



2004

Environmental and
Social Activities Report 2004



 **POWER**
EPDC

Corporate Data

Category of Business Electric Utility
 Date of Incorporation September 16, 1952
 Paid in Capital 152,400 millions of yen

J-POWER has **75** power generation facilities (including those of its subsidiaries) throughout Japan contributing to stable electric power supplies.

Domestic Electric Power Facilities

(As of March 31, 2004)

Power Generation Facilities (Certified maximum output)

Hydroelectric Power Stations

Number: 59 sites 8,550,500 kW

Thermal and Geothermal Power Stations

Number: 8 sites 7,824,500 kW

Total Number: 67 sites 16,375,000 kW

Transmission Lines (Total length) 2,404.4 km

Extra-high-voltage power transmission lines 1,970.2 km

DC power transmission lines 267.2 km

Substations (Certified output)

Number: 3 sites 4,292,000 kVA

Frequency Converter Station (Certified output)

Number: 1 site 300,000 kW

AC/DC Converter Station (Certified output)

Number: 4 sites 2,000,000 kW

Wireless Communication Facilities (Circuit length) 1,418,173 ch-km

Subsidiaries' Power Generation Facilities

Wind Power Station: Number 4 78,050 kW

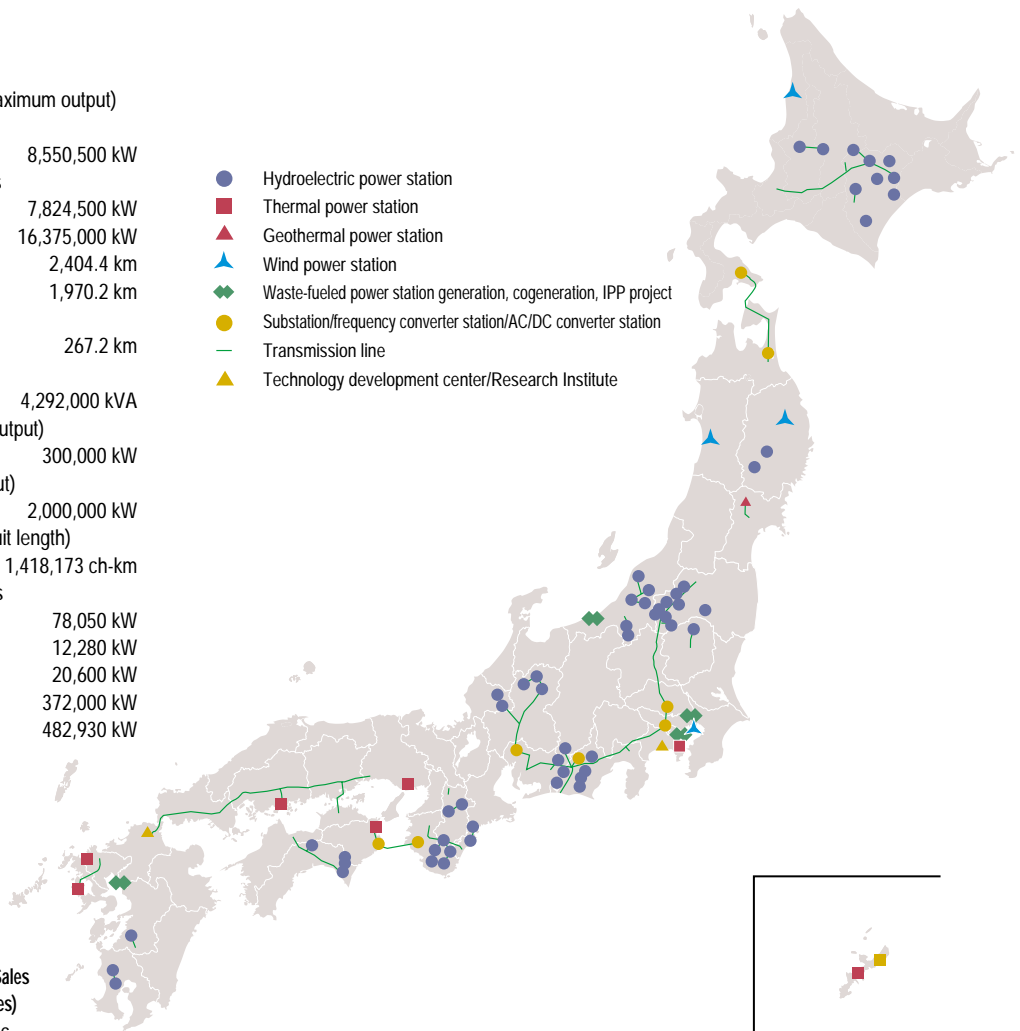
Cogeneration: Number 1 12,280 kW

Waste-fueled Power Station: Number 1 20,600 kW

IPP Generating Facilities: Number 2 372,000 kW

Total: Number 8 482,930 kW

- Hydroelectric power station
- Thermal power station
- ▲ Geothermal power station
- ▲ Wind power station
- ◆ Waste-fueled power station generation, cogeneration, IPP project
- Substation/frequency converter station/AC/DC converter station
- Transmission line
- ▲ Technology development center/Research Institute



Electric energy output (Year ending on March 31, 2003. Except subsidiaries)

Hydroelectric 12,103 GWh

Coal-fired thermal 51,133 GWh

