETRO]).

Also, on consignment from the overseas consortium CCP (CO₂ Capture Project), Kansai Electric started research at our Nanko power station into higher efficiency oil extraction by CO₂ pumping (into oil fields), using decarbonization technology jointly developed with Mitsubishi Heavy Industries.

Furthermore, we signed the "Institutional Transfer and Technical Consulting services for Hydropower Development Project" agreement with Myanmar Electric Power Enterprise, as hydro power is being developed to help in the prevention of global warming.

*For "the Kyoto Mechanism" see pg. 94

6. Recycle promotion

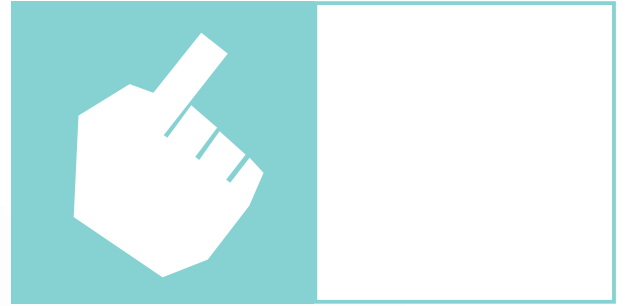
pg.66

To help promote the evolution of a recycling-based society, Kansai Electric formed a Recycle Activity Promotion Committee that is working to purchase green products and promote a "3 R's" -- reduce, reuse and recycle -- waste initiative by setting cross-company targets for office supplies, etc.

Our business environment has become even harsher with market liberalization and other advents, yet, without giving into circumstances, we will continue to set higher targets for ourselves and improve our activities, in order to maintain the trust of our customers.

Kazuo Sato
Vice President and
Chairman of the Nuclear Power and
Global Environment Committee





Policy, Targets and Performance in Environmental Protection

Kansai Electric continues to improve company environmental protection activities through voluntary targets and self-restraint, based on the Five Basic Principles of the Action Plan for Global Environmental Considerations.

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Environmental Policy and Action Plans

Kansai Electric's most fundamental management policy has always been to contribute to the development and prosperity of the local communities.

As part of this commitment, we have undertaken a range of measures to address environmental issues in our service area, with particular attention to the needs of each community.

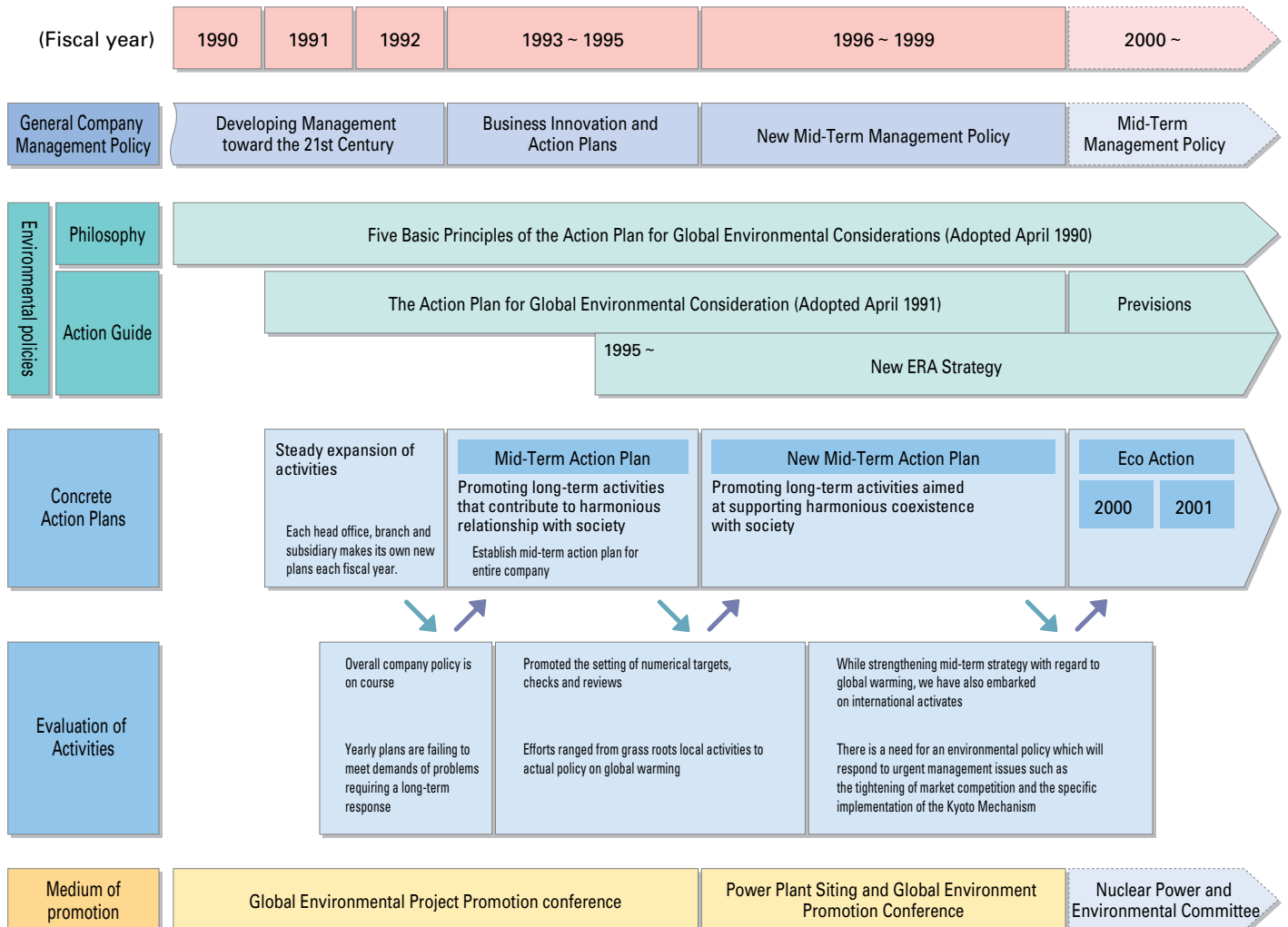
Recently, environmental problems causing worldwide damage - global warming, acid rain, ozone layer depletion, vanishing tropical rain forests, and the spread of deserts - have clearly become a serious concern. These global

environmental problems are presenting a new challenge to modern civilization. To effectively address them will require integrated international effort.

Not only technological measures, but changes in many areas, such as social awareness and consumer lifestyles, need to occur on a global scale. In order to achieve sustainable world development, which will require both economic development and global environmental preservation, it is vital for us as global citizens to "think globally and act locally" in our communities.

Realizing that it has an important responsibility as an electric utility and energy supplier, Kansai Electric is strongly committed to supporting global environmental preservation while working to make people's lives more comfortable. In this respect, we are continually studying advanced measures for environmental protection and ways to integrate these into all aspects of our operations. Our policy is to begin by immediately taking action wherever there is something that can be done.

Changes Up to Now



This action has taken concrete form in efforts such as our Five Basic Principles of the Action Plan for Global Environmental Considerations, which we drew up in April 1990, and the Kansai Electric's Action Plan for Global Environmental Considerations of 1991. Both of these outline the environmental protection policies that we follow in all areas of our business.

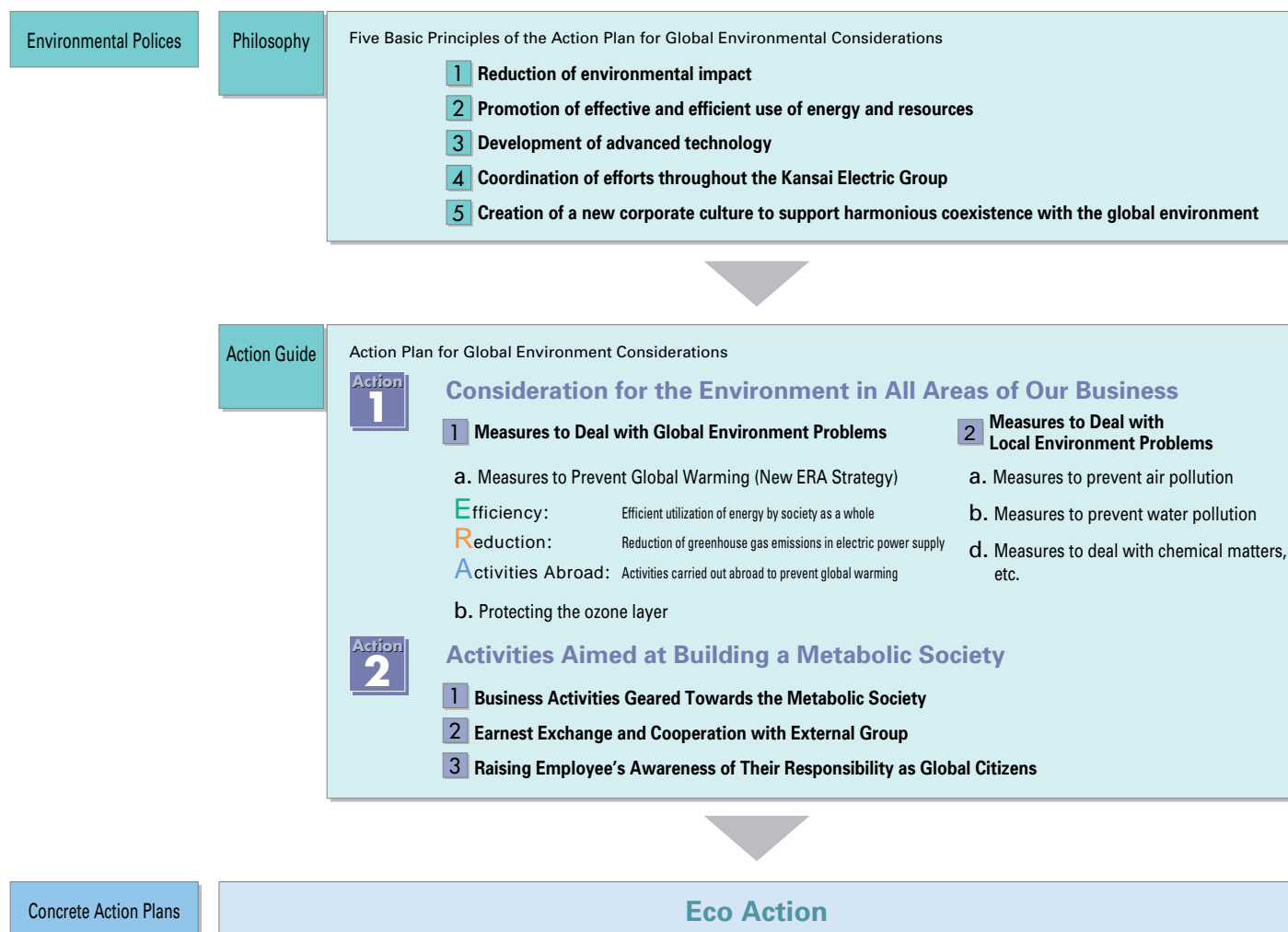
To further boost our efforts, in fiscal 1993 we created the Mid-term Action Plan for Global Environmental Considerations (fiscal 1993-1995), which outlines concrete action plans based on concrete numerical goals. This plan and the

New Mid-term Action Plan for Global Environmental Considerations (fiscal 1996-1999), created in fiscal 1996, have guided our environmental protection efforts to the present.

Owing to major changes in the management environment, such as the partial liberalization of retail energy sales starting in March 2000, we revised the Kansai Electric Action Plan for Global Environmental Considerations in fiscal 2000. At the same time, we created a new plan of action with three-year rolling targets to be set annually, Eco Action. This will replace the old Global Environmental Mid-Term Action Plan.

With Eco Action, we are voluntarily and aggressively challenging environmental problems so as to maintain the trust of everyone.

System of Environmental Measures





Outline of Eco Action (Companywide action plan)

Item		Results of Eco Action 2001			
		Result	Goals	Performance evaluation	
Reduction of Greenhouse gas	Reduction of CO ₂ emissions per unit of power consumed (sold)	0.26kg-CO ₂ /kWh	Approx. 0.3kg- CO ₂ /kWh (Forecast)	Reduced unit CO ₂ emission per power consumed (sold) by efficiently using nuclear power generation.	
	Improving capacity factor of nuclear power stations	84.5%	More than 80%	Used nuclear power facilities extensively by ensuring safety and reliability, and working hard to increase work efficiency. Also, introduced constant cycling at rated thermal output.	
	Maintaining and improving thermal efficiency of thermal power stations	42.2%	More than 42%	Increased allocation of high heat efficient combined cycling to improve overall thermal efficiency. Also, improve operation with older plants such as by shortening firing time, in order to maintain and improve heat efficiency.	
	LNG use (the ratio of LNG to thermal fuel)	5,290,000 t	Approx. 5,000,000t (consumption)	Attained target. Future targets should be raised to increase percentage of LNG amongst thermal power fuels.	
	Output expansion through hydro power station renovation (kW)(Total from fiscal 1989 to present)	30,452kW	30,452kW	Increased output 700 kW by refurbishing in line with designs. Future design will be updated in line with demand.	
	Reduction in overall loss (losses in generation, transmission and distribution)	8.3%	Reduce as much as possible	Same level as last year	
	SF ₆ gas exhaust control (Rate of Recovery of Gas on Inspection of Apparatus)	96.4%	Approx. 90%	Attained high recovery rate owing to effective projects. Will work to maintain high rate in future and will review annual target if needed.	
Efficient use of energy	Leveling off peak load	Increase number of (Happy plan, etc) contracts	151,000 Contracts	140,000 Contracts (time period-based contracts)	Attained target number of time period-based contracts. Will work to gain more electric housing ("Happy plan", etc.) contracts.
		Increase number of (load heat storage adjustment) contracts	4,697 Contracts	5,000 Contracts	Revised target downward. Will develop schemes to spread use and reach target in 2002 and beyond.
		Promotion of peak-cut-type equipment	235,000 Units	250,000 Units	
	Introduction of electric vehicles		173 Units	177 Units	Abandoned plans with some vehicles because of maintenance problems, thus revised target downward. Will study more effective ways of promoting environmental considerations with vehicles in the future.
	Use of untapped energy sources		11 Districts	11 Districts	Started supply to 1 customer in 2001.
	Cooperation in helping spread the use of new energy sources	Photovoltaic power generation	19,000,000 kWh	We will contribute to the spread of new sources of energy by purchasing excess electricity generated by photovoltaic power, wind power, and the burning of waste material	Increased number of contracts by about 3,800 over previous year to about 11,800.
Wind power generation		2,000,000 kWh	Added 2 new contracts for 3 total.		
Power generation using waste materials		548,000,000 kWh	Added 1 new contract for 26 total.		
Reduction of SO _x and NO _x emissions per power generation	SO _x	Our company: 0.01 g/kWh (Thermal: 0.04 g/kWh)	Maintaining at current reduced level	Reduced source unit emission with greater use of LNG units than previous year. Will work to maintain level in the future.	
	NO _x	Our company: 0.04 g/kWh (Thermal: 0.13 g/kWh)	Maintaining at current reduced level	Will work to maintain level in the future.	
Improving recycling rate of industrial wastes		87%	More than 90%	Revised target downward, but outperformed previous year. Will continue examining ways to improve recycle rate. Reduced discharge by about 7,000 ton from previous year.	
Usage rate of 100% recycled copy paper		100%	100%	Continued using 100% used copy paper at all business sites.	
Increasing installations of Systems Conforming to ISO standards (in total)		20 Districts	Order in Increase in Number of Places Conforming to Standard	Shut down 3 thermal power plants last year, but added Ohi, Tanabe, Himeji and Kurobegawa for total of 20.	
Development of 100,000 People's Eco-Family Campaign		Implemented in all locations	Voluntary activities carried out at each location (items decided voluntarily, with efforts made to achieve over 70% of targets set)	Increased voluntary activities in all locations.	

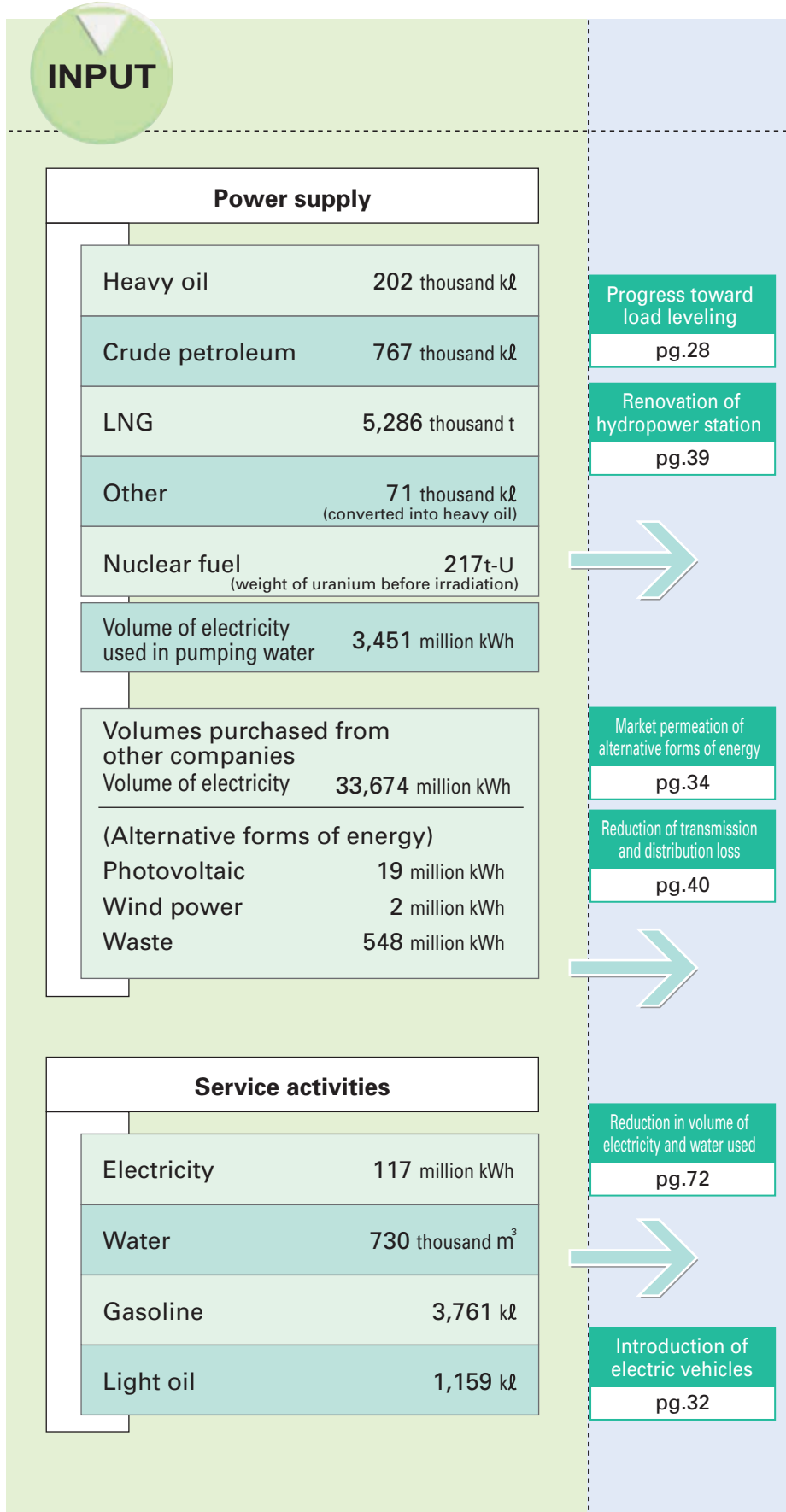
Eco Action 2002 (3 Years of Eco Action and Mid-term Action Plan for or Global Environmental Considerations)				See page
Fiscal 2002	Fiscal 2003	Fiscal 2004	Goals and plans of action set for the fiscal year 2010	
Approx. 0.3kg- CO ₂ /kWh (forecast)			In order to achieve the targets set for the electricity industry as a whole (bringing levels of CO ₂ down to 0.3kg- CO ₂ /kWh per unit of power consumed by the fiscal year 2010), we have set our own target to this level. We are now promoting our New ERA Strategy aimed at maintaining and exceeding this target.	pg.27
More than 85%			We will gradually introduce steady cycling at rated thermal output from fiscal 2002, aiming at 85% or more of nuclear power utilization rate.	pg.36
More than 42%			We will maintain a thermal efficiency of above the current target of 42%.	pg.38
More than 85% (LNG ratio)			While reducing the amounts of electricity produced through burning of thermal fuels, we will make efforts to heighten the ratio of LNG thermal fuel used, which is excellent from the point of view of the environment.	pg.39
33,872kW	35,172kW	39,072kW	We are continuing to overhaul our hydropower stations, and are planning to achieve an increase in output amounting to 41,672kW by the fiscal year 2006.	pg.39
Reduce as much as possible			We are making the utmost effort to reduce loss in the layout and running of all our facilities.	pg.40
94%	95%	96%	Improve 97% target of electric power industry by 2005.	pg.43
200,000 Contracts	250,000 Contracts	300,000 Contracts	Will work to increase number of all-electric housing ("Happy plan", etc.) contracts with new menu plan. Develop effective schemes and increase number of contracts.	pg.28
5,600 Contracts	6,600 Contracts	7,600 Contracts		
280,000 Units	292,000 Units	—————		
Approx. 170 Units			Assess and study introduction of vehicles that reduce environmental load including hybrid and low emission vehicles (LEV), in addition to electric vehicles.	pg.32
11 Districts	11 Districts	12 Districts	We will continue to promote constructive PR and proposal activities in line with regional development.	pg.33
Purchase of excess electricity produced by solar power, wind power and waste and cooperation with the work of the Kansai Green Electricity Fund.			Contribute more to promotion of new energy sources through voluntary development in line with Special Measures for Use of New Energy Sources in the Electric Power Industry (RPS Law).	pg.34
SOx: Maintaining at current reduced level (Reference: An average for the five-year period from fiscal 1997-2001 Our company: 0.03g/kWh Thermal: 0.08g/kWh)			We maintain at current reduced level.	pg.55
NOx: Maintaining at current reduced level (Reference: An average for the five-year period from fiscal 1997-2001 Our company: 0.05g/kWh Thermal: 0.15g/kWh)			We maintain at current reduced level.	pg.56
More than 90%			Further promote 3 R's (reduce, reuse and recycle) waste initiative to attain zero waste target in mid to long term.	pg.66
100%			We will continue to implement our policy of using 100% recycled paper for use as copy paper at all our places of business.	pg.71
Order in Increase in Number of Places Conforming to Standard			We plan to strengthen our environmental management system.	pg.19
Voluntary activities carried out at each location			We need to increase awareness with regard to the environment. We shall revise our activities in this area.	pg.79



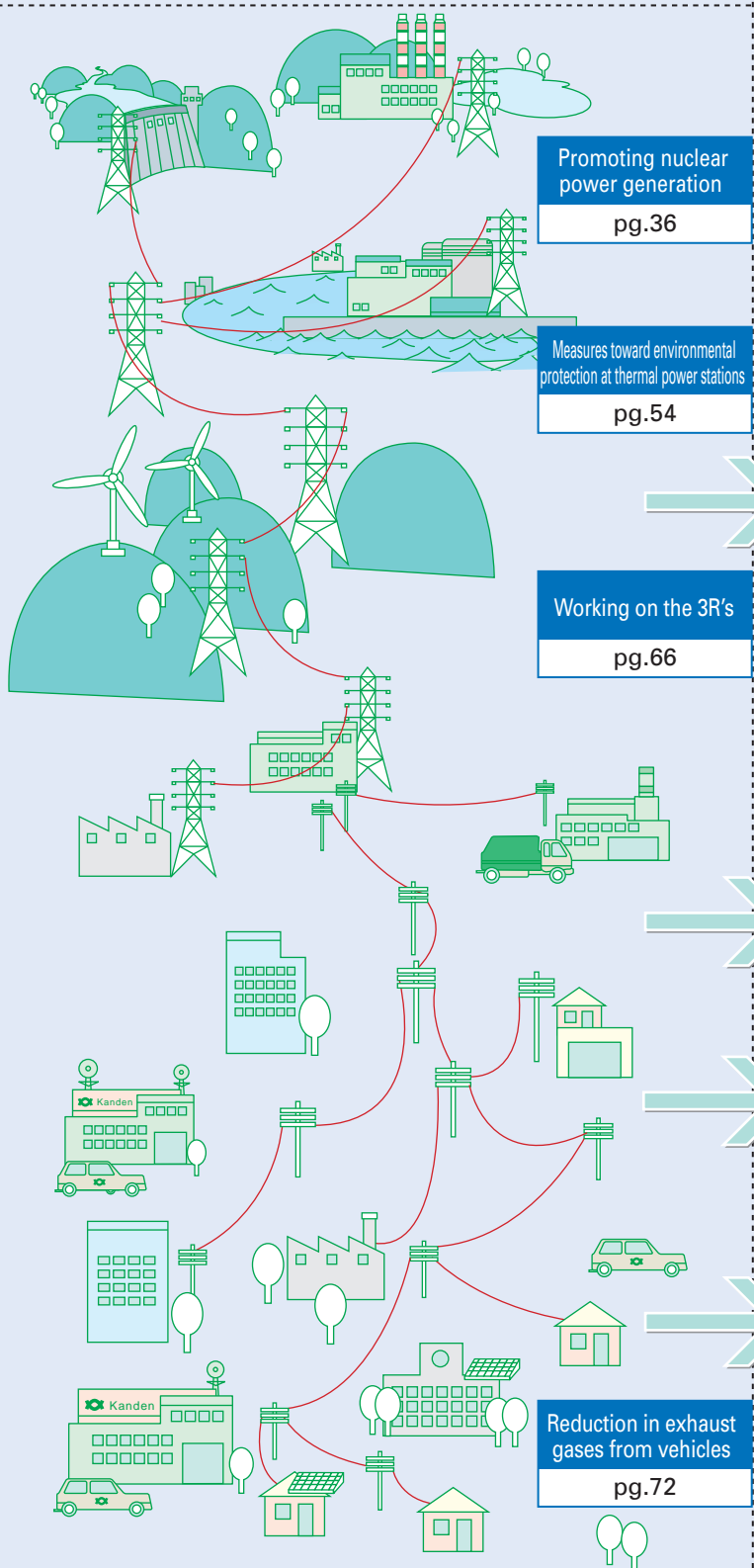
Environmental Load

We are to deliver electricity to our customers. Therefore in order to produce good quality electricity, we have to consume various types of fuel at our power stations (input). In providing services to our customers, we also consume gasoline in our vehicles and electricity and water in our offices. These are all limited resources and we do our best to use them wisely by undertaking various measures to keep the amount of CO2 and other types of industrial waste (output) produced as a result of our business activities down to the absolute minimum.

To help us in our efforts to obtain real reductions in environmental impact in all our areas of business, we have built up a general picture of the load our operations exert on the environment. As far as possible, we have tried to obtain a quantitative picture in order to better grasp and understand the situation.



Main Areas of Effort toward Reducing Load on Environment



OUTPUT

Power supply	
Volume of electricity produced	122,231 million kWh
CO ₂	36.88 million t-CO ₂
SO _x	1,438 t
NO _x	4,801 t
Volume of industrial waste	64 thousand t
Volume recycled as new resource	53 thousand t
Volume used for reclamation	2 thousand t
Volume of thermal energy harvested	2 thousand t
Reduction in volume treated mid-process	2 thousand t
Final volume processed	7 thousand t
Volume of low-level radioactive waste *1	3,545 (200 liter drums)
Volume of high-level radioactive waste *2	62 (classification)
Volume of internal consumption and transmission/distribution loss	12,675 million kWh
Service activities	
Volume of electricity sold	139,779 million kWh
Volume of CO ₂ emissions from use of vehicles	11,750t-CO ₂

*1 Net amount produced (Produced amount - Reduced amount)
*2 The number of barrels from this company accepted at Rokkasho village, high-level radioactive waste disposal plant in Aomori prefecture in the fiscal 2001.



Environmental Accounting

Kansai Electric introduced environmental accounting in 1999 in order to quantitatively identify the cost and effectiveness of environmental protection efforts. The ultimate aim is not only to publicize results but also to promote more efficient and more effective environmental protection activities.

Important Matters That Act as the Basis for Conducting Environmental Accounting

1 . Base conditions of computations

- | | |
|-------------------|---|
| (1) Target period | One fiscal year from April 1, 2001 to March 31, 2002. |
| (2) Scope | All business activities and operations at Kansai Electric |

2 . Criteria for calculating environmental protection cost

- | | |
|---|---|
| (1) Method for calculating depreciation | Depreciations are not included in audits so as to avoid duplicated investment figures. |
| (2) Criteria for composite spending | Environmental protection costs are sampled in the following order. [1] Balance computation [2] Pro rate calculation based on rational criteria [3] Pro rate calculation based on simplified criteria. Costs for buried cable infrastructure included in III-3. Natural Environment Protection and Harmonization Costs are calculated as 50% of actual cost, because the purpose of burying cables is to maintain scenery and ensure supply. |

3 . Criteria for calculating environmental protection effect

- | | |
|-----------------------------------|--|
| (1) Scope of target effect | The effect on environmental load and waste generated from our primary business activities (electricity production, distribution, sales and service activities) |
| (2) Method for calculating effect | In principle, the environmental protection effect is calculated by a simple comparison against a reference term, that being the previous term. |
| (3) Basis of units | Total effect. Individual units are recorded also with CO ₂ , SO _x and NO _x |

4 . Criteria for calculating economic effect of environmental protection activities

- | | |
|--|---|
| (1) Scope of target effect | Real effect based on solid proof. Does not include estimated effects based on hypothetical calculations. |
| (2) Method for calculating economic effect | |
| [1] Revenue | Financially accountable revenue earned from environmental protection measures is included in audits. |
| [2] Cost cutting | Results of environmental protection measures are compared against the inevitable if those same measures were not implemented, and are included in accounting. |

5 . Other

- | | |
|---------------------------------|--|
| (1) Guidelines to conform by | In principle, calculations for environmental accounting conform to the 2002 Environmental Accounting Guidelines of the Ministry of the Environment, with some considerations being given to the nature and characteristics of the electric power industry in determining categories, etc. |
| (2) Other important information | There are diverse thoughts on how to sample environmental protection costs in regards to nuclear power generation. At present, because it is necessary to carefully conduct environmental accounting, the full amount of individual environmental measures (radiation control and measuring, treatment of radioactive waste, planting projects, etc.) are recognized and included in accounting. |

Results from 2001 Accounting

The environmental balance for 2001 showed ¥38.0 billion in investments and ¥42.9 billion in outlays. Investment increased a total of ¥5.6 billion over the previous year because a larger investment was made in pollution prevention equipment on account of construction projects for new thermal power stations. Outlays decreased a total of ¥1.5 billion from the previous year because of a reduction in maintenance (repair) costs for pollution prevention equipment, which owes to different thermal power stations being either temporarily or permanently shut down.

As for environmental protection effect, CO₂ emissions for both Kansai Electric-produced power and power purchased from other companies declined 2.66 million t-CO₂, while SO_x and NO_x emissions for Kansai Electric-produced power only fell respectively 1,396 t and 1,322 t against the previous year. This is because we generated more electricity by nuclear power generation and less by thermal power generation than the previous year.

The economic effect from environmental protection efforts fell ¥800 million against the previous year.

Improvement of Our Environmental Accounting

Kansai Electric continues to examine ways to conduct environmental accounting with nuclear power generation, as this power source is environmentally effective especially with regards to global warming not to mention important towards energy security. We want to improve both the accuracy of our environmental accounting and its effective use as a business management tool. We are also looking at the costs and effects of environmental protection activities of the Kansai Electric Group so as to gradually include them in our accounting. Studies will be launched into testing and eventually introducing an environmental accounting system for the entire group.

Environmental protection costs

Units: 100 million yen

Field	Main items	Amount invested		Expenses	
		Fiscal 2000	Fiscal 2001	Fiscal 2000	Fiscal 2001
. Cost of environmental management				53.4	46.8
1. Environmental management	Compilation of environmental reports, internal education on the environment, obtaintment of external ISO certification			0.7	0.8
2. Environmental advertising	Monthly events related to the environment, PR work on saving energy			2.8	1.5
3. Labor costs				49.9	44.5
. Cost of measures against global warming	Purchase of excess electricity from new energy sources, measures toward increasing thermal efficiency at existing thermal power stations	20.3	1.4	5.6	7.4
. Cost of conservation of regional environment		274.1	363.9	273.0	267.8
1. Monitoring and measuring environmental impact	Management of measuring levels of radioactivity, research and measurement of environmental concentrations	4.9	8.4	24.4	20.5
2. Preventing pollution	Measures for preventing air pollution (measures for extracting sulfur and nitrogen), measures to prevent water contamination	79.5	179.2	187.0	194.9
3. Protecting nature and harmonizing with environment	Underground maintenance, greening	189.7	176.3	61.6	52.4
. Cost of building a metabolic society		25.7	8.7	67.9	65.1
1. Disposing of and recycling industrial waste	Processing of industrial waste	0.9	2.7	12.9	13.0
2. Disposing of and recycling general waste	Subcontracting recycling of old paper			0.3	0.3
3. Processing radioactive waste	Processing radioactive waste	24.7	6.0	54.0	51.3
4. Green purchasing	Effective use of insulation material scrap in paving, use of recycled road base material	0.1	0.0	0.7	0.5
. Cost of technological development	Measures against CO ₂ and Waste Disposal	0.6	0.4	29.2	26.3
. Other		3.5	5.8	15.3	15.5
1. Living in harmony with local environment and education on environment	Co-sponsorship for groups and events related to environmental conservation			3.3	4.9
2. International efforts	Donations to overseas environmental funds	3.5	5.8	0.3	
3. Environmental subsidies and donations	Levies on pollution levels			11.7	10.6
Total		324.2	380.2	444.4	428.9
Total investment during the related period		4,790	4,105		
Total running cost during the related period				22,453	22,061

Effect of environmental protection activities

Field	Items (unit)	Fiscal 2000(A)	Fiscal 2001(B)	Results(B-A)	Details	Reference page	
. Environmental management	Premises that have received external ISO certification (number)	3	6	-	11 (Total)	pg. 19	
. Measures for global warming	CO ₂ emissions (10,000t-CO ₂) <emissions per unit of power (kg-CO ₂ /kWh)*>	3,954 0.28	3,688 0.26	266 0.02	Compared to fiscal 1990 572 0.09	pg. 27	
. Regional environmental conservation	Prevention of air pollution	SO _x emissions (t) <emissions per unit of power (g/kWh)*>	2,834 0.02	1,438 0.01	1,396 0.01	Compared to fiscal 1990 9,805 0.08	pg. 55
		NO _x emissions (t) <emissions per unit of power (g/kWh)*>	6,123 0.05	4,801 0.04	1,322 0.01	Compared to fiscal 1990 10,246 0.08	pg. 56
	Harmonizing with environment	Extension of underground electric cable (km)	300	186	-	12,550 (total)	pg. 62
	Grid extension (in thousands of km ²)	13	46	-	4,116 (total)	pg. 60	
. Building of metabolic society	Introduction of electric vehicles (number of vehicles)	177	173	-	-	pg. 32	
	Emissions including industrial waste (thousand t) <percentage of reuse as resource(%)>	71 84	64 87	7 3	-	pg. 66	
	Low-level radiation solid waste (200-liter drums)	2,944	3,545	-	114,750 (total)	pg. 74	
. Other effects	Planting of trees (units of 10,000)	3.0	2.9	-	29.4(Since fiscal 1993)	pg. 79	
	Beautification activities (no. of cases)	1,521	1,027	-	5,301(Since fiscal 1996)	pg. 79	

*CO₂ emission intensity per used (sales) power, SO_x and NO_x emission intensity per power generation

Economic effect of environmental protection measures

Units: 100 million yen

Field		Main items	Fiscal 2000	Fiscal 2001
Profits	Income from recycling	Flue gas desulfurization plaster	0.1	0.0
	Other	-	0.3	
Costs saved	Costs saved from energy conservation	Measures to improve the thermal efficiency of thermal power stations*	120.0	111.2
	Costs saved from things like reuse and recycling	Reuse of things like transformers	47.0	46.8
	Other	Levies saved on pollution levels		1.5
Total			167.4	159.5

*With respect to the thermal efficiency of thermal power stations, the reduction in fuel costs for the corresponding year was calculated from the improvement in thermal efficiency derived by adjustment for the base year for environmental protection effectiveness (CO₂, SO_x, NO_x) and comparison with the fiscal year 1990.



Eco-Efficiency Assessment

What is Eco-Efficiency?

For the sustainable development of a company, a company must reduce its environmental load while increasing profitability at the same time. This relationship between environmental performance and financial performance can be expressed as the "Eco-Efficiency" proposed by the World Business Council for Sustainable Development (WBCSD).

Formula

$$\text{Eco-Efficiency} = \text{Value of products and services}^{*1} \div \text{Environmental impact}^{*2}$$

"Generally applicable" index

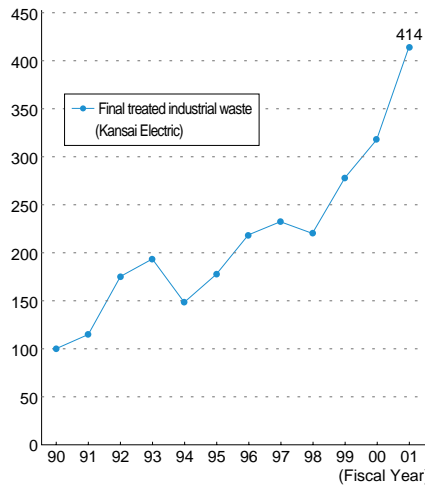
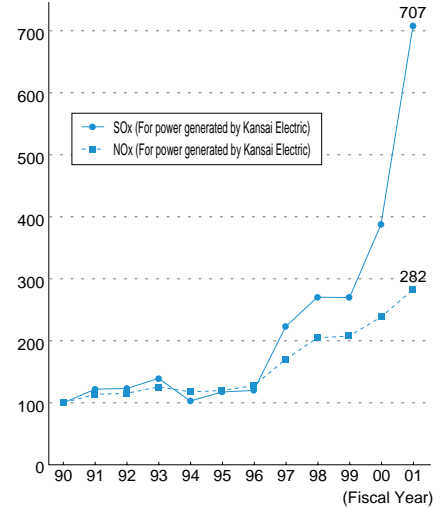
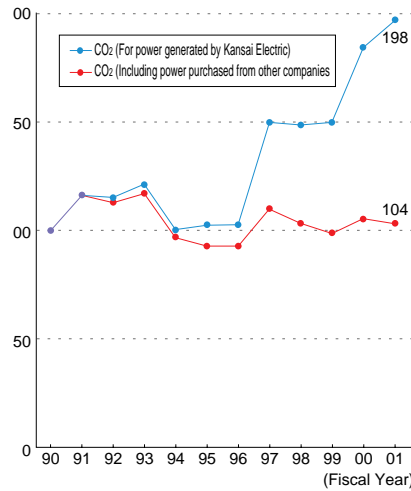
*1 Amount of products, amount of services offered, sales, earnings

*2 Amount of energy consumption, amount of greenhouse gases emitted, amount of pollutants emitted, amount of waste discharged

Along this line of thinking, Kansai Electric devised a formula for expressing the relationship between the environmental load generated by our business activities and the economic value of our business activities (profits), or in other words, the economic profit per unit environmental load.

Because of the nature of our business, in order to calculate environmental load, we look at the amount of CO₂, SO_x, NO_x and waste. And, to calculate economic profit, we use the operating profits recorded on our accounting balance for environmental performance-calculated business (electric power business).

Eco-Efficiency (Operating profits ÷ Environmental load), 1990 level = 100%



Note

Overseas, we have developed a method for standardizing environmental load substances of differing units into a single index by adding the environmental impact and degree of damage to living things and ecosystems. However, because countries cite differing conditions as the pretext for determining compounding variables and because the variables themselves change depending on the type of thinking that is applied, we will continue to study a standardized approach to assessing environmental load through discussions and research in Japan.

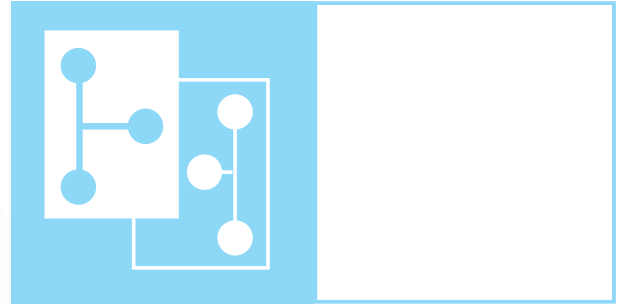
Results of Trial Calculations and Future Directions

If we take 1990 to be 100 and express the Eco-Efficiency of fiscal 2001 as an index against fiscal 1990, CO₂ for both Kansai Electric-produced power and power purchased from other companies is 104, SO_x 707, NO_x 282 and waste 414, each of which shows an improvement. In all cases, the improvement owes to a steady reduction in environmental load, which we achieved by improving efficiency

in nuclear power generation (see pg. 36) and thermal power generation (see pg. 38), fuel and equipment measures (see pg. 55 and 56), and the promotion of recycling-based activities based on the "3 R's" initiative (see pg. 66).

Kansai Electric will continue the use of Eco-Efficiency as a business indicator for promoting activities that target both a reduction in environmental load and an increase in economic value, while constantly working to improve the accuracy of our environmental accounting

system and examining other potential applications of environmental efficiency as a management index.



Environmental Management

Kansai Electric is further upgrading the current environmental management system based on the concepts of total quality management (TQM), in order to take efficient and effective action and ensure our conformity with laws and regulations.

Chapter 2 Contents

- 18** Environmental Management System
 - 19** Environmental Improvement Activities Based on ISO 14001
(Examples from our facilities)
 - 20** Environmental Education
 - 20** Award of Excellence in Environmental Action Promotion
- 21** State of Environmental Communication
 - 21** Communication with Local Communities
 - 22** Communicating Over the Internet
 - 22** Communicating Through Environmental Reports
- 23** Observance of Environmental Regulations
 - 24** Environmental Assessment for Power Station Construction



Environmental Management System

Environmental management at Kansai Electric is based on the principle of TQM (total quality management)*. We set out the "Protocol on Environmental Management" in April of 1998 in order to further bolster our environmental management system.