Geothermal 105 GWh

Total 63,341 GWh

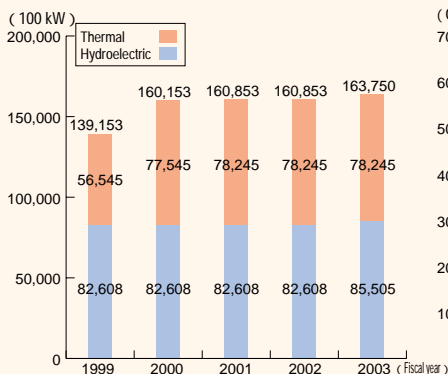
Electric Power Sales/Income from Electric Power Sales (Year ending on March 31, 2003. Except subsidiaries)

Electric Power Sales Income from Electric

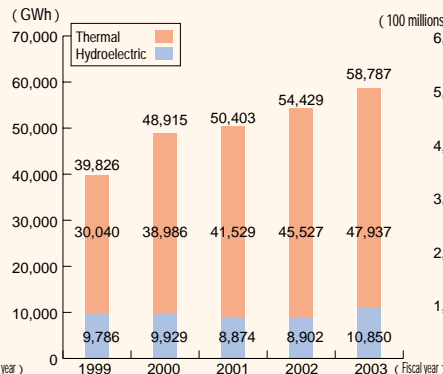
58,787 Millions kWh

Power Sales 453,478 Millions of yen

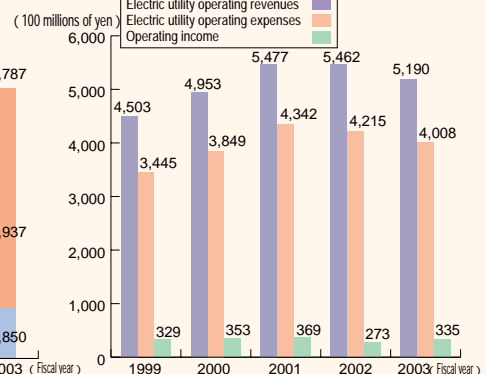
Power Generation Capacity



Electric Power Sales



Operating Revenues/Operating Expenses/Operating Income



Subsidiaries' figures are not included in the chart.

Editorial Policies

Our company has been publishing similar Environmental and Social Activities Report on an annual basis. The purpose is to furnish information on our overall efforts in promoting environmental issues since 1998 and this is our seventh report and we'll continue to provide such environmental information and issue the next report in August 2004.

While preparing this report, we referred to the viewpoints expressed in environmental reports of other companies and the ideas stipulated in the "Environmental Report Guidelines (fiscal 2003)" released by the Ministry of Environment.

We have also included the topics of "Overall Management", "Society" and "Environment" in the report, in order to better address the subject of sustainability.

This report is focused on our domestic activities for the 2003 fiscal year. (The results of some activities carried out after April 2004 are also included in the report.)

Our group companies mentioned in this report, in principle, are the same as the range of consolidated subsidiaries.

Additional numerical data are based on the results of our parent company, as of the end of March 2004. When the data include those of our group companies, the inclusion is noted in the relevant sections.