*In 1981, we were the first electric power company to introduce a TQC (total quality control) method. In 1984, we received the Deming Prize. Since then, we have been pursuing consistent and comprehensive activities aimed at improving our environmental performance.

Cycle of Environmental Improvement Activities

The Nuclear Power and Environmental Committee, which is chaired by our company president and made up of members of management, sets concrete action plans for the entire company of the fiscal year.

All divisions, departments, and branches make their own plans and goals. They independently implement their environmental improvement activities and check and review the results of these activities.

The Environmental Considerations Department reports the results of the check-and-review process to the Nuclear Power and Environmental Committee so that these results can be reflected in the company's concrete action plans for the following year.

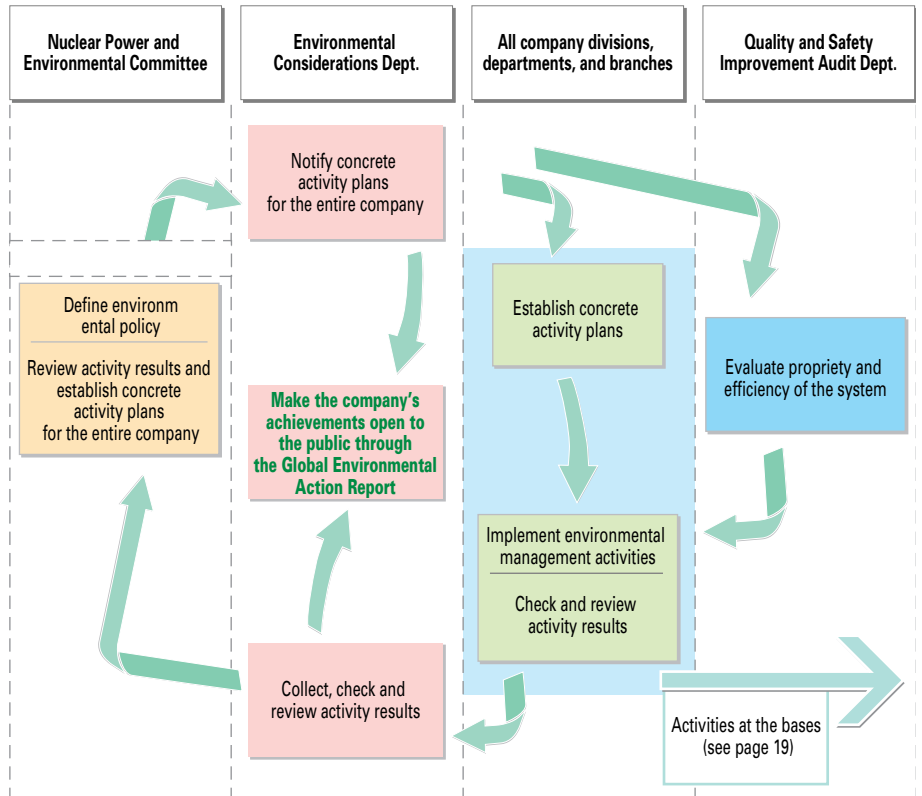
When necessary, the Quality and Safety Improvement Audit Department assesses the appropriateness and effectiveness of the environmental management system.

Organizational Structure

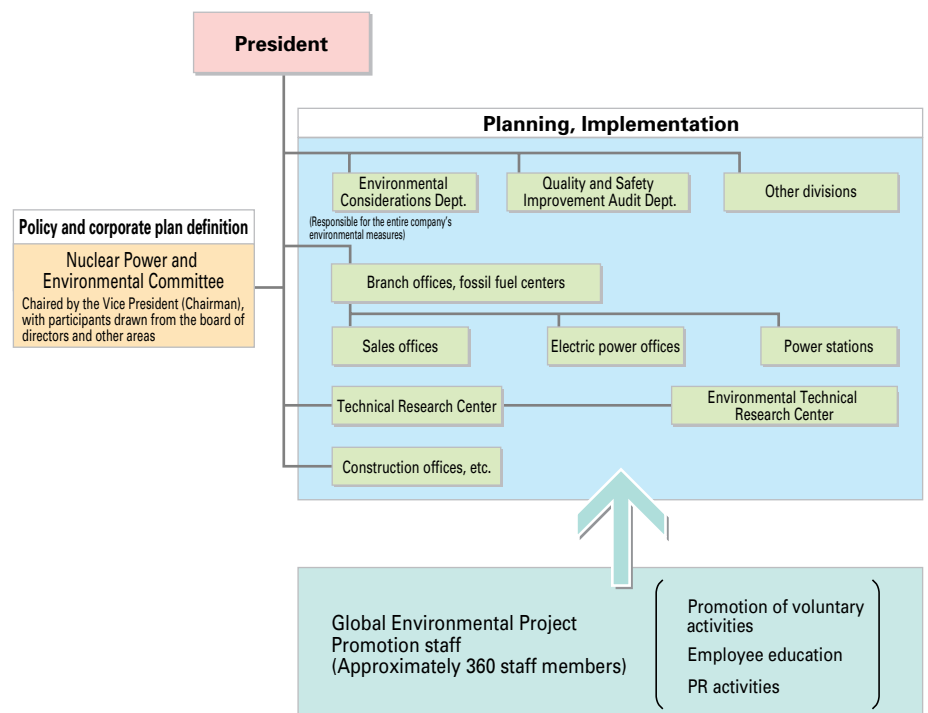
The Environmental Considerations Department is the general control center for the operation of the environmental management system. In all divisions, departments, and branches, the Department has set up organizational structures and appointed personnel for the purpose of environmental management.

To boost independent efforts in all workplaces throughout the company, we have appointed about 360 environmental project promotion staff members, whose job it is to carry out activities such as internal education and training and external public relations for their own part of the company.

PDCA Cycle



Organization



Environmental Improvement Activities Based on ISO 14001 (Examples from our facilities)

Create a Comprehensive Environmental Management System Compliant with ISO 14001

In order to enrich the company's environmental management system, in 1997 we began building an environmental management system compliant with ISO 14001, an international environmental management standard, starting with our thermal power stations and now we have completed the introduction of this system at all of those stations.

As a result, we have seen even greater effort toward saving energy resources along with a heightening of awareness with regard to the environment in our staff.

Based on this result, we completed the introduction of an environmental management system at our Mihama Nuclear Power Station, Ohi Nuclear Power Station, and our electric power offices at Kishiwada, Tanabe, Himeji and Kurobegawa.

We will continue to improve our environmental management system.

Facilities conforming to ISO14001 standard

Type of Facility	Power offices	Thermal power stations	Nuclear power stations
Self-declared	0	7	2
Externally certificated	4	7	0

Specific Operations

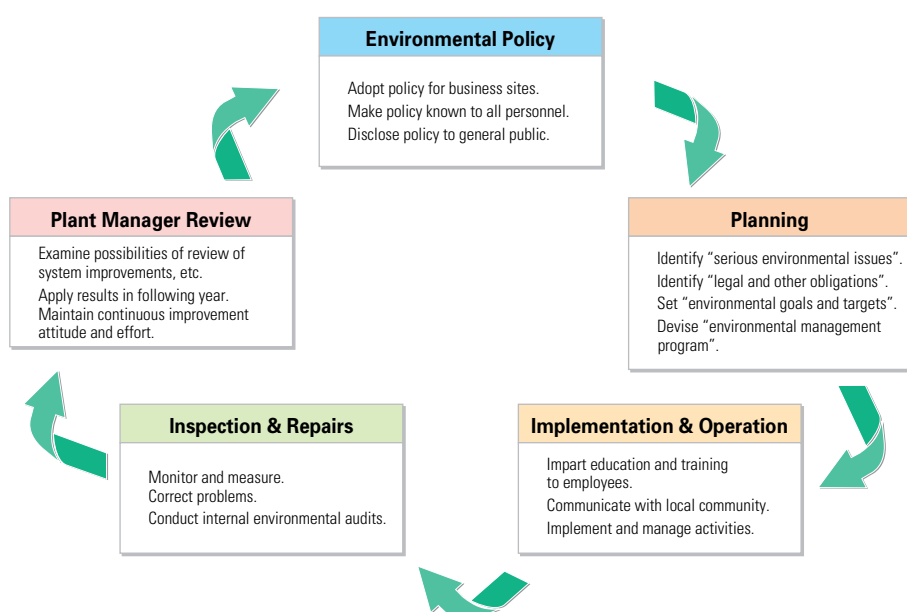
The following gives information on how those facilities that have instituted an environmental management system in line with the ISO14001 Standard are putting it into practice.

Acquiring Outside Recognition To Foment Greater Understanding

To more objectively evaluate our activities, we applied for and obtained ISO14001 certification for the Miyazu Energy Research Center in 1999. Following that success, we expanded the number of facilities receiving outside certification to 11 by 2001. In 2002, we launched programs to gain our first certification for nuclear power stations in Mihama and Ohi.

Facilities that have been awarded external certification

Name of facility	Date of Registration
Miyazu Energy Research Center (Thermal power)	March 24, 2000
Himeji No. 1 Power Station (Thermal power)	March 24, 2000
Kainan Power Station (Thermal power)	October 27, 2000
Himeji No. 2 Power Station (Thermal power)	March 23, 2001
Kishiwada Electric Power Office	March 23, 2001
Sakaiko Power Station (Thermal power)	February 22, 2002
Tanabe Electric Power Office	February 22, 2002
Kurobegawa Electric Power Office	February 22, 2002
Nanko Power Station (Thermal power)	March 29, 2002
Himeji LNG Management Office	March 29, 2002
Himeji Electric Power Office	March 29, 2002



Raising Awareness

Nanko Power Station

At the Nanko power station, we are doing research into maintenance of power generation and environmental protection systems, promotion of resource and energy conservation, waste reduction and flue gas decarbonization.

In our offices, business waste is being sorted and raw waste from the cafeteria is being converted into compost. The compost is packaged in plastic containers and used in gardening or given away to visitors at events we sponsor.

In an average year, some 200,000 people visit our facilities, many of which are elementary and junior high school students who come to see what we do. As part of our educational program, we are teaching people about our operations, the environment and the importance of environmental protection, through experiments with acid rain and global warming.



Himeji Electric Power Office

The Himeji electric power office is working hard to reduce fuel, water and electricity consumption, purchase green supplies and improve SF₆ gas recovery. The office is also recycling lumber as a raw material for pulp, whereas in the past it was burned as waste.





Environmental Education

We plan to promote even greater activity toward environmental protection throughout all our areas of business. Therefore, we believe it is necessary to continually educate our personnel. This is done at each place of work according to role and level of responsibility, so that each employee may become ever more autonomous and positive in their approach to the environment.

We will continue to run various internal education programs. These will be aimed at giving each employee in charge of, or responsible for, implementing any given policy

on the environment in the workplace an understanding of domestic and international trends with regard to various environmental issues, a knowledge of the company's own specific measures with regard to each problem and the directionality of those measures.

We intend to continue to enhance our employee education program so that we may further promote environmental protection, starting by giving our staff the practical knowledge to deal with the requirements and implementation of the ISO14001 standard.

Personnel training and education (Kansai Electric)

Program	Period	Description	Imparted to	Number participants
ISO14001 Staff Training	June 2001	Provide knowledge of ISO requirements and improve skills in environmental sampling, assessment and other special techniques.	ISO14001 Office (Managers charge of program building and operation)	30
Internal Environmental Audit Training	Sept. 2001	Provide knowledge of ISO requirements and improve skills in environmental audit techniques, to develop auditors for sites.	Business site auditors (Asst. site managers and department managers)	22
Environmental Staff Training	Sept. 2001	Provide knowledge of company environmental policy, environmental problems in and outside company, ISO management techniques, planting, etc.	New environmental staff	41



Every Employee Needs to Know -- Kishiwada Electric Power Office

The Kishiwada electric power office thinks it is important to raise the awareness of environmental problems with every employee in order to develop environmental protection activities that will earn the friendship and understanding of the local community. The below programs were set up by the Environmental Management Team as educational activities.

Environmental Problems

- General education on environmental problems
- Education for new staff

ISO Related

- Special environmental training
- Training for chief environmental auditors
- Training for internal environmental auditors
- Training for ISO environmental managers

Award of Excellence in Environmental Action Promotion

Since 1992, Kansai Electric has been giving an Award of Excellence to business sites that implement exemplar environmental activities through their central and satellite offices, in order to raise environmental awareness amongst the workforce and promote bigger and better activities. In addition to citing environmental performance (reduction of environmental load) for a given year, the award recognizes overall activities including grassroots activities that have been implemented for an extended period of time.



Speeding Up Initiatives By Working with Other Sections – Imawatari Electric Power Office

Imawatari electric power office has made "aggressive measures in global environmental protection" important targets in their annual plans and, to promote related efforts, formed a working group -- Green Work 21 -- that straddles multiple sections. The entire station is working to attain specific targets. Green Work 21 has made energy conservation in business offices a target and

created a program to attain that target. They operate as the center for promoting activities by discussing ways to implement initiatives and share environmental information.

State of Environmental Communication

Communication with Local Communities

Because our business activities are rooted in many local communities, Kansai Electric aggressively promotes activities that enable face-to-face communication with these communities. These activities include publishing pamphlets and offering programs to improve public understanding of our operations and environmental undertakings, as well as our understanding and applying the needs of these communities and our customers towards improving our operations.

The opinions and needs of supporting communities and our customers are treated as vital information with which we can improve the efficiency of our operations. We disseminate this information throughout the company over our in-house LAN nicknamed "The Voice of Danbo". The network is an efficient way of making everyone aware of what the outside world wants.

Kansai Electric further seeks the views of area scholars and opinion-leaders through Informal

Talks on Energy we stage at branch offices and affiliate companies, as well as through Informal Talks on Services held at sales points. And, questionnaires are sent to customers so that we can find yet other ways to improve our work. Kansai Electric is curious to know what people think about our operations and environmental activities, because people are a good source of ideas for improving what we do best.

What People Have to Tell Us About the Environment (The Voice of Danbo) Is Reflected in Our Activities

When I heard about the Kansai Green Power Fund, I knew it was a great thing. But, not enough PR has been done.

I think the Kansai Green Power Fund is a great system. I'd like to join and do what I can to help.



To gain widespread cooperation in the Kansai Green Power Fund, Kansai Electric has launched diverse PR activities including newspaper ads, radio commercials, and information on the backside of meter notices for customers. We will continue to promote activities to help diffuse the use of new energy sources in the future.

(For more information on the Kansai Green Power Fund, see pg. 35.)

I'd like to see you dedicate more efforts and assets towards the diffusion of natural energy sources.

I've understood it that liberalization in the power market has invited companies other than Kansai Electric to generate power, but that would mean building more thermal power plants and spewing more pollution. I wish more were being done to develop natural energy sources such as existing hydropower generation and wind power generation.



Kansai Electric is involved in the promotion of new energy sources in a number of ways including research and development of solar and wind power generation, the purchase of surplus power from customers and support for the Kansai Green Power Fund. Also, rehabilitation projects are systematically underway with hydropower stations to increase output. Kansai Electric will continue to play a constructive part in these and other similar activities in the future.

(For more information on developing and popularizing New Energy Sources, see pg. 34.)
(For more information on renovating Hydropower Stations, see pg. 39.)

I was interested so I took part in the Environment Month Symposium sponsored by Kansai Electric in June 2002. It was really worthwhile. I now want to be a little smarter about the electricity we use everyday and our way of life.

Environmental problems are being talked about by people of all grades, so I'd really like it if you held classes in the school.

Rather than stage events for a limited amount of time, I'd like you to provide more opportunities in all sorts of places (public facilities and schools) so that adults and children alike can become more interested in the environment.



During Environment Month every June, Kansai Electric sponsors seminars, plants trees in various communities and stages events so that the company and residents of surrounding communities can think about environmental problems. Outside of Environment Month, Kansai Electric has programs for teaching elementary school children about the environment in an easy to understand fashion. Kansai Electric continues to develop educational activities with the hope of gaining even more interest in environmental problems.

(For more information on cooperation with the Local Community, see pg. 80.)

I wish you would build PCB treatment facilities as quickly as possible.



Kansai Electric has plans to build a recycle center for utility pole transformers in Konohana, Osaka. Preparations are currently underway to start construction on the facility. With guidance from competent authorities and the understanding of the general public, we will move towards an early completion.

(For more information on the recycle center for utility pole transformers, see pg. 69.)



Communicating Over the Internet

The Internet has proven to be a very convenient resource, as many people have been reading our Global Environmental Action Report since we first started publishing it on our website in 1998. Also taking advantage of the net's instantaneous and interactive nature, we are using it to circulate press-releases on our environmental activities and provide information on environmental events we stage, as well as to reply to inquiries on our activities via e-mail. We

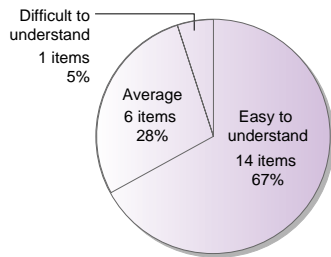
are actively using the Internet to increase customer trust and better understand customer concerns. Moreover, the Internet is helping us to provide a wide range of information through links to other websites such as the Voluntary Action Plan page of the Kansai Economic Forum that carries news on environmental activities of businesses in the Kansai area, as well as the Kansai Green Power Fund that we are promoting in cooperation with the Kansai

Information and Industry Activation Center. Kansai Electric sees the Internet as a useful and resourceful communication tool and we will continue looking for new effective ways to use it in the future.

Communicating Through Environmental Reports

In addition to using the Internet, Kansai Electric is learning what people and customers think through a questionnaire provided at the end of this environmental report. We use these opinions to improve our environmental activities and reporting, which in turn help promote a better understanding of who we are at Kansai Electric.

Impression of the report



Impression of our company's work in tackling environmental problems



Comments from Readers and Our Response

Kansai Electric's Global Environmental Action Report

How easy it was to read

There was plenty of detail and the text was easy to understand, but there was a lot of information. (Man, 32 years old)



To gain a better understanding of our environmental protection activities, we were careful to add more details and present the information in an easy to understand way. The result was that there was more information overall. To meet the diverse needs of readers, we have published a digest version of the report as well as made the same information available over the Internet. In the future, we plan to utilize the Internet even more while also improving the information we release both in terms of content and quantity.

There is a good outline of all activities. It could be even better if the key points were highlighted. (Man, 37 years old)



To make it easy enough to get a grasp of the contained information "at a glance", we added a table of contents and key points to each new chapter page in the 2002 report. The summary of Kansai Electric's 2002 activities are introduced in "feature activities in 2001"

PR points that should be emphasized more

- Your contributions to the local community (Woman, 60 years old)
- Reduced transmission loss (Man, 32 years old)
- Response to demands from the local community (Man, 37 years old)
- Educational activities for elementary school children ((Man, 57 years old)
- Energy consulting activities (Man, 61 years old)
- Environmental protection activities for concerned communities (Other than the eco-business) (Man, 62 years old)



Information that readers felt was lacking in the 2001 report has been added to the 2002 report and other information that already existed has been presented in a more concrete way.

What Kansai Electric should do in the future about environmental protection

- Provide information to enable a correct interpretation of nuclear power. (Man, 42 years old)
- Develop clean energies such as LNG and wind power. (Man, 52 years old)
- Put more effort into environmental education. (Man, 54 years old)
- Share information on the eco-business within the group, and utilize technology and know-how of other group companies. (Woman, 29 years old)
- Become a leader in green procurement. (Man, 63 years old)
- Reduce industrial waste including radioactive waste. (Man, 22 years old)
- Do more to support decentralized energy systems exemplified by micro gas turbines, fuel cells, etc. (Man, 50 years old)
- Provide environmental information to nearby residents. (Woman, 22 years old)



This report describes specific activities in various areas. We will continue referring to reader comments so as to improve the content of this report.

¹ Cannot really say 'or
² Cannot say ' : no answers to these

Observance of Environmental Regulations

The Environmental Protection Agreement contains the various legal restrictions, bylaws and various items mutually agreed with local bodies and businesses with regard to the running of our facilities. As yet, there have been no examples of any of these restrictions being broken.

Main Statutes Regarding to the Environment

Title	Contents (Aims)	Material and/or behavior concerned
Air Pollution Control Law	Restrictions pertaining to emissions of soot, smoke and particulate from the business activities of factories and business establishments, and also emissions of particulate while buildings are being demolished	Restrictions pertaining to concentration of hydrogen ions and volumes of chemical and biological oxygen demands, suspended matter, etc.
Water Pollution Control Law	Restrictions pertaining to effluent discharged by factories or establishments into the Public Water Areas or underground	Restriction pertaining to the maximum permissible levels of noise within boundaries of factories or other types of work sites
Noise Regulation Law	Restrictions pertaining to noise generated by the operation of factories and other types of work sites as well as construction work affecting a considerable area	Restriction pertaining to permissible levels of vibration within boundaries of factories or other types of work sites
Vibration Regulation Law	Restrictions pertaining to vibration generated by the operation of factories and other types of work sites as well as construction work affecting a considerable area	Restriction pertaining to concentrations of offensive odor materials within boundaries of factories or other types of work sites
Offensive Odor Control Law	Restrictions pertaining to offensive odors generated in the course of business activities at factories or at other places of business	Deals with control of production and processing of domestic wastes and industrial wastes including ashes and sludge
Waste Management and Public Cleansing Law	Controls waste discharge and appropriate sorting, storage, collection, transport, recycling, disposal, etc. of wastes	Deals with control of production and processing of garbage, general waste materials, ashes and sludge resulting from industrial waste

Main Ordinances

Title	Contents (Aims)	Material and/or behavior concerned
Ordinance Pertaining to the Protection of Living Environment in Osaka Prefecture (Osaka Prefecture)	Sets our duty of prefecture and local government, businesses and citizens with regard to protection of the habitat. Lays down and promotes prefectural policy on this; enforces protection against environmental pollution	Mostly equivalent to general laws pertaining to water and the atmosphere. Its restrictions on waste materials are the same as or stricter than the standard
Ordinance Pertaining to the Protection and Creation of Environment (Hyogo Prefecture)	A comprehensive and planned approach to promoting the protection of a healthy and rich environment; a consensual policy on behalf of the citizens of the prefecture, based on the unique characteristics of Hyogo prefecture, toward the creation of a beautiful and comfortable environment	
Law on the Protection and Fostering of the environment of Kyoto Prefecture (Kyoto Prefecture)	Contributes toward the firm establishment of the protection of a rich and comfortable environment in which people and nature may eco-exist in harmony and enjoy a rich and proud history and culture; and to a healthy and cultural lifestyle both now and in the future through the creation of a pleasant and comfortable environment in which to live	
Ordinance Pertaining to the Prevention of Environmental Pollution in Wakayama Prefecture	Contributes to the comprehensive and planned promotion of policy toward environmental protection through the establishment of basic items of policy on such; thus contributes toward the firm establishment of a healthy and cultural lifestyle for both now and the future	
Ordinance Pertaining to the Prevention of Environmental Pollution in Fukui Prefecture	Contributes toward the health and protection of the prefectural citizens and the protection of their living environment by laying down the necessary restrictions and measures to be taken with regard to the prevention of environmental pollution	

Main Agreements

Each of our power stations has had an agreement concerning environmental protection between the local governments. Such an agreement contains stringent values compare to those standards set by laws and ordinances, for the purpose of achieving environmental protection.

(As of June, 2002)

	Title	Power Plant Targeted	Party
Pollution prevention agreements	Agreement on Pollution Prevention Concerning Construction of Tanagawa No. 2 Power Station	Tanagawa No. 2	Osaka Prefecture and Misaki Town
	Agreement on Pollution Prevention at Nanko Power Station	Nanko, Sakaiko, Sanpo, Osaka	Osaka Prefecture
	Agreement on Pollution Prevention	Takasago	Hyogo Prefecture and Takasago City
	Agreement on Environmental Protection	Himeji No. 1, No. 2	Hyogo Prefecture and Himeji City
	Agreement on Pollution Prevention	Aioi	Hyogo Prefecture and Aioi City
	Agreement on Environmental Protection	Akoh	Hyogo Prefecture and Akoh City
	Agreement on Pollution Prevention	Kainan	Wakayama Prefecture, Kainan City and Wakayana City
	Agreement on Environmental Protection at Gobo Power Station and Gobo No. 2 Power Station	Gobo, Gobo No. 2	Wakayama City/Gobo City and Mihama Town
	Agreement on Pollution Prevention at the Miyazu Energy Research Center	Miyazu Energy Research Center	Kyoto Prefecture and Miyazu City
	Agreement on Environmental Protection at Maizuru Power Station	Maizuru	Kyoto Prefecture, Maizuru City and Takahama Town
Agreement on Environmental Protection at Wakayama Power Station	Wakayama	Wakayama Prefecture and Wakayama City	
Safety agreements	Agreement on Environmental Safety for Area around Nuclear Power Station	Mihama	Fukui Prefecture and Mihama Town
	Agreement on Environmental Safety for Area around Nuclear Power Station	Ohi	Fukui Prefecture and Ohi Town
	Agreement on Environmental Safety for Area around Nuclear Power Station	Takahama	Fukui Prefecture and Takahama Town



Environmental Assessment for Power Station Construction

Since 1973, the Ministry of International Trade and Industry (MITI) (currently, the Ministry of Economy, Trade and Industry) has required that an environmental impact assessment be conducted whenever a power station is constructed. In accordance with the ministerial council's 1977 document entitled "Strengthening of Environmental Impact Reviews in Power Plant Siting," we have carried out 16 environmental assessments to date in order to contribute to environmental protection.

In 1997, the new Environmental Impact Assessment Law was passed, and revisions of the Electric Utilities Industry Law were implemented in June 1999. Under the Environmental Impact Assessment Law, before implementing large-scale development projects, corporations conduct their own environmental impact assessment to determine the procedures for implementing environmental assessment with consideration to environmental preservation. Specific procedures for power

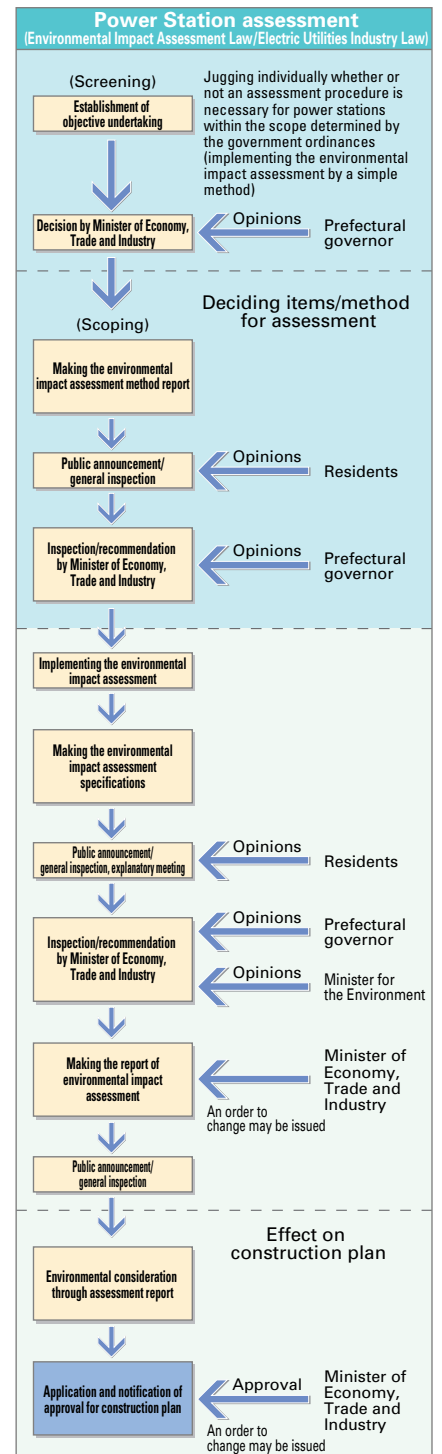
stations have been determined additionally under the Electric Utilities Industry Law.

Under the new system, environmental consideration is required from the early stages of the project, and procedures to judge whether assessment is necessary or not and determine contents and method of the assessment have been added. For the construction of power stations, the result of the assessment becomes the requirement for the approval of the construction plan.

Moreover, we carry out surveys both during construction work and after commencement of operations in order to ascertain whether predicted results and effects of steps for environmental conservation fall in line with those found in the evaluation report.

Based on this environmental assessment system, Kansai Electric will endeavor to construct and operate power plants with consideration to the environment.

Power station assessment system in accordance with the law



Note) Procedures which have been added in accordance with the enactment or amendment of a law
 Clauses complying with assessment report have added to approval conditions for construction plans.



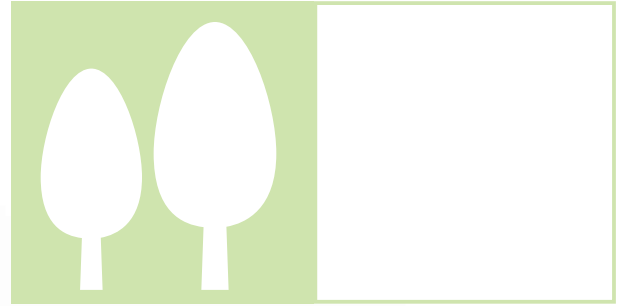
Environmental Assessment Prior to Building Sakai LNG Center

Prior to the start of construction on LNG facilities and wharf in Sakai LNG Center, Osaka, Kansai Electric and Kansai Group company Sakai LNG Co., Ltd. conducted an environmental impact assessment on the site to ensure the environment would not be effected by construction.

The assessment examined the current state of air, water, noise, vibrations and other qualities and forecasted the impact on the surrounding environment. Efforts like these assessments show how concerned Kansai Electric is about the environment and testify to the fact that, as a company, we are taking concrete measures to protect the environment.



Water sampling in sea area near construction site



Response to Global Environmental Problems

Kansai Electric continues to effectively apply technology and know-how, and develop a New ERA Strategy of comprehensive measures that pursue farther-reaching potential, in order to reduce the emission of greenhouse gases and aggressively challenge global environmental problems.

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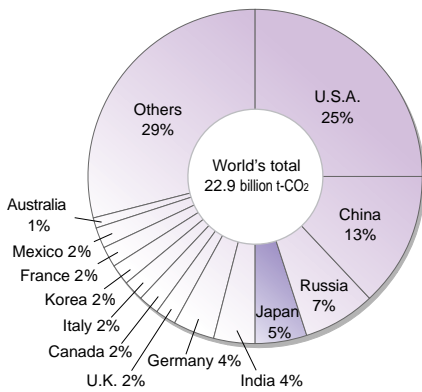
CO2 Emissions Worldwide and in Japan

Worldwide CO2 emissions amounted to approximately 22.9 billion t-CO2 (result for fiscal 1999), with Japan accounting for 5% of the total. Looking at CO2 emissions in Japan by sector, the industry sector accounted for 40%, the domestic sector (households) 14%, the commercial sector (offices, other businesses) 12%, and the

transportation sector 21%. Of the increase in CO2 emissions caused by energy generation in each sector since fiscal 1990, the industrial sector has seen an increase of 1%, the commercial sector an increase of 21% and the transportation sector a marked increase of 21%. This is mainly due to the

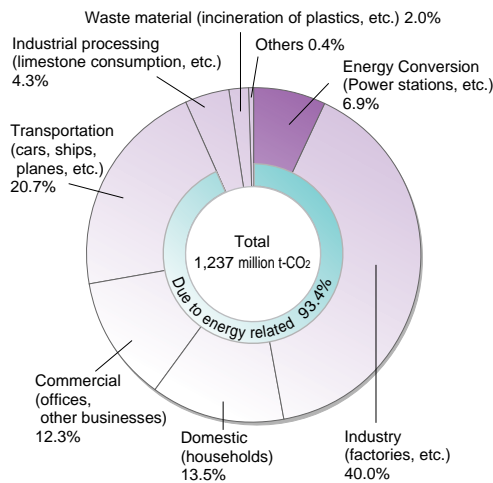
increase of energy consumption per household and in number of households in the commercial sector, as well as the increase in number and size of private cars in the transportation sector.

World CO2 emissions from fossil fuel combustion (Fiscal 1999)



Source: Outline of Energy and Economic Statistics 2002 The Institute of Energy Economics, Japan

Japan's CO2 emissions by sector (2000)

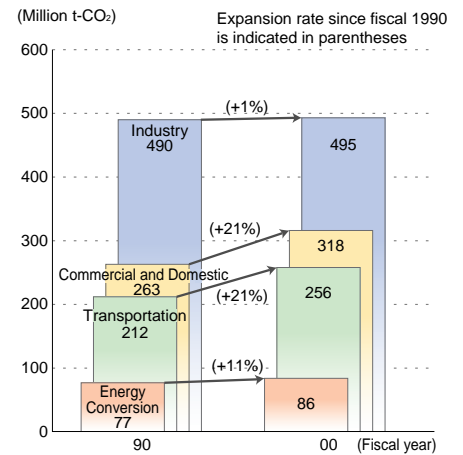


Source: assembled from Ministry of Environment data

Note: Figures indicate percentage of total emissions by power plants allotted to various sectors by their final demand in proportion to their power usage.

Figures in this graph indicate percentage of total emissions. "Others" includes statistical errors at power distributions as well as the consumption of lubricants.

Japan's CO2 emissions trend by sector (2000)



Source : assembled from Ministry of Environment data

Measures to Reduce CO2 Emissions in the Electric Power Industry

We must Attack the Problem from both the Supply Side and the Demand Side

To reduce CO2 emissions resulting from power generation, we must attack the problem from both the supply side and the demand side.

In order to achieve this, electric utility companies have taken a number of measures to reduce CO2 emissions per kWh, by working to achieve the optimum generation capacity mix with a focus on nuclear power and improve the efficiency of facilities at thermal power stations. We are also promoting load leveling to achieve efficient energy use by developing and popularizing equipment that has high energy efficiency.

The Electric Power Industry's Environmental Plan of Action

The Federation of Electric Power Companies of Japan published the Environmental Plan of Action for the Electric Power Industry in November 1996, in order to step up voluntary efforts to solve problems such as global warming. The fourth review was conducted in September 2001.

The plan sets the following target: "By fiscal year 2010, we will try to reduce the number of CO2 emissions per unit of power consumed by as much as 20% of the real figure for fiscal year 1990 (approx. 0.3kg-CO2/kWh)".

Accordingly, even though gross electric power output is expected to increase by 150% by 2010,

CO2 emissions are expected to increase by around 120%, based on fiscal 1990 levels.

<p>CO2 emissions Approx. 330 million t-CO2 (120% of that of 1990's)</p>
<p>II Power consumption (quantity of electricity consumed) Approx. 964 billion kWh (150% of that of 1990's)</p>
<p>x CO2 emissions per unit of power consumed (CO2 emissions unit) Approx. 0.3 kg-CO2/kWh (reduced by 20% of that of 1990's)</p>

Kansai Electric's Measures to Prevent Global Warming - New ERA Strategy

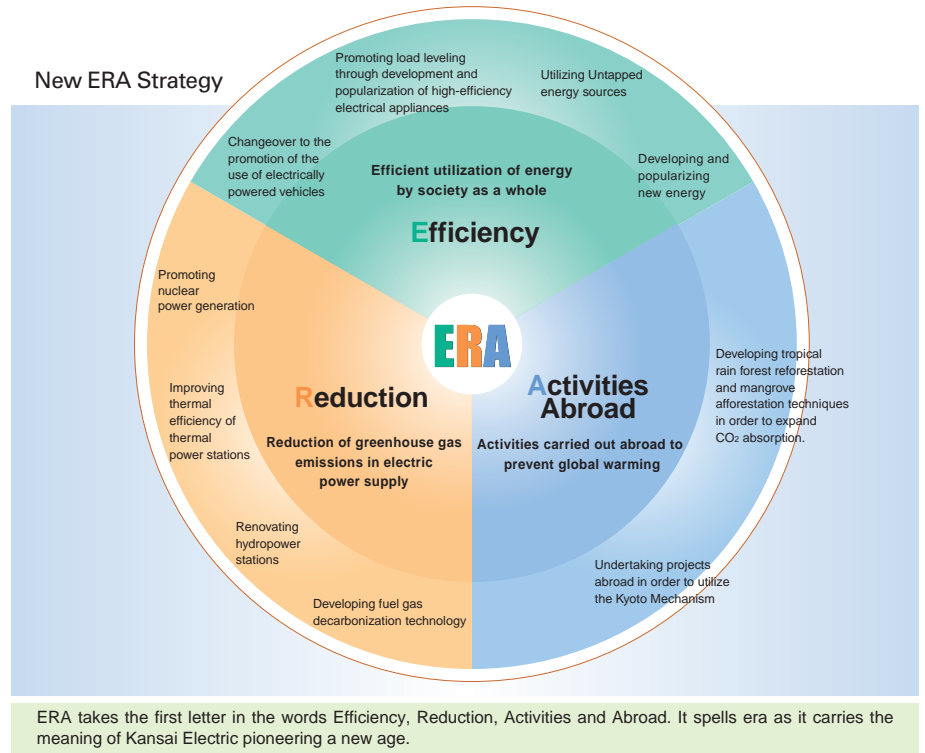


CO₂ Emissions Worldwide and in Japan / Measures to Reduce CO₂ Emissions in the Electric Power Industry / Kansai Electric's Measures to Prevent Global Warming - New ERA Strategy

Outline of New ERA Strategy

Kansai Electric is actively developing its New ERA Strategy, a comprehensive policy on the further reduction of greenhouse gas. We will continue to explore new possibilities that can be integrated in this strategy.

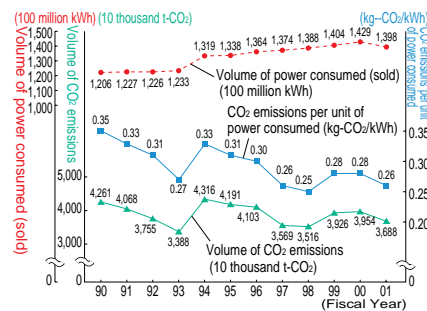
We will continue endeavoring to maintain sustainable development by simultaneously achieving its goals - the 3Es, which are "Economic Growth" "Energy Security", and "Environmental Preservation". We are working to balance the "E", "R", and "A" of our "New ERA Strategy" in order to propel our long-term endeavor to preserve the global environment. The various measures included in the New ERA Strategy are described from page 28 onwards.



CO₂ Reduction Target

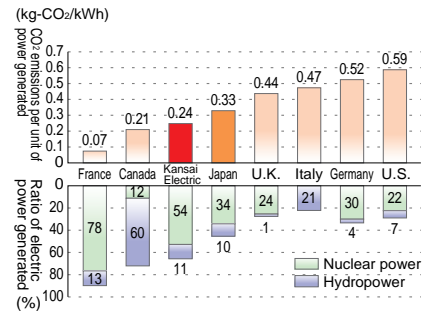
Under the New ERA Strategy, we have set a number of numerical goals to reduce CO₂ emissions per kWh (emissions per unit of power consumed) utilized (sold) in fiscal 2010 to approx. 0.3kg-CO₂/kWh, in accordance with the targets of the electric power industry (see page 26). As a result of the New ERA Strategy, CO₂ emissions per unit of power consumed in fiscal 2001 amounted to 0.26kg-CO₂/kWh.

Trend of CO₂ emissions per unit of electric power consumed (sold)



Compared to fiscal 1990, the volume of power consumed increases by 16%, while the volume of CO₂ emissions reduced by 13%.

CO₂ emissions per unit of power generated and nuclear / hydropower ratio (2000)



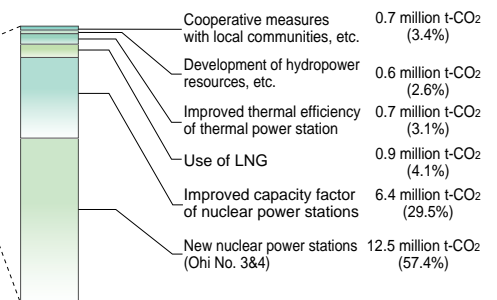
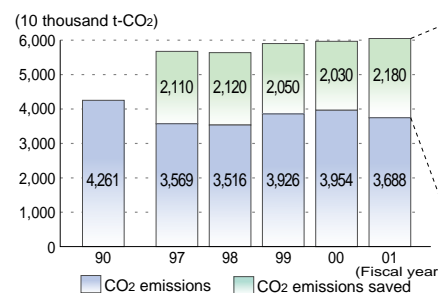
Source for foreign countries : Energy Balances of OECD Countries 1999-2000
Source for Japan : survey by the Federation of Electric Power Companies.
Actual results for Kansai Electric for fiscal year 2001.

Compared CO₂ emissions per unit of power generated of Kansai Electric to those of Europe and U.S., we are in the third level behind France, high ratio of nuclear power, and Canada, high ratio of hydropower.

The effect of CO₂ reduction through the New ERA Strategy

CO₂ emissions reduced were approximately 21.8 million t-CO₂ less in fiscal 2001 as compared to fiscal 1990 levels and nuclear power generation accounted for nearly 90% of the total reduction. This is equivalent to approximately 2% of Japan's total CO₂ emissions - 1,237 million t-CO₂ - in fiscal 2000. Converted into the petroleum equivalent, this amounted to an estimated saving of approximately 7.8 million kl of oil (equivalent to about 90% of our annual fuel consumption).

CO₂ emissions saved



Note: Percentages are calculated against total amounts.



Efficiency

Efficient utilization of energy by society as a whole

INPUT Load Balancing

Encouraging the Use of Nighttime Electricity (Less CO₂ Emission)

Power consumption differs during the day and night because of the increased demand for cooling and heating. To close this gap, Kansai Electric is forever trying to use equipment more efficiently and is recommending to customers the use of nighttime electricity, which emits less CO₂. In other words, we are promoting the spread and use of equipment and a rating system* that help to balance load by using nighttime electricity. The benefits are as follows.

Customers use cheaper electricity.

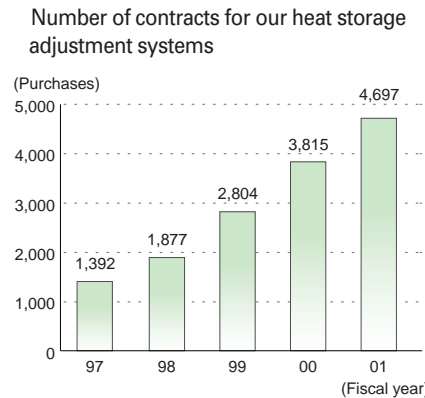
Kansai Electric uses equipment more efficiently, which helps lower production costs.

Together with our customers, we are contributing to the fight against global warming by getting customers to use nighttime electricity produced with a higher rate of nuclear power generation which emits less CO₂ than thermal power generation.

*Kansai Electric has a number rating plans that help balance load. (See pg. 94.)

Undertakings for Factories and Buildings

Heat storage systems that run on nighttime electricity are being used more and more in air-conditioning and industrial processes. Alongside this, Kansai Electric has seen a steady rise in the number of customers contracting heat storage to take advantage of the lower rates of nighttime electricity. For example, use of our Eco-Ice Mini ice heat storage air-conditioning system is growing amongst customers with offices or stores of some 50 - 200 m² in floor space.



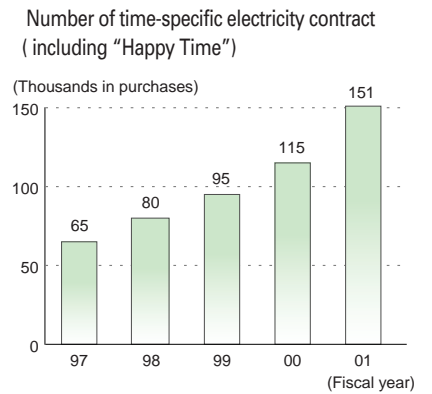
To promote increased use of heat storage systems, the Kansai Electric Group has consolidated efforts into "energy-saving consulting services", with which we are teaching customers about the environmental side of electricity and how to use it smartly. We are working with customers to get them to use nighttime electricity through heat storage systems and, at least, to efficiently use electricity with whatever equipment they have.



Diagnostic team inspecting customer's facilities

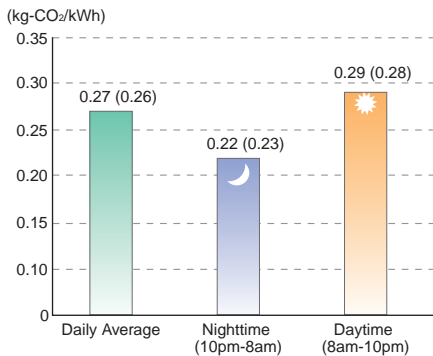
Undertakings with General Consumers

The use of electric water heaters that run on nighttime electricity continue to spread steadfast and the number of customers who have contracted time-specific electricity that lets them take advantage of lower rate nighttime electricity has increased.



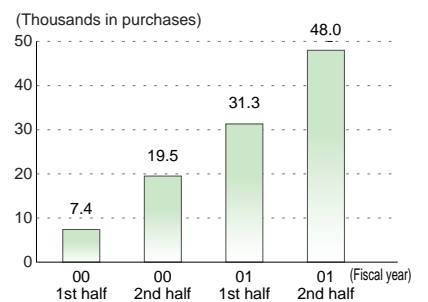
There has also been a rapid increase in our Happy Time rating plan that was introduced in March 2000, as well as all-electric homes that are both economical and eco-friendly in addition to being safe, secure and comfortable, and our low rate Happy Plan. To aggressively promote all-electric homes, we launched the Happy Package lease system in October 2001.

CO₂ emissions per unit of power consumed (sold)



(Average demand over five years from fiscal 1997 to 2001. Figures in parentheses are for fiscal 2001 only)

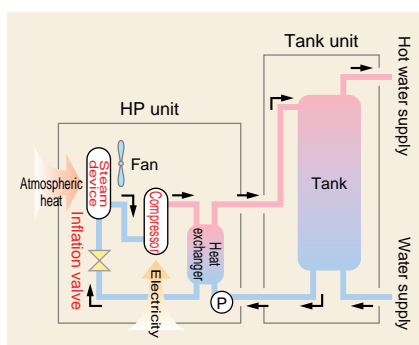
Number of households using "Happy Plan"





In November 2001, we launched sales of the Eco-Cute, a hot water supply Natural Air-Conditioning Heat Pump that was jointly developed together with appliance manufacturers. It uses a natural cooling medium (CO₂) and efficiently utilizes energy. On top of the energy savings and eco-friendliness, running costs are low because it runs at night when electricity rates are lower. All in all, it is a hot water heater for a new age. We will be dedicating efforts to diffusing its use.

Eco-Cute System



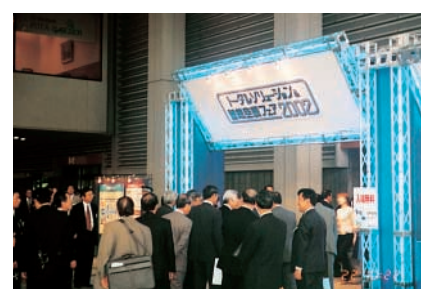
Eco-Cute Features

Item	Feature
Eco-friendliness	Replaces CFC with natural cooling medium (CO ₂). Ozone destruction coefficient : 0 Global warming factor : 1/1700 of CFC
Energy-saving	Heat pump system Annual average : COP* 3 or higher
Cost	Greatly reduces running costs. Special rates available in Happy Plan Highly efficient as equipment (COP of 3 or higher)

*COP (Coefficient of Performance) expresses heating/cooling ability per unit power consumption. The higher the value, the more efficient the system. (See pg. 95.)

PR with Customers

Kansai Electric introduces activities like these to our customers through events like our Storage Heat Air Conditioning Fair and Lifestyle Electricity Fair.



Storage Heat Air Conditioning Fair



Storage Heat Air Conditioning Fair

Events

Event	Dates	Description
Lifestyle Electricity Fair	April – May	Proposes affluent lifestyles to families through use of electricity. (Electric water heaters, IH ranges, Eco-Cute, electric floor heating, etc.)
Storage Heat Air Conditioning Fair	May or June	General proposals on electric energy use such as heat storage systems.
Eco-Ice Campaign	May – August	PR activities aimed at diffusing use of Eco-Ice and Eco-Ice Mini, which are ice heat storage air-conditioning systems.
All-Electrification Campaign	Oct. – Dec.	PR activities aimed at popularizing the electric home, centered around electric water heaters, IH ranges, etc.



Developing Technology for Efficient Energy Use

Generating constant output is more energy-efficient and economical than starting up and shutting down the power station to adjust to fluctuations between nighttime and daytime demand.

Accordingly, Kansai Electric is researching and studying power storage batteries which will enable nighttime power to be stored during the nighttime and then put to use during the daytime. In particular, it has been decided to introduce redox flow batteries at the Kansai Gakuin University Kobe Sanda Campus in 2001. This is one of the ways in which we have achieved the wider use of such batteries. Furthermore, such batteries can be expected to be useful in improving voltage dip and for emergency power supply systems, as well as in helping bring about the load leveling mentioned above. Therefore, we are making every effort to research further such functions.



Redox flow batteries

Features of redox flow batteries

High speed response Response within 4 m sec or below	High output power capacity Excessive load response capability under more than twice of the rating	Easy maintenance control Normal temperature operation
Long-Life Long life for more than 15 years	No Loss No standby loss during non-operation	Quick Start up Start up in less than a minute
Environmentally Friendly Electrolyte can be used semi-permanently No emission of exhaust gases, such as CO ₂	Simple procedures for installation Not requires for special management and qualified personnel because of not using dangerous substances specified in Fire Service Law	Easy to increase capacity Increasing the amount of electrolyte enable high capacity. Separated designs of the output part (cell) and capacity part (electrolyte tank) provides high flexibility of its layout.



Responding to Business Needs of Customers (Energy Service Business)

To further develop the general energy service business, Kansai Electric created Kanden Gas and Cogeneration (Kanden GASCO) in April 2001 with operations for selling gas and proposing cogeneration systems to customers.

Already, the new company is producing results especially in the energy service field, having accepted a project from the very first customer to reduce energy consumption across their entire factory by 11% through equipment efficiency

improvements and energy-saving measures.

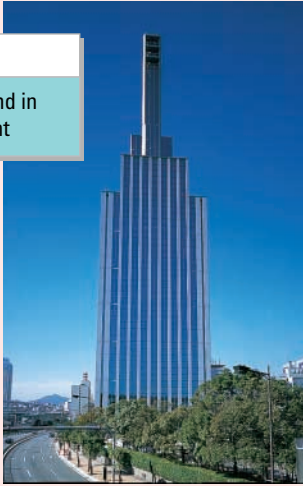
The company provides a wide range of services from equipment remodeling to energy audits. They will continue to propose the most effective system to customers and provide them with energy services that optimally mix electricity and gas.



An Environmentally Friendly Resource Saving Building (The Kobe Kansai Electric Building)

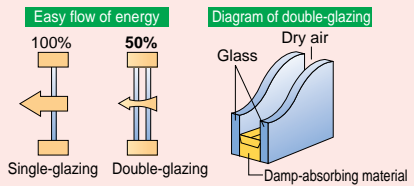
The Kobe Kansai Electric Building was rebuilt in line with the concept of having a structure that would be robust against disaster, highly safe and reliable while exceptionally environmentally friendly and gentle on resources at the same time. As part of this, by way of being adapted to the environment, it makes positive use of solar power, well water and other such natural energies. It has superb energy-saving capabilities and is extremely economical, incorporating an air conditioning system that utilizes heat storage in order to cut down on CO₂ emissions (Eco Ice). In these and other ways it aims to use energy and resources effectively.

Design
Design chosen to blend in with local environment



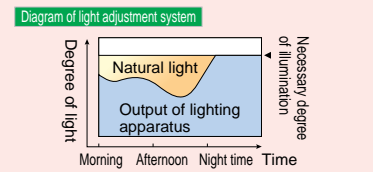
Capturing light
Generation of solar power. Solar energy panels capable of generating 18 kW of power.

Cutting off heat
The windows are double-glazed. This cuts down on the amount of heat entering and leaving the building, thus saving the amount of energy required for air conditioning.

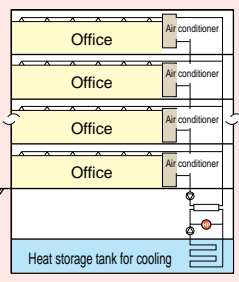


Capturing wind
Using the wind power capturing via the radio tower, the whole building may be ventilated

Treating energy with respect
The building is designed to allow the effective use of nature light in providing lighting for the rooms. Light sensors work to adjust the energy output of lighting apparatus, allowing energy to be saved.



Treating energy with respect
The building uses the Eco Ice system. Demand for air conditioning has moved 100% to night time only. Using the relatively cheaper night time electric power, heat is stored in a tank using a heat pump. This is then used during the day to provide air conditioning. This has allowed drastic cuts in running costs.

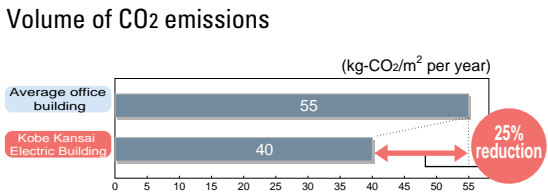
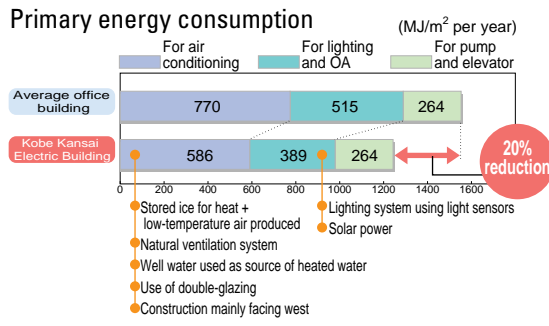


Treating resources with respect
The filler for the panels in the OA room were created using old glass bottles and glass waste rendered into powder and reconstructed.

On construction of the underground foundations (slabs, walls), a high-strength plastic frame was used so as to raise the rate of possible reuse.

Treating water with respect
Well water is used for the air conditioning system and general use.

Main energy-saving effects



Achieved an approximately 25% reduction in emissions of CO₂



INPUT

Promoting the Spread of Electric Vehicles (EV)

Kansai Electric has seized a number of opportunities to promote the use of electric vehicles. In the future, the company will also assess performance of other types of low-polluting vehicles, with the intent of building a fleet of vehicles that place minimal load on the environment.

EV Utilized at Various Scenes

Electric vehicles are more energy-efficient than gasoline vehicles, as they emit only 1/3 of the amount of CO₂, even when taking into consideration the loss during power generation. The amount of CO₂ emissions is further reduced when the batteries are charged at night.

At present, Kansai Electric is aggressively promoting the use of electric vehicles within the company. We have also placed 173 electric vehicles (excluding vehicles solely for use on the premises) mainly at five sales offices located in major cities, and are using them on a daily basis. Furthermore, we participate in and present them at a variety of events.



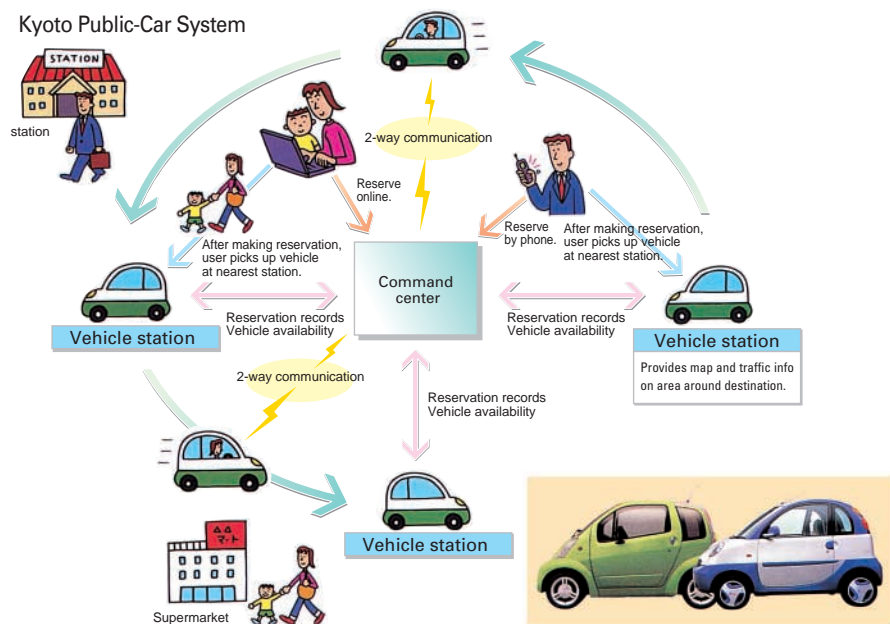
EV utilized as a leading car in a marathon race

Taking Part in the Kyoto Public-Car System

The Kyoto Public-Car System* is a program sponsored by the Japan Electric Vehicle Association that makes available for public use a number of compact electric vehicles stationed at 6 locations around the city of Kyoto. Kansai Electric is taking part in this promising program as it should promote the use and spread of the electric vehicle by allowing drivers of all backgrounds to use the vehicles for sightseeing, business and other purposes.

* <http://www.ev-kyoto.com/>

Kyoto Public-Car System



Topics

Easier Recharging Will Increase Spread (Development of 100V Charging Stand for Ultra Small EV)

The number of ultra small electric vehicles (motorized 4-wheel electric vehicles, electric scooters, electric vehicles for the handicapped, electric wheelchairs, etc.) on the road has rapidly increased as they can be easily charged from an ordinary 100V household electric outlet. And, they are expected to spread further.

These ultra small electric vehicles have been faced with a few setbacks in that they could travel only a short distance on a single charge and there were few places in the city where they could be recharged.

But, in conjunction with Tohoku, Hokuriku and Kyushu power companies, Park 24 and Japan Storage Battery Co., Ltd, Kansai Electric develop a coin-operated charging stand that, located throughout a city, anyone can easily use to recharge their parked vehicle. Manufactured on orders by Japan Storage Battery Co., Ltd, the stand went on sale in 2002.

By locating this stand throughout urban areas such as in parking garages, electric vehicles can extend their traveling range. This should help promote the use and spread of electric vehicles.



Charging stand for ultra small electric vehicles



Motorized 4-wheel electric vehicle

INPUT Utilizing Untapped Energy Sources

A large amount of energy in municipal areas disappears without being used.

Recycle-type regional heating services which make effective use of such untapped energy contribute to environmental preservation.

We are making efforts to convert untapped energy from sources such as steam from thermal power stations, waste heat exhausted from office buildings and computers, and the regional heat supply, by taking advantage of the differences between river or seawater temperatures and atmospheric temperatures.

In April 2001, we introduced a regional heat supply to the Osaka Konohana Rinkai district (USJ District). Moreover, we are now planning to introduce a regional heating supply that makes use of river water and waste heat from substations in the Osaka Nakanoshima 3-chome district.

Regional Heating Service Area

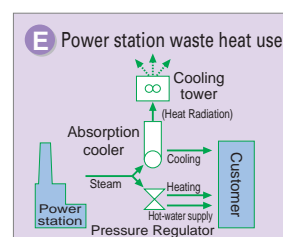
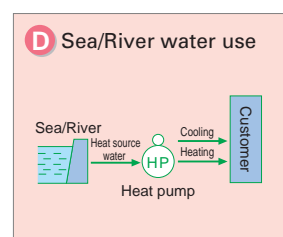
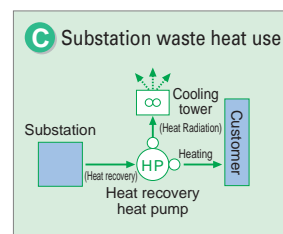
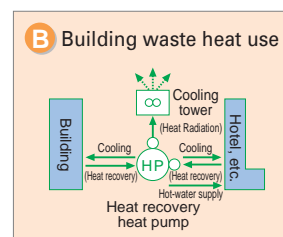
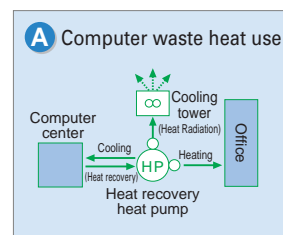


Utility tunnel and pipes

Projects for Practical Use of Untapped Energy

Area	Energy source	Applied system
	Started	
Osaka Nishi Umeda	Waste heat from cogeneration Apr. 1991	
Osaka Honjo Higashi	Waste heat from computers Jan. 1992	A
Nakanoshima 6-chome Nishi	Waste heat from buildings Nov. 1992	B
Osaka Nanko Cosmo Square	Sea water temperature, waste heat from cogeneration and buildings Apr. 1994	B D
Kansai International Airport	Waste heat from power stations Apr. 1994	E
Wakayama Marina City	Extracted steam from power stations Jul. 1994	E
Kobe research Park Kanoko-dai	Waste heat from computers and buildings Nov. 1994	A B
Tenjinbashi 1-chome	River water temperature, waste heat from cogeneration Jan. 1996	D
Rinku Town Area	Waste heat from substation and building Sep. 1996	B C
South of Sannomiya Station	Waste heat from buildings and computers Apr. 1999	A B
Osaka Konohana Rinkai	Waste heat from cogeneration Apr. 2001	

Example Systems





Developing and Popularizing New Energy Sources

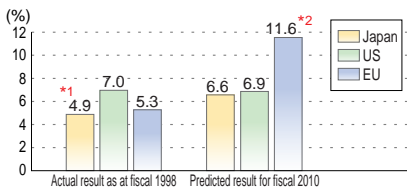
Current State of New Energy Sources

Natural energies like photovoltaic power, wind power, hydro power and geothermal power are called renewable energies as they do not produce CO₂ in power generation. The percentage to which Japan has introduced these new energies in the primary energy supply mix and the future prospects of increased use are no less in comparison with other countries.

Of these natural energies, photovoltaic power and wind power are designated new energies and efforts to spread their use are being promoted on the national level. Other designated new energies are waste power generation and biomass power generation.

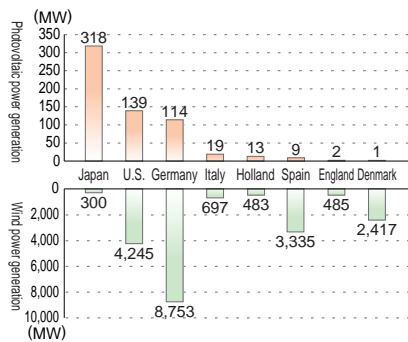
Natural energies like photovoltaic power and wind power have the strong point of not generating CO₂, but on the other hand, energy density is low and supply stability unlikely as they are highly susceptible to the weather. Presently, the biggest problem is that they cost more to generate power than other energy sources do. Having little primary energy resources of its own, Japan is aggressively developing the use of these natural energies and has in fact introduced more photovoltaic power generation than any other country in the world. Europe and the USA are introducing and promoting wind power generation because of the vast amount of area where favorable wind conditions are found.

Rate of introduction of reusable energy in the primary energy supply



*1 Actual result as at fiscal 1999
*2 Target value set by European Commission
Source: Assembled by Kansai Electric from documentation provided by General Energy Chosakai's New Energy Meeting

Photovoltaic and wind power introduced



Source: Assembled by Kansai Electric from the IEA PVPS REPORT (Sep. 2001) and WIND POWER MONTHLY (Apr. 2002)
Note: Photovoltaic power as at end of 2000 and wind power as at end of 2001

Activities to Use of New Energies

New energies present several problems that need to be overcome and so they are considered supplementary sources of power supply. Nevertheless, they carry high expectations as pure domestic sources of energy and minimal environmental load. Kansai Electric, too, is promoting the use and diffusion of new energies to note photovoltaic and wind power generation, while also constructively adding support to new energy initiatives through the purchase of surplus power from users and donations to the Kansai Green Power Fund.

Kansai Electric will also be increasing its contribution to the new energy effort by generating clean power within the Kansai Electric Group as mandated by the with Special Measures for Use of New Energy Sources in the Electric Power Industry (RPS Law) of June 2002 that requires power companies to make up a certain amount of their supply mix with new energies.

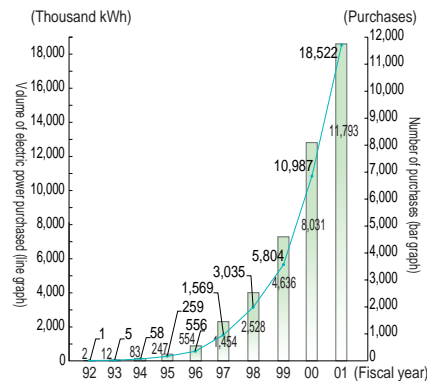
Photovoltaic and Wind Power Generation

With new offices, Kansai Electric has been installing photovoltaic power generation systems. As of the end of FY 2001, we were generating 765 kW of power. Wind power generation accounted for 154 kW at the end of FY 2001.

Also, with customers who have introduced photovoltaic power generation systems and the like to generate their own power, we have been buying back their power surplus at their request since April 1992. In 2001, we purchased 613,000 kW of surplus wind-generated power from two

facilities as well as 1.614 million kWh of wind-generated power from commercial facilities designed specifically to generate power. This surplus energy is purchased at the same price (kWh) we sell power to customers at, which is the least we can do to promote the development and diffusion of new technologies as well as provide our support to the early formation of a new energy power market. Kansai Electric is taking part in a model pricing program sponsored by NEDO (New Energy and Industrial Technology Development Organization, the Ministry of Economy, Trade and Industry).

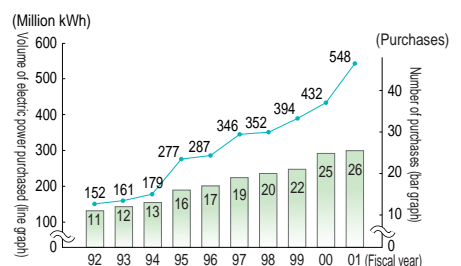
Purchase of surplus power from photovoltaic generation



Power Generation Using Waste Materials

Electric power from waste is generated by using combustion heat from waste as a heat source. Since there is no additional burden on the environment from this system, Kansai Electric purchases from local governments waste-generated power at a higher price than surplus power from other independent power producers and at a similar price to Kansai Electric's unit selling price.

Purchase of surplus power from waste generation



Purchasing cities: Osaka, Kyoto, Kobe, Suita, Wakayama, Toyonaka, Itami, Takatsuki, Sakai, Nishinomiya, Ibaraki, Akashi, Amagasaki



Kansai Green Power Fund

The Kansai Green Power Fund was created in October 2000 on a proposal made by Kansai Electric. It was set up to promote the use and spread of new energies. The Fund basically provides financial aid for the construction of photovoltaic and wind power generation systems, from donations received from our customers. Kansai Electric matches the donations that customers give yen-for-yen. Kansai Electric is collaborating in other constructive ways, too, by handling PR activities, accepting and depositing donations, and more.

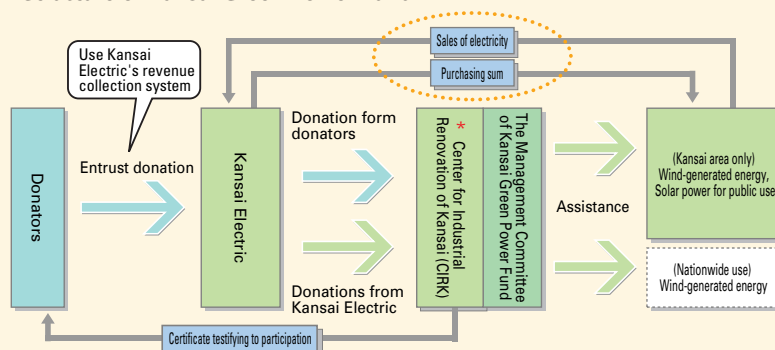
Green Power Certification



Japan Natural Energy

Japan Natural Energy* was founded in November 2000 with capital from 11 power companies including Kansai Electric. The company provides natural energy generation to customers who prefer to use natural energy, by outsourcing power generation to natural energy producers. As part of the contract with the customer, a third party verifies power generation performance of the natural energy producer. Japan Natural Energy then issues a Green Power Certification to the customer, showing that they have converted to natural power for part of their power needs. Natural power is one way to conserve energy and reduce CO₂ emissions, so the customer can advertise this as their environmental activity.

Structure of Kansai Green Power Fund



* <http://www.kiis.or.jp>

Aid recipients for 2001 (Photovoltaic power generation)

Recipient	Output Capacity
Kyoto Prefectural Uji Water Purification Plant (Kyoto Prefecture)	40 kW
Shiga Prefecture Hikone Engineering High School (Shiga Prefecture)	20 kW
Ashiya City Iwazono Elementary School (Hyogo Prefecture)	20 kW
Yao City Kitayamamoto Elementary School (Osaka Prefecture)	10 kW
Toyooka City Higashi Day Service Center (Hyogo Prefecture)	10 kW

(Wind-generated energy)

Recipient	Output
Taikoyama Wind Power Station (Kyoto Prefecture)	4,500 kW

Aid recipients for 2002 (Photovoltaic power generation)

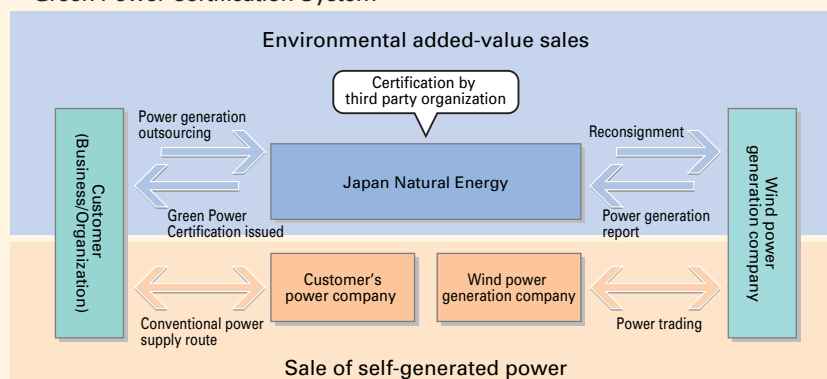
Recipient	Output Capacity
Minakuchi-cho Bandani Higashi Elementary School (Shiga)	20 kW
Shinmeiji Tunnel (Hyogo)	16.2 kW
Kyotanabe Chubu Shimin Center (Kyoto)	10 kW
Tatsuno General Health and Welfare Center (Hyogo)	10 kW
Toyooka Jonan Daycare (Hyogo)	10 kW
Inagawa Hokubu Medical Center (Hyogo)	4 kW

In 2002, there were no applications to sell wind-generated power to us. All purchased power came from photovoltaic power generation.

As of end of March 2003, Kansai Electric had signed agreements to purchase a total of 35.15 million kWh of wind power per year from 28 businesses and organizations.

* <http://www.natural-e.co.jp>

Green Power Certification System





Reduction

Reduction of Greenhouse Gas Emission in Electric Power Supply



Promoting Nuclear Power Generation

Improving Capacity Factor of Nuclear Power Stations

Kansai Electric plans to increase electrical power generation using nuclear energy, a power source that does not emit CO₂, while making every possible effort to improve the reliability and capacity factor of our nuclear power stations.

We have been making every effort to even further strengthen our traditionally high level of quality control and cut down on accidents and trouble occurring at our nuclear power stations. At the same time, we are working to maintain reliability at all our facilities and ensure quality through the regular inspections that have been carried out over recent years. In addition, we have brought about greater efficiency by revamping our operation systems in the various areas. This means that since fiscal 1997, the capacity factor at our nuclear power stations has kept a steady 80% level.

With safety and reliability always as a pretext, Kansai Electric continues to promote increased efficiency in a number of ways, one of which has been to systematically group specialty work during periodic inspections. We will also introduce steady cycling at rated thermal output

in fiscal 2002 to boost capacity factor of nuclear power stations even higher. Our target is to push nuclear power use beyond past highs to 85% or more.

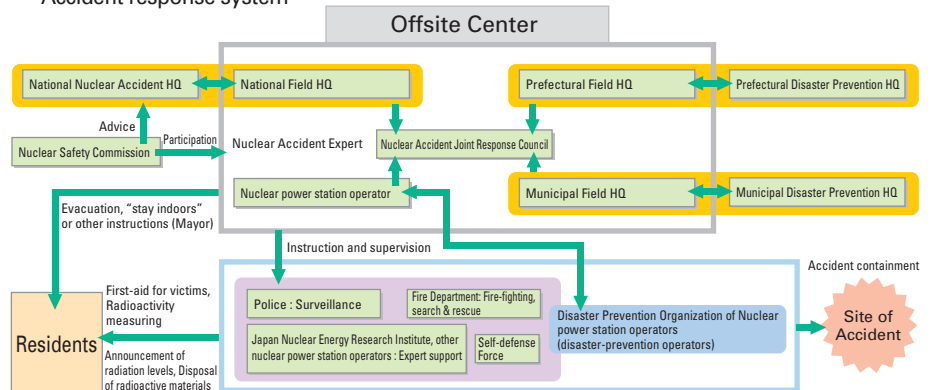
To Ensure Safety at Nuclear Power Plants

Safety is the prime concern of a nuclear power plant. That is why the facilities have been designed and built with redundant measures that safely avert accidents and, in the event of trouble, contain it to as small an area as possible. Every possible scenario has been taken into consideration.

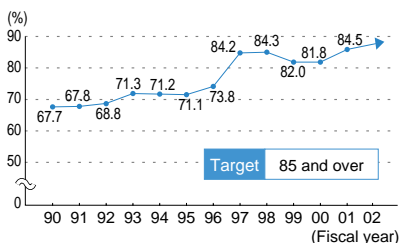
Prepared for Nuclear Accident

The Law for Measures Against Nuclear Accidents provides a framework of cooperation that allows national and local governments, power companies and related organizations to build a defense against nuclear accidents that threaten surrounding areas. In line with this same law, Kansai Electric has adopted an Accident Response Plan that spells out action to take in a nuclear emergency. Formulated through discussions with local government offices, the plan is part of efforts to ensure our preparedness in the event of trouble, as Kansai Electric continues to build and upgrade our accident prevention readiness.

Accident response system



Nuclear power generation capacity factor



Topics

Further Efficiency Improvements Provide Hopes of Increased Output (Steady Cycling at Rated Thermal Output)

Steady cycling at rated thermal output is an operation mode for a nuclear reactor that maintains thermal output at the maximum regulated level. It improves power generation efficiency and thereby increases electricity

output, when the temperature of seawater is low as in winter. The mode is designed to maintain safety and utilize energy effectively. It also reduces CO₂ emission and is expected to boost output by about 2% a year.

Drills

As indicated in the Accident Response Plan, each nuclear power plant stages drills once a year to ensure preparedness in the event of a nuclear accident. The national and local governments play an active part in these drills as they serve to strengthen coordination.



Accident response HQ meeting during emergency drills at Mihama Power Station



Activities Aimed at Gaining Trust

Recently, because of the JCO uranium processing plant criticality accident and the exposure of the falsification of data regarding MOX fuel at BNFL (British Nuclear Fuels Ltd.), public trust in the nuclear power industry has declined. There have been delays in the national Plutermal plan and the situation continues to be tough. In response to this situation, the entire nuclear power industry must regain public trust. Kansai Electric is taking every opportunity to promote activities to do just this – gain back public trust in nuclear power.

Tours of NPP

Seeing is believing. And so, as part of the effort at Kansai Electric to reassure the general public that our nuclear power plants are safe, we give tours of the facilities.

The initiative aims to make people more familiar with nuclear power through displays such as the actual steam generator from the Mihama station where cracked steam pipes sent a scare through the local community in February 1991.

Releasing Information Over the Internet

Kansai Electric provides a variety of information on nuclear power through 4 separate corners, including the main feature “Nuclear Power Generation News”, on our website. We additional release trouble reports. In fiscal 2001, there were 2 reports of trouble and 1 notice that we were obliged to release by law. Kansai Electric will continue the positive approach to providing information as quickly as possible through our websites and other channels.

Information-sharing Over NSN

On the lessons learned from the critical accident at the JCO uranium processing facility in September 1999, the nuclear power industry launched NSN (Nuclear Safety Network)* in December that same year to ensure safety across the entire industry. NSN’s major activities are given below and Kansai Electric is active in them as part of the effort to ensure facility safety and safe operation at nuclear power plants.

Building a safety culture in the nuclear power industry

Seminars, safety caravans, etc.

Peer reviews of members

Teams of experts visiting and assessing members’ facilities

Sharing and providing information on nuclear power safety

Sharing trouble information, etc.

*  <http://www.nsnet.gr.jp>

Activities in Kansai Atomic Power Information Net-Surfing

Activities in Kansai Atomic Power Information Net-Surfing

In October 2000, universities and businesses with nuclear-related facilities in the Kansai area formed Kansai Atomic Power Information Net-Surfing *. The pillar activities of this organization aim to enhance the safety of nuclear power and create a proper understanding of it amongst the general public. Since their start, the organization has staged various events and learning opportunities to provide the general public with correct information about the industry, such as the “So This Nuclear Power!” exhibition (Fiscal year 2000 and Fiscal year 2001) at Kinki University, the “General Open Day” (Fiscal year 2001 and Fiscal year 2002) at the Kumatori branch of the Nuclear Fuel Industries, Ltd. and “Shibune Summer School” at Mitsubishi Heavy Industries.

To commemorate their first year of activity, the organization sponsored the Energy Forum with a host of opportunities for the general public to think about nuclear power and how it is part of their lives. Kansai Atomic Power Information Net-Surfing is now looking for ways to effectively utilize facilities and human resources of members towards gaining public trust and understanding of nuclear fuel recycling and the whole span of operations associated with nuclear power.

*  <http://www.kgj-net.com/>



Ohi PS Gets High Evaluation in Peer Review

Ohi power station was the first Kansai Electric facility to go through a NSN peer review. The 4-day review lasted from January 22 to 25, 2002. In the review board’s assessment, the power station was “confirmed to endeavor concertedly, seriously and faithfully to maintain and strengthen the safety assurances of their nuclear power facilities.”



Peer review at Ohi PS



Energy Forum 2001
“Thinking About Your Life and Nuclear Power”



Improving and Maintaining Thermal Efficiency of Thermal Power Stations

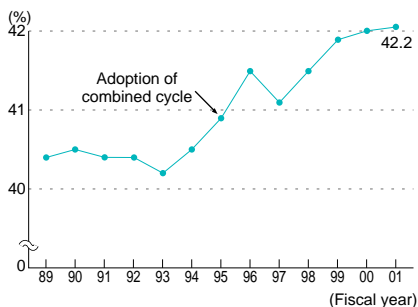
Measures to Improve Thermal Efficiency Using Combined Cycle Generation

By improving thermal efficiency at thermal power stations, we are able to conserve thermal power which enables us to control CO₂ emissions. We have introduced highly efficient combined cycle generation (thermal efficiency 54%) at our Himeji No. 1 Power Station. As a result, we have raised the total thermal efficiency for thermal power stations by maintaining a high utilization factor.

In combined cycle power generation, hot exhaust from a gas turbine is routed to a heat recovery steam generator, where it is used to generate steam to run a steam turbine. Effective combination of these two generation cycles can improve the thermal efficiency of the entire generation facility.

We are also working to maintain and improve thermal efficiency by adopting improvement measures for both equipment and operation at steam turbine plants, an existing generation method.

Kansai Electric's thermal power gross transmission thermal efficiency



In recent years, we have introduced highly efficient combined cycle power generation with thermal efficiency of 54%. By operating existing equipment, gross thermal efficiency is approximately 42% at all thermal power stations.

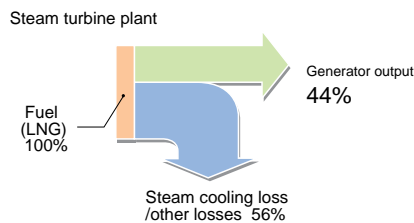
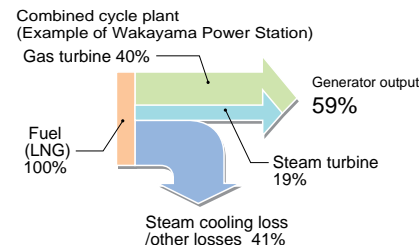
Combined Cycle Generating System with State-of-the-Art Gas Turbines

We are planning to adopt a combined cycle power generation at Wakayama Power Station, which is in the construction planning stages, incorporating state-of-the-art 1500°C-class (combustor exit temperature) gas turbines.

We expect that this will raise the gross thermal efficiency to the world's highest level, about 59%, and will reduce CO₂ emissions from electricity generation by about 25% compared to conventional LNG power generation.

Thermal efficiency is shown at a lower heating value.

Gross thermal efficiency of combined cycle generating system

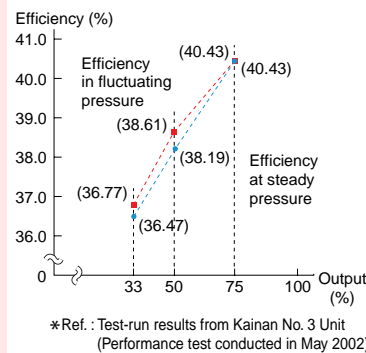


Reduced Loss, Increased Efficiency (Improved Power Generation Efficiency of Steady Pressure Once-through Boiler)

In recent years, we have had many opportunities to run thermal powered power stations at low output because of an increase in utilization factor of nuclear power plants. But, low output operation with power stations that employ a once-through boiler translates as high energy loss and low power generation efficiency.

On the Kainan No. 3 Unit, a front-end valve on the boiler's super heater was old and needed replacing, so we installed a valve that was strong enough to withstand the pressure fluctuations of normal operation and modified operation to vary pressure of the boiler's super heater according to power output. Test-runs after the change confirmed a 1.1% relative increase in power generation efficiency at 50% output. This was the first-ever case in Japan and, because of the success, we plan to remodel the Himeji No. 5 Unit in a similar fashion during 2002.

Efficiency change between steady pressure and fluctuating pressure





OUTPUT Using LNG

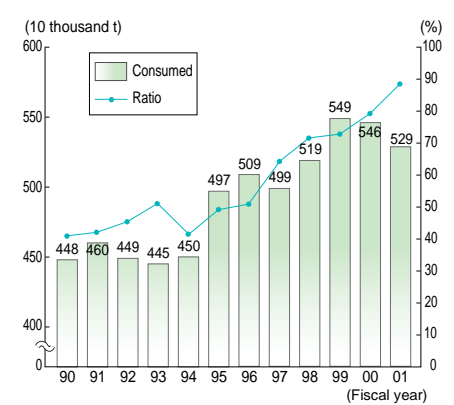
Since carrying out trials with LNG in fiscal 1973, we started importing this fuel, first from Indonesia in fiscal 1977, then from Western Australia in fiscal 1989, from Malaysia in fiscal 1995, and from Qatar in fiscal 1999. In fiscal 2001, we used a total of 5.29 million tons of LNG. This accounts for approximately 88% of fuel used for thermal reactors (heavy oil conversion ratio), making it the major source of fuel for our company. LNG has minimal impact on the environment: it contains almost no sulfur or nitrogen, and it emits far less CO₂ than thermal



LNG Ship

powers like oil and coal. We plan to continue making LNG our main fuel for our thermal power stations.

Amount of LNG consumed

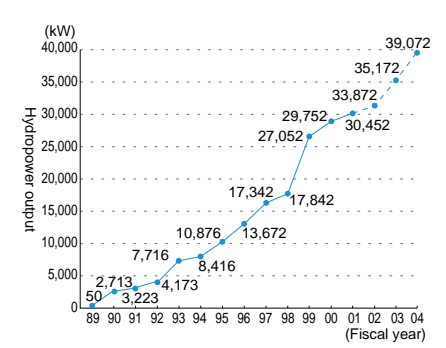


INPUT Renovating Hydropower Stations

It has become increasingly difficult to conduct large-scale hydropower development, since undeveloped areas are mainly small in scale. However, because hydropower is a clean energy resource that is purely domestic, we are developing this power source as much as possible. When we replace obsolete facilities in already-existing power stations, we use more efficient water turbines. In rivers with an ample amount

of water, we strive to produce as much electricity as possible by using the maximum amount of water for power generation. From fiscal 1989 through fiscal 2001, output had increased to 30,452 kW at hydropower stations as a result of plant renovation. We plan to further increase output by 8,620 kW, or seven units, from fiscal 2002 through fiscal 2004.