The reliability of the numerical data on corporate business and environmental activities (INPUT, business activities and OUTPUT), given on pp.11-12, and that of our 2003 performance compared to our quantitative targets (p.19) were reviewed by an independent organization – the Shin Nihon Environmental Management and Quality Research Institute Co., Ltd. The results are given on p.67.

A digest version of the fiscal year's report has been issued.

The report will also appear under "Environmental and Social Activities" on our website (due for release in September 2004).

- Terminology and index are included in pp.79-82.

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I. Environmental Management

II. Environmental Activities Status

Society

External Evaluations and Opinions

Independent Review

Materials

Message from the President

After the revision of the Electric Utilities Industry Law in June 2003, future electric utilities are expected to become increasingly competitive due to the steady expansion of retail deregulation and the establishment of Japan Electric Power Exchange.

Privatization of J-POWER started after the October 2003 abolition of the Electric Power Development Promotion Law under which J-POWER had been established. The J-POWER Privatization Fund Co., Ltd was created in order to acquire, manage and sell J-POWER's stocks as part of the move towards its full privatization. A substantial increase in capital stock has already been realized.

Since 2001, we have therefore been promoting the Third Phase of the Company Reform Plan (5-years plan), in order to continue to develop as a company that can win a place in the competitive national and international markets, through our management policies of "bolstering our competitiveness in the wholesale electric power business" and "expanding international business and new projects." To help accomplish this plan, the J-POWER Group was reconstructed in April 2004, in order to strengthen our group management.

J-POWER has been involved in environmental management since our "Environmental Policy" was established in June 2000. However, based on our corporate philosophy aiming at the coexistence of energy and environment and in order to further contribute to the development of a sustainable society we have decided to define our attitude toward "Environmental Management" to allow for both environmental conservation and enhanced economic value, and to disseminate this throughout our group of companies.

Based on this decision, in April 2004 we defined the "J-POWER Group's Environmental Management Vision" concerning our group's basic stance on global and regional environmental issues, approaches to transparency and reliability - taking over from J-POWER's previous Environmental Policy. As an energy supplier producing significant CO2 emissions, we have particularly emphasized our determination to focus on global environmental issues.

In line with this policy, we are currently launching a detailed review of long and mid-term challenges, how to define targets and how best to accomplish them, in order to develop action programs for J-POWER and the J-POWER Group's consolidated companies.

J-POWER will make all out efforts to promote ongoing environmental management after its privatization, focusing on "energy" and "the environment."

August, 2004



President

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Corporate Philosophy

We aim to ensure constant supplies of energy to contribute to the sustainable development of Japan and the rest of the world.

Sincerity and pride underlie all our corporate activities.

We build community trust by harmonizing our operations with the environment.

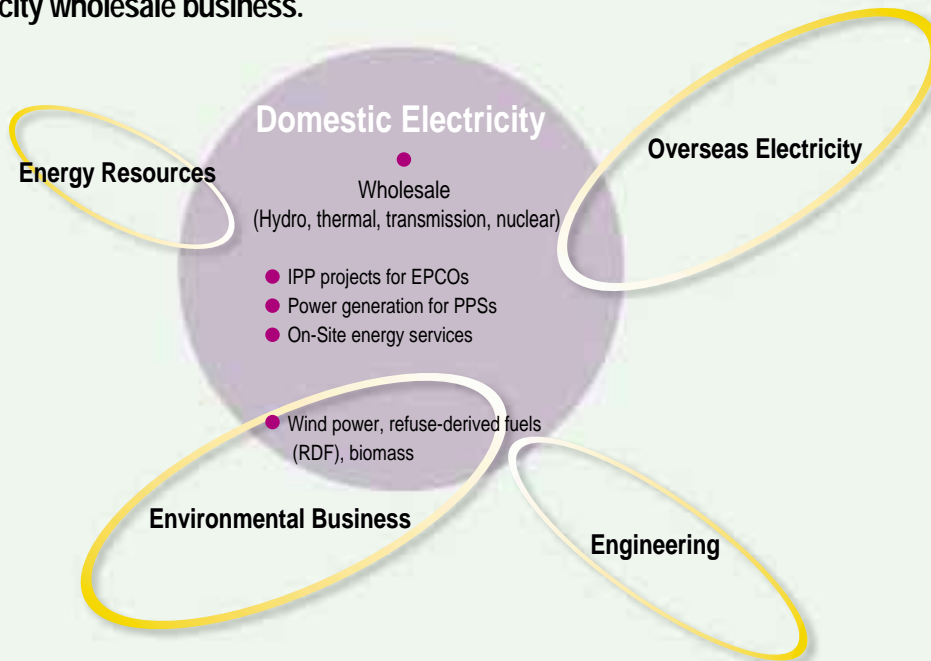
Profits are a growth source, and we share the benefits with society.