Increase in hydropower output from facility renovation



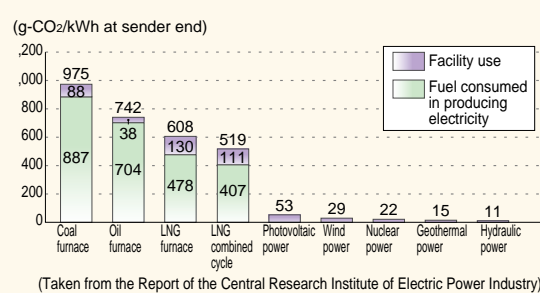
Life Cycle CO₂ Emissions per unit of power by Type of Electricity Source

The graph on the right gives and compares CO₂ emissions per unit of power by type of electricity source for Japan.

(Explanation)

It has been calculated taking into account all the energy consumed, not just the fuel burnt in producing the electricity. This includes energy consumed in obtaining the basic fuel for construction of facilities, transportation of fuel, refining, use and protection. In calculating for electricity produced by nuclear energy, we have included spent fuel that is currently planned for reprocessing domestically and use in Pluthermal (on the premise of one recycling only) along with high-level radioactive waste intended for disposal.

Units and comparison of CO₂ emissions in Japan by type of electricity source



(Taken from the Report of the Central Research Institute of Electric Power Industry)



Reducing Transmission and Distribution Losses

Reducing Transmission and Distribution Losses

We have managed to reduce and maintain a low loss ratio for many years now at transmission and distribution facilities by developing and introducing technology such as higher transmission voltage and greater volumes of power transmitted and distributed. We will continue to work to ensure that distribution facilities are structured so as to ensure low transmission and distribution losses and that we operate facilities with the same goals.

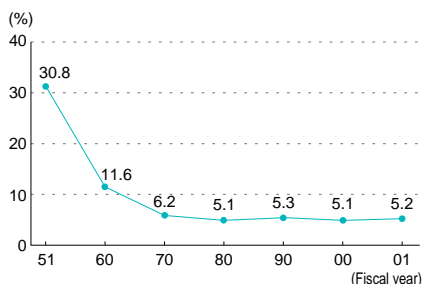
Introduction of 20 kV Power Lines

Kansai Electric is making efforts to increase and expand the reach of 20 kV class power lines (22 kV and 33 kV) that deliver electricity to customers. Because the 20 kV lines carry 3 to 5 times higher voltage than our 6 kV lines, we can supply more power while reducing transmission loss at the same time. The lines are used to supply special customers who contract 20 kV supply and high-rise buildings. We also use the utility towers for both 6 kV and 20 kV lines so that infrastructure is efficiently utilized.

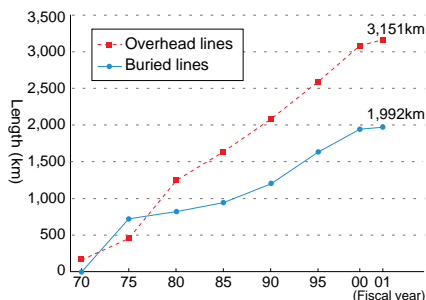
Adoption of High Efficiency Transformers

To reduce loss from utility pole transformers, Kansai Electric newly purchased transformers with a high saliency silicon steel band and noncrystalline alloy core, which is proven to reduce load (iron) loss. 17,000 of these transformers were purchased in 2001. Presently, 90% of all transformers are this high efficiency type. The loss reduction effect when converted into CO₂ emission comes out to a roughly 50,000 t yearly.

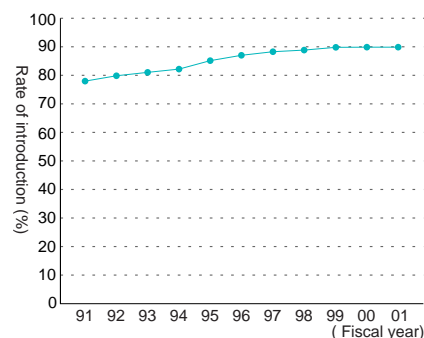
Ratio of transmission and distribution losses



Length of 20 kV power lines



Introduction of high efficiency transformers



Efforts to Reduce Transmission Loss in the Operation of Distribution Systems

Kansai Electric's distribution system is built like a grid to enable multiple supply routes from differing power stations and over differing power lines. Normally, some of the switches are left open, which radiates electricity. The amount of power line loss varies greatly depending on which of these switches are left open. Kansai Electric, therefore, added a low-loss navigational feature to our automated power line system that optimally opens and closes switches on a substation basis so as to keep transmission loss to a minimum.



Technological development with the Goal of reducing CO₂ emissions

Developing Flue Gas Decarbonization Technology

With the goal of eliminating CO₂ from flue gas at thermal power stations, we have been researching chemical absorption methods since 1991, by operating a flue gas CO₂ recovery pilot plant at Nanko Power Station. We have succeeded in reducing the amount of energy required to recover CO₂ by using newly developed absorbent liquids, and we are evaluating the optimum system configuration based on these results

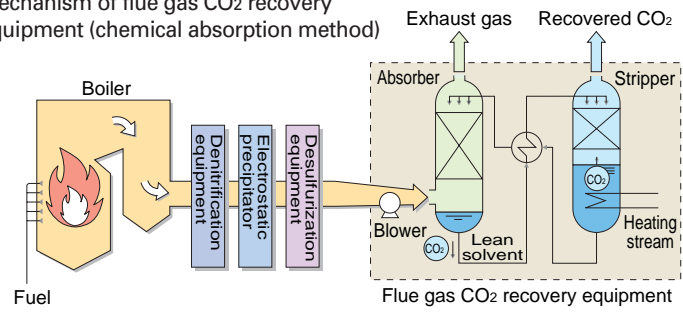
We have applied for a patent for the results of our research so far in Japan, the United States, Europe and Asia, and many countries have recognized the patent. Using these results, highly efficient CO₂ recovery equipment has been adopted at Malaysian companies.

Also, we are conducting comprehensive CO₂ recovering studies, such as synthesizing dimethyl ether from CO₂ to produce the hydrogen necessary for synthesis.



Flue gas CO₂ recovery pilot plant (Nanko Power Station)

Mechanism of flue gas CO₂ recovery equipment (chemical absorption method)

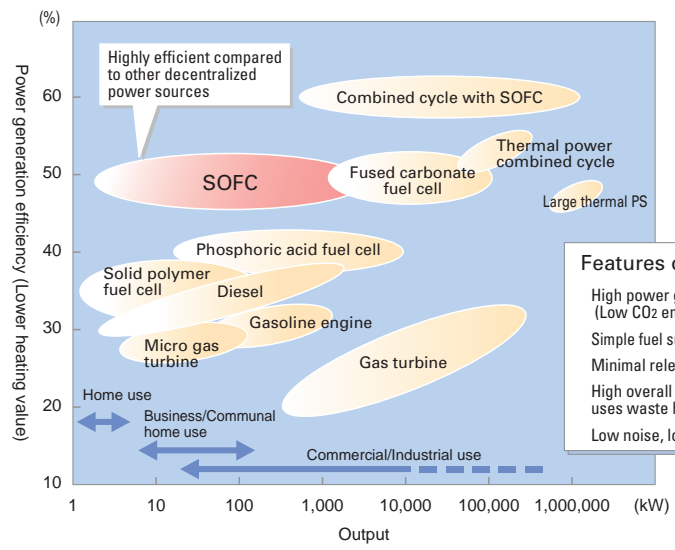


Development of Advanced Technology for Next-Generation Energy Supply

R&D into Next-Generation Fuel Cells

Fuel cells chemically react hydrogen and oxygen to directly produce electricity. They are highly efficient with minimal loss in energy conversion. Also, since natural gas, methanol, coal gas and a host of other fuels can be used, fuel cells are a hopeful new power generation system with widely diverse fuel base. Kansai Electric is researching several potential next-generation fuel cells of high power generation efficiency and high-level waste fuel utilization, such as solid oxide fuel cells (SOFC) and melted carbonate fuel cell (MCFC).

Features of solid oxide fuel cells (SOFC)



Experimental Apparatus for Solid Oxide Fuel Cell (SOFC)

- Features of SOFC Systems**
- High power generation efficiency (Low CO₂ emission)
 - Simple fuel supply (Internally reformable)
 - Minimal release of NO_x, SO_x and SS
 - High overall efficiency because uses waste heat
 - Low noise, low vibrations

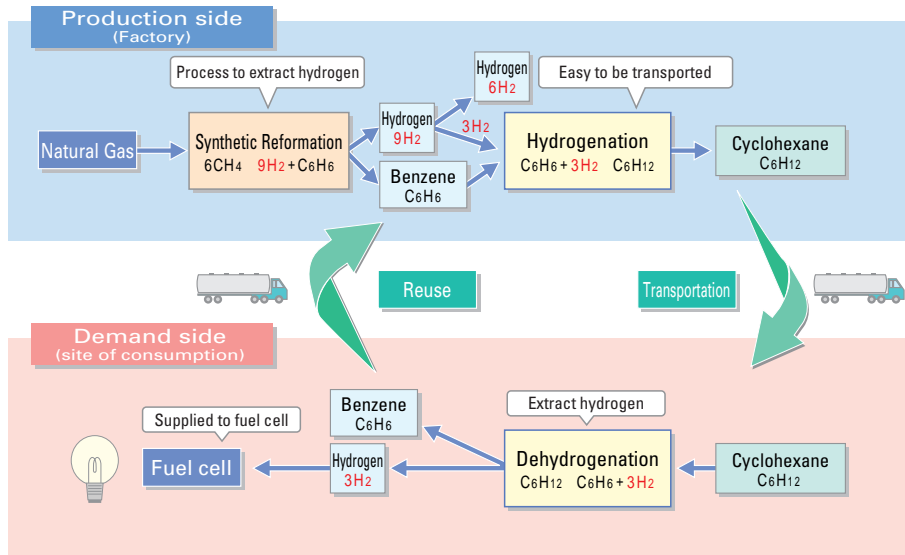


R&D into New Types of Fuel

Many new kinds of fuel, kind to the environment, are in the process of being developed such as hydrogen, DME (dimethyl ether) and GTL (liquid fuel using natural gas as its base). In particular, hydrogen is regarded as the favorite to replace oil as a source of energy.

We are carrying out extensive research and investigation centered on the possibilities of hydrogen from the viewpoints of its production, supply, use and the infrastructure it would require. For example, as one hydrogen system for the future, we are conducting research into a supply system that would transport hydrogen that had been produced by methane as chemical hydride in liquid form at normal temperature and pressure. The hydrogen would then be extracted at the site of delivery and transferred to fuel cells and so on.

Transporting hydrogen as chemical hydride

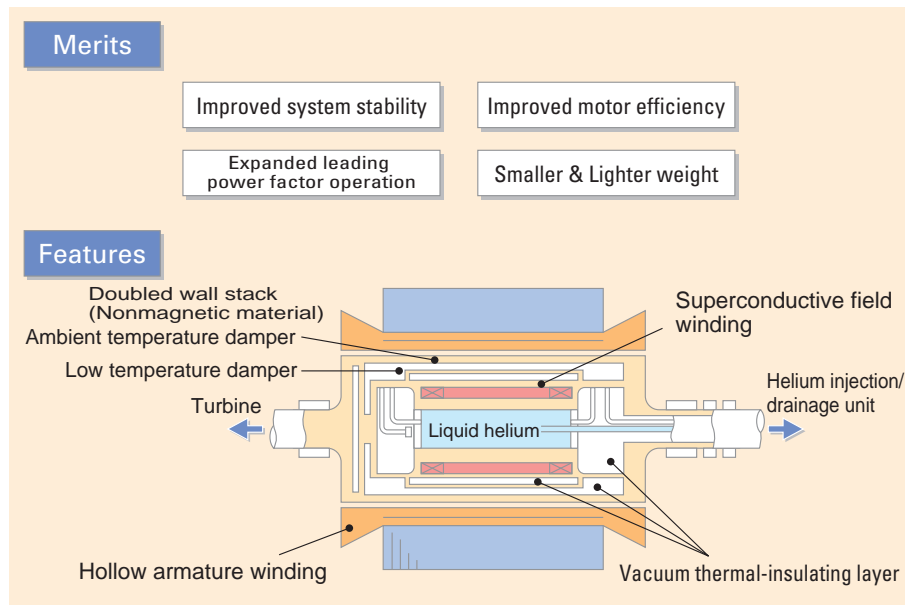


Research on Electric Power Applied Superconductivity Technology

Superconductivity technology could potentially bring about a revolution in all areas of future society. Superconducting generators improve efficiency over traditional generators and also improve power system stability. Accordingly, incorporating superconducting generators leads to resource conservation by reducing the use of fossil fuels and contributes to energy conservation through improved stability of electric power systems, thereby enhancing transmission capacity.

We are also engaged in basic research to determine the possibility of applying superconductivity technology in power generation apparatus, in preparation for a superconduction power generation system in the 21st century, and participating in the government's superconductivity development project for the purpose of finding solutions to utilize superconducting generators.

Merits and features of super induction motors





Reducing Emissions of Greenhouse Gases other than CO₂

Emissions of Greenhouse Gases

At COP3 in Kyoto in December 1997, reduction goals were determined for greenhouse gases including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbon (HFC), perfluorocarbon (PFC), and sixth fluoridation sulfur (SF₆).

CO₂ has more emissions than other greenhouse gases, more than 90% of Japan's total, and over 99% of Kansai Electric's total.

Apart from CO₂, although we do produce small amounts of SF₆, which we use in insulation in electrical equipment, we use almost no other greenhouse gases.

Reducing emissions of SF₆

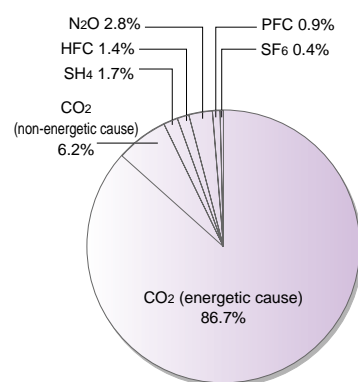
SF₆ is a high performance insulating gas. Because it helps downsize electric equipment and is safe to humans, it is widely used with electric devices such as gas circuit breakers and insulated switchgears. SF₆ gas insulator greatly reduces the amount of land needed for substations, thus helping make substations more eco-friendly.

This equipment, however, is overhauled once every 18 years and SF₆ gas can escape in the process. Therefore, with the cooperation of electric equipment manufacturers in recovering and reusing SF₆ gas, Kansai Electric has reduced the amount of SF₆ gas that is released into the atmosphere.

Basically, [1] SF₆ gas recovered in overhaul work is recharged into the device after work is done. [2] When equipment is retired, equipment manufacturers use the SF₆ gas to charge new equipment. [3] And, if recovered SF₆ does not meet performance demands, gas manufacturers destroy it before release.

Kansai Electric has also installed SF₆ gas recovery systems at all business sites (26 in all) and has greatly improved recovery rate by developing a booster called "Kankyo 1". Kansai Electric will continue working with manufacturers as well as introduce Environment 1 into more places, in an attempt to improve SF₆ recovery rate in overhaul work to about 97% by fiscal 2005 and thereby minimize release into the atmosphere.

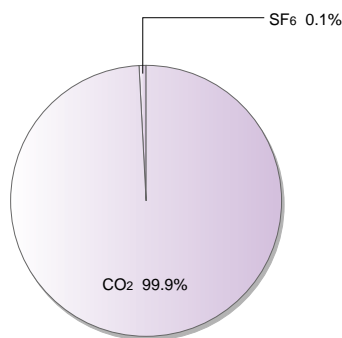
Emission rate of greenhouse gases in Japan (Fiscal 2000)



Note: Emission rate was calculated as carbon dioxide equivalent (IPCC, 1995), using global warming coefficient.

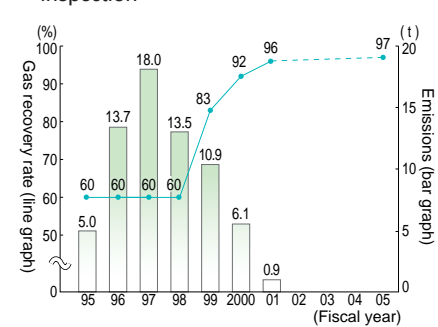
Source: assembled from data of Ministry of Environment

Emission rate of greenhouse gases at Kansai Electric (Fiscal 2001)



Note: Emission rate was calculated as carbon dioxide equivalent (IPCC, 1995), using global warming coefficient.

SF₆ gas recovery rate during apparatus inspection



SF₆ Gas Recovery Systems



Not Even a Little Bit Escapes (Development of SF₆ Gas Recovery Booster, "Kankyo 1")

Because of structural reasons, the system for recovering SF₆ gas from electric equipment always contains leftover SF₆, so Kansai Electric developed the "Kankyo 1" as a booster for recovering this residual SF₆ and ultimately improving overall recovery rate. This booster unit works in conjunction with the main unit to improve SF₆ recovery rate to 97% or more.



"Kankyo 1"



Activities Abroad

Activities Carried out Abroad to Prevent Global Warming

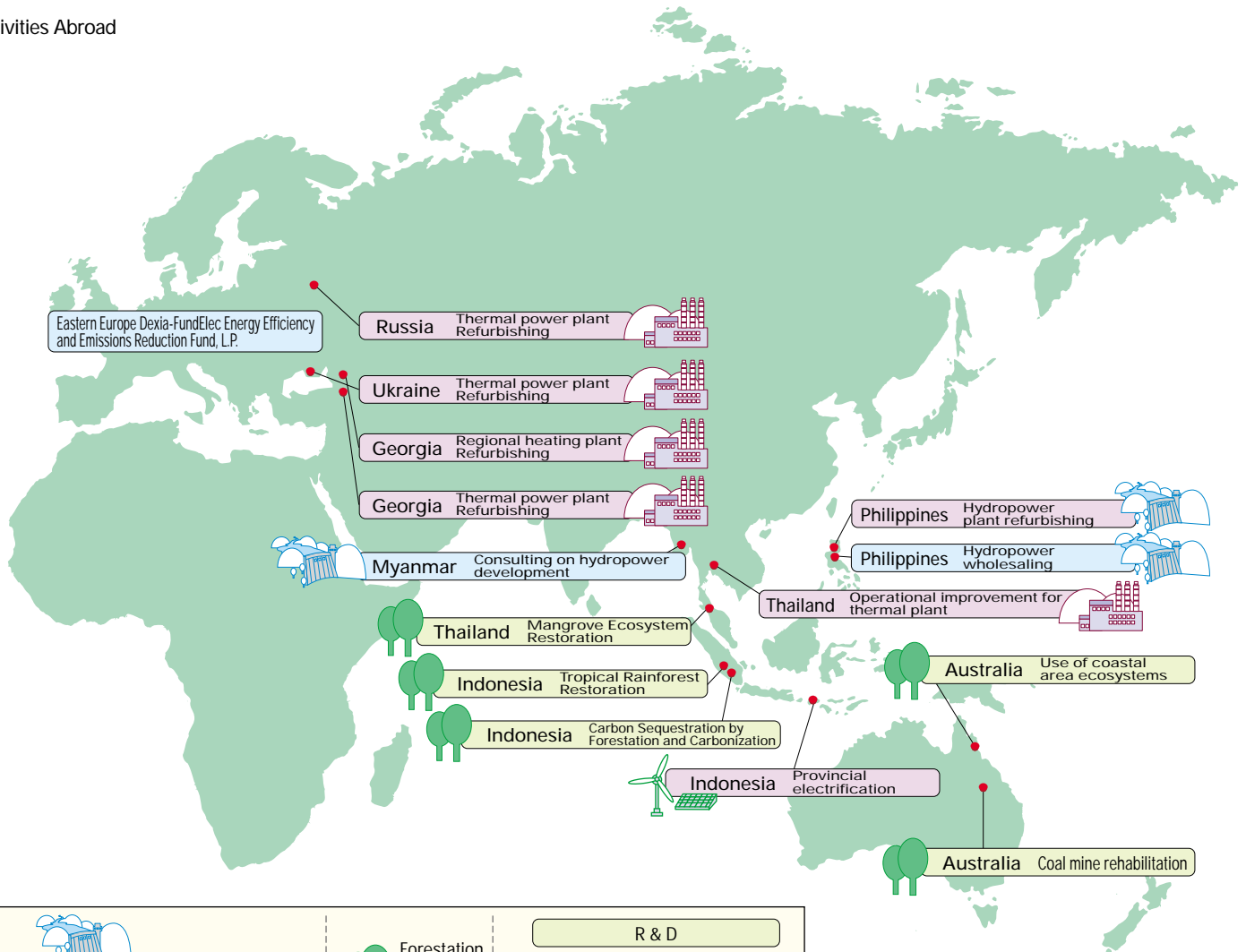
The United Nations Framework Convention on Climate Change (UNFCCC) is emphasizing international cooperation in the fields of technology, funding, and research into climate change. At the third session, COP3, in 1997 in Kyoto, members agreed to introduce the Kyoto Mechanisms Emissions Trading, Joint



Implementation, and the Clean Development Mechanism to complement the goals each of them set for reduction of greenhouse gasses in their own countries.

Kansai Electric believes the Kyoto Mechanism for implementing CO₂ reduction projects is an feasible cost-effective means for effective

reduction of greenhouse gas emissions. Therefore, we are developing projects overseas in which we can apply technical expertise, experience and know-how of years of research and development with the aim of applying those projects to the Kyoto Mechanism.

Activities Abroad



 <p>CO₂ Reduction Projects</p>	 <p>Forestation related projects</p>	<p>R & D</p> <p>Jointly implemented activities, project feasibility studies</p> <p>Developing international business</p>
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Research and Development to Expand Natural Resources

Developing Technology to Restore the Rainforests through Large-scale Afforestation

Every year, 12.6 million hectares of tropical rainforest--an area roughly one-third the size of Japan-- disappear.

Against this background, Kansai Electric and Gadjah Mada University in Indonesia have been carrying out international joint research since fiscal 1992 under the Tropical Rainforest Restoration Technology Development Project.

Under this project, researchers make use of the symbiotic relationship between lauan and mycorrhizal mushrooms in order to raise the number and growth rate of the seedlings. So far, they have selected certain mycorrhizal mushrooms beneficial to the growth of lauan saplings and developed a method of inoculating large numbers of lauan saplings with these mycorrhizal mushroom fungi. As well, they have found that the fungi have been effective in doubling tree size growth and in increasing the number of trees by five times.

The project ended in March 2002 and the President of Gadjah Mada University presented Kansai Electric with a Letter of Appreciation for our contribution.

As part of the research follow-up, monitoring continues into fields where agroforestry (A kind of forestation method that manages forest with earning income through selling of farm products grown among trees while protecting them against destruction by slash-and-burning, etc.) is conducted.

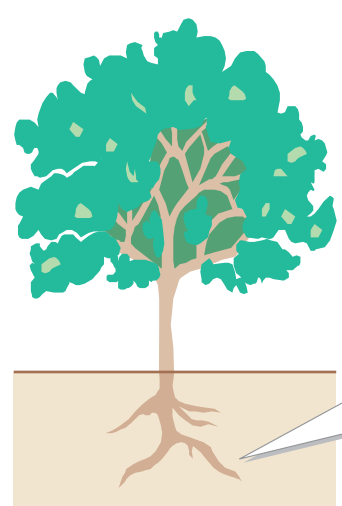


Four-month-old saplings (above) have been treated with fungi and grow at twice the rate of untreated ones (right).



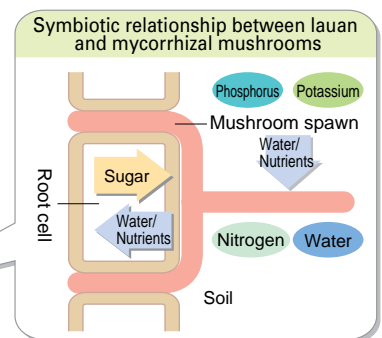
Pilot plantation Afforestation field test (Sumatra, Indonesia): 30cm lauan seedlings obtained a height of 8m over a 5-year period

Symbiotic relationship between lauan and mycorrhizal mushrooms



Effect of mycorrhizal mushrooms

- Contribute to growth of the lauan seedlings and planted trees.
- Resistant to dryness.
- Not susceptible to disease.
- Not likely to wilt and die.



Spawns spread out vertically and horizontally from the roots collecting water and nutrients such as phosphorus from the soil, and supplying them to the roots. Spawns simultaneously receive sugar from the roots. Hence, the two live symbiotically.

Outline of joint project with Indonesia's Gadjah Mada University

	Contents
Project name	Tropical Rainforest Restoration Technology Development Project
Participating Japanese companies	Kansai Electric Kansai Environmental Engineering Center
Cooperative body	Gadjah Mada University
Project contents	Develop technology for reforestation of lauan, a native tree, in order to restore the tropical rainforests, which act to absorb CO ₂ .
Site	Java and Sumatra, Indonesia
Area	Approx. 80ha
Duration of the project	Fiscal 1992-Fiscal 2001



Developing Technology for Planting Mangroves in Devastated Lands for the Sake of Local Improvement

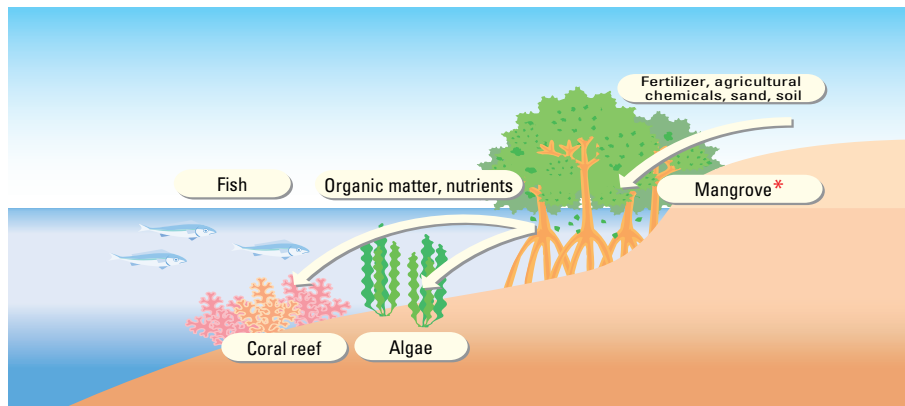
Mangrove forests have been rapidly disappearing in Southeast Asia due to expanded shrimp cultivation and tin mining.

For four years from 1996 to 1999, the Kansai Electric Group and the Australian Institute of Marine Science carried out joint research into CO₂ absorption and fixation of mangrove forests in Australia and Thailand. This research revealed that mangrove forests are better at absorbing and fixing CO₂ than tropical rainforests. As well, it was discovered that the areas where sea and fresh water meet contain very little oxygen and thus things like falling leaves are not decomposed but rather accumulate as organic carbon. This means that these coastal areas hold promise as storage areas for carbon.

The Kansai Electric Group is now building on these results in the Mangrove Ecosystem Restoration Reforestation Technology Development Project, a joint effort with the Royal Forest Department in Thailand started in 2000.

The aim of this research is to restore the mangrove forests, which have been devastated by industries like shrimp cultivation, and develop reforestation technology that can sustain the mangrove forests and thus contribute to the local improvement in a sustainable way. We are planting approximately 250,000 mangrove trees covering an area of roughly 80ha. In addition, we are looking into the possibility of creating a "Silvo-fishery system" combining forestry and fishery related activities.

Ecology of mangrove forests



*"Mangrove" is the general term for thickets of salt-resistant plants distributed throughout tropical and subtropical regions in the brackish waters of coastal and estuarial intertidal regions. In these swamps, leaves and twigs fall continuously from plants, then decay and are consumed by plankton, which are in turn eaten by fish. Thus, a mangrove swamp plays an important role, forming the center of an entire food chain.

Outline of project with the Australian Institute of Marine Science

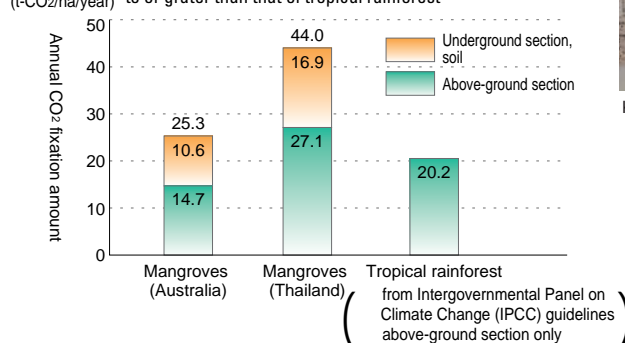
	Contents
Project name	CO ₂ Absorption and Fixation Research Through the Use of Coastal Ecosystems
Participating Japanese companies	Kansai Electric Kansai Environmental Engineering Center
Cooperative body	Australian Institute of Marine Science
Project contents	Confirm the coastal areas are highly effective in absorbing and fixing CO ₂ and propose measures to protect coastal ecosystems
Site	Hinchinbrook, Australia; Chumpon, Thailand
Duration of the project	Fiscal 1996-Fiscal 1999

Outline of project with Thailand Royal Forest Department

	Contents
Project name	Mangrove Ecosystem Restoration Reforestation Technology Development Project
Participating Japanese companies	Kansai Electric Kansai Environmental Engineering Center
Cooperative body	Royal Forest Department in Thailand
Project contents	Development of technology to plant trees in a devastated mangrove forest, which is a promising CO ₂ pool
Site	Don Sak and Khanom and other locations in Thailand
Area	Approx. 80ha
Duration of the project	Fiscal 2000-Fiscal 2003

Research results

The carbon fixation capacity of mangrove forests is equal to or greater than that of tropical rainforest



Khanom forest area, Thailand



Model Development of Carbon Sequestration Project by Forestation and Carbonization

A research aiming at model development of a project to sequester carbon by forestation and carbonization (CFC: Carbon Sequestration Project by Forestation and Carbonization) commenced in the fiscal year 2002. CFC is a project to seek to realize sustainable wood production and effective atmospheric CO₂ sequestration simultaneously.

Toward this aim, CFC uses plants, which has sequestered CO₂ by photosynthesis, as biomass fuel for power generation and raw materials of pulps and building materials. The usage of biomass can reduce the consumption of fossil fuel, which finally leads to effective reduction of CO₂ emission. CFC also produces charcoals, that can sequester atmospheric CO₂ semi-permanently, from the left-over woods after harvesting and wastes from pulp producing process and use them as soil conditioner and water treatment materials.

This research is implemented in Sumatra, Indonesia, on a 190,000ha site with the cooperation of a local tree planting company and a pulp company. The research aims for the development of carbonization technology through carbonizing left-over woods from the tree planting site and wastes from the pulp company. It also aims at developing economically viable project model through estimating how much usable amount of charcoal can be produced and how much carbon can be sequestered.

Kansai Electric expects this research will help establish Carbon Sequestration Project and contribute to reduction of atmospheric CO₂ which is causing global warming.

Outline of Carbon Sequestration Project by Forestation and Carbonization

	Contents
Project name	Model Development of Carbon Sequestration Project by Forestation and Carbonization (CFC)
Participating Japanese companies	Kansai Electric, Kansai Environmental Engineering Center
Cooperative body	PT. Musi Hutan Persada, PT. Tanjungem Lestali Pulp And Paper
Project contents	Develop model carbon sequestration project that simultaneously enables sustainable wood production and effective CO ₂ fixation.
Site	Sumatra, Indonesia
Duration of the project	Fiscal 2002-Fiscal 2004

Development of Tree-Planting Technology for Rapid and Reliable Rehabilitation of Open-cut Coal Mine

Since October 2000, a group consisting of Kansai Electric, Japan Coal Energy Center, Idemitsu Kosan Co., Ltd. and Electric Power Development Co., Ltd. has been carrying out a joint Japan-Australia project to develop and test technologies for growing forests of high CO₂ fixation capacity on the site of an open-cut coal mine. The project is run by the New Energies and Industrial Technologies Comprehensive Development Organization (NEDO).

Since the site in Australia is dry and contains little rain, it is considered to be difficult to rehabilitate vegetation there. Nevertheless, planting trees and growing a forest there would greatly help to cope with global warming, the project was launched.

Currently, about 13,000 eucalyptus trees have been planted over roughly 28 ha site and growth is being monitored.

Project Site



Planting as of December, 2000

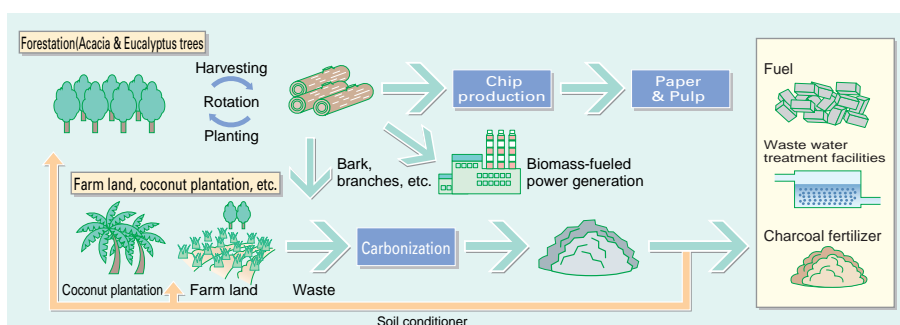


As of July, 2002



Site overview (May, 2001)

Carbon sequestration by Forestation and Carbonization (CFC)



The study area gets little rain and is classified as savannah. Yet, Kansai Electric hopes to make the most of the technologies it has developed to enhance the plant growth using mycorrhizal mushrooms and charcoal.

Outline of Open-cut Coal Mine Rehabilitation Project in Australia

	Contents
Project name	Open-cut Coal Mine Rehabilitation Project
Participating Japanese companies	Kansai Electric, Japan Coal Energy Center, Idemitsu Kosan Co., Ltd., Electric Power Development Co., Ltd.
Cooperative body	Commonwealth Scientific and Industrial Research Organization (CSIRO)
Project contents	To look into methods for the rapid planting of forests high in CO ₂ absorbing capabilities in open-cut coal mine, and to develop simulations in order to achieve the effective use of such new technologies.
Site	Australia's Ensham and Ebenezer Mines
Area	Approx. 28ha
Duration of the project	Fiscal 2000-Fiscal 2004



Looking to Apply Carbon Dioxide Recovery Technology Abroad

Research into Possible Overseas Applications

In cohort with Mitsubishi Heavy Industries, Kansai Electric developed absorption technology for efficiently recovering CO₂ in flue gas from thermal power stations. Its recovery rate is currently the highest in the world. (see pg. 41.)

Research began in 2001 on consignment from CCP (CO₂ Capture Project, consortium of 8 major oil companies) and started by searching for ways to improve the efficiency of oil extraction by injecting CO₂ into oil fields. Tests were conducted at our Nanko power station.

Carbon Dioxide Recovery technology is expected to contribute greatly to the effective use of CO₂ overseas and subsequently a worthwhile response to global warming.

Research into carbon dioxide recovery technology applications

	Contents
Project name	CO ₂ Capture Project (CCP)
Participating Japanese companies	Kansai Electric, Mitsubishi Heavy Industries, Kvaerner Process Systems (KPS)
Cooperative body	BP Amoco, ENI, Norsk Hydro, Chevron Texaco, EnCana, Shell, Statoil, Suncor Energy
Project contents	Reduce cost of CO ₂ fixation by combining CO ₂ recovery technology from Kansai Electric and MHI with membrane technology from KPS.
Site	Kansai Electric's Nanko power station
Duration of the project	Fiscal 2001-Fiscal 2002

Outline of the project with the Electricity Generating Authority of Thailand (EGAT)

	Contents
Project name	Power Plant Thermal Efficiency Improvement / Recovery Through Enhanced Operational Management
Participating Japanese companies	Kansai Electric, Electric Power Development, Chubu Electric
Cooperative body	Electricity Generating Authority of Thailand (EGAT)
Project contents	The four companies named above have been promoting improvement of their power plants' thermal efficiency, and have developed various energy-saving techniques. Based on this technical experience and expertise, the parties jointly and cooperatively implement the project to improve/recover the power plant thermal efficiency.
Site	South Bangkok Power Station
Duration of the project	Fiscal 1996-Fiscal 1999 (including monitoring)
Expected effect (project total)	CO ₂ emission reduction : 40,000t-CO ₂ / thirty months



South Bangkok Power Station

Outline of the project in Indonesia

	Contents
Project name	Installation of Renewable Energy Supply Systems in Indonesia*
Participating Japanese companies	Kansai Electric, Tokyo Electric
Cooperative body	The Directorate General of Electricity and Energy Development of the Ministry of Mines and Energy of the Republic of Indonesia (DGEED)
Project contents	To cooperate in ways contributing to sustainable energy supply through installing renewable energy supply systems including the implementation of solar home systems, microhydropower and hybrid system (photovoltaic and wind power) in rural areas in Indonesia.
Site	Rural areas in Indonesia
Duration of the project	Fiscal 1996-Fiscal 2000 (we have been providing support for management of maintenance activities since the beginning of 2001)
Expected effect (project total)	CO ₂ emission reduction : 1,200 t-CO ₂ / year

*This project will be implemented in the name of "e7". "e7" is a group consisting of some of the world's major producers and distributors of electricity, which was organized in 1992 to hold global consultations on environment issues.



Explaining the Solar Home System at the local level

Activities and Business Feasibility Studies for the Future Utilization of the Kyoto Mechanism

Participating in Activities Implemented Jointly (AIJ) Japan Program

The UN Framework Convention on Climate Change introduced the concept of "joint implementation" whereby multiple countries could work together to reduce emissions of greenhouse gases. To promote the idea, Japan created the AIJ Japan Program under which Kansai Electric has implemented two projects: the "Power Plant Thermal Efficiency Improvement/ Recovery Through Enhanced Operational Management in Thailand" and the "Installation of Renewable Energy Supply System in Indonesia". In both cases, Kansai Electric contributed to improve heat efficiency at the thermal power station and cooperate in the development of sustainable energy sources, through providing Kansai Electric's technical know-how and, by utilizing the knowledge and wisdom of both sides. Making good use of the successful experiences of these projects, Kansai Electric will study the possibility implementing of similar projects whether they could be applicable to Joint Implementation and the Clean Development mechanism of the Kyoto Mechanisms.

Feasibility Studies for Business Development

Looking to drum up future business under the auspices of the Kyoto Mechanisms, Kansai Electric has conducted four studies under a publicly recruited feasibility study organized by NEDO, including basic studies into combined cycle planning for the Konakovo thermal power station in Russia in fiscal 1998. Kansai Electric also took part in two projects under another publicly recruited feasibility study called the Study for Environment and Plant Rehabilitation Projects that was organized by JETRO (Japan External Trade Organization), one of which was the rehabilitation project of the Ambuklao hydropower plant in the Philippines in fiscal 2000.

In fiscal 2002, Kansai Electric will lock arms with Kansai Environmental Engineering Center, one of Kanden Group companies, to study possible efficiency improvements to a bagasse-fired power station in Mauritius under a publicly recruited feasibility study organized by NEDO.



Outline of the business feasibility study with Russia (Fiscal 1998)

	Contents
Project name	Basic Study on Reconstruction and Modernization of Konakovo Thermal Power Station
Participating Japanese companies	Kansai Electric, Mitsubishi Corporation
Cooperative body	United Power System of Russia
Project contents	The project would improve the total plant thermal efficiency of Konakovo Thermal Power Station by introducing a modern gas turbine combined cycle power plant which would substantially reduce the plant's CO ₂ gas emissions.
Site	Konakovo Thermal Power Station (suburb of Moscow)
Expected effect	CO ₂ emission reduction : 2.3 million t-CO ₂ / year



Konakovo Thermal Power Station (Moscow)

Outline of the business feasibility study with Georgia (Fiscal 2000)

	Contents
Project name	Renovation and Rehabilitation of District Heat Supply System
Participating Japanese companies	Kansai Electric, Shimizu Corporation
Cooperative body	Ministry of Fuel and Energy, Tbilisi
Project contents	Introduce thermoelectric supply system into existing heat supply plant and study ways to reduce energy consumption across entire plant.
Site	District Heating Plants in Tbilisi
Expected effect	CO ₂ emission reduction: 50,000 t-CO ₂ /year (Highest value case where optimum plan for achieving highest reduction in CO ₂ has been used)



District Heating Plants in Tbilisi, Georgia

Outline of the business feasibility study with the Philippines (Fiscal 2001)

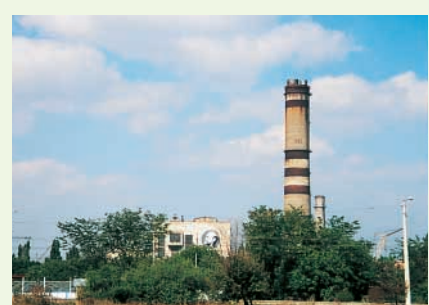
	Contents
Project name	Binga Hydropower Plant Rehabilitation Plan in Philippine
Participating Japanese companies	Kansai Electric, NEWJEC
Cooperative body	Philippine National Power Company (NPC)
Project contents	To maintain the proper operation of power plants, a plan to apply maintenance experiences and technologies used at power plant in Japan to power stations where sand deposition in reservoirs in progress is designed
Site	Binga Hydropower Plant (Benguet Province, Luzon Island)
Expected effect	CO ₂ emission reduction : 260,000 t-CO ₂ / year



Binga Hydropower Plant (Benguet Province, Luzon Island)

Outline of the business feasibility study with Ukraine (Fiscal 1999)

	Contents
Project name	Basic Study on Reconstruction and Modernization of Symferopolskaya Thermal Power Station
Participating Japanese companies	Kansai Electric, Sumitomo Corporation
Cooperative body	Krymenergo
Project contents	The project would improve the total plant thermal efficiency of Symferopolskaya Thermal Power Station by introducing a modern gas turbine combined cycle power plant which would substantially reduce the plant's CO ₂ gas emissions.
Site	Symferopolskaya Thermal Power Station (Crimea)
Expected effect	CO ₂ emission reduction : 0.7 million t-CO ₂ / year



Symferopolskaya Thermal Power Station (Crimea)

Outline of the business feasibility study with the Philippines (Fiscal 2000)

	Contents
Project name	Ambuklao Hydropower Plant Rehabilitation Plan
Participating Japanese companies	Kansai Electric, NEWJEC
Cooperative body	Philippine National Power Company (NPC)
Project contents	In addition to using Japan's experience and technology in repairing stalled hydropower facilities, plan and carry out measures to quickly get the facilities back up and running. Diagnose the facilities and repair and replace intake mechanisms and deteriorated machinery
Site	Ambuklao Hydropower Plant (Benguet Province, Luzon Island)
Expected effect	CO ₂ emission reduction : 250,000 t-CO ₂ / year



Ambuklao Hydropower Plant (Benguet Province, Luzon Island)

Outline of the business feasibility study with Georgia (Fiscal 2001)

	Contents
Project name	Basic Study on Reconstruction and Modernization of Garbadani Power Plant in Georgia
Participating Japanese companies	Kansai Electric, Kawasaki Heavy Industries, Shimizu Corporation
Cooperative body	Ministry of Fuel and Energy
Project contents	Enable combined cycling by high efficiency gas turbine in 3 seriously aged steam turbine at power plant, reduce energy use with improved energy efficiency and reduce CO ₂ emissions.
Site	Garbadani Power Plant, Rustabi
Expected effect	CO ₂ emission reduction: 570,000 t-CO ₂ /year (total for 3 units)



Garbadani Power Plant, Rustabi



Developing International Business that Contributes to the Decrease of Global Warming

Participate in a Hydropower Generation Project

In April of 1998, Kansai Electric decided to participate in a hydropower generation project in the Philippines. This was the first time that a Japanese power company committed its resources to full-scale investments and participation in an electric power generation project abroad, known as the San Roque Multipurpose Project. This will be one of the biggest hydropower generation projects in the Philippines, and we are jointly investing and participating in the project with Marubeni Corp. and Sithe Energies, Inc.

Furthermore, in August of 2001, we entered into a consultation contract with Myanmar Electric Power Enterprise (MEPE), to facilitate our electric power development projects.

According to this agreement, our company will be engaged, in technical guidance to Myanmar Electric Power Enterprise employees, along with NEWJEC Inc. for the following three-year period. This project was initiated by the government of Myanmar, being troubled by chronic power shortages, and employing the country's rich hydropower resources, it will develop power generation plants (12 locations) capable of generating 2 million kW of power in the period from 2001 to 2005.

We consider that participation in this type of renewable hydropower development is significant in terms of its contribution to the mitigation of global warming.

Investment in Dexia-FondElec Energy Efficiency and Emissions Reduction Fund, L.P.

Furthermore, in January 2000, our company made the decision to participate in the "Dexia-FondElec Energy Efficiency and Emissions Reduction Fund, L.P.," an environmental fund put together by the European Bank for Reconstruction and Development (investment: 10 million euros). The purpose of this fund is to

invest in energy businesses involved in such areas as electricity, heat supply, and gas supply in the 26 Eastern European countries which are candidates for loans from the European Bank for Reconstruction and Development, thereby reducing the emission of greenhouse gases at the same time as increasing revenues through improved efficiency, while aiming for the eventual acquisition of emission reduction credits of greenhouse gases.



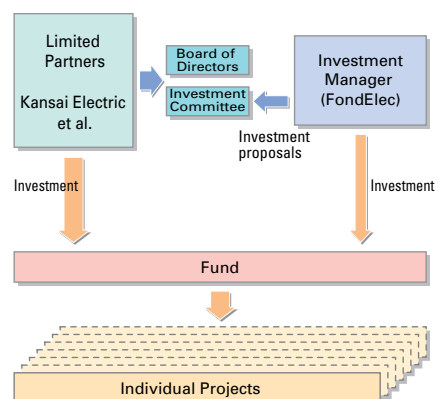
Construction site for San Roque Project



Ceremony for the signing of the Consultant Contract

Outline of the investment fund in Eastern Europe

	Contents
Name	Dexia-FondElec Energy Efficiency and Emissions Reduction Fund, L.P.
Investor	European Bank for Reconstruction and Development (project planner), Kansai Electric, Dexint, Marubeni Corporation, Electric Power Development Co., Ltd., Mitsui & Co., Ltd.
Investment Manager	FondElec (Connecticut, USA)
Project contents	To invest energy businesses involved in electricity, heat supply, and gas supply in Eastern European countries, thereby reducing the emission of greenhouse gases while at the same time increasing revenues through improvement of efficiency, eventually aiming for the acquisition of emission reduction credits of greenhouse gases.
Site of fund	Established at 71 million euros. Additional fundraising to maximum of 150 million euros
Duration	2000-2009 (extended a maximum of two years)



Scheme for the Investment Fund for Energy-Conserving Businesses in Eastern Europe.

Outline of the project in the Philippines

	Contents
Project name	San Roque Multipurpose Project (115MW×3 Units)
Implementing corporation	San Roque Power Corporation*
Project contents	Construct a hydropower plant, and hand over the ownership of the plant to National Power Corporation after 25 years of operation.
Site	Agno River (northern part of Luzon Island, Philippines)
Expected effect	CO ₂ emission reduction: 0.7 million t-CO ₂ /year

*Kansai Electric will begin by establishing wholly owned company Kanden International Co., Ltd., then establish subsidiary KPIC Singapore Ltd. in Singapore. KPIC Singapore will invest in San Roque Power Co., Ltd.

Outline of the project in Myanmar

	Contents
Project name	Institutional Transfer and Technical Consulting Services for Hydropower Development Projects
Companies involved	Kansai Electric NEWJEC
Cooperative body	Myanmar Electric Power Enterprise (MEPE)
Project contents	The Kansai Electric Group will support Myanmar to develop hydropower plants and transfer engineering technique obtained through its over-century experience by means of OJT (On the Job Training) in Myanmar and training programs in Japan.
Site	Sittang Valley and others in Myanmar. 12 sites (2000 MW)



Group Activities Aimed at Future Overseas Operations

The Kansai Environmental Engineering Center is studying the possibility of participating in a number of international projects and developing business in cohort with Kansai Electric. They are aggressively looking for business opportunities in the fight against global warming, which includes their part ownership of carbon trader Natsource.

Participation in Project to Tackle Global Warming through Forest Carbonization

In October 2000, in consideration of future business activities overseas, the we sent researchers to the Research Institute of Innovative Technology for the Earth (RITE), which is conducting the Development of Technology for Creating Compound Environment Measures such as Preventing Global Warming Through Tree Carbonization. This work is taking place under the framework on guidance research related to environmental industry technology, which is run by the New Energy and Industrial Technology Development Organization (NEDO). Among the responsibilities of our members are selecting carbon fixing plants and developing effective charcoal compost manufacturing methods.

Outline of project to create anti-warming measures through carbonization of things like trees

	Contents
Project name	Development of Technology for Creating Compound Environmental Measures such as Preventing Global Warming through the Carbonization of things like Trees
Implementing organization	Research Institute of Innovative Technology for the Earth (RITE)
Participating companies, etc.	Kansai Environmental Engineering Center Co., Ltd. Wood Research Institute, Kyoto University Ebara Corporation
Project contents	In order to gather, fix, and deactivate large amounts of CO ₂ , confine carbon long-term by carbonizing the carbon fixed within plants, and develop effective uses for charcoal such as purifying water and improving soil. In addition to this long-term deactivation of CO ₂ , carry out basic research that will be useful in creating measures for things like preventing pollution and protecting the environment.
Duration of the project	Fiscal 2000-Fiscal 2002 (planned)

Development of Technology for CO₂ Coal Layer Fixation

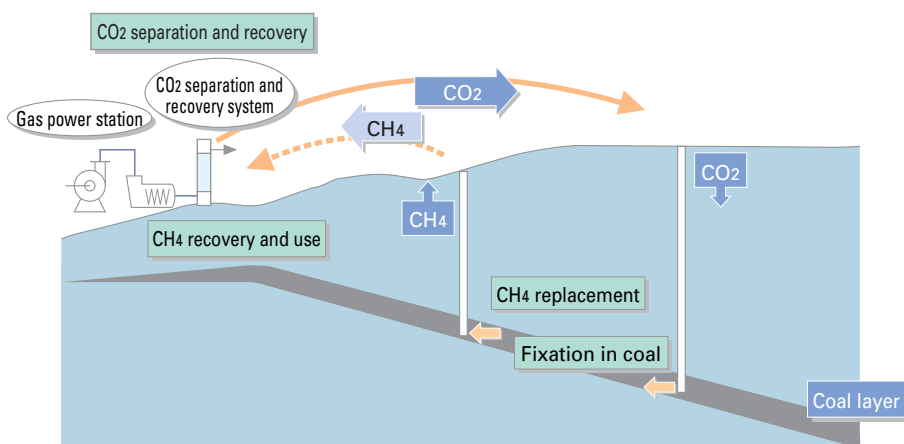
Under the Ministry of Economy, Trade and Industry's CO₂ Fixation and Effective Utilization program that searches for a solution to global warming, development is moving forward on technology to fixate CO₂ recovered from large sources by separation in seawater or underground storage. A new development project started in 2002 is aiming at technology for CO₂ coal layer fixation. As the project leader, the Kansai Environmental Engineering Center has guided research done in cooperation with research institutes and universities to the steps immediately prior to practical application. More specifically, the project involves a series of technologies that start by compacting CO₂ separated and recovered from a large source into a stable fixing coal layer and ultimately recovering untapped methane (CH₄) that replaces the CO₂ in the coal layer as clean energy. After identifying the mechanism by which CH₄ replaced CO₂ as well as the optimum

CO₂ fixing conditions and examining diverse monitoring techniques, field verification tests will be done and further studies will be launched to look into how the entire system can be turned into a project.

Development of technology for CO₂ coal layer fixation

	Contents
Project name	Development of Technology for CO ₂ Coal Layer Fixation
Implementing organization	Kansai Environmental Engineering Center
Participating companies, etc.	Kansai Electric, etc
Project contents	Develop technology to fixate CO ₂ in coal layer and effectively utilize resulting CH ₄ , using mechanism whereby CH ₄ replaces CO ₂ in coal.
Duration of the Project	Fiscal 2002-Fiscal 2006 (planned)

CO₂ Fixation in coal layer





International Cooperation

Promoting Worldwide Technical Cooperation to Contribute to Prevention of Global Warming

In order to address critical issues the international society are facing today, such as "global warming" and "sustainable development", it is indispensable to expand cooperation activities to worldwide scale. Expectations are growing for electric utilities further contribution, since they can especially play a greater role among the private sectors in providing technology transfer related to issues (such as nuclear generation, energy conservation and environmental protection, etc). Based on these circumstances, Kansai Electric aggressively involves in multitude of international projects that can contribute to mitigate climate change, with an emphasis on using our field-proven technical expertise. Our activities are consisting mainly of:

Participating proactively in international associations and groups that seek to promote sustainable energy development

Implementing activities with Developing Countries which aim at reducing Green House Gas (GHGs) emissions.

Carrying out Human Capacity Building activities related to electricity and the environment.

Highlights of our Activities

As a member from the onset of e7 and WBCSD (see below), Kansai Electric has been providing support for large-scale environmental improvement to developing economies. The results of these efforts have been reported as views and experiences from the industrial sector in many opportunities such as on the Conference of the Parties (COP) of the UN Framework Convention on Climate Change. Kansai Electric has also played a constructive role in international discussions, including

participation in experts' sessions on global environmental problems at the World Energy Conference (WEC) and International Council on Large Electric Systems (CIGRE).

Kansai Electric is also cooperating internationally for the global safety of nuclear power by providing technical support to the Qinshan nuclear power station in China, for example. We believe our support and cooperation can contribute to the development of nuclear power.

e7 (a group of leading electric utilities in the G7 countries)

Established	1992
Objective	To play an active role in protecting the global environment and promoting sustainable development through efficient generation and use of renewable energy sources
Outline of activities	Enhancing the quality of international debate on global environment policy issues by sharing its experiences and perspectives. Taking initiative to organize international cooperation for actions to curb and reduce greenhouse gas emissions in developing countries, such as joint projects in Indonesia and Jordan.
Membership	American Electric Power (USA), EDF (France), ENEL (Italy), Hydro Quebec (Canada), Ontario Power Generation (Canada), RWE (Germany), Tokyo Electric (Japan), Kansai Electric (Japan), Scottish Power (UK)

WBCSD (World Business Council for Sustainable Development)

Established	1995
Background and objective	WICE (World Institute for Conservation and Environment, established in 1993) and BCSD (Business Council for Sustainable Development, established in 1990) merged as WBCSD in 1995. It aims to promote world industry to take a leading role in realizing sustainable development.
Outline of activities	Conducting seminars and producing papers that support the WBCSD's commitment to sustainable development, such as "Climate and Energy", "Eco-Efficiency", "Social Trust", "Standardization of calculation method of greenhouse gas emission"
Membership	This coalition represents about 160 companies from more than 30 countries

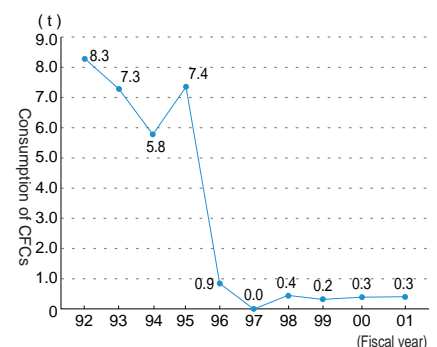
Protecting the Ozone Layer

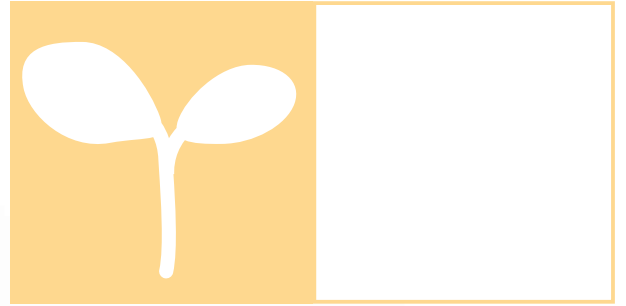
We are taking every possible measure to abolish the use of specified CFCs, with the aim of aggressively promoting the Japanese government's measures to protect the ozone layer.

Measures to eliminate use of specified CFCs

	Use	Measures	
		New facilities	Existing facilities
Specified CFCs	Mainly AC refrigerant	Introduces equipment that uses alternative refrigerants.	Replaced equipment with non-CFC type. Recovered CFC properly at equipment inspection.
Specified halons	Fire extinguishing agent for power generation facilities	Introduced CO ₂ and other chemical fire extinguishers.	Not use except for fires.

Consumption of CFCs





Response to Local Environmental Problems

Kansai Electric is also searching for greater harmony between our operations and local environments by planting greenery, adapting infrastructure to maintain scenery and more.

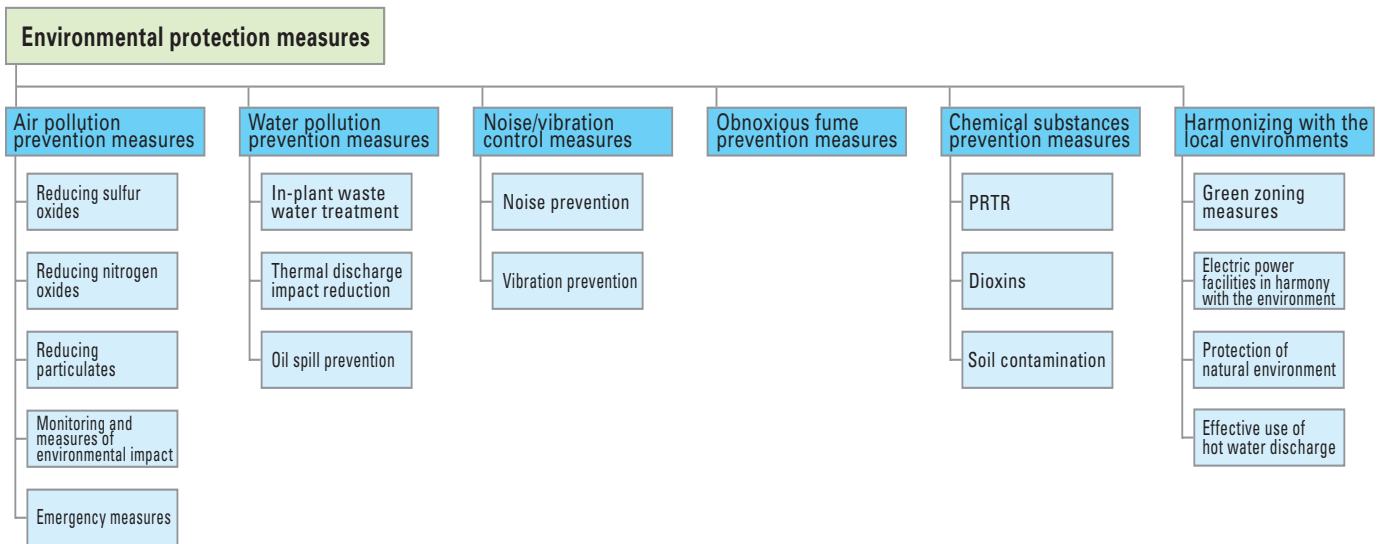
Chapter 4 Contents

- 54** Response to Local Environmental Problems
- 55** Air Pollution Prevention Measures
- 57** Water Pollution Prevention Measures
- 58** Noise/Vibration Control Measures
- 58** Obnoxious fume Prevention Measures
- 58** Chemical Substances Prevention Measures
- 60** Harmonizing with the Local Environments

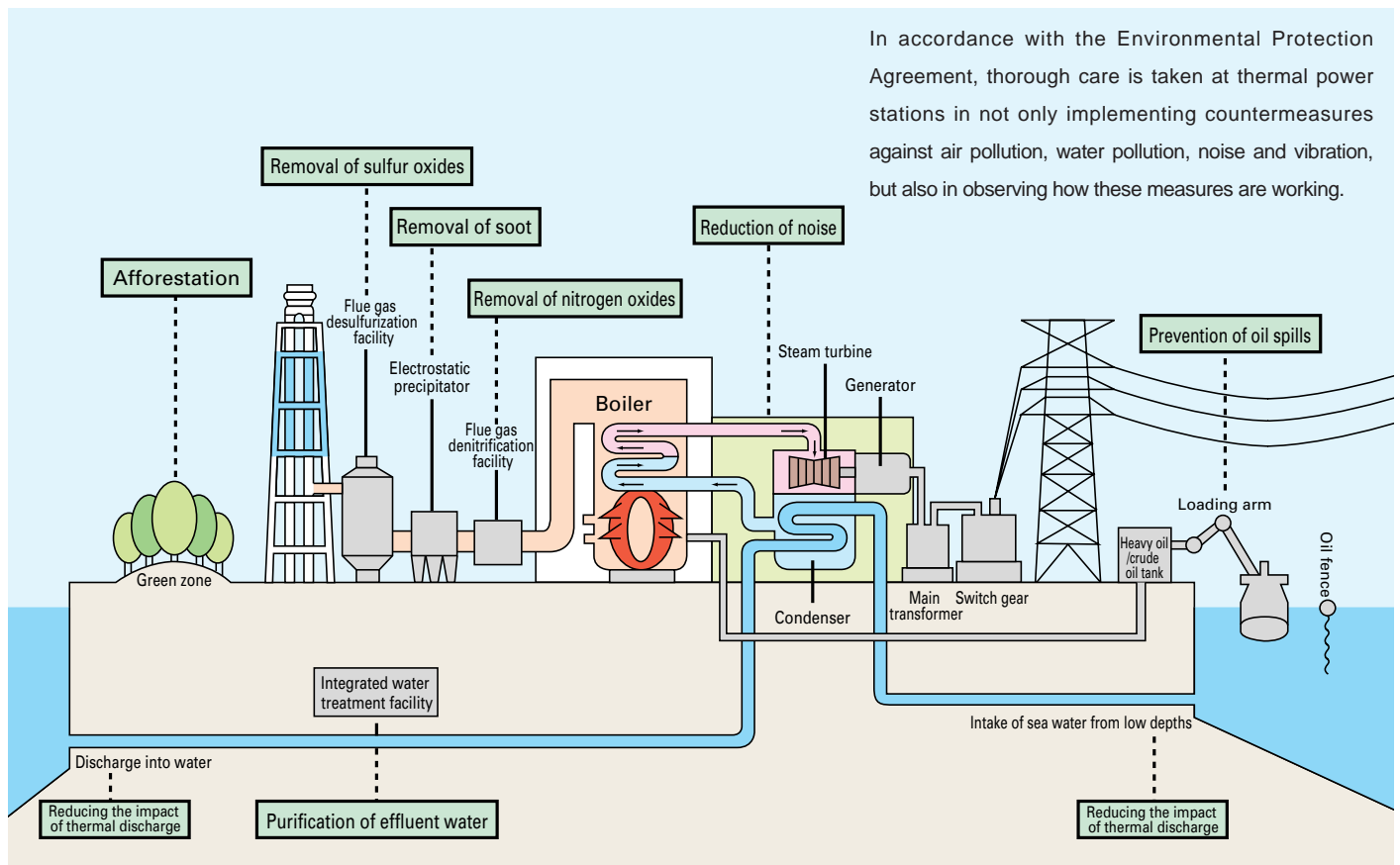


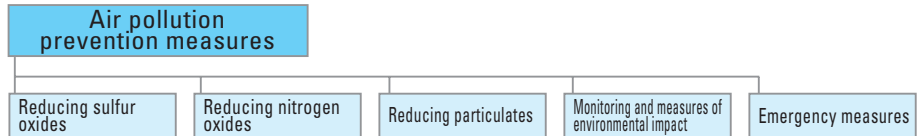
Response to Local Environmental Problems

Kansai Electric long ago started taking action against air and water pollution, and is now also carefully addressing new issues such as chemical pollution. Kansai Electric is also searching for greater harmony between our operations and local environments by planting greenery, adapting infrastructure to maintain scenery and more.



Environmental protection system in a thermal power station





Air Pollution Prevention Measures

Reducing Sulfur Oxides (SOx)

Sulfur oxides (SOx) form when sulfur (S) in fuel is combusted and bonds with oxygen (O) in the air. As part of the effort to reduce SOx emissions from thermal power stations, Kansai Electric is using low-sulfur fuel and has installed desulfurization units to remove SOx from flue gas. This combination of fuel and facilities measures has reduced SOx emissions.

Use of Low-Sulfur Heavy Oil and Crude

Because a lower sulfur content in fuel will reduce SOx emissions, Kansai Electric is using low-sulfur-content heavy oil and crude. This is one of the major moves Kansai Electric has taken to reduce SOx emissions.

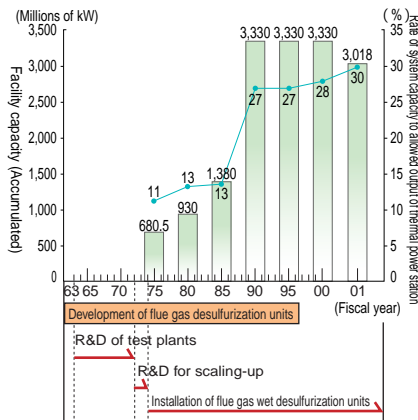
Use of LNG and NGL

Kansai Electric uses also liquid natural gas (LNG) and natural gas liquid (NGL), both which contain absolutely no sulfur. In 2001, we used 5.29 million tons of LNG for our thermal power stations, which was approximately 88% of all fuel we used.

Installation of Flue Gas Desulfurization Unit

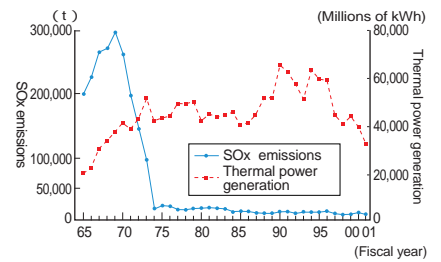
Kansai Electric has aggressively researched, developed and introduced equipment and systems to remove SOx from flue gas. As of the end of fiscal 2001, 8 such units with an equivalent capacity of approximately 3.02 million kW have been installed. Kansai Electric is not only promoting the use of low-sulfur fuels but it also greatly contributing to environmental protection by reducing SOx emissions.

Installation of flue gas desulfurization facilities



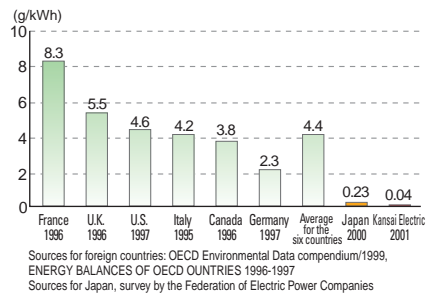
Because of these efforts, SOx emissions in fiscal 2001 were 0.7% that of fiscal 1965.

SOx emissions and thermal power generation



The rate of SOx emissions per unit of thermal power generation achieved by Japanese power companies is considerably lower than that of major Western countries (USA, Germany, UK, France, Canada and Italy). The Japanese average is 0.23 g/kWh as opposed to their combined average of 4.4 g/kWh. Kansai Electric's level is 0.04 g/kWh, marking the world's highest level.

SOx emissions per kWh from thermal power generation





Reducing Nitrogen Oxides (NOx)

NOx is generated when nitrogen in fuel and in the air react chemically with oxygen in the air. It is said that the higher the combustion temperature becomes, the more NOx is generated. To reduce NOx emissions, our thermal power stations are implementing the following measures.

Improving the Combustion System

To reduce NOx emissions through the improvement of the boiler combustion system, three methods are available - the two-stage combustion method, the exhaust gas recirculation combustion method, and the use of low-NOx burners. Kansai Electric has made improvements on boilers to enable them to simultaneously use both the two-stage combustion method and the exhaust gas recirculation combustion method. For an even greater reduction in NOx emissions, we have also installed low-NOx burners, which have been developed based on the principles of these methods.

Use of Fuels with Low Nitrogen Content

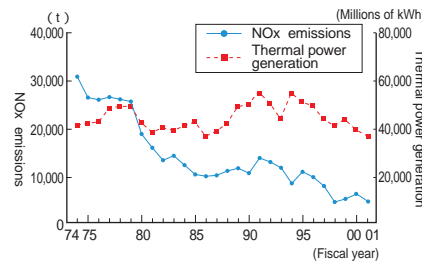
As of the end of fiscal 2001, Kansai Electric has converted the boilers at 12 out of 13 existing thermal power stations to use LNG or high quality oils such as NGL, which contain little nitrogen.

Installation of Flue Gas Denitrification Units

Kansai Electric has focused much effort on the research and development of flue gas denitrification units to reduce NOx emissions and on their introduction to plants. As of the end of fiscal 2001, we have 35 denitrification units with a total capacity of 13,894 MW.

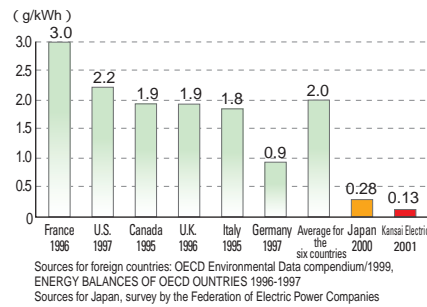
By implementing the above measures, the annual NOx emissions in fiscal 2001 have been reduced to approximately 16% compared to fiscal 1974.

NOx emissions and thermal power generation

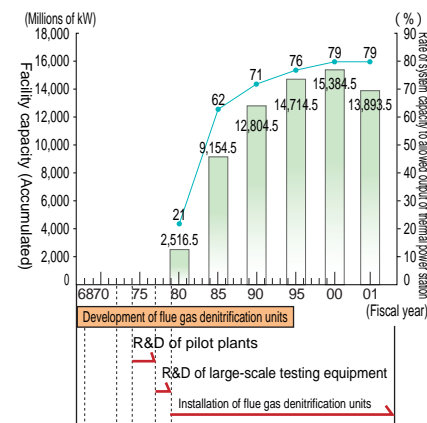


In addition, average NOx emissions per unit of thermal power generation in Japan is 0.28 g/kWh, a figure considerably lower than the 2.0 g/kWh combined average of the USA, Germany, the UK, France, Canada and Italy. Kansai Electric's level is 0.13 g/kWh, marking the world's highest level.

NOx emissions per kWh from thermal power generation



Installation of flue gas denitrification units



Reducing Particulates

All boilers for crude and heavy oil are equipped with high efficiency electrostatic precipitators in order to achieve the lowest possible level of particulates.



Electrostatic precipitator (Kainan Power Station)

Monitoring and Measuring of Environmental Impact

Monitoring and Measuring of SOx, NOx, etc.

Kansai Electric is implementing environmental measures at all of our business sites and, in order to verify the effectiveness of these measures, we are regularly monitoring and periodically taking environmental measurements using instruments.

Particularly with our power stations, we monitor and measure air, water, noise and vibrations in accordance with agreements made with hosting governments. Findings (SOx and NOx in flue gas) are relayed to governmental monitoring centers and measurements (COD and SS of waste water) are compiled into reports.

We also monitor the air and sea area around power stations to assess the overall environment for problems.

Emergency Measures

The "Air Pollution Law" defines an emergency as that in which air pollution reaches the level, which may cause damage to human health and the living environment.

In such cases, the governors of municipal governments are to issue public announcements such as forecasts and warnings according to the degree of the state of

emergency.

All our thermal power stations are equipped with computerized on line systems in which real time observations are possible. In the event of an emergency, appropriate actions are taken quickly.

In the photochemical smog emergency, we take measures meeting the local government's request to reduce nitrogen oxides (NOx) by raising efficiency of denitrification facilities, and restricting output of power and converting to

good quality (low-nitrogen content) oil.

We submit the reduction plans in emergency to relevant prefectural authorities during the early fiscal year.

Number of measures taken to reduce NOx emissions in the photochemical smog emergency (Number for fiscal year 2001)

Number of measures taken to reduce NOx emissions at our thermal power plants concerned	Number of photochemical smog warnings issued	
	Forecast	Warning
135	33	26



Water Pollution Prevention Measures

In-plant Waste Water Treatment

In-plant waste water produced from operations at thermal power stations contains small amounts of acid, alkali, suspended solids, oil and other substances. Machine cleaning during annual boiler and turbine overhaul inspections also produces waste water. All the waste water is specifically treated based on its respective condition by using neutralization and aggregation/precipitation equipment and oil separation equipment for purification. It is then purified using filtering and adsorption treatment facilities.

Also domestic waste water from employee facilities is purified using specifically designed treatment facilities before being discharged.

Thermal Discharge Impact Reduction

At thermal and nuclear power stations, turbine generators are driven by high-pressure, high-temperature steam which is cooled by seawater in a condenser in order to return it to a liquid state. The temperature rise (thermal discharge) of the seawater is kept at 7°C or less. In order not to affect sea life, deep-sea intake and submarine discharge is used, and their locations are carefully selected by the characteristics of each station's location in order to minimize the area in which heated water is dispersed.

Oil Spill Prevention

Oil brought in by tankers is unloaded at docking facilities on power station sites. To avoid oil spills, we use a loading arm, which directly and firmly connects an intake valve on the pier with an outlet valve on the tanker. During the unloading of oil, absorbers are kept on hand, and an oil fence is in place to prevent oil from spreading in the rare case that a spill occurs.

When the loading arm is in operation, the area is under intense surveillance by trained staff. Oil retaining dikes are also installed around fuel tanks to prevent any spilled oil from spreading.



Oil fence at unloading dock



Noise/Vibration Control Measures

Noise Prevention

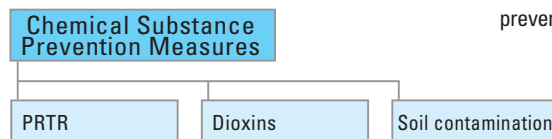
In power stations and substations, various devices such as draft fans, transformers, turbine generators, and pumps are usually in operation. To prevent noise, we generally place these facilities inside buildings. When they must be built outdoors, these facilities are specially equipped with silencers and soundproof walls to minimize noise and are located in isolated places in order not to disturb residential areas.

Vibration Prevention

Facilities that may cause vibrations at power stations and substations are installed on a solid base. They are also located as far as possible from the station's outer boundaries in order to minimize vibration levels outside the power stations.

Obnoxious Fume Prevention Measures

We deal with the substance ammonia at our power stations, and this gives off noxious fumes. These ammonia fumes are sucked into smoke and particulate extraction apparatus and electrically operated dust chambers. This equipment functions automatically and works to continually absorb the appropriate amount of fumes. Ammonia concentrations in the smoke are kept down to a low level and periodical measurements of those levels are also carried out. These facilities use apparatus that conforms to the technological standards stipulated by "High Pressure Gas Control Law". This equipment is regularly inspected and the appropriate maintenance is carried out to prevent leakage.



Chemical Substances Prevention Measures

PRTR

Kansai Electric has been managing chemical substances with care for some time. We began voluntary PRTR inspections in 1997 before the PRTR system * went into effect and, as of 2000, we have been publishing our findings in this report.

Kansai Electric has created a register for managing chemical substances subjected to PRTR Law and is using it to accurately know and manage chemical substances not only at our facilities but those of affiliates.

Results from 2001 inspections are shown at right. High release is for ethylbenzene and other paints we use to maintain equipment.

Kansai Electric will continue to streamline use of chemical substances and work to minimize release into the environment.

Release, transport and use of PRTR substances (Fiscal 2001)

Substances	Use	Quantity owned (t/yr)	Release (t/yr)			Transported (t/yr)	
			Air	Public water area	Soil	Sewerage	Waste
2-amino ethanol	Water supply processing agent	65	< 0.1	0	0	0	0.6
Asbestos (Special type 1 controlled substance)	Piping insulation, etc.	40	0	0	0	0	40
Bisphenol A epoxy resin	Paint	6.6	0	0	0	0	0
Ethylbenzene	Paint	3.2	3.2	0	0	0	0
Xylene	Paint, power generation fuel	80	50	0	0	0	0
Di-chloro-penta-fluoro-propane (HCFC-225)	Paint	7.3	7.3	0	0	0	0
Styrene	Paint	7.9	0	0	0	0	0
Toluene	Paint, power generation fuel	39	13.0	0	0	0	0
Hydrazine	Supply water treatment	90	0.1	< 0.1	0	< 0.1	< 0.1
Benzene (Special type 1 controlled substance)	Power generation fuel	76	< 0.1	0	0	0	0
Trixylenyl phosphate	Power generation turbine control oil	7.0	0	0	0	0	7.0
Dioxins (Special type 1 controlled substance)	Waste incineration	—	94.0 (mg-TEQ/yr)	0.030 (mg-TEQ/yr)	0	0	7.1 (mg-TEQ/yr)

* This table omits final owned conditions with type 1 controlled substances (1 t/yr) and special type 1 controlled substance (0.5 t/yr). However, this does not apply to dioxins.
 * "0" is indicated when substance was not released.
 * "<0.1" indicated release of less than 0.1 t/yr.
 * The Release and Transport for dioxins are only for specially designated facilities (e.g., waste incinerators, etc.), so the Quantity owned indicates "*".

* PRTR

The PRTR (Pollutant Release and Transfer Register) system requires businesses to identify and report to governmental authorities the quantity of controlled substances that they release into the environment, which the government then discloses to the general public. The system was enforced with the July 1999 promulgation of

the Bill Concerning Reporting, etc. of Release to the Environment of Specific Chemical Substances and Promoting of the Improvements in Their Management. Under this law, Kansai Electric has had to report to governmental authorities the known amount of chemical release and transport every 6 months, since April 2001.

Dioxins

Dioxins are regulated by the Waste Disposal and Public Cleansing Law, and the Law Concerning Special Measures Against Dioxins. These laws focus primarily on waste incinerators of an incineration capacity of 50 kg/h or more.

Kansai Electric is working to reduce incineration volume by preventing waste generation and recycling, while also shutting down many of our incinerators. In fact, only 35 of the 430 incinerators that were operating in 1997 are still being used.

Moreover, dioxin concentration from these incinerators is under the regulated level. Furthermore, we conducted voluntary inspections on our thermal power stations and found the minute amount of dioxins they released not to have any effect on the environment.

We will continue working to reduce the release of dioxins by shutting down more incinerators and properly operating and thoroughly managing facilities.

Dioxin release in all Japan

(From WHO-TEF 1998)

Source	Released amount		
	1998	1999	2000
1. Release into atmosphere			
General waste incinerators	1,550	1,350	1,019
Industrial waste incinerators	1,100	690	555
Small waste incinerators	368 ~ 619	307 ~ 509	353 ~ 370
Crematory	2.2 ~ 4.8	2.2 ~ 4.9	2.2 ~ 4.9
Industrially generated			
Steelworks electric furnaces	139.9	141.5	131.1
Steelworks sintering processes	113.8	101.3	69.8
Zinc recovery systems	25.4	21.8	26.5
Aluminum alloy manufacture	23.166	17.366	16.566
Thermal power stations	1.55	1.64	1.71
Other industries	20.4219	12.3909	12.9877
Cigarette smoke	0.1 ~ 0.2	0.1 ~ 0.2	0.1 ~ 0.2
Vehicle emissions	1.61	1.61	1.61
2. Release into water	12.2	12.3	8.5
Total	3,358 ~ 3,612	2,659 ~ 2,864	2,198 ~ 2,218

Note: Units are g-TEQ/yr.

Ref. : Prepared by Kansai Electric from Records of Levels of Dioxin discharges (Dec. 2001, Ministry of the Environment)

Results of measurements on dioxin levels in discharged gasses from thermal power plants in Japan

(ng-TEQ/m³N)

	Concentrations in discharged gasses
Oil power	0 ~ 0.0097
LNG power	0 ~ 0.0008
Coal power	0 ~ 0.0092

Source: Record of levels of dioxin discharges (June 2000, Environmental Agency)

Reference: level of atmospheric concentrations for fiscal year 2000 was 0.0000073-0.001ng-TEQ/m³N (Source: Environmental White Paper, fiscal 2002)

Results of measurements on dioxin levels in reported facilities and discharged gases (Fiscal 2001)

	Combustion capacity	Concentrations of standard value (unit: ng-TEQ/m ³ N)	Number of facilities (unit)	Results of measurements on concentrations of dioxins (unit: ng-TEQ/m ³ N)
Waste product incinerator	Over 200kg/h	5	1	0.001 or less
		80	2	N.D. - 0.015
	Over 50kg/h, Less than 200kg/h	5	4	N.D. - 3.8
		80	28	0.02 - 17.0

N.D. stands for Not Detectable and means that the value is too low to be detected

Soil Contamination

By order of the Ministry of International Trade and Industry, a system of environmental assessments was introduced for power stations in 1997. Kansai Electric has since been investigating soil contamination and is observing all pertinent laws (Water Pollution Control Law, Waste Management and Public Cleansing Law, PRTR Law, etc.).

Also, prior to converting land over to other uses, we do soil tests and take the proper measures against contamination as prescribed by the Environment Agency Regulations on Testing, Instruction and Operations for Soil and Ground Water Pollution.

And, Kansai Electric is working hard to protect the environment in accordance with the Soil Contamination Law that was enacted in May 2005.

As for the planned site for our new power station in Wakayama, we tested the site ourselves because it has been used for waste landfill. We detected a comparatively high concentration of dioxins (max. 25,000 pg-TEQ/g) in some of the buried incinerated waste and sludge. We have sought the advice of experts and have taken measures to prevent the waste from being dispersed in the air or run off by water. Findings and action have been reported to governmental authorities and disclosed to the general public. In the future, Kansai Electric will continue seeking the advice of experts and the guidance of governments so as not to effect the surrounding environment.



Harmonizing with the Local Environments

Harmonizing with the Local Environments

Green zoning measures

Electric power facilities in harmony with the environment

Protection of natural environment

Effective use of hot water discharge

Harmonizing with the Local Environments

Green Zoning Measures

Kansai Electric is helping to build near-natural forests that are highly effective in preserving the environment. To cover the land in forest as quickly as possible, we are using an ecological greening method of planting a dense mix of saplings of existing species of vegetation. As a result, rich forests have grown in green tracts of many sites and have now become the home to all kinds of wildlife and insects. Our work was announced at International Association of Vegetation Science Symposium in Germany in July 2001 where the "ecological greening method" we used was highly evaluated for afforestation and planting.



Ecological greening (Ako Power Station)

Furthermore, with ecological greening as our theme, we have planted the representative city flower and city tree at each of our power stations and have opened these areas up to the use of the general public.

Those efforts of ours have come in for praise, and in 1992 the Himeji No. 2 Power Station (thermal power) received the Prime Minister's Award for "excellent green zoning activities" with the Kainan Power Station (thermal power) receiving the Trade and Industry Minister's Award in 1995.

Moreover, so that the people living around our power stations might enjoy the green areas they provide, we are also working to create an environment that will be suitable as a habitat for dragonflies, lightning bugs and other such



Building a brook for lightning bugs (Himeji No. 1 Power Station)

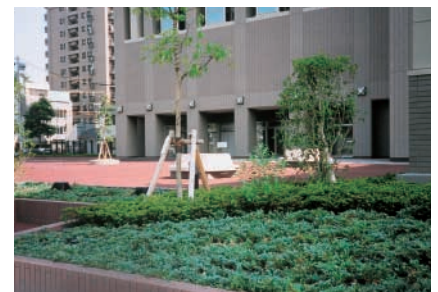
insects.

In addition, we are also making every effort to create rich, safe and pleasant green areas that everybody can enjoy in the open spaces around our city substations.

As at the end of fiscal 2001, we had managed to create green areas amounting to some 4.12 million square meters of space, including those areas that had been restored as far as possible to their original condition after being altered.

Rate of greening at main electric power facilities (As at end of fiscal 2001)

Thermal power stations	34%
Nuclear power stations	79%
Substations	32%



Green space in open area around city substation (Uehonmachi Substation)

Rooftop Greening

Kansai Electric Hospital

A garden (approx. 100 m²) with trees and an arbor was created on the rooftop of the Kansai Electric Hospital. A path allows visitors to stroll by beds of seasonal flowers even on wheelchair, and there are benches for relaxing. The garden is used for walking rehabilitation and meeting people.



Rooftop greening at Kansai Electric Hospital

Head Office

On the third floor of Kansai Electric's Head Office is a small rooftop greening where evergreen oaks and camellias have been growing since 1975. It makes for a refreshing view in the tight space between buildings.