We continuously refine our knowledge and technologies to be a leader in these areas.

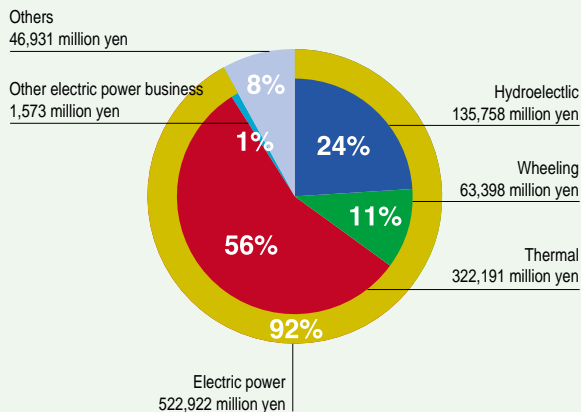
We meet the challenges of tomorrow by harnessing our unique skills and enthusiasm.

J-POWER Group's Business Fields

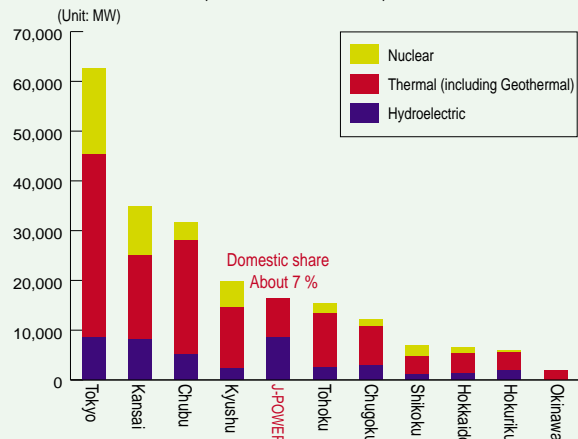
We are expanding our business fields using the technologies that we have accumulated through the electricity wholesale business.



Composition of Operating Revenues
(For the year ended March 31, 2004)



Power Generation Capacity of J-Power and Japan's 10 EPCO's
(As of the end of March 2004)



Generating Utilities and the Environment

Our company is developing generating utilities for production and supply of energy essential for living and economic activities as our main business. We consider environmental aspects of our core business facilities (coal-fired and hydroelectric power stations) and other facilities under development (nuclear power, wind and biomass power) as described below;

Coal-fired Power Generation and the Environment

Our Coal-fired Power Generation

We are a leading company for coal-fired power generation in Japan, owning a total capacity of 7,810,000 kW (from 7 power stations throughout the country). This is equivalent to about 22% of the total coal-fired capacity of all Japanese electric utilities. Coal is the fossil fuel that has outstanding supply stability and cost-efficiency but also generates sulfur oxides, nitrogen oxides and dust during its combustion.

Global viewpoint

We consider it essential to address international concerns such as global warming and coal use on a global scale, using the Kyoto mechanisms. Coal is the most abundant fossil fuel and has the longest history of use. Globally, coal accounts for about a quarter of all primary energy and produces about 40% of all electricity. In long-term, coal consumption is expected to increase. Particularly in developing countries that are not committed to the Kyoto Protocol, the consumption of coal is expanding significantly. This presents a great challenge for measures aimed at reducing global warming, as do the many less efficient power generating facilities still used in Europe and the United States.

In order to minimize the environmental impacts from these emissions, we consider the most effective approach to convert coal energy to clean electricity is to generate power in a power station with total flue gas treatment in place. Our company has power generation facilities with the world highest efficiency and has also introduced the state-of-the-art technologies for dust removal, desulfurization and denitrification.