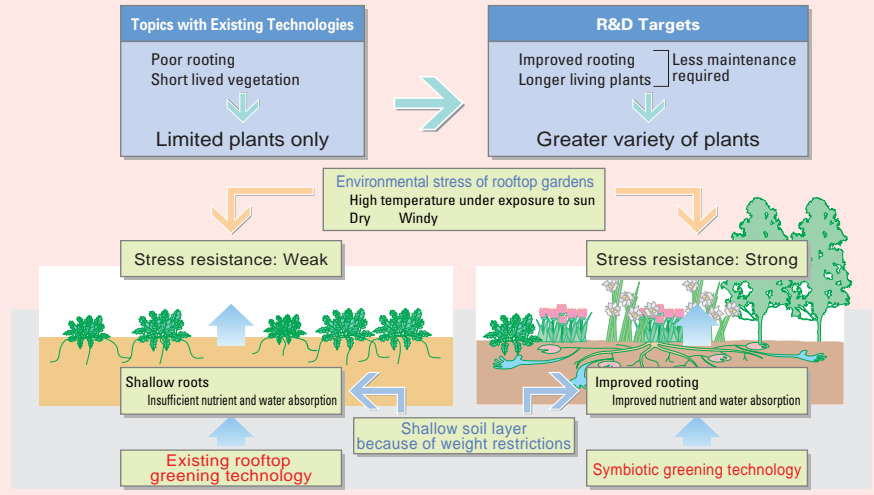
Rooftop greening at Kansai Electric's Head Office

Topics

Joint Research in Rooftop Greening Systems (OG Kanden Joint Planning)

Attention has turned to rooftop gardens as one way to save energy in buildings and lessen the heat-island effect of inner-city areas. Group company OG Kanden Joint Planning is studying the possibilities of rooftop greening technologies as a joint project with Osaka Gas. Symbiotic technology that Kansai Electric and Osaka Gas have can be used to actively absorb nutrients and water in soil and transfer them to plants so that they grow healthy and strong in weak soil. Symbiosis can help plants take root in harsh environments. It is a hopeful technology for increasing the development of rooftop gardens and improving city environments.

Research into rooftop greening systems



Electric Power Facilities in Harmony with the Environment

Power Station as an Area Symbol Mark

Our Nanko Power Station has a monument-looking smokestack that is well-known as the "Symbol Tower". Driven by solar cells, it lights up different colors as the seasons go by. The smokestack of No. 5 and 6 Units of our Himeji No. 1 Power Station is also something of a landmark in the bay area as special lighting effects and a flashing strobe signal tidal level, air temperature and time of day. These efforts won Kansai Electric the below award.

Furthermore, our Sakaigawa power station built in Kamitaira, Toyama, is designed to look like the steep rafter roof houses in the area that have been named UNESCO World Heritages. Kansai Electric cares about the surrounding environment and is taking steps to harmonize our infrastructure with the beautiful scenery.



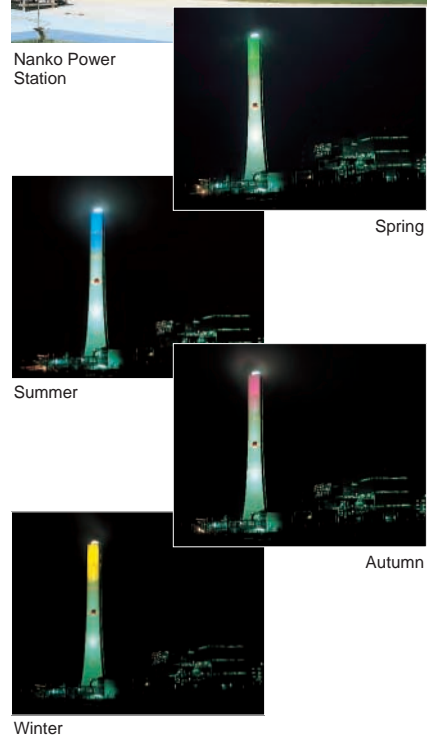
Himeji No. 1 Power Station



Sakaigawa Power Station



Nanko Power Station



Spring

Summer

Autumn

Winter

Awards won by power stations

Power station	Award
Nanko	Color Prize for Public Utilities (Japan Color Laboratory) International Illumination Design Award (North America Illumination Institute) Good Design Institution (Ministry of International trade and Industry)
Himeji No. 1	Urban Spectacle Award (Himeji City Government)



Substation Designs in Harmony with Surrounding City Buildings

At substations, radiators and other equipment are hidden from view and trees are planted to enhance the landscape. The design and color of the buildings are also coordinated with surroundings.

For example, the Hoshida Substation (Katano City, Osaka), which is in a residential area, has been designed as a low building with the external appearance of a residential house in order to blend in with the local environment.



Hoshida Substation

Reduced Area Required for Substations by Using GIS

Reducing the area of a substation not only reduces the amount land needed to prepare the site but also promotes a greater coexistence with the natural environment. Kansai Electric has been successful in reducing substation area demand by using gas insulated switches (GIS).

A GIS is an electric device such as a breaker sealed in SF6 gas. It is entirely housed in a metal casing, so it is smaller than conventional air-insulated devices. Using them, Kansai Electric has greatly reduced the area of our substations and, because the overall device is smaller and lighter, we can use the freed up area for planting, which helps the substation blend in better with the surrounding environment.



Nose Substation

Eco-friendly Utility Towers and Power Lines

When rigging overhead power lines, if towers are located near to natural parks, Kansai Electric dims the brightness of the metal by painting the towers a dark brown. We also run low reflective cables so as to obscure our presence as much as possible and prevent glare.



Low brightness utility tower

Burying Cables Helps Maintain Scenery

With buried cables, we have two basic positions – to streamline cables in a way suitable for electricity use and to design systems to match the cityscape. This means selecting aboveground infrastructure that compliments the forms and colors of the inner-city without sacrificing our primary responsibility of providing a stable supply of power. Through a trilateral cooperative effort with road authorities and cable companies (group communication company, etc.), Kansai Electric is our pulling strengths together to come up with designs that match the peculiarities of local areas.



Underground power lines (The area around Osaka International Conference Center)



A Shopping Arcade Reborn

The Ginza-dori shopping arcade in Tanabe, Wakayama, stood along a narrow road with no sidewalks despite its booming business and popularity. With passing cars posing a threat to pedestrians, there was an urgent need to ensure traffic safety.

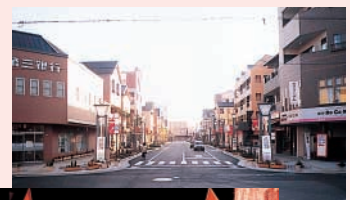
So, Kansai Electric's Tanabe office got involved in earnest discussions with Tanabe City and the arcade, and a project was launched by the three parties to bury power lines.

As a result, the landscape was beautified and the arcade was reborn as a bustling center of activity. Both the arcade merchants and local residents greatly appreciated the redevelopment work.

Also, because Kansai Electric has contributed to road development with excellent projects such as this, the company was given a Special Commendation at the All Japan Road Competition by the Land, Infrastructure and Transportation Ministry in June 2001.



Before

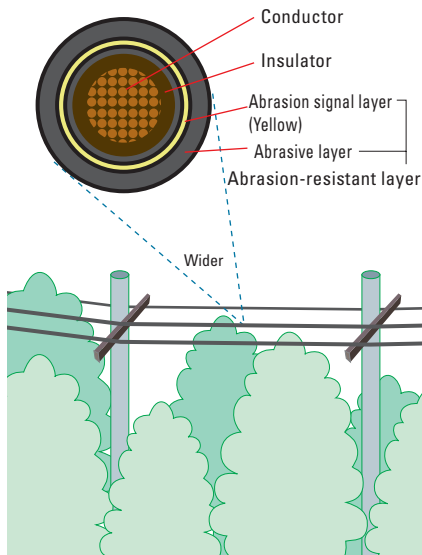


After

Protecting Trees with Abrasion-resistant Insulated Cable

High voltage overhead cables are strung in all kinds of environments – downtown areas, residential districts, between mountains, etc. In mountainous areas, there is a particular concern about abrasion; rubbing against trees can erode the sheathing and, in worse cases, start a fire or electrically shock someone. To avoid this, trees are periodically cut down in areas near to power lines. However, in city areas where greenery is a major issue, we cannot simply cut down trees that threaten our cables. That is why Kansai Electric developed an abrasion-resistant insulated cable that ups insulation performance against contact with trees. Fortunately, we have been able to fell less trees, which is good way to protect them.

Abrasion-resistant insulated cable



Protection of Natural Environment

The Area of Undeveloped Land to Be Modified and its Reduction

We are doing everything we can to conserve the natural environment in the construction of our power stations by keeping the area of land to be developed and trees to be removed down to a minimum.

For example, we have the Maizuru Power Station, a thermal power station, under construction in Maizuru City in Kyoto Prefecture. There, part of the land to be used is designated as Wakasa-wan Quasi National Park. We have taken advantage of the topographical undulations of the site to undertake a two-tier construction. At the same time, by using silo storage towers for coal we have managed to greatly reduce the area of sea needed for reclamation and land to be altered.

Moreover, we aim to keep the amount of deforestation to the minimum by preserving some of the existing trees and tangerine orchards.

With regard to hydropower stations, we have the Kaneihara power station that will straddle Ikagun Kinomoto town in Shiga Prefecture and Ibi-gun Sakauchimura in Gifu Prefecture. Here, part of the planned site and its surrounding area are designated as belonging to Ibi Prefectural Park and are rich in natural beauty. Therefore, an underground design has been chosen for the waterway and power station itself, with part of the road being contained in a tunnel. This will help reduce the area of land that will have to be altered and keep the impact on the local environment and wildlife down to a minimum.

Protection of Endangered Wildlife

When ground preparation for a power station threatens endangered wildlife, Kansai Electric moves to protect this wildlife by taking conservation measures.

One such case happened in Maizuru while building a power station, it was discovered that an extremely rare species of plant, the *Epimedium sempervirens*, was growing in area that was to be zoned. So, Kansai Electric decided to transplant it into a natural forest on the premises of the power station and watched it grow from there.



Epimedium sempervirens

Reduced Use of Rain Forest Lumber

Reducing the use of machineries made of rain forest lumber is one way to protect the world's tropical rain forests against destruction. To put this idea to work, Kansai Electric switched from wood to metallic and metal frames used in construction work.



Metal frames used to erect a coal silo at the Maizuru power station



Effective Use of Hot Water Discharge

Using thermal discharge from thermal and nuclear power stations, we have been cultivating fish and young shellfish with regional characteristics such as Kuruma prawn and abalone and conducting research on their growth. We are working to establish such technology and verify the effectiveness and safety of thermal discharge. In addition to utilizing the technologies we have developed, we are also releasing cultivated fish and shellfish into the ocean, thus helping to promote the local fishery industries.

Also, using the heat energy of thermal discharge and a heat pump, we are growing orchids at the Takahama power station and, at our Miyazu Energy Research Center, test-farming flowers and vegetables found at the core of the local agricultural industry. We are also testing proportions for a soil mix made of waste rock wool, fermenting drift wood collected from dam sites and shells. By caring and applying science, Kansai Electric is helping to promote local agriculture.



Kuruma prawn (Tanagawa No. 2 Power Station, Miyazu Energy Research Center)



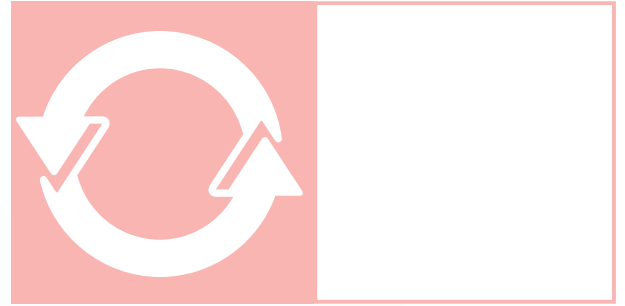
Abalone fixed to oyster shells and released (Takahama Power Station)



Inspection of strawberry cultivation by related local groups and farmers(Miyazu Energy Research Center)

Current situation with regard to experimentation and research

Location of activity		Type of activity	Cumulative total released		
Fisheries related	Takahama Power Station (1977 ~)	Fish and shellfish were released into the sea around the power station as an experiment in breeding and farming	Total release into nearby sea area (cumulative)	Black abalone	800,000
	Tanagawa No.2 Power Station (1977 ~)			Turbo	200,000
	Miyazu Energy Research Center (1989 ~)			Prawns	34,000,000
				White shrimps	64,000,000
				Black abalone	600,000
				Prawns	12,000,000
Farming related	Takahama Power Station (1979 ~)	Experiment in breeding temperate zone plant life orchids : phalaenopsis, etc	Loaned to public facilities for exhibitions		
	Miyazu Energy Research Center (1989 ~)	Experiment in adapted breeding of plant life Ornamental plants: Turkish Bellflower, etc. Vegetables: strawberries, etc.	Distributed to visitors viewing harvest		



Projects and Activities for a Recycling-Based Society

Kansai Electric is promoting recycle projects and activities through initiatives such as our “3 R’s” (reduce, reuse and recycle) program and green purchasing, while still other activities are underway for a midrange goal of completely eliminating waste for landfill.

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Promotion of Measures Concerned with the Recycle of Resources

Working on the "3 R's" -- Reduce, Reuse and Recycle

Already for some time now, Kansai Electric has been reducing industrial waste generation and recycling and reusing resources. The waste we cannot reuse is disposed of properly. Kansai Electric will continue promoting the "3 R's" with even greater thrust as our part in the formation of a recycling-based society.

Reduce

Reduce waste by using less resources, using longer-lasting supplies, etc.

A few of ways Kansai Electric is reducing resource consumption are by designing longer-lasting power generation and transmission infrastructure, prolonging replacement intervals, downsizing equipment so that less resources are required to make it, using prefabricated construction techniques and simplifying packaging.

Reuse

Reuse products and parts.

Kansai Electric is working to effectively utilize resources by using reusable power generation and transmission equipment, and salvaging and repeatedly using replaceable machinery.

Recycle

Recycle resources and heat.

The dust and desulfurized gypsum produced as a byproduct of burning heavy crude at our thermal power stations are being used as cement filler, fuel and construction material. Kansai Electric has also diverted waste concrete from unusable concrete utility poles as aggregate for roadbeds. In fact, we recycle almost all of it.

Kansai Electric's "3 R's" initiative was commended with the Chairman's Award (11 total) of the Reduce, Reuse and Recycle Promotional Committee.

Award in fiscal 2001

- Development of recyclable low voltage vinyl insulated cable
- Effective use of excavated soil, lumber, etc.
- Recycling of drift wood, pruned branches, etc.
- (Activity of affiliate)

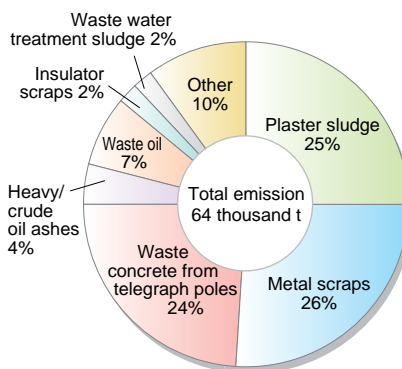
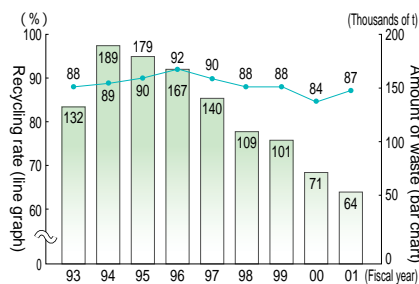
The Production of and Recycling of Industrial Waste

The volume of industrial waste created in the fiscal year 2001 came to approximately 64,000t, showing a reduction of 10% compared to the previous year. Furthermore, the recycled resource ratio has maintained a high, 87%.

Midrange Target

To completely eliminate the generation landfill waste

Production and reuse as a new resource of industrial waste



Industrial waste	Recycling rate	Main uses for recycling
Plaster sludge	100%	Construction materials
Waste water treatment sludge	76%	Ingredient for cement
Heavy/crude oil ashes	100%	Rare metals recovery
Waste oil	73%	Fuel, other
Metal scraps	97%	Metal recovery
Waste concrete from telegraph poles	100%	Road materials
Insulator scraps	54%	Road materials

Examples of Effective Resource Use

3R's

Working Towards ZERO Emission

At the Himeji No. 1 and 2 Power Station, we are applying the 3 R's initiative to waste generated by the facility with the goal of eliminating waste discharge entirely. More specifically, we set up a "waste sorting station", are looking into new recycling techniques and modified operation to reduce waste. Progress has been good enough that the initiative has been taken up at the Kainan Power Station, too.



Waste sorting station

Effective Use of Soil Excavated for a Substation

In preparing the ground for a substation, there's all sorts of waste like excavated soil, fallen trees and concrete. For that reason, Kansai Electric is looking everywhere to find ways to reduce waste generation and then, with the waste that is unavoidably produced, employing ourselves to recycle it as building material or crushed stone for construction. Some of the waste we export overseas is used to make valves.



Excavated soil and fallen trees from ground work being reused for construction

Reduce

Changing Over to Block Insulation Materials

In order to prevent loss from heat dispersal at our thermal power stations, we are covering all our valves and pipes with insulation material. We used to have to break up and dismantle such material on each valve and pipe inspection. Therefore, we have started to use block insulation material that can be dismantled piece by piece, allowing for reuse. This helps us to cut down on the creation of waste from insulation materials and to effectively use our resources.



Insulation material for piping at power station

Development of Low Power Medium Intensity Aircraft Warning Light

Standing more than 60 m tall, utility towers are necessarily equipped with lights to make them visible to aircraft. Amongst them, incandescent bulbs have been used for these light source of red flashing light of medium intensity in the past. Kansai Electric developed a long-lasting light of low power consumption using a high brightness reflecting LED as the light source.



Medium intensity aircraft warning light of low power consumption

Reuse

Repeated Use of Power Meters

About 11 million power meters are used by customers in our service area to measure the amount of electricity they consume.

After a certain tenure of service, we replace the power meter for our customers. Because of the need to effectively use resources, Kansai Electric checks and repairs the replaced power meters and returns them to service. In fact, some 1.1 million meters every year are returned to service.

Kansai Electric is doing the same with some 530 other types of equipment. We are fixing them up and putting them right back into use.



Check and repair of power meters

Reusing Equipment As Yet Another Way to Effectively Use Resources

Six retired gas turbines from our power stations have been shipped to the USA where they are still being used effectively to generate electricity.



Gas turbine with a second reused on life

We are also looking to employ other equipment from 15 shutdown small output power stations of ours in stations that are either running or under construction.

Equipment for reuse (representative examples)

Electrical and meter type	Control equipment Circuit breakers Control center Operation command units, etc.
Machinery type	House boilers, Air conditioners Electrically powered fire fighting pumps Electrically powered hoists, valves, etc.

Development of Vegetable Oil Transformer

This vegetable oil transformer uses ester oil from rapeseed as the insulating oil. The Vegetable oil contains no sulfur and readily breaks down into harmless substances, thereby placing minimal load on the environment. Vegetable oil also delivers a better insulating effect than mineral oil and it has enabled us to downsize the transformer.



Vegetable oil transformer





Recycle

Making Water-permeable Pavement from Insulator Scraps

Whenever power equipment needs repairing, there is always a lot of ceramic scraps from broken insulators. Kansai Electric launched R&D into finding effective ways to utilize this insulator scraps. As a result, since 1993, this waste has been used to make water-permeable pavements that are effective towards cooling down the heat island phenomenon seen in urban areas and it requires little energy to produce. Since 1995, other products using the insulator scraps have been on sale such as bright-colored asphalt that keeps road surfaces from getting hot in summer and wears down little in winter under the abuse of snow chains.



Water-permeable pavement from insulator scraps (Amagasaki Techno-land)

Introduction of Shell Compactor

The water gates of thermal and nuclear power plants have to be periodically cleaned of adhering and deposited shells. So, Kansai Electric introduced equipment that crushes the shells, drains them and very efficiently compacts the volume to minimize the amount of waste. The compacted shell matter is being used wisely as fertilizer and in other ways.



Shell compactor



Before compacting

After compacting

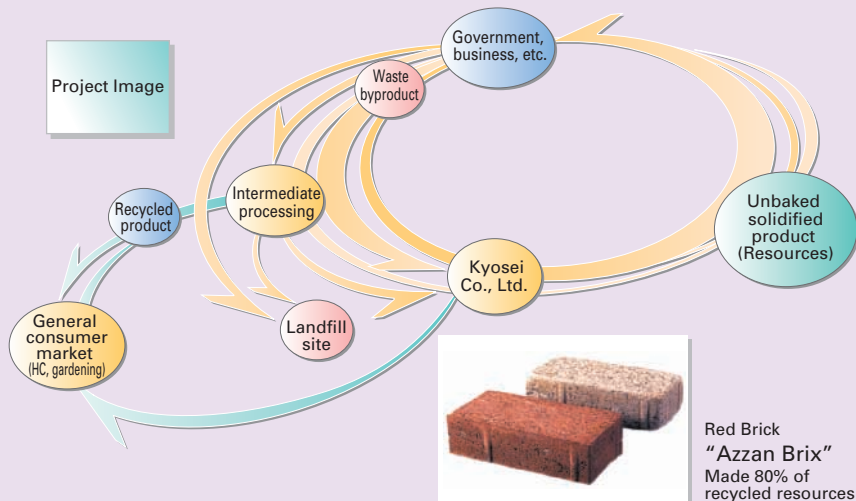
New Red Bricks

This unbaked red brick is made 80% of insulator scraps from our thermal power stations and industrial waste from businesses and governments. Using special solidification technology, the bricks are formed to a hardness that clears safety regulations of the Ministry of the Environment without baking (Eco Mark approved). In October 2001, Kyosei Co., Ltd. of the Kansai Electric Group started business in the new bricks making and selling 600,000 in 2001. The bricks have been used in both public and private constructions. Dischargers and users will build a recycle network in the future to promote new business opportunities.



Seemingly warm walkway utilizing unbaked bricks (The area around JR Nishinomiya Station)

Effective use of red bricks made from waste



Red Brick "Azzan Brix" Made 80% of recycled resources

Developing Ways to Recycle Power Transmission Equipment

These past few years have seen a number of recycling laws enacted and diverse industrial sectors establishing their own recycle systems for the advent of truly recycling-based society. In November 2000, the Electric Technology Research Association consisting of power companies, manufacturers and academic scholars launched a special committee on recycle technology for power transmission equipment, which is researching ways to reduce environmental load across the entire life of power transmission equipment from raw material excavation to manufacture, construction, operation, takedown and resource recycling.

Recycle

Recycling PCB Waste

PCB, an insulating material used with electric equipment like transformers, was discovered to be harmful after an outbreak of Kanemi oil disease in 1968. Since that time, it has been regulated and careful handling is mandatory by law. Kansai Electric keeps it in a special storage facility.

In 1976, the Waste Disposal Law recognized disposal of PCB by high temperature incineration only, but much wasn't incinerated for a long time. Then, Kansai Electric and group company Kansai Tech Corporation jointly developed original chemical processing

PCB stockpile (The end of March 2002)

High voltage transformers and condensers	5,416
Utility pole transformers	Approx. 160,000

technology that generates no combustion gas and which was highly evaluated by authorities as a practical application. Ultimately, with amendments to the Waste Disposal Law in 1998, the technology was approved for treating PCB. We are building facilities to apply this technology to utility pole transformers which carry a low concentration of PCB. As for high voltage transformers and condensers that have



PCB waste storage facility

a high concentration of PCB, we will study plans to adequately treat the PCB by the deadline specified in the law.

PCB

Now, PCB is a controlled substance. In 1972, the government ordered the stop of all production and use. In 1974, with the enactment of the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances, it became prohibited to make, import or even use PCB in Japan so PCB has to be kept under strict control.

In July 2001, the Special Measures Law on the Promotion of Proper Treatment of PCB was enacted, which built a nation-wide system to constructively promote the treatment of PCB.



Recycling with Original Technology (Recycle Center for Utility Pole Transformers)

Kansai Electric has planned the construction of a recycle center to recover and detoxify the insulating oil in utility pole transformers, which contains - though infinitesimal - PCB, and recycle it. We received approval to build the facilities from Osaka City in February 2002, as prescribed by the Waste Disposal and Public Cleansing Law. We are now constructing the center.



Artist's conception of the planned recycle center

Overview of plans

Name	Recycle Center for Utility Pole Transformers	
Location	1-2 Umemachi, Konohana-ku, Osaka	
Site area	Approx. 9,000 m ²	
Targeted waste	Insulating oil and case of utility pole transformers (Contains minute quantity of PCB.)	
Major facilities	Insulating oil recycle plant	Case of utility pole transformers recycle plant
Treatment method	Breakdown by dechlorination (Organic alkaline metal decomposition, t-BuOK)	Hot water blasting, solvent washing
Operating time	Continuous 24 hr	Daytime 8 hr
Treatment capacity	Approx. 36 k ℓ /day	Approx. 96 unit/day
Planned startup	Fiscal 2003	



Recycle

Recovering Drift Wood from Hydropower Stations

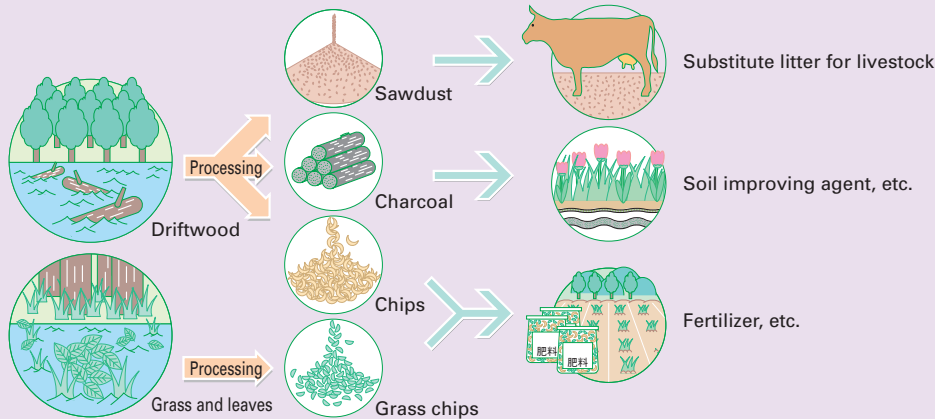
Wood carried downriver to the water intake of our hydropower plants is being collected and sorted in an attempt to effectively utilize the wood, grass and leaves.

A driftwood recycle plant in Nakatsugawa City, Gifu, is processing drift wood and other debris collected and sorted by our hydropower station along the Kiso River, into products that can be effectively utilized by people in the local area.



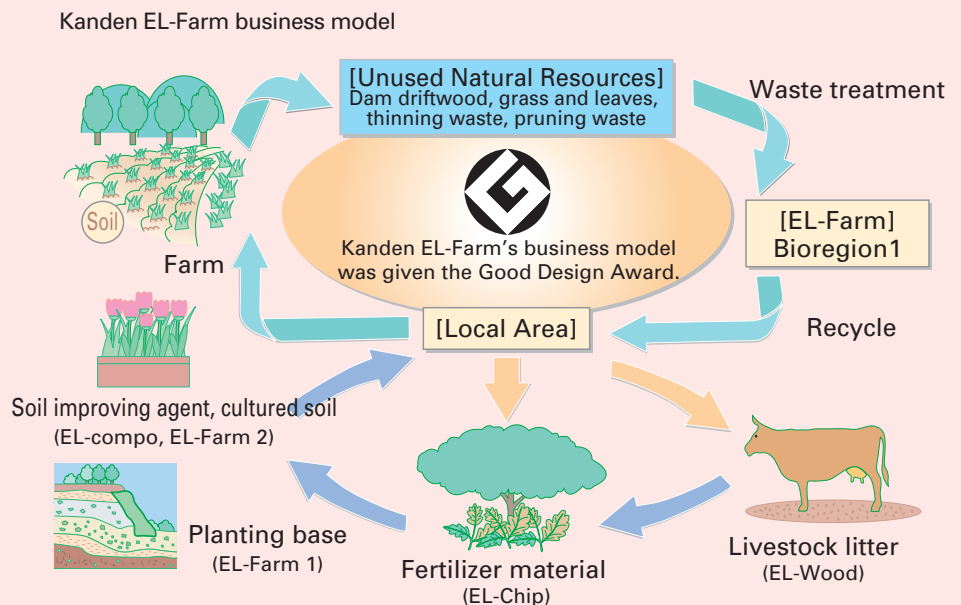
Working at the driftwood recycle plant

Recycle flow of driftwood collected at hydropower station



Recycle Project for Dam-collected Driftwood, etc. (Kanden EL-Farm)

Group company Kanden EL-Farm (established in January, 2000) was the first venture born from Kansai Electric's Entrepreneurial Opportunity System. They are recycling wood and leaves collected by dams, fallen lumber in the area, wood waste from forest thinning and other organic waste as part of a bioregion project. Their R&D efforts have led to a series of recycled driftwood products such as soil improving agent (EL-compo) and cultured soil (EL-Farm 2). Another strong-selling product of theirs is the EL-Pianta gardening pot set. Kanden EL-Farm will continue to apply the technology and know-how of the Kansai Electric Group to developing the recycle business.



Promoting of Green Purchasing

For some time now, Kansai Electric has been purchasing energy-efficient electric vehicles, energy-saving equipment like low-loss transformers, and eco-label products. However, in fiscal 1999, these efforts were converted into a company-wide activity under a new policy of Green Purchasing Promotion Policy.

Office Supplies

In April 2001, company efforts to protect the environment through green purchasing were given a boost as Kansai Electric established Green Purchasing Guidelines and set company-wide purchasing targets.

Green purchases (percentage) and company-wide targets

Item	Purchased	Target
Copy paper	100%	100%
Stationary	51%	50%
Office equipment	100%	100%

*Percentages were computed against the number of items. (Fiscal 2001)

Work Clothes

Kansai Electric adopted uniforms of a fabric made from recycled plastic bottles.

Insulating effect, strength and comfort were confirmed in 2000 through quality tests and trial use (Eco Mark acquired). The uniforms were adopted for all sales offices and power plants in 2001 and Kansai Electric purchased 10,000 of them.

Vehicles

In addition to introducing electric vehicles, Kansai Electric is switching over from gas and diesel vehicles to low emission vehicles when it's time to renew leases. In 2001, we did this with 140 of the 340 vehicles that were replaced. In the future, we will continue to pursue this course of replacing our fleet with low emission vehicles and introducing hybrid vehicles as well.

Power Generation Equipment

Kansai Electric sent a questionnaire on environmental protection activities to 160 main suppliers (manufacturers with 350 business sites) and, based on the results, established guidelines on power generation equipment in June 2002 to broaden our promotion of green purchasing.

Cooperation with Outside Groups

Amidst various efforts inside the company, Kansai Electric has established relations with outside groups such as Kansai Economic Federation and Green Purchase Network (GPN). Kansai Electric also reported company green purchasing activities at the 2001 Green Purchasing Forum in Osaka sponsored by GPN.

Topics

Constructive Participation in Local Community Activities (Mihama PS)

One of major points of environmental activities at the Mihama Power Station is to promote green purchasing. Every month, they report their green purchasing and release related information, and they have joined the Green Purchase Fukui Net in Fukui. From their aggressive efforts, green purchasing rate in 2001 was about 70% for stationary and 100% for copy paper.

They are also doing extensive PR about green purchasing, including introducing the concept to cooperating companies. We can look forward to the Mihama Power Station developing even more their green purchasing activities.

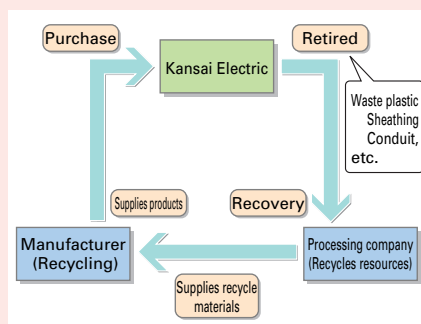
Topics

Green Purchasing of Recycled Products in a Closed Recycle System

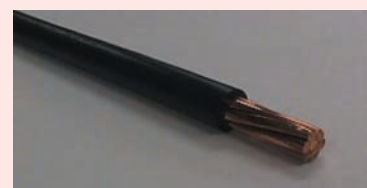
Retiring power transmission equipment generates a large volume of waste plastic in the form of cable sheathing and conduit. The waste is being recycled into new sheathing, conduit and drums spools for wire, which Kansai Electric is purchasing.

To make this effort work, Kansai Electric is doing LCA (life cycle assessments) that examine the environmental impact of products throughout the entire life cycle of the product from design to discard.

Waste plastic recycling scheme



Recycled equipment



Cables



Conduits



Drum spools



Energy Conservation and Resource Saving Activities with Office Supplies

Reduced Use of Electricity and Water

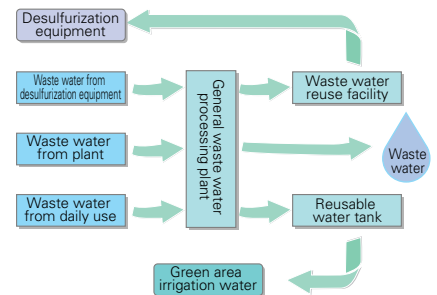
Electricity and water are indispensable to everyday operations, but at business sites, Kansai Electric is using resources carefully and consolidating efforts to reduce use.

Furthermore, waste water produced on the premises of our power stations is recycled to facilitate effective use and help keep consumption down.

The following are some of our main efforts in this area:

- Water for daily use is piped to a reusable water tank after being cleaned and used to irrigate green areas within the power stations.
- Waste water that has already been finally processed is piped to a reusable waste water storage facility to be used in the desulfurization process.

Flow of main waste water



What the Little Man Can Do

Kurobegawa Power Office

Kansai Electric's Kurobegawa Power Office, which earned ISO14001 certification in February 2002, is working to reduce electricity use at the station. Each department has set its own targets. Now, before leaving the office and during lunch break, computers and lights are turned off and air-conditioners are appropriately set. And periodically, environmental managers (department manager or control room manager) makes checks, to make sure everyone is working hard to attain their targets.

Akashi Office

Kansai Electric's Akashi Office is trying to reduce water use by sprinkling less water on the solar printemps unit and installing a imitation sound unit for toilets. Yet, the best effort of all comes from the individual employees. All sorts of opportunities are being used such as in-house e-mail, to provide information and raise awareness of conservation and the environment. As a result, the office saved 9.5% (433 m³) more water in fiscal 2001 from a year earlier.



Solar printemps unit

Reduction in Exhaust Gases from Vehicles

The staff that drive our company vehicles are trained to check the air pressure in the tires before they set off. This means that the vehicles will consume less fuel when they are moving. We also encourage our drivers not to leave their engines running when they park somewhere or temporarily stop. Additionally, they try to be careful when they park so as not to obstruct other vehicles. In this way, they avoid causing traffic congestion, and this helps avoid the production of excess exhaust gas.

The following shows the amount of fuel consumed in running vehicles for the fiscal year 2001:

Amount of fuel consumed in running vehicles and CO₂ emissions

Type of fuel	Volume consumed (kℓ)	Distance driven (In thousands of km)	Volume of CO ₂ emissions (t-CO ₂)
Gasoline	3,761	36,766	8,689
Light oil	1,159	7,726	3,061

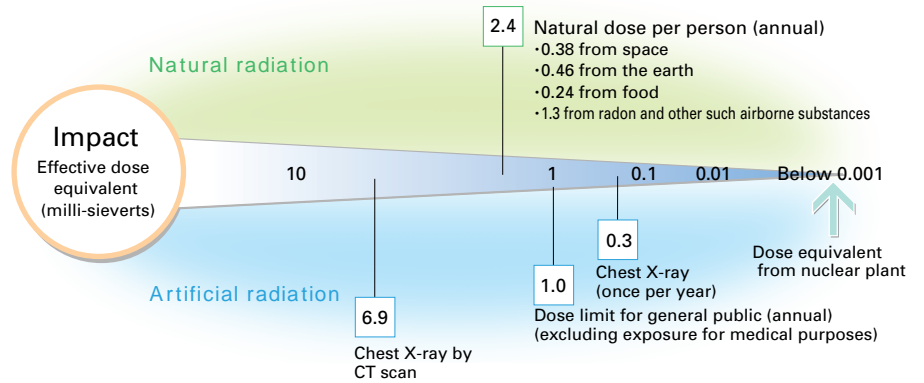
Measures of Radioactive Waste Treatment

Monitoring and Measurement of Radioactivity and Radioactive Materials

In order to make sure that the amounts of radiation produced in the running of our nuclear power stations do not reach a level where they may become a problem, radiation and radioactive materials are monitored.

We keep the volume of radioactive waste transferred from our nuclear power stations well below regulatory levels, therefore exposure in the surrounding public area is less than 0.001 mSv/yr. This value is far below the approx. 2.4 mSv/yr that the same public area is exposed to by natural radiation.

Level of radiation encountered in daily life



Evaluation value of radiation in the power station surrounding area (Milli-Sieverts per year)

Power Station	Fiscal 1997	Fiscal 1998	Fiscal 1999	Fiscal 2000	Fiscal 2001
Mihama	below 0.001	below 0.001	below 0.001	below 0.001	below 0.001
Takahama	below 0.001	below 0.001	below 0.001	below 0.001	below 0.001
Ohi	below 0.001	below 0.001	below 0.001	below 0.001	below 0.001

Sievert: Unit denoting degree of impact of radioactivity on human body



Monitoring post

Monitoring Points





Management of Radioactive Waste

Radioactive waste is generated in the running of a nuclear power station, but Kansai Electric carefully manages this waste and works hard to minimize any effects to the environment.

Gaseous waste produced at our nuclear power stations is stored in a tank to attenuate the radioactivity. It is then filtered so that radioactive substances are of sufficiently low concentration before being released from the smokestack. And, of course, we are monitoring for radioactivity the whole time. Liquid waste is

dried, thickened and filtered. The resulting distilled water is reused, while radioactive substances are monitored to ensure they are of sufficiently low concentration and then released into the sea from the discharge gate. Also, the thickened liquor that is leftover is solidified with asphalt and packed in drum cans. These drum cans and others containing solid waste that has been reduced in volume by compressing and incineration are placed safely in a storage facility. As necessary, this solid waste is

hardened and checked for conformity with national regulations, and then buried underground in the Rokkasho-mura Center for low level radioactive material.

Though some of the gaseous and liquid waste is treated and released into the environment, the radioactive material in it is sufficiently below regulatory levels.

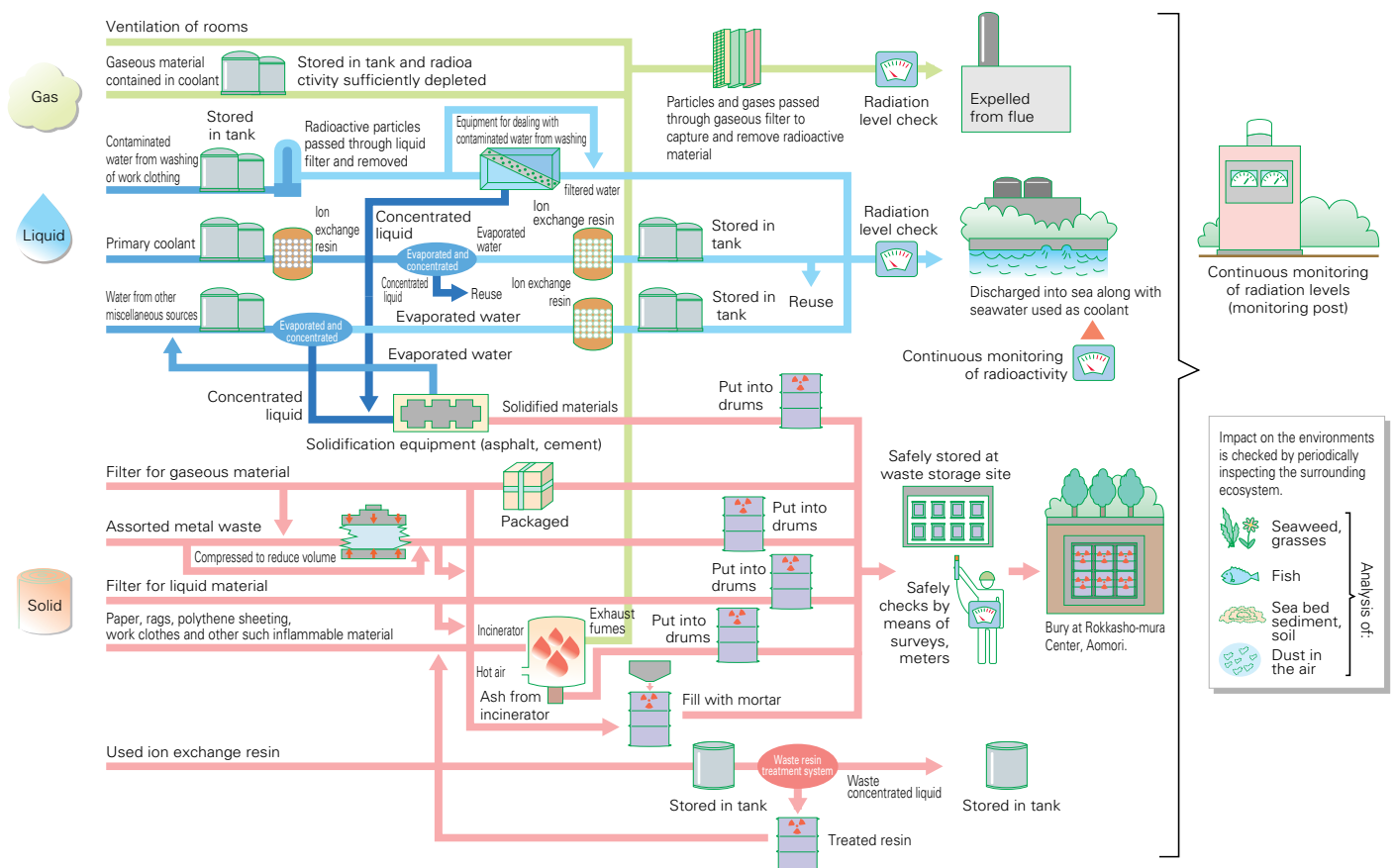
Discharge of Radioactive Gaseous and Liquid Waste materials

(Becquerels)

		Power Station	fiscal 1997	fiscal 1998	fiscal 1999	fiscal 2000	fiscal 2001
Gaseous Waste Products	Rare Gases	Mihama	1.9×10^{11}	1.7×10^{11}	2.3×10^{11}	1.6×10^{10}	1.4×10^{10}
		Takahama	3.7×10^{11}	4.2×10^{11}	4.0×10^{11}	1.6×10^{10}	1.8×10^{10}
		Ohi	4.3×10^{11}	6.1×10^{11}	1.2×10^{11}	5.7×10^{10}	1.5×10^{10}
	Iodine	Mihama	1.8×10^6	2.4×10^6	3.2×10^6	3.2×10^5	9.9×10^4
		Takahama	3.8×10^6	9.9×10^5	2.7×10^5	2.7×10^5	1.8×10^5
		Ohi	8.6×10^5	1.2×10^5	1.6×10^5	1.6×10^5	2.7×10^5
Liquid Waste Products (except Tritium)	Mihama	N.D.	N.D.	N.D.	N.D.	N.D.	
	Takahama	N.D.	N.D.	N.D.	N.D.	N.D.	
	Ohi	N.D.	N.D.	N.D.	N.D.	N.D.	

(Note 1) Becquerels are units which denote the depletion of one atomic nucleus per second in radioactive material
(Note 2) N.D. stands for Not Detectable and means that the value is too low to be detected

Method for processing of radioactive waste





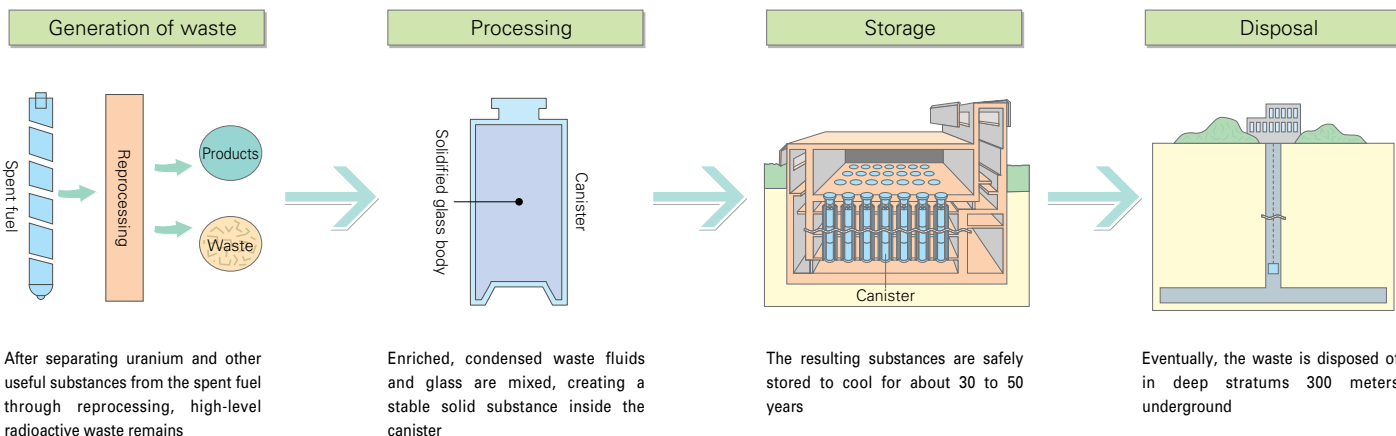
The reprocessing of spent fuel from a nuclear power station separates out useful materials like uranium. The remaining high level radioactive material is carefully stored for around 30 to 50 years to allow it to cool. The policy after that is to ultimately bury it at least 300 m below ground.

At present, the Nuclear waste management Organization of Japan* is making preparations to select a final disposal site. When thinking

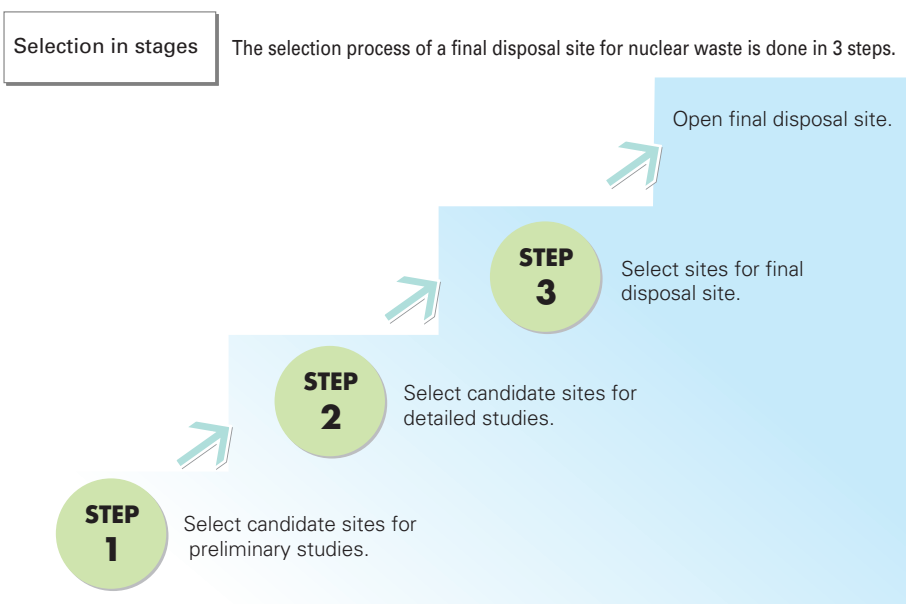
about our children and grandchildren, Kansai Electric believes it necessary to properly manage nuclear waste.

*  <http://www.numo.or.jp/>

Processing and disposal of high-level radioactive waste



Disposal site selection process





Recycling of Used Fuel Pluthermal Plan

Under the Pluthermal Plan, plutonium which has been collected by reprocessing spent fuel is mixed with uranium to form MOX fuel (mixed oxide fuels) and then reused in nuclear reactors (light-water reactor; thermal reactor). (The word "pluthermal" comes from the "plu" of plutonium and the "thermal" of "thermal reactor".) Countries such as Germany, France, and the United States have reported successful results with this program.

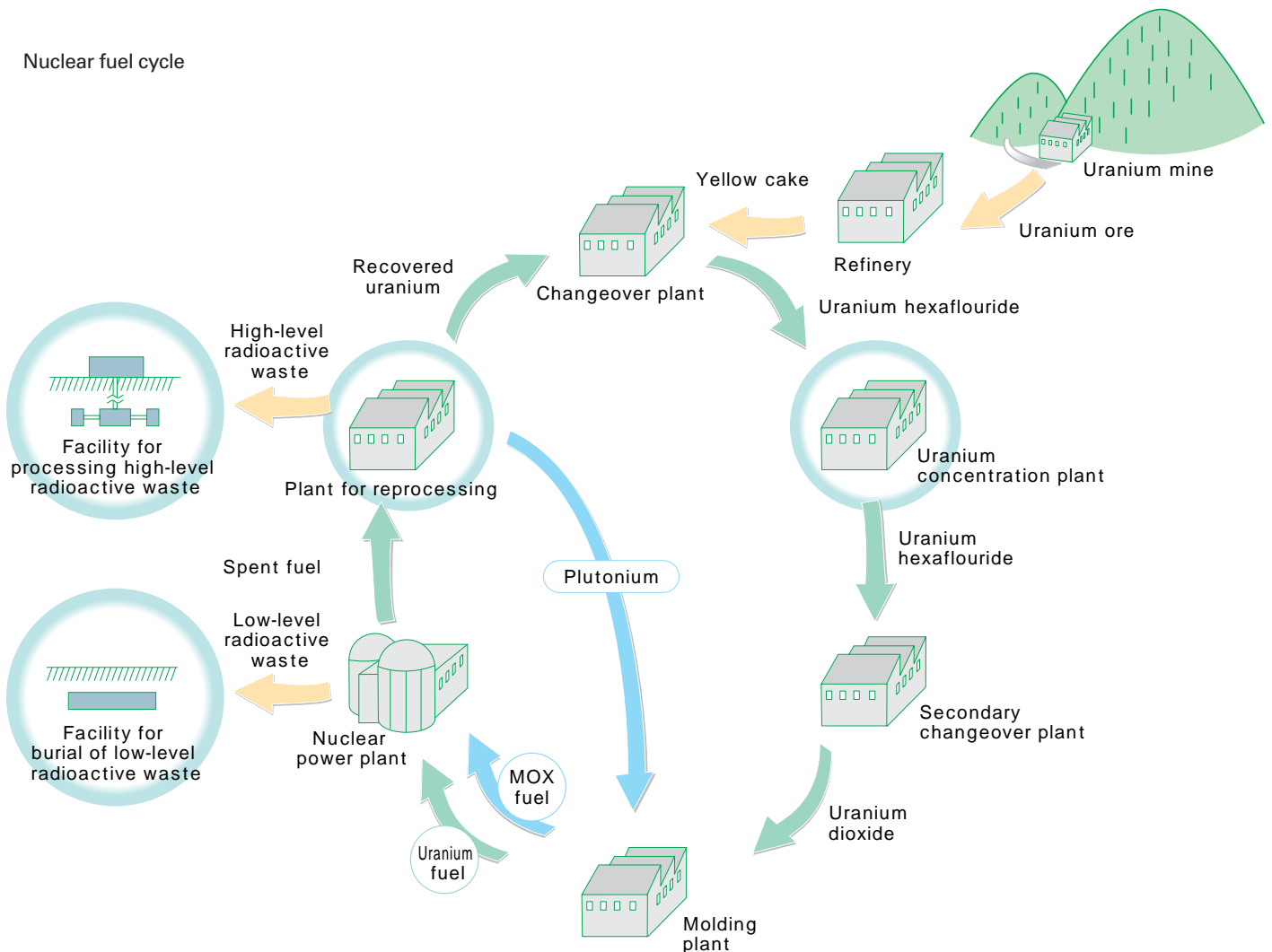
With limited natural resources, Japan's basic energy policy is to recycle any spent fuel that can possibly be reused. In line with this policy, Kansai Electric is proceeding with its own Pluthermal Plan.

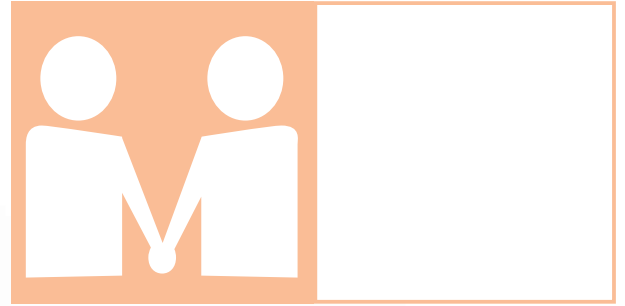
Kansai Electric had planned to start using Pluthermal at the Takahama Power Station in 1999, but because the MOX fuel data from BNFL that year was incorrect, we canceled the shipment. It was agreed in July 2000 that the 8 rods that were already brought to Takahama would be returned to England at the responsibility and expense of BNFL. The fuel was eventually shipped from Takahama in July 2002 with the approval of the US government as was required by the Japan – US Nuclear Power Agreement.

Pluthermal Plans are basically on hold after the fuel data issue with BNFL and decision in December 2001 to stop processing Comox's

MOX fuel, but Japan's basic policy is to "reprocess spent fuel and effectively reuse the recovered plutonium and uranium." In line with this policy, and with the understanding of local communities that host our operations, Kansai Electric wants to move forward again with the Pluthermal Plan.

Nuclear fuel cycle





Our Relationship with Society

Kansai Electric values the company's relationship with people and local communities. We will continue to think, work and grow with society, as everyone on our workforce is a member of that society, too.

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Exchange and Cooperation with External Bodies toward Environmental Conservation

Spreading Awareness on Saving Energy

In order to deepen understanding of energy conservation, Kansai Electric, at the request of local governments, women's groups, and consumer associations, cosponsors lectures and courses targeted at housewives on the basics of electricity and its efficient use. Our widespread education campaigns also include running special energy conservation supplements in major newspapers and in our in-house publication and cosponsoring exhibitions on effective energy use with outside groups like the Energy Conservation Center. Furthermore, our meter-readers give customers a statement that compares the amount of electricity used each month with the same month of the previous year. We also try to make our information pamphlets and publicity goods as entertaining and

interesting as possible so that learning about energy conservation can be more fun for more people. At the same time, we have also established an enjoyable energy-saving section on our company's website entitled "Energy-saving Solutions: Housewife Challenger" to facilitate the spread of awareness of energy-saving issues.



Energy conservation pamphlets and publicity goods



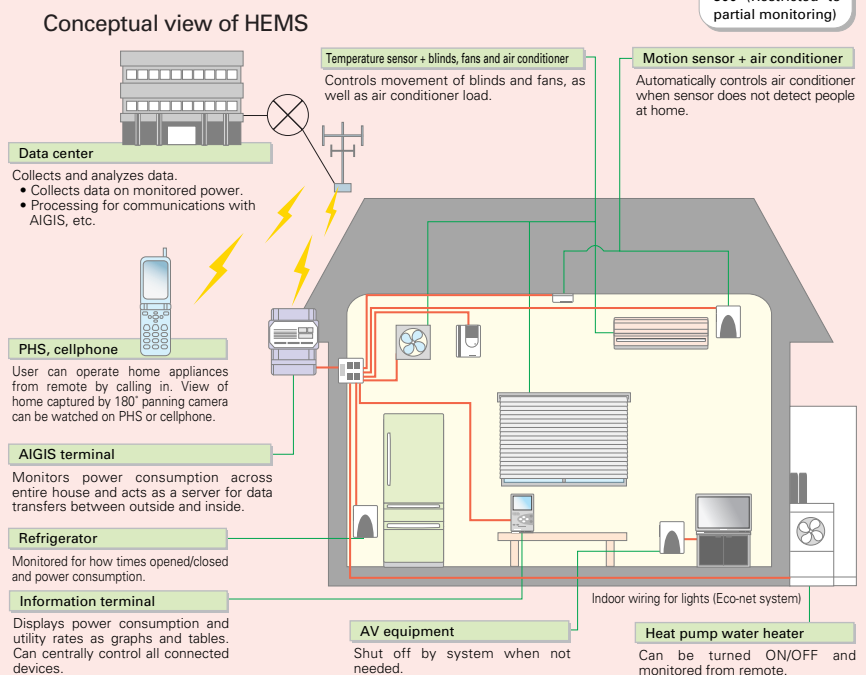
Topics

Energy-saving Systems Using IT (Home Energy Management System [HEMS])

Together with Matsushita Electric Industries and Hitachi, Ltd., Kansai Electric created the venture company EL-Quest Company Inc. in November 2001. EL Quest is doing validation tests*2 on HEMS, a home energy demand management system built with IT in the form of power line communications and AIGIS*1, a general consumer service that uses a high performance power meter. HEMS links home appliances like air-conditioners into a network, through a power meter made by Kansai Electric. In addition to enabling users to turn off lights by remote control and effectively conserving power by interlocking appliance operation linked to motion sensor, the system monitors power consumption of individual appliances and the entire house. Information is displayed as easy-to-understand graphs and tables. It is hoped that the system will enhance awareness of energy conservation and reduce home CO2 emissions by about 10%.

*1 AIGIS (Advanced Intelligent Gate-keeper for Integrated Service): General consumer service built around Kansai Electric's next-generation high performance power meter

*2 These validation tests are being conducted with a grant from NEDO (New Energy and Industrial Technology Development Organization).



Everyone's Eco-Friendly Campaign

Background to Activities

Since fiscal 1993, all Kansai Electric employees have taken part in the Everyone's 1-2-3 Campaign, which calls for participants to plant trees, reduce paper waste, and collect empty cans for recycling. For this effort, our company received a Ministry of International Trade and Industry Award in fiscal 1995 for outstanding contributions to the promotion of recycling.

This success led to the start in fiscal 1996 of the New Everyone's 1-2-3 Campaign, which comprises the three activities of tree planting, resource and energy conservation in the office, and community beautification.

In fiscal 2000, we started the Everyone's Eco-Friendly Campaign, in which employees continue to contribute to the protection of the local environment through our previous activities by working in cooperation with the local community.



Tree planting with elementary school students

Tree Planting

Kansai Electric is conveying the importance of keeping and cultivating greenery by transplanting saplings cultivated in our nurseries with the help of local residents and our employees. In fiscal 2001, we planted 29,150 sapling in school yards, parks and other public places. Since 1993, we have planted 293,000 trees.

Community Beautification

For some time Kansai Electric has been promoting environmental beautification programs together with the local community. Based on this experience, we have been promoting company-wide environment beautification with the cooperation of the local community since fiscal 1996. In fiscal 2001, we carried out 1,027 such activities to give us a cumulative.



Community beautification activity near an office

100,000 People's Eco-Family Campaign

In addition to efforts in the industrial world, the Prospectus on Global Warming Action that was adopted by the national government in March 2002 calls upon families and individuals to make a commitment such as to watch TV for one less hour a day or to increase temperature setting by one degree for car air-conditioner.

We have been promoting the 100,000 People's Eco-Family Campaign since fiscal 1998 to become environmentally friendly in our homes. Simple ways to conserve energy include turning off the TV at the mains when not in use, not running idle car engines and using public transportation as much as possible.

Since fiscal 1999, we decided to promote Green Purchasing, encouraging everyone to

purchase eco-friendly products such as recycled toilet paper.

As of fiscal 2001, each of our business locations has been developing volunteer activities and encouraging people to look closer at their lives to see what improvements can be made that will help the environment. Kansai Electric is trying to spread this initiative to local communities through PR and events.

Furthermore, the activities conducted in this campaign have received high praise, and in February 2000, it was chosen for presentation to all attending the G8 forum on the future of the environment as one of the best practice examples (superior examples) of measures against global warming conducted in Japan.



Leaflets (left and middle) and stickers (right) for the 100,000 People's Eco-Family Campaign





Cooperation with the Local Community

Symposium on Global Environmental Issues

We regularly hold symposiums, supported by the Osaka City and prefectural governments, that focus on global environmental issues. This is an important opportunity to consider and act on these issues together with the local community.



Environmental Month Symposium

Environmental Events and Cooperation with Local Governments

During Kansai Electric's "Environment Month" and "Customer Service Month", our branches and offices hold a variety of events with environmental themes, such as eco-cooking and recycling fairs, in exchange and affiliation with the local community through local governments.



Kanden Green Festival

Supporting Environmental Education

For elementary and junior high school students, we have produced an animated video titled "Mako-chan's Parrot: What is the Global Environment?" that explains global environmental issues and a booklet titled "Our Friends on the Earth", an easy-to-understand guide to the ecology of everyday fauna and flora.

List of environment-related publications by Kansai Electric

Title	Main contents
Kansai Electric's Global Environmental Action Report	An annual report on the progress of our environment-related activities
A well-Balanced Environment Today and Tomorrow	An annual report in English on the progress of our environment-related activities
Our Declaration of Concern for the Environment	Introduction to our company's work in tackling environmental problems
Grandma's Earth-Friendly Ideas	Presents traditional earth-friendly wisdom collected from community residents
The Eco-Family's Way to Live and Be Kind to the Earth	Q&A format on how to live in harmony with the environment
Our Friends on the Earth	Easy introduction to everyday fauna and flora
Videos	As a business that continues to care about the environment Kansai Electric's activities to fight global environmental problems
	Introduction to our company's work in tackling environmental problems
Mako-chan's Parrot - What's the Global Environment? (animated)	Explanation of global environmental problems for the next generation (for elementary school students)

Environmental Information Activities

To gain the trust of customers with regards to our environmental activities, Kansai Electric provides information in a number of ways and explains matters verbally through opportunities like tours of our power stations. We, therefore, are making an effort to ensure the information we provide is easy to understand and that people recognize Kansai Electric as a friendly part of society.

Within the company, information is released in a timely manner over our in-house TV network and intranet.

And, the information goes both ways as we collect news on advanced environmental initiatives outside the company and try to identify trends in local communities and all of society in general, so as to stay abreast of change and adapt our efforts accordingly.



Cooperation with Environmental Groups

To protect the environment, it is necessary to weave the ideas and actions of the national and local governments, businesses and grassroots organizations into a partnership. Within these efforts, environmental NPOs have been growing year after year, giving them today an important role in society. Kansai Electric is studying ways to interact with these organizations so as to know their wants and needs as to the best form of partnership with us. As a result, we have forged ties with several groups that understand and are willing to play a constructive part in our activities.



Class on recycling in cooperation with an NPO

Cooperation with the Global Environment Forum-Kansai

The Global Environment Forum, Kansai* is composed of people from academic circles, government offices, businesses, labor unions, women’s groups and more. They study global environmental problems and make proposals on a base of activities run by six subcommittees, with the ultimate goal of developing “Metabolism-Oriented Society”. Kansai Electric sits on each of the subcommittees, developing scenarios on themes of minimizing and effectively utilizing resources and promoting technical cooperation in environmental fields, as a contribution from the Kansai area to Asia. The Forum also supports environmental education, which is one particular area where Kansai Electric is playing a constructive role.

*  <http://www.global-kansai.or.jp/navi.htm>



Proposals of the Global Environment Forum-Kansai

Cooperation with Kansai Economic Federation

The Kansai Economic Federation* has released statements on “Green Purchasing Promotion” and “Summer Energy Conservation Fashion” as part of their activities to encourage “Construction of an Eco-cycled Society and Shift to a New Lifestyle”. This is a key element in their Kansai Revitalization Plan adopted in December 1999. Kansai Electric is an active part of these efforts as well.

*  <http://www.kankeiren.or.jp/index-j.htm>

Support for the Kansai Research Foundation for Technology Promotion

The Kansai Research Foundation for Technology Promotion* provides support to researchers in the Kansai area in the form of grants for testing, research and international exchange activities in the field of energy supply and use, and resource recycling. Their ultimate goal is the sustainable development of society that balances human activity with environmental protection. Since 1995, on the lessons learned from the Great Hanshin - Awaji Earthquake, they have also been promoting research into the disaster prevention sciences. In the ten years since their founding, the Kansai Research Foundation has receive 631 grant applications, approved 385 and provided the equivalent to ¥418.70 million in subsidies. Kansai Electric helped to found the organization in 1992 and has since been a major supporter of their work.

*  <http://www.krf.or.jp/>



Subsidy presentation ceremony/Denki Shimbun Newspaper



Our Relationship with Society

Exchange and Cooperation with External Bodies toward Environmental Conservation

Community Relations Facilities

In an attempt to provide information on our electric utility business and our environmental preservation efforts and to communicate with local residents, community relations facilities have been built on power station sites, where people can familiarize themselves with our operations and equipment.

Kansai Electric has major plans to build facilities with exhibits that introduce the public to our environmental policies and where they can see working models of things like photovoltaic power generation and thus learn about new energy sources.



Website guide map



Guidebook to PR Kan



Tropical Wonder

Wakasa Takahama ELdoland

At Wakasa Takahama ELdoland, Kansai Electric's community relations facility, visitors can observe all kinds of tropical plants and various tropical fish in the Tropical Wonder greenhouse. Exhibits placed around the site assist in teaching people about environmental problems and energy issues.

Address 4-1 Aoto, Takahama-cho, Ohi-gun, Fukui Prefecture

Hours From 10:00 a.m. to 6:00 p.m. (winter 5:00 p.m.)

(Closed Mon. and Dec. 29 to Jan. 3)
*If closing day falls on a national holiday, following weekday is holiday in lieu.
Open Apr. 29-May 5, Jul. 20-Aug. 31

Contact information Tel: (0770) 72-5890



Mihama Nuclear Power Community Relations Center

The Mihama Nuclear PR center at the Mihama Power Station features models of a nuclear reactor and power station and various exhibits on nuclear power, giving visitors the chance to enjoy while learning.

Address Niu, Mihama-cho, Mikata-gun, Fukui Prefecture

Hours From 9:00 a.m. to 5:00 p.m. (Closed Dec. 29 to Jan. 3)

Contact information Tel: (0770) 39-1210



Ohiri-kan, EL Park Ohi (Ohi Power Station)

At the Ohiri-kan, visitors can see the actual workings of a nuclear power station at the Nuclear Power Theater, a model of a nuclear reactor containment built to one-third scale. They can also view the plant's actual radiation management section through a glass barrier.

Address Tsutsumishita 40, Oshima, Ohi-cho, Ohi-gun, Fukui Prefecture

Hours From 9:00 a.m. to 5:00 p.m. (Closed Dec. 29 to Jan. 3)

Contact information Tel: (0770) 77-3053



EL City Nanko (Nanko Power Station)

A great place to experience the freshness of the wilderness in Osaka, the EL City Nanko community relations center boasts surrounding forested hills with walking trails, an open grass field, and a brook for playing or relaxing.

Address	7-3-8 Nanko Minami, Suminoe-ku, Osaka
Hours	From 10:00 a.m. to 5:30 p.m. (Closed 3rd Thurs. of every month, Dec. 29 to Jan. 3)
Contact information	Tel: (06) 6613-7458



Aquarium



Darrieus wind turbine power generator

Tango Watch-kan (Miyazu Energy Research Center)

The Tango Watch-kan community relations center at the Miyazu Energy Research Center has an aquarium with fish and shellfish native to the coastal areas near the site as well as a “petting pool” where kids can reach in and touch the fish. Visitors can also see a wind-powered generator and solar-powered house.

Address	1001 Oda Shukuno, Miyazu, Kyoto
Hours	From 9:00 a.m. to 5:00 p.m. (Closed Dec. 29 to Jan. 3)
Contact information	Tel: (0772) 25-2026



EL Village Okawachi (Okawachi Power Station)

The EL Village Okawachi community relations facility has log house style buildings that fit in perfectly with the surrounding mountains and forests. The buildings house a library where visitors can learn about nature and plants of the world and a center where guests can receive advice on planting their own flowers and gardens.

Address	34-1 Nitta Hase, Okochi-cho, Kanzaki-gun, Hyogo Prefecture
Hours	From 10:00 a.m. to 5:30 p.m. (Closed 2nd Mon. of every month, Dec. 29 to Jan. 3)
Contact information	Tel: (0790) 35-0888



Kurobegawa Electricity Memorial Hall

Let us introduce you to the fierce beauty of the Kurobe canyon and the drama of the people who have forged a life here, the courage and wisdom of our ancestors. Please see how our company has harnessed hydropower.

Address	483-1, Unazuki-machi, Shimoniikawa-gun, Toyama Prefecture
Hours	From 7:30 a.m. to 6 p.m. 20 April to 30 November From 9 a.m. to 4 p.m. December 1 to April 19 (closed Tuesdays between December 1 and April 19)
Contact information	Tel: 0765 (62) 1334



Activities to Benefit Local Society

As a company that lives in step with the local society, we are involved in various types of activity aimed at enabling us to 'Live in Harmony with the Local Community'.

Support and Take Part in Local Events

We are involved in the production, transmission and delivery of electricity, an activity that has deep roots in local society. We have many head offices, branch offices, headquarters and moreover sales outlets, electric power offices and power stations spread around various locations. All these operations work to hold events, support and take part in local festivals and other such events.



Kobe Luminarie



Changing the braided rope of "Saino-kami" in Kanzaki-cho (Fukusaki office)

Welfare for the Elderly

It is predicted that one in every four persons in the year 2020 will be age 65 or older. This rapid aging of society is posing all sorts of problems that need to be looked at. Already, Kansai Electric is building general welfare facilities and working in other ways to improve welfare for elderly persons in local

communities where we operate, such as providing electric diagnostic equipment for elderly persons who live alone. Furthermore, we are making it possible for every individual to lead a safe and secure way of life by supplying "electricity" that can make life more comfortable.



Diagnostic equipment for elderly persons who live alone

Welfare for the Physically Challenged

Our wish is for a society in which everyone, whether they be physically or mentally challenged or not, may experience the joy of living. Our activities here range from those undertaken personally on behalf of the surrounding community to those where the entire company is involved in an event. As one example of such work,

we have set up Kanden L-Heart Co., Ltd. facility as a place where the physically challenged may enjoy doing a variety of worthwhile work (Multi-Purpose Work Center for the Severely Physically Challenged).

We want to continue with such work into the future as part of our aim for a "No Barriers Between Hearts" society.



Kanden L-Heart



Lively festival

Support for Arts, Culture and Sports

Arts, culture and sport all serve to vitalize a community and give each member of that community courage. They serve to uncover new talents and to educate, and they create and widen new bonds of exchange between communities.

Every year, we hold classic concerts in each community where local citizens

may enjoy famous works of classical music and opera. We also cosponsor the FLASHBOWL series in the Kansai Collegiate American Football Association by way of encouraging junior sport. We are taking a comprehensive approach toward the promotion of arts, culture and sports at the local level.

Classical concert



FLASHBOWL

Fostering Health in the Young

Our wish is that children, who will shoulder the burden of the next generation and build the future, may be raised to be healthy. Therefore, we are working in various ways and through exchange to help children to acquire social vision; we are working to engender a rich sensitivity in them. We go into the classroom to give informal talks on the various environmental

issues we all face in relation to energy, and we provide classrooms where they may conduct scientific experiments. One example of such work is the Kanden Youth Soccer Tournament. Together with the Osaka Soccer Society we annually cosponsor this event so that children may enjoy soccer at a first-class venue.



KANDEN Youth Soccer Tournament

Support for Volunteer Activities by our Staff

Many of our staff are involved in volunteer work. This work is purely voluntary. They do it because they wish to contribute to the local community. In order to support such work, we have a system whereby we allow staff to take time off work or be absent during such activities. We also loan company facilities and equipment, and host seminars aimed at encouraging such activity.

Through such volunteer activities, our staff come into contact with many of the local residents. In this way, they gain various perspectives that they wouldn't get just from corporate culture itself. This strengthens their sense of being a member of the local community. We hope that this will help them become good and highly humane members of society.



KANDEN Volunteer seminar



Safety and Sanitation Activities

Aiming to Create a Workplace with Safety and Health in Mind

It goes without saying that for the people who work there, the ability to work in a safe and healthy environment is of the utmost importance. Recently, we have seen a major stiffening in competition in the electricity business. Therefore, if we are to have people choose our company for their supply of electricity, then it is indispensable that our staff energetically go about their work with enthusiasm and that they display their abilities to the utmost. One of our mid-term management policy goals is that of "creating a lively work environment", and in order to achieve this, not just the company itself, but every single employee has joined forces to work toward safety and sanitation with the objective of ensuring the safety and health of all our staff. Based on this concept, we are making every effort to promote safety and health activities aimed at creating a

safe and healthy work environment. Therefore, we have adopted the "Policy on the Management of Safety and Sanitation" as part of our mid-term policy, and the "Plan for the Management of Safety and Sanitation" as our plan for the coming year.

Safety and Sanitation Activities

As far as company attitude to safety and sanitation goes, we are aware that the safety and health of our employees are valuable assets for our company. So, with this in mind, we are involved in work that puts great emphasis on ensuring both. Not only do we strictly observe all the related legislation on this, such as the Industrial Safety and Health Law and other related regulations, but we have also set down our own company standards and are involved in independent activities toward such goals.

Fiscal year 2001-2004 Main Points of the Kansai Electric's Policy on the Management of Safety and Sanitation

Safety Related

1. Preparation of a solid basis for the management of safety
2. Encouragement of activities toward boosting safety in cooperating companies

Sanitation Related

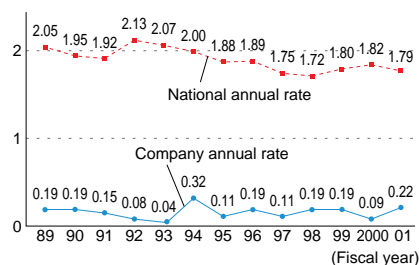
1. Promotion of mental health care for the competitive age
2. Promotion of supportive measures toward personal responsibility for health
3. Strengthening of base for health support system

Management of Safety

Education and Events Related to Safety

In order to prevent accidents occurring while staff are carrying out their duties, we provide facilities and equipment which enable all our employees, whoever is carrying out a particular operation, to work in safety. We also provide education and hold events aimed at raising awareness of safety issues. As a result, our company's annual rate of accidents at work is lower than the national level.

Annual rate of accidents at work



Annual Rate: Number of hours of work missed through accident per total of 1,000,000 working hours

Measures with regard to Human Factor

A thorough analysis is carried out in the event of an accident occurring and we examine measures aimed at preventing a recurrence. This activity is carried out throughout the entire company. Particular emphasis is given toward such activity with regard to instances where the cause of the problem was psychological. For example, one of our policies is to hold regular monthly meetings at all our work places where small groups meet to discuss the human factor.

Designation System for Drivers

Our company has its own system of designation for drivers. If an employee is to drive a company vehicle, then they must take a prescribed course. Their driving ability is checked before they are given permission to drive, and this is followed up with other regular tests. The company has a well-developed policy on the management of safe driving.

Safety Activities Company-wide

Safety activities aimed at improving the management of safety at cooperating companies and among our subcontractors take place throughout the entire Kansai Electric Group. These activities include the sharing of information on safety matters, providing advice and giving instruction.

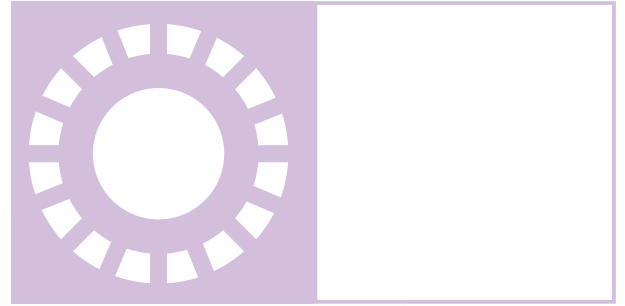
Management of Sanitation

Promotion of Mental Health Care

Recently, much attention has been paid to the problem of stress in the workplace and the importance of creating a healthy frame of mind has grown in significance. Therefore, we are working to encourage education toward dealing with stress and have set up a system where people may discuss their problems.

Promotion of Supportive Measures toward Personal Responsibility for Health

We are involved in a number of activities aimed at the prevention of illness resulting from personal lifestyles. We offer information on such issues aimed at improving people's exercise and eating habits: for example, we provide guidance on health matters and offer support to those who wish to give up smoking.



Activities of the Kansai Electric Group

Environmental protection is a group-wide effort at the Kansai Electric Group. While doing what we can for the environment, we will continue to provide customer-satisfying products and services so that customers and local communities alike recognize us as a “trustworthy and strong” group.

Chapter 7 Contents

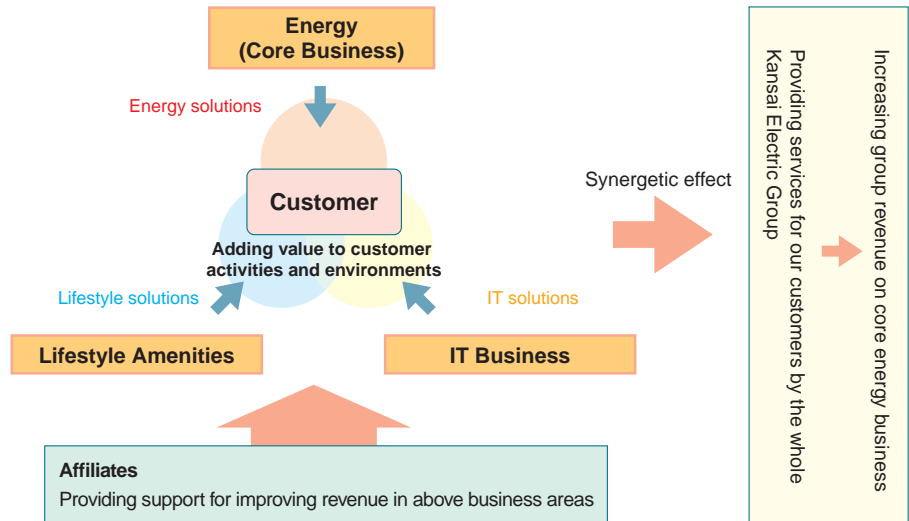
- 88** 2010 Group Vision - General Consumer Infrastructure Industry
- 88** Group-wide Activities
 - 89** Improving Environmental Management
 - 90** Eco Business Examples



2010 Group Vision - General Consumer Infrastructure Industry

The Kansai Electric Group provides a number of solutions for the energy-consuming “ambient” on a core of energy. In developing business, it is important to have customers select services and gain their trust. This is the direction we are taking to establish a “Kanden Brand” as a “general lifestyle infrastructure industry”. Not only are we developing “energy”, “lifestyle amenities” and “IT” as autonomous business domains but we are also searching for ways to develop the synergies between them.

2010 Group vision overview



Group-wide Activities

On the Five Basic Principles of the Global Environmental Action Plan that outlines Kansai Electric’s environmental policy, the Kansai Electric Group is united in increasing group revenue by promoting the eco-business and strengthening risk management through improved environmental management. You can access websites of group companies from Links on Kansai Electric’s site.

Staff Meetings, etc.

To share the latest information on the environment and introduce examples of eco-business, staff meetings and report meetings are held for the 50 odd members of “Promotional Staff for the Related Company Global Environmental Project” chosen by each group company to sit in on the “Conference for Promotional Staff for the Related Company Global Environmental Project” and “Studies Examples of Activities”. Every sort of opportunity is being used to strengthen relations with group companies.

Publication of “Eco-Business News”

To promote efforts to provide information on markets and more, the Kansai Electric Group publishes a newsletter entitled “Eco-Business News”. The purpose is to support new market development and build eco-business on the diverse environmental technologies and know-how of group companies.



Eco-Business News

Improving Environmental Management

Environmental activities are a key management issue of the Kansai Electric Group. Each group company has introduced an environmental management system and is developing activities in line with the type and nature of their business. Some of these activities are described below.

ISO14001 Introduction

Kinden Corporation

“Eco-friendliness” is a high priority issue of Kinden Corporation as the general electrical equipment business. We have developed activities for building environmental management systems on a concerted effort amongst our workforce and a basic policy of “promoting eco-friendly equipment design and construction”.

Kinden examined, assessed and identified the environmental impact of our business activities and our Osaka and Chubu Offices became the first in the industry to acquire ISO14001 certification in September 1999. Since that date, we have gained certification for all of our business sites in Japan.

Together with ISO9001 certification obtained at all sites in Japan we will continue to improve ourselves both in terms of product quality and environmental protection, by upgrading and strengthening our operations to provide “technology you can trust”. While developing activities to deliver quality and improve the environment, Kinden wants to keep customers feeling satisfied and secure, and prove ourselves worthy and useful to society as a company.

Environmental Policy

Basic Policy

Promoting eco-friendly equipment design and construction

Action Policy

- Proper management of waste
- Resource conservation
- Energy conservation

Kansai Tech Corporation

Kansai Tech Corporation has been in the environment business for some time creating -- for example -- forestation department launched in 1972. We spun off our environment business in 2000 and developed several environmental products, one of which was the Support Software for the PRTR management in compliance with PRTR law.

As part of recent undertakings for global environmental problems, we have aggressively promoted activities to reduce environmental load. These efforts gained us ISO14001 certification for our environment division and Fukuzaki plant in 2002.

Kansai Tech will be playing an increasingly more constructive part in promoting activities of the Kansai Electric Group in the future and will be looking to earn the trust of society by addressing issues of public interest to note global environmental problems.

Environmental Policy

Strive to reduce our environmental load and coexist harmoniously with the natural environment by providing eco-friendly technologies and services and working with customers.

Fukuzaki Plant Action Policy (Excerpt)

- Work to conserve resources and reduce waste in order to minimize the impact that our business activities have on the environment.
- Observe all laws and regulations, customer requests and in-house rules.
- Continuously seek improvement by having the entire workforce embody and maintain policy.
- Contribute constructively to environmental protection activities of customers.

Environmental Load Reduction Activities

- 1) Waste reduction
- 2) Waste recycling
- 3) Energy conservation, global warming prevention
- 4) Water pollution prevention
- 5) Green procurement

Example Activities

Ujiden Building Co., Ltd.

Waste Reduction Activities

Ujiden Building has devised a waste collection scheme in cooperation with office buildings tenants that targets a higher recycle rate through waste reduction and proper treatment. In fiscal 2001, we were able to recycle 135 t (70%) of the 194 t of waste generated from our three buildings. We are looking for more effective activities to implement in the future.



Recycle collection boxes

NEWJEC Inc.

Green Procurement Activities

NEWJEC Inc. has introduced a program for purchasing eco-friendly products and supplies. In fiscal 2001, 10% of the paper products purchased by our offices were green. In fiscal 2002, they want to establish targets for the entire company and promote green purchasing across the company.





Eco Business Examples

Kansai Tech Corporation

Dioxin Measuring and Analysis Technology

At our General Engineering Center, Kansai Tech is outfitted with state-of-the-art equipment on a solid base of high precision measurement and analysis technology for diverse fields including pollution diagnostics for water, air and soil, and PCB measurement and analysis. And, we provide the technology for measuring and analyzing dioxins.

As the Law Concerning Special Measures Against Dioxins stiffened regulations on release into the air, water and soil, Kansai Tech invested in more dioxin measurement equipment and established a system for providing all the services from dioxin sampling to analysis.

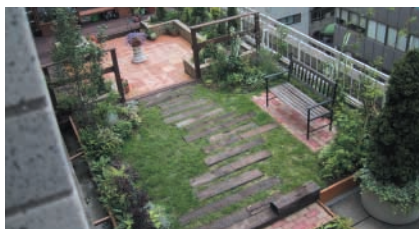


Dioxin measurement and analysis station

Kansai Environmental Engineering Center Co., Ltd.

Using Kansai Electric's Head Office As a Testing Ground and Showroom for Rooftop Gardens

In April 2002, Kansai Environmental Engineering Center opened the K-Sky Garden on the 6th floor terrace of Kansai Electric's Head Office building. There, we set up a showroom with two rooftop gardens that consolidate rooftop greening technologies - "Flower Garden" and "Healing Garden" - as well as a "Test Area". The showroom has on display gardening supplies and two gardens give customers a good look at what a rooftop garden can look like. In the Test Area, we are experimenting with commercially available artificial soil to make objective analyses and assessments as to suitability.



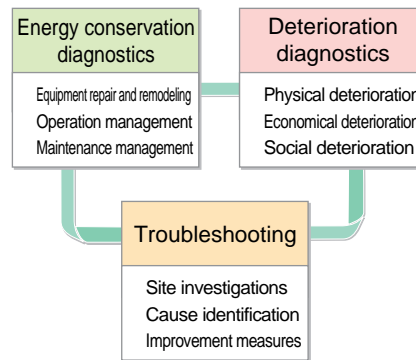
K-SKY GARDEN

Kinden Corporation

Energy Conservation Activities

Following amendments to the Law Concerning the Rational Use of Energy, Kinden set out to optimize energy conservation by pulling the host of diagnostic technologies we had (deterioration diagnostics, energy conservation diagnostics and troubleshooting) into a "energy conservation promotion technology" package, and are now developing services from renewal proposals to planning, installation and verification.

General equipment diagnostic system



New Energy Activities

Kinden is also responding to diversified demands for "wind power generation" and producing steadfast results by building simpler downsized systems utilizing the strong points of foreign manufactured equipment.



Sarakitomai (Hokkaido) 1,650 kW X 9 units

Kanden Kogyo Co., Ltd.

Startup of AC Filter Cleaning Business

In October 2002, Kanden Kogyo will start cleaning and recycling medium performance air-conditioner filters using ultrasonic waves. Before, used filters were simply thrown away, but calls for environmental protection and the cost of replacements cited by customers have made recycling an interesting business. A filter can be washed 3 to 5 times. The system measures pressure loss and dust removal rate to confirm the filter is "as good as new" before being returned to the customer. This new line of business should reduce waste to 1/3 - 1/5, while also save customers their money by reducing the need to purchase new filters. Kanden Kogyo wants to develop the business for suction filters used on gas turbines.



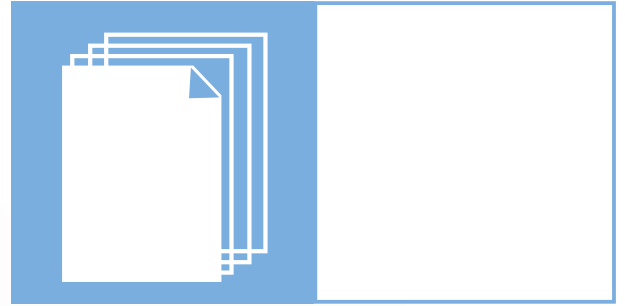
Kanden L-Garden Co., Ltd.

"Tom's Garden" business

Kanden L-Garden runs "Tom's Garden" gardening center whose business is based on barrier-free access and plant therapy. Tom's Garden sells saplings, trees and gardening supplies, but also proposes garden styles and gardening techniques that anyone can do and enjoy including barrier-free gardening for persons in wheelchairs. Kanden L-Garden also develops barrier-free gardening tools such as wooden flowerbeds for wheelchair riders and trowels for the physically handicapped. The store also sells kitchenware, imported interiors and sundries with plant and flower motifs that let consumers enjoy the plant world even inside the home.



Flower beds and shovels that are easy on the wrist for people continued to wheelchairs



Reference Information

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Environmental Load of Thermal Power Stations

Kansai Electric's thermal power stations are bound not only by laws and regulations but even stricter agreements with local governments. To ensure residents of the local communities where we operate can lead a safe and secure life, we measure and report the environmental load of our power stations to hosting governments.

Item			Sakaiko				Osaka	Sanpo	Tanagawa	Tanagawa No. 2	Nanko	Miyazu Energy Research Center			
Primary fuel			L/H/C				L/H/B	H/BFG		H/C	L	H/C			
Air quality	SOx	Emission per hour (m ³ /h)	APC Law (total emissions)	390				77	44	Not recorded. Shut down 12-15-2001	587	98	⁵ 306		
			Value agreed to	—				—	—		—	—	—	112	
			Actual value	103				9	Not recorded		139	0	67		
		Emission per day (t/day)	Value agreed to	10.1				3.8	1.6		9.3	—	—		
			Actual value	1.2				0.3	Not recorded		4.4	0	—		
		Emission per year (t/yr)	Value agreed to	940				615	240		3,020	—	492 × 10 ³ m ³ N		
	Actual value		14.2				16.7	Not recorded	350.4		0	12 × 10 ³ m ³ N			
	NOx	Emission per hour (m ³ /h)	APC Law (total emissions)	613				118	66		² 398	255	Outside designated area		
			Value agreed to	—				—	—		—	—	58		
			Actual value	120				16	Not recorded		144	31	37		
		Emission per day (t/day)	Value agreed to	7.7				2.2	0.9		7.2	1.8	—		
			Actual value	3.5				0.5	Not recorded		3.8	1.1	—		
		Emission per year (t/yr)	Value agreed to	1,420				320	180		2,100	400	244 × 10 ³ m ³ N		
	Actual value		735.4				42.8	Not recorded	347.2		219.8	6 × 10 ³ m ³ N			
	Dust	Emission concentration (g/m ³ N)	APC Law, ordinances	⁴ 0.050				⁴ 0.050	⁴ 0.050		0.070	0.030	0.050		
			Value agreed to	0.020				0.020	0.020		0.020	—	0.014		
			Actual value	0.005				0.005	Not recorded		0.005	0	0.004		
	H ion concentration		WPC Law, ordinances	Discharge gate	C-oil	D-oil	E-oil	Sewerage discharge	NO ₂ -oil		5.8 ~ 8.6	5.8 ~ 8.6	³ 5.0 ~ 9.0	5.0 ~ 9.0	
5.8 ~ 8.6						³ 5.0 ~ 9.0	⁴ 5.8 ~ 8.6	—	—	—					
—						—	—	5.8 ~ 8.6	—	5.8 ~ 8.6					
		Value agreed to	—						—	—	5.8 ~ 8.6	—	5.8 ~ 8.6		
		Actual value	7.5 ~ 8.3	6.6 ~ 7.8	6.4 ~ 7.7	6.5 ~ 7.5	7.4 ~ 7.9	6.9 ~ 7.4	7.8 ~ 8.1	6.6 ~ 8.1	6.8 ~ 8.3	6.4 ~ 8.2	6.3 ~ 8.1		
Water quality	COD	Max. concentration (mg/l)	WPC Law, ordinances	12				³ 200	⁴ 14	12	—	30	³ 200	160	
			Value agreed to	—				—	—	—	—	15	—	200	15
			Actual value	4	2	7	8	5	2	3	7	7	12	2.7	
	Pollutant load (kg/day)	WPC Law, ordinances	393.2				—	—	—	—	55	—	—		
		Value agreed to	—				—	—	—	—	25	—	20.8		
		Actual value	21.7				—	—	—	—	7.9	—	3.4		
	SS	Max. concentration (mg/l)	WPC Law, ordinances	50				³ 200	⁴ 90	50	—	80	³ 200	200	
			Value agreed to	—				—	—	—	—	20	—	200	20
			Actual value	4	5	5	5	7	< 1	7	9	9	47	< 1	
n-hexane extracts	Max. concentration (mg/l)	WPC Law, ordinances	10				³ 4	3	10	—	5	4	5		
		Value agreed to	—				—	—	—	—	1	—	4	1	
		Actual value	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.5		

APC Law: Air Pollution Law, WPC Law: Water Pollution Control Law, L: LNG, B: Bituminous coal, H: Heavy oil, C: Crude oil, BFG: Blast Furnace Gas

Note: The Kasugade, Amagasaki Higashi and Amagasaki No. 3 power stations were shut down on December 15, 2001.

Item			Kainan			Gobo	Himeji No. 1		Himeji No. 2	Takasago	Aioi	Ako		
							1 ~ 4u	5 · 6u						
Primary fuel			H/C			H/C	L		L/H/C	H/C	H/C	H/C		
Air quality	SOx	Emission per hour (m ³ /h)	APC Law (total emissions)	646			¹ 7,800	Not recorded. Shut down 6-30-2001		112	780	344	¹ 3,054	¹ 2,146
			Value agreed to	310			264			—	58	155	165	180
			Actual value	152			197			0	9	104	108	87
		Emission per day (t/day)	Value agreed to	—			—			—	—	—	—	—
			Actual value	—			—			—	—	—	—	—
		Emission per year (t/yr)	Value agreed to	1,760 × 10 ³ m ³ N			1,390 × 10 ³ m ³ N			—	400 × 10 ³ m ³ N	2,492	885 × 10 ³ m ³ N	650 × 10 ³ m ³ N
	Actual value		218 × 10 ³ m ³ N			57 × 10 ³ m ³ N	0			0.7 × 10 ³ m ³ N	90.9	10 × 10 ³ m ³ N	15 × 10 ³ m ³ N	
	NOx	Emission per hour (m ³ /h)	APC Law (total emissions)	Outside designated area			Outside designated area			Outside designated area		Outside designated area	Outside designated area	Outside designated area
			Value agreed to	450			110			104	463	320	85	94
			Actual value	307			60			55	354	237	44	74
		Emission per day (t/day)	Value agreed to	—			—			—	—	—	—	—
			Actual value	—			—			—	—	—	—	—
		Emission per year (t/yr)	Value agreed to	2,400 × 10 ³ m ³ N			560 × 10 ³ m ³ N			590 × 10 ³ m ³ N	2,263 × 10 ³ m ³ N	1,620 × 10 ³ m ³ N	390 × 10 ³ m ³ N	340 × 10 ³ m ³ N
	Actual value		159 × 10 ³ m ³ N			10 × 10 ³ m ³ N	264 × 10 ³ m ³ N			1,143.7 × 10 ³ m ³ N	72 × 10 ³ m ³ N	8 × 10 ³ m ³ N	22.6 × 10 ³ m ³ N	
	Dust	Emission concentration (g/m ³ N)	APC Law, ordinances	0.070			0.070			0.050	0.050	0.070	0.070	0.050
			Value agreed to	0.050			0.010			—	—	0.050	0.015	0.015
			Actual value	0.004			0.001			0	0	0.005	0.003	0.003
	H ion concentration	WPC Law, ordinances	Site waste water treatment	Main building oil treatment	Tank yard oil treatment		—			5.8 ~ 8.6		5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6
5.8 ~ 8.6				—	5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6					
Value agreed to			5.8 ~ 8.6			5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6	5.8 ~ 8.6			
Actual value			7.0 ~ 7.8	6.7 ~ 7.8	6.2 ~ 7.7	6.4 ~ 8.0	6.5 ~ 7.4	6.5 ~ 7.4	6.4 ~ 8.2	6.0 ~ 8.2	6.8 ~ 7.6	6.5 ~ 7.6		
COD	Max. concentration (mg/l)	WPC Law, ordinances	10			160	100		100	100	100	100		
		Value agreed to	10			10	15		15	20	15	15		
		Actual value	6	2.8	2.4	3.8	4	2	7	3	2	2		
	Pollutant load (kg/day)	WPC Law, ordinances	187.7			—	83.6		105	102	66	84		
		Value agreed to	50			34.4	1.9	15.2	35	34	18	22.4		
		Actual value	5.6			5.8	1.75	1.55	15.7	3.5	1.4	2.7		
SS	Max. concentration (mg/l)	WPC Law, ordinances	40			200	90		90	90	90	90		
		Value agreed to	20			20	20		20	20	20	20		
		Actual value	5	3.4	2.4	2.1	1	1	7	< 1	4	1		
n-hexane extracts	Max. concentration (mg/l)	WPC Law, ordinances	1			5	5		5	5	5	5		
		Value agreed to	2			1	1		1	1.5	1	1		
		Actual value	0.1	0.1	0.1	0.3	0.1	0.1	0.1	< 0.1	0.1	0.1		

1: k value regulation

2: Value reported to Osaka Prefecture under Guidelines on NOx Reduction from Fixed Sources

3: Value under Osaka Municipal Ordinance on Sewerage Regulations

4: Osaka Prefectural Ordinance on Living Environment Protection

5: Kyoto Prefectural Ordinance on Environmental Protection

Third Conference of the Parties for Framework Convention on Climate Change (Global Warming Prevention Conference in Kyoto: COP3)

Approximately 10,000 people from fields such as government, NGOs, and media in 161 countries participated in the Third Session of the Conference of the Parties to the UNFCCC (COP3) held in Kyoto, December 1-11, 1997. Although

assertions from each country were strongly divided over the goals for greenhouse gas reduction, the conference ended by adopting the Kyoto Protocol to determine concrete numerical goals for advanced nations.

At the October 2001 COP7 in Marrakech, Morocco, the Marrakech Agreement was adopted as the legal agreement for implementing the Kyoto Protocol.

Main contents of the Kyoto Protocol

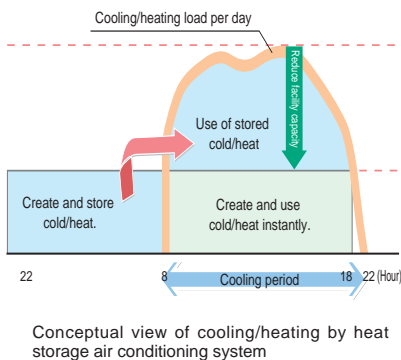
Target period	Five years between 2008 and 2012 (Fiscal Phase)	Kyoto Mechanism	Emission Trading	The difference between numerical goals and actual emission can be traded as an "emission right".
Target gas	CO ₂ , methane, nitrous oxide, HFC, PFC, SF ₆		Joint Implementation	If the greenhouse gas reduction project is performed among advanced nations, emission reductions from the project can be transferred and/or obtained.
Base year	1990 (1995 may also be selected for HFC, PFC, SF ₆)		Clean Development Mechanism (between advanced nations and developing nations)	The greenhouse gas reduction project will be performed between advanced nations and developing nations. Advanced nations can obtain their reduced amount through a certain authentication procedure. Developing nations also receive profit from the project activities.
Emission reduction target	At least 5% reduction from the base year by advanced nations as a whole EU 8%, USA 7%, Japan 6%, Russia 0%, Australia +8%, etc.			
Sinks	Resulting from land use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, were considered.			

Plan Menu

Contract by Load (L PAC)

This new type of plan offers five inexpensive electricity rates for customers who efficiently and continuously use electricity. Even greater savings can be earned by adding the following plans and improving load rate.

- Heat storage adjustment
- Air conditioning system
- Electric heating

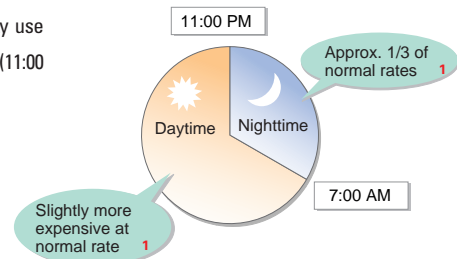


Commercial-use power WE/high voltage power WE

Special plan for customers who use a lot electricity on Saturdays, Sundays and holidays

Time-specific Electricity Contract

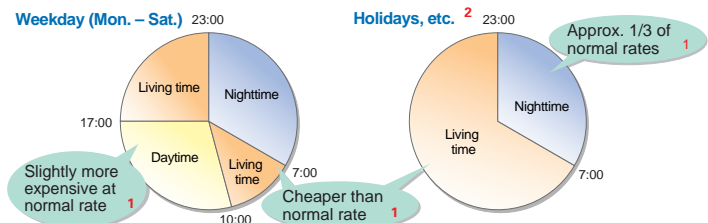
This plan divides, monitors and bills electricity use by daytime (7:00 AM - 11:00 PM) and nighttime (11:00 PM - 7:00 AM) use.



Happy Time

This plan uses heat storage equipment for hot water heaters and other home appliances, and divides electricity use into "living time", "daytime" and "nighttime". Families benefit from the savings of time-specific rates.

- 1: Compared to our specific light A unit price
- 2: Holidays refer to Sundays, holidays designated under "Law concerning National Holidays", January 2 and 3, April 30, May 1 and 2, December 30 and 31.



Happy Plan

The Happy Plan offers further discount for customers with an all-electric house.

Happy Plan discount ³
= Discount rate (Basic rate + Electricity rate) x 10%

(³: Max. ¥3,000 discount per month)

Working Principle and Performance of Heat Pumps

Air-conditioners in most homes are heat pumps. These air-conditioners come as a set of indoor and outdoor units as shown in the below figure. The heating and cooling of this kind of system will be used to explain how a heat pump works.

If you spray hairspray for a long time, the can gets cold. It cools as the liquid inside expands. The same thing happens in cooling and heating; as the refrigerant in the air-conditioner expands, it gets cold. It's this cooled refrigerant that cools room air.

By the way, to expand air-conditioner refrigerant, it must first be pressurized. However, if the refrigerant is compressed with a motorized pump, it inversely warms as it expands and does not cool as well.

So, in order to ensure the refrigerant is cold when expanded, it is cooled (heat is released) using the fan of the outdoor unit before it is expanded.

Most everyone has seen how warm the air blown from the outdoor unit is and probably been surprised by it. Well, it is warm because it is carrying the heat from the refrigerant. That air was blown over the refrigerant to cool it since it was warmed by compression and expansion.

What happens is that the refrigerant in the air-conditioner captures the heat in the room and releases it outdoors. The indoor unit cools and the outdoor unit releases the heat.

In other words, the system is pumping indoor heat out of the house, hence the name "heat pump".

Heating by air-conditioning is the just the opposite; it cools the outdoor air in winter. In short, it steals the heat in the outdoor air and releases it inside the home. The outdoor unit cools and the indoor unit releases the heat. Basically, the refrigerant flows in opposite directions when cooling.

So, how much energy is needed to pump a certain amount of heat?

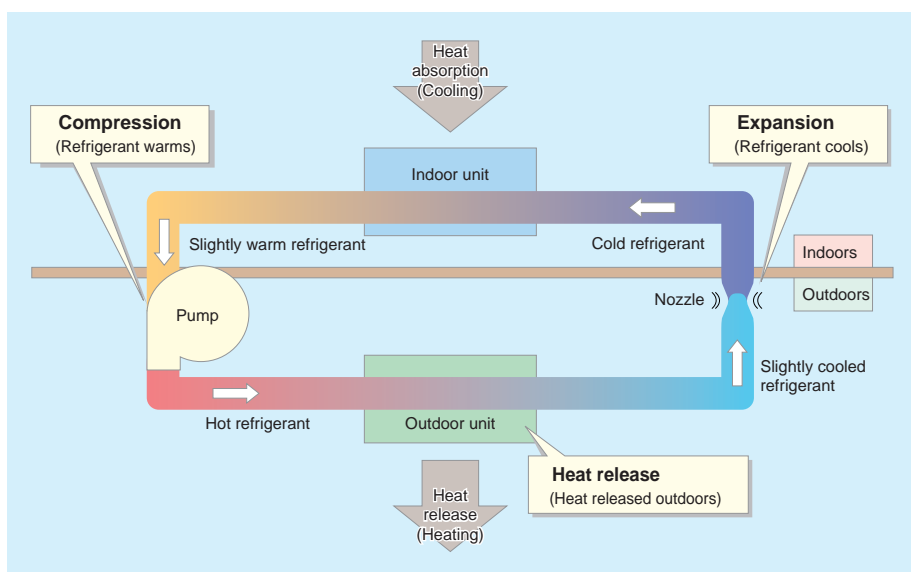
The amount of heat that is pumped with a certain amount of energy is called the "coefficient of performance (COP)". The heat is a multiple of the energy input, so, for example, a COP of 3 means that 3 times as much heat as the energy that was put into the system is pumped. In recent years, high performance heat pumps of a COP of 5 and higher have been marketed.

The efficiency of our most recent natural gas-fired thermal power station is about 50% or, in other words, about half of all energy we input comes back as electricity.

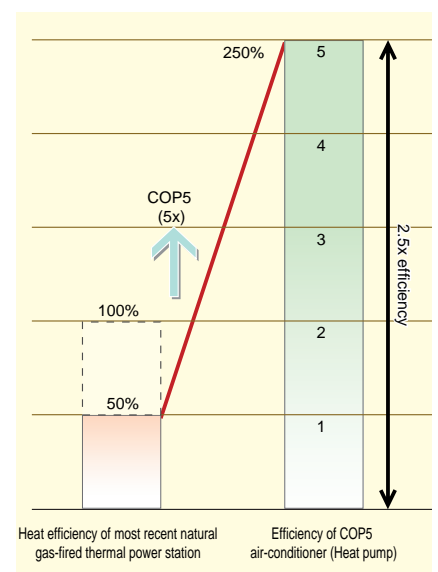
With the most recent heat pump of a COP of 5, we can pump 2.5 times the heat with the electricity we generate: $0.5 \times 5 = 2.5$.

What this means is that efficiency is 250% or we get about 2.5 units of heat for every unit of energy we use.

Working Principle of Heat Pump



Ratio of Useable Energy to Invested Energy





Activities for Providing Information on Electromagnetic Field

Newspaper, magazines field, TV and other media sources have reported the effects of electromagnetic radiation on the environment and health. The issue of whether in fact there is any kind of effect on our health or not has been drawing the interest of the media and the general public in Japan since the early part of the 1990s. This section of the report introduces the evaluations of experts from inside and outside Japan, as well as what Kansai Electric is doing about the situation.

Effects of Electromagnetic Field

An electromagnetic field is the combination of an electric field and a magnetic field, therefore it is generated wherever electricity flows. For this reason, an electromagnetic field is produced not only around power equipment like power lines but also the everyday home appliance such as the TV, vacuum cleaner and drier.

Reports on the effects of 50/60 Hz electromagnetic field generated by power equipment and home appliances have been released by the World Health Organization (WHO), the National Academy of Science, Japan’s Agency of Natural Resources and Energy, Japan’s Ministry of the Environment and others.

Based on a comprehensive evaluation of multiple papers written on the subject of electromagnetic field, these reports conclude that there is “no evident to suggest electromagnetic field in the living environment causes harm to human health”.

As for the possibility of electromagnetic field causing cancer, UK’s National Radiological Protection Board (NRPB) and the International Association for Cancer Registries (IACR) both reported in 2001 that there was no conclusive evidence that would indicate electromagnetic radiation causes cancer.

Activities at Kansai Electric

Until now, Kansai Electric has been collecting scientific knowledge on the effects of electromagnetic field on health, while also publishing pamphlets, producing videos and launching even a website on the subject in an effort to provide the general public with correct information.

With the objective of gathering scientifically reliable data, Kansai Electric jointly researched the topic with other power companies from 1996 to 2000. We continued research on our own from 1997 to 2001. These studies failed to did not produce data that would suggest harmful effects

from electromagnetic radiation, and Kansai Electric announced these results to academic societies in Japan.

Based on past reports from experts, Kansai Electric has decided, for now, that “electromagnetic radiation from power equipment does not adversely effect human health”, but we will continue to study the issue and provide information.

Reports on Electromagnetic Field from Expert Organizations (1987 - 2001)

Organization	Title of report	Summary
World Health Organization (WHO)	Environmental Health Criteria 69 (1987)	No harmful biological effects were detected under electromagnetic field of 50,000 milli-Gauss, nor any biological effects were detected under 5,000 milli-Gauss.
Agency of Natural Resources and Energy	Investigative Report into the Effects of Electromagnetic Radiation (1993)	Presently, no evidence has been found of commercial frequency electromagnetic field in the living environment having an effect on human health.
Ministry of Environment (formerly Environment Agency)	Investigative Research into the Health Effects of Electromagnetic Radiation (1995)	Nothing new that would correct the information reported by WHO has been reported.
The National Academy of Science	Effects of Electromagnetic Radiation in the Living Environment on Health (1996)	Current important information does not indicate that electromagnetic field harms human health. In particular, there is no decisive or consistent evidence that would indicate cancer, harmful effects on nerves or behavior, or any sort of effect on reproduction and growth from electromagnetic field in the living environment.
National Radiological Protection Board (NRPB)	Extremely Low Frequency Electromagnetic Field and the Risk Cancer (2001)	In laboratory tests, sufficient evidence that would indicate electromagnetic field causes cancer was not obtained, while epidemiological research suggested as well that does not cause cancer in general. There is some epidemiological evidence suggesting a relationship between high level electromagnetic field and infantile leukemia, but the evidence is not strong enough to justify conclusions that electromagnetic field causes infantile leukemia.

Publication of the Site Report

Alongside the publication of this Global Environmental Action Report 2002, Kansai Electric is releasing for the first time the Site Report from our Himeji No. 2 Power Station, to report in detail and subsequently gain a greater understanding of the environmental protection activities of our business sites amongst residents in the local communities where we operate. Here following is an overview of that report.

Environmental Report from Himeji No. 2 Power Station (Beetle Power Station)

The Himeji No. 2 Power Station is the largest thermal power station in Kansai Electric, with 6 units producing 2,550 MW of power and a 750,000 m² site including the Himeji LNG Management Office. It is known amongst the local population as the "Beetle" power station because atlas beetles are raised in a beautiful forest that was created on the site through "ecological planting" and there are opportunities for people to come see them.



Children looking at beetles

The power station has been actively involved with local environmental protection from some time and they are aggressively promoting activities to prevent global warming and build a recycle-based society. They also acquired ISO14001 certification in March 2001 and their entire workforce is making a concerted effort to improve environmental activities.

More specifically, the important issues and activities are as follows.

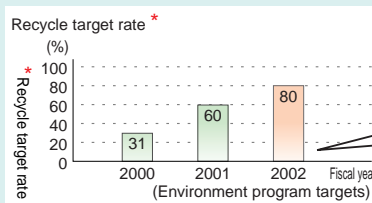
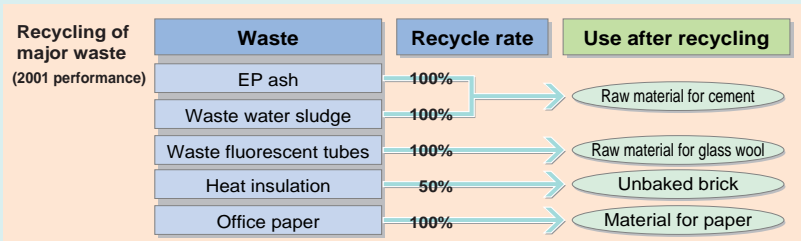
1 Reduction of CO₂ emissions (Promotion of energy conservation)

Boiler fuel consumption
On-site power consumption

2 Challenge to zero emission

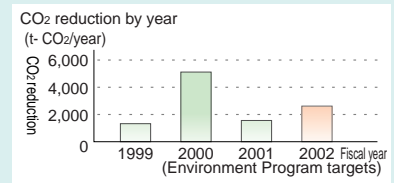
Promotion of 3 R's (reduce, reuse and recycle) initiative

Challenge to zero emission



Himeji No. 2 Power Station

Reduction of CO₂ emissions (Promotion of energy conservation)



Specific activities for attaining 2002 targets

Example activity	CO ₂ reduction
Reduce fuel consumption by reducing heating vapor in fuel oil tanks	1,053 t-CO ₂ /year
Reduce fuel consumption by reducing power loss with newly configured generator stator coil	310 t-CO ₂ /year

Specific activities for attaining 2002 targets

In addition to continuing with past efforts, boost shellfishery, raw garbage, and waste plastic recycling to 100% (target).

*Recycle target rate = Number of recycled waste items ÷ All items (35 items)

Working to Protect the Environment in the 21st Century

We have welcomed the start of the 21st century, dubbed the "century of the environment". To build a sustainable recycle-based society, mankind must find ways to reduce environmental load to a greater extent than what has been done so far.

At the Himeji No. 2 Power Station, we have an environment management system and, from within our business activities, we are trying to reduce CO₂ emissions by promoting energy conservation and aggressively promoting the 3R's for zero emission. We will continue with our environmental protection efforts to win the trust and support of local residents.

Yoshitsugu Hota
General Manager, Himeji No. 2 Power Station





History of Energy and Environmental Issues

	Kansai Electric	Japan	World
1950s	1951 Kansai Electric Power co., Inc. established.		
1960s	1962 Direct burning of crude oil begun. 1963 R&D on flue gas desulfurization begun.	1962 Law Concerning Flue Gas Control enacted. 1967 Anti-Pollution Basic Measures Law enacted. 1968 Air Pollution Control Law enacted.	
1970s	1971 Public Pollution Investigation Department established. 1972 Exhaust gas recirculation and two-stage combustion methods introduced. Use of naphtha begun. 1973 Public Pollution Investigation Department reorganized as Environmental Affairs Department. Use of NGL and LNG begun. 1974 Practical use of flue gas desulfurization facility begun. R&D on flue gas denitrification facility begun. 1975 Environmental Month introduced as an annual event. 1977 General Office of Plant Siting & Environmental Considerations reorganized 1979 Low-NOx burners introduced.	1970 Water Pollution Control Law enacted. Law Concerning Waste Treatment and Cleanup enacted. 1971 Environment Agency established. 1974 Total pollutant load control for SOx introduced. 1977 Strengthening of Environmental Impact Reviews in Power Plant Siting determined by MITI's Ministerial Council. 1979 Law Concerning Efficient Use of Energy enacted.	1972 Limitation of Growth Report presented by the Club of Rome. United Nations Conference on the Human Environment held in Stockholm. 1973 First oil crisis. 1979 Second oil crisis. Accident at Three Mile Island Nuclear Power Plant in USA.
1980s	1980 Flue gas denitrification facility implemented. 1984 Deming Award for TQC activities received. 1988 New corporate management plan Vision for the Year 2030 released. 1989 "Development of Management toward 21st century" adopted	1981 Total pollutant load control for NOx introduced. 1984 Details on environmental impact assessment determined by the Cabinet. 1989 Ministerial Committee on Global Environmental Protection established.	1985 Vienna Convention for Protection of the Ozone Layer adopted. 1986 Accident at Chernobyl Nuclear Power Plant in former USSR. 1987 Montreal Protocol adopted. 1988 Intergovernmental Panel on Climate Change (IPCC) established.
1990s	1990 Global Environmental Project Promotion Conference established. Five Basic Principles of Action Plan for Global Environmental Technology Research Center opened. Research and development of flue gas carbon dioxide recovery system begun. 1991 Kansai Electric's Action Plan for Global Environmental Considerations adopted.	1990 Action Program to Arrest Global Warming adopted. Global Environmental Forum Kansai established. 1991 Global Environment Charter adopted by Keidanren (the Federation of Economic Organizations). Law Concerning Promotion of Reprocessed Resource Use enacted. Law Concerning Waste Treatment and Cleanup revised. Act Charter adopted by Global Environment Forum Kansai. 1992 Law on Protection of Endangered Flora and Fauna enacted.	1990 Second World Climate Conference held (IPCC's interim assessment report presented). 1991 Intergovernmental Negotiating Committee of the Framework Convention on Climate Change begun. 1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro.

	Kansai Electric	Japan	World
1990s	<p>1993 “Action Plan for Innovative Corporation” adopted. Kansai Electric’s Mid-Term Action Plan for Global Environmental Considerations adopted.</p>	<p>1993 Temporary Law Concerning the Promotion of Business Activities in Regard to Economizing the Use of Energy and the Utilization of Recycled Resources adopted. Basic Environmental Law adopted.</p>	<p>1994 Framework Convention on Climate Change (FCCC) effected.</p> <p>1995 First Conference of Parties (COP1) to the FCCC. IPCC Second Assessment Report presented.</p> <p>1996 Second Conference of Parties (COP2) to the FCCC. ISO Environment Management System and Environment Auditing established.</p> <p>1997 UN General Assembly Special Session on Environment. Third Conference of the Parties for Framework Convention on Climate Change (Global Warming Prevention Conference in Kyoto: COP3).</p> <p>1998 Fourth Conference of the Parties for Framework Convention on Climate Change (COP4).</p> <p>1999 Fifth Conference of the Parties for Framework Convention on Climate Change in Bonn (COP5).</p>
	<p>1995 New ERA strategy (Global Warming Prevention Measures) formulated.</p>	<p>1994 Global Environment Forum-Kansai reorganized. Action plans for each country presented, based on Framework Convention on Climate Change. Basic Environment Plan formulated.</p> <p>1995 Law on the Classified Collection of Container and Packaging Waste, and the Promotion of Recycling adopted. AIJ Japan Program launched.</p>	
	<p>1996 “New Mid-Term Management Plan” adopted Power Plant Sites/ Global Environmental Promotion Conference established. (Global Environmental Project Promotion Conference abolished.)</p>	<p>1996 JIS Environment Management System and Environment Auditing established. Environmental Action Program of Electricity Utilities Industry formulated.</p> <p>1997 Environmental Impact Assessment Law enacted. Federation of Economic Organization’s Environmental Autonomy Action Plan formulated.</p>	
	<p>1998 “Notice of Environmental Management” established</p>	<p>1997 Electric Utilities Industry Law amended.</p> <p>1998 Law Concerning the Rational Use of Energy amended (enacted April 1999). Outline for Promotion of Efforts to Prevent Global Warming decided. Law Concerning Promotion of Measures to Cope with Global Warming formulated (enacted April 1999).</p> <p>1999 Basic Policies Relating to Global Warming determined by Cabinet. Law Concerning Special Measures Against Dioxins enacted. Japan’s PRTR Law enacted. Accident at JCO uranium processing plant.</p>	
2000s	<p>2000 Kansai Electric’s Action Plan for Global Environmental Considerations revised. Eco Action 2000 adopted. Nuclear Power and Environmental Committee established. (Power Plant Sites/Global Environmental Promotion Conference abolished.) ISO14001 certification acquired at Miyazu Energy Research Center and Himeji No. 1 power station. Environment Department reorganized. Environmental auditing introduced.</p>	<p>2000 Metabolic Society Creation Promotion Law enacted. Cabinet decision on Basic Environment Plan Long-term plan regarding research into nuclear power and development and its use (New Long-Term Plan) enacted.</p> <p>2001 Ministry of Environment launched. Special Measures Law on the Promotion of Proper Treatment of PCB enacted.</p> <p>2002 Prospectus on the Promotion of efforts to prevent Global Warming revised. Soil Contamination Law enacted. Law Concerning Promotion of Measures to Cope with Global Warming (Global Warming Action Law) enacted. Kyoto Protocol signed. Special Measures for Use of New Energy Sources in the Electric Power Industry (RPS Law) enacted. Law Concerning the Rational Use of Energy amended. Law for the Recovery and Destruction of CFC from Special Products (CFC Recovery Law) enacted.</p>	<p>2000 Sixth Conference of the Parties for Framework Convention on Climate Change in Hague (COP6).</p> <p>2001 Reconvening of the Sixth Conference of the Parties for Framework Convention on Climate Change. IPCC 3rd assessment report presented. Sixth Conference of the Parties (COP6) to the FCCC in Bonn. Seventh Conference of the Parties (COP7) to the FCCC in Marrakech. World Summit on Sustainable Development in Johannesburg.</p> <p>2002 World Summit on Sustainable Development in Johannesburg.</p>

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Takashi Gunjima
Professor of Doshisha University

Coaxial Policies for Business and Environment Make the Best Practice

This is the tenth year since the 1992 UN Conference on Environment and Development (Earth Summit) in Brazil. That Earth Summit adopted the Rio Protocol, Agenda 21 and a number of conventions and declarations. One was the Framework Convention on Climate Change (FCCC). After that, Conferences of the Parties to the FCCC were held to discuss schemes for taking action in 2001 and beyond. The general framework was decided in the Kyoto Protocol of COP3 in 1997 and an agreement was reached at COP7 in Marrakech, Morocco in 2001. Following this chain of events, Japan signed the Kyoto Protocol and announced a prospectus of domestic undertakings on June 4 this year.

A decade having passed from the Earth Summit, the World Summit on Sustainable Development (Rio +10 Conference) was held in Johannesburg, South Africa, to assess past progress and promote further action against global environmental problems. The 21st century has been dubbed the “century of the environment” and quite imaginably there will be frequent international conferences on the environment, but the effort is now needed to systematically build the mechanisms for turning awareness into action and take action to steadfastly resolve environmental problems. Needless to say, today’s global environmental problems are tied to activity of all mankind and it is necessary that not only the producers of economic activity but also the users take action. Since the reduction of CO₂ can bring about greater affluence for all, the entire nation must get involved.

Since the first edition in 1993, Kansai Electric has published this Global Environmental Action Report every year, making it the tenth edition this year. In publishing it, of obvious concern is to be accurate and to present the information in an easy to understand format, but also it is very important to provide as much information as possible. In this report, Kansai Electric has upgraded its overall reporting by continuing with the environmental auditing of last year, disclosing negative information as well as upgrading environmental information of the Kansai Electric Group and its social commitments as a company, providing supporting data and covering our serial release of information over the Internet. Environmental action demands accountability, however communication on environmental issues in Japan tends to go one way as businesses disclose only information that works to their advantage and use environmental reports as a PR tool. As the word suggests, accountability is an “account”; an environmental report should disclose the balance of pluses and minuses for readers to assess. For that assessment, it is important that an environmental report function as a means of interactive communication.

This Action Report is constructively used as a part of environmental education and in seminars within and outside the company. In addition to its most recent undertakings, our technological innovations with energy conservation and new energy resources have been explained in detail and reported as an “encyclopedia” of environmental information. Moreover, illustrations and photographs help to promote an understanding of an industry that requires expert and often difficult-to-comprehend knowledge to know. For anyone interested in real technology and facts, this is the report to read. Nevertheless, for this report to be easy to understand, it would have to be written for each individual. Especially if Kansai Electric was to report this information to children, it would need an entirely different report.

Today, power companies face a very difficult situation. While they must balance liberalization (competition) in the name of “cheaper power” with “stable supply” on the one hand, they must find a harmony between “energy and the environment” on the other. It is likely, as we go forward, that the “councils” of businesspeople will approve of coaxial policies for business and environment as the best practice for challenging these trilemmas.

Please give us your thoughts and impressions

FAX: 81-6-6441-3549

To: Environmental Management Group, Environmental Considerations Department, Kansai Electric Power Co., Inc.

Please check the items that most closely match your opinions or impressions.

1 I think this report is:

Easy to understand Average Difficult to understand

Reason: []

2 What do you think about Kansai Electric's approach to environmental problems?

Very good Fairly good Not very good Not good

Reason: []

3 Was there anything in this report that you want to know more about or are interested in?

(Check all applicable boxes.)

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4 Comment on the following. List any wishes you may have. (Give a page number if any.)

Was there anything that particularly impressed you or which lacked sufficient information?

[]

Was there any information you felt should be reported again in the future, should be emphasized more or developed as PR?

[]

What should Kansai Electric do for the environment in the future?

[]

5 From what perspective are you reading this report?

A customer of the company Investor/shareholder A party doing business with the company Government employee
Affiliated with an environment-related NPO Mass media-related person Corporate environment-related person Student
Other (Explain:)

6 From where did you learn about this report?

Newspaper/magazine The company's website Heard from one of the company's employees
Heard from a friend of acquaintance Other (Explain:)

Thank you very much for your cooperation. If you do not mind, please also fill in the following information.

Name: Gender: Male Female Age:

Address:

Occupation (Company name or organization):

Cut along dotted line

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Kyoto Kami Office	☎ 075-491-1141	Himeji Office	☎ 0792-92-3131		

About This Report

Kansai Electric publishes this Global Environmental Action Report to let our customers the many stakeholders who support our company know what our policy and targets are for dealing with environmental problems, and to report on the progress we have made with related activities.

In publishing this 2002 edition of the report, we reflected heavily on the valuable comments many people offered us in regards to the previous report and worked hard over the year to make additions and improvements that would foment a better understanding of our position on the environment and the action we are taking for it. In the future as well, we will continue to improve our environmental protection activities as well as this report with the hope of gaining even greater approval of our efforts. We welcome your comments and any requests you might have in regards to this year's report. You will find a questionnaire at the end of this publication.

Major Additions and Improvements to the 2001 Report

The 2001 edition of the report drew mainly on the 2000 Environmental Report Guidelines of the Ministry of Environment, but to gain a better understanding of our environmental policy and the specific activities we are involved with, we categorized and edited our activities aimed at reducing the load we place on the environment into "(our) Response to Global Environmental Problems", "(our) Response to Local Environmental Problems" and "Promoting Activities for a Recycling-Based Society".

To help readers better understand individual activities, we have tried to be more specific in our descriptions and added as best possible concrete examples such as "Topics", photos and charts, and even launched a website where detailed information can be viewed.

We have tried to more constructive this time by disclosing more information and creating several new sections such as "Preventing Nuclear Accidents" (pg. 36), "Protecting the Natural Environment" (pg. 63), "2010 Group Vision" (pg. 88), "Identifying Environmental Load of Fossil Fuel-fired Plants" (pg. 92), and "Providing Information on Electromagnetic Fields" (pg. 96).

Scope of 2002 Report

Period Covered: This report covers fiscal 2001 (April 1, 2001 - March 31, 2002), but anywhere we mention continuing activities or targets from the past, future plans or the latest information prior to publication of the report, the time period is clearly stated.

Business Scope: This report is on Kansai Electric Power Co., Inc., but it also contains information on the Kansai Electric Power Group.

Applicable Fields: In addition to environmental protection, the report also takes a look at society with information concerning the local community and occupational safety and hygiene.

Scope of Environmental Impact: This report focuses on the environmental load caused by the production, distribution and sale of electricity, and related service activities.

History of Publication and Next Edition

Kansai Electric has published a Global Environmental Action Report every year since 1993, therefore this year is our 10th edition. We plan to release a 2003 edition in summer of 2003.



Published in Sept. 2000

Published in Sept. 2001

The below tools are also available for your pleasure.

(You can view the below information at our website at



<http://www.kepco.co.jp/index.htm>)

Annual Report

Fact Book

Company Profile

Handing the beautiful earth
down to future generations



Taking our resources into consideration, the following ink and paper was used to publish this report.



古紙配合率100%再生紙を使用



Using 100% recycled paper not only protects natural forests but is also significant because it shows the effective utilization of resources and reduces waste. The soy ink used in printing this publication contains soybean oil, which makes it more readily biodegradable than conventional ink and lessens the amount of petroleum solvent in the ink. Furthermore, a dry printing technique has been used as it does not require steam that can include alkaline developer or isopropyl alcohol.

This report is available on the Internet. (http://www.kepco.co.jp/e/action_e/ac_e.htm)

Please send any inquiry regarding this report to Environmental Management Group, Environmental Considerations Department.

THE KANSAI ELECTRIC POWER CO., INC.

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The logo featured above is the symbol for Kansai Electric's "Environment Month" (June). It evokes an image of the earth's beauty and calls upon us to preserve it.