Tachibana Wan Thermal Power Station (Tokushima Prefecture)

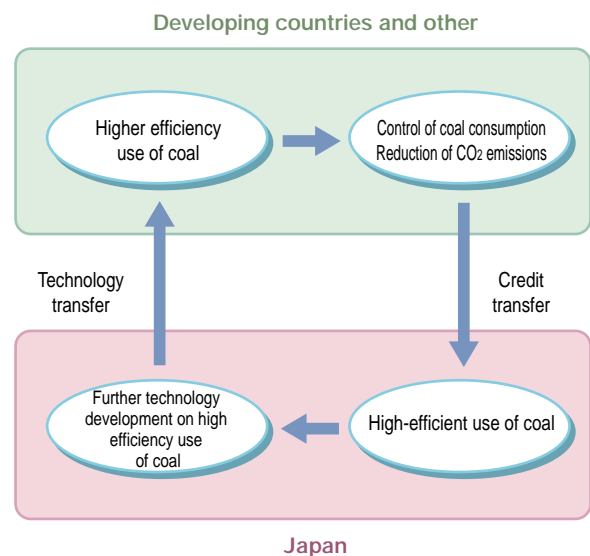
Sustainable use of coal

Japan has high-efficient coal thermal generating technologies superior in environmental capability.

We consider that transfer of these technologies to these countries will provide a key solution for global warming. If Japan implements this transfer of the technologies in accordance with the Kyoto mechanisms, it will be able to obtain CO₂ emission credits through the Joint Implementation (JI) and the Clean Development Mechanism (CDM) and also continue to efficiently use coal within the country with the obtained credits. At the same time, this will lead to the development of coal use technologies for higher efficiency. Japan can not only use the higher efficient technologies but can also transfer them to foreign countries through the Kyoto mechanisms.

Our company believes that long-term and continuing implementation of these efforts are the role of Japan and its organizations, such as J-POWER owning to world's preminent coal use technologies and that the implementation offers a paradigm for a method of sustainable coal utilization on which to ensure energy security in Japan and improve economics while to solve the warming issues globally.

Sustainable coal use cycle

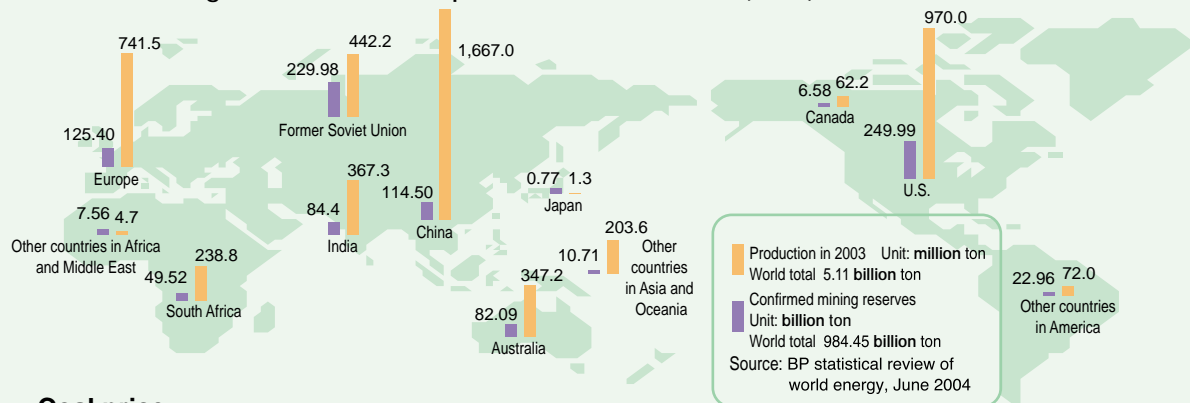


Coal supply stabilization

Coal mining reserves are considered to contain 192 years' of resources (984.45 billion t) which is extremely high, in comparison to 67 years (175.8 trillion m³) in natural gas and 41 years (1.1477 trillion barrel) in oil. In addition, coal is widely distributed in various countries such as U.S., Australia, Europe and China, and provides outstanding stable supply energy sources to our country that relies mostly on imported energy. In the meantime, about 63% of all oil in the world is centered in the Middle East and there may occur a great risk of hampered oil supply due to international disputes since Japan is heavily dependent on oil from the Middle East with 86% of its dependency rate.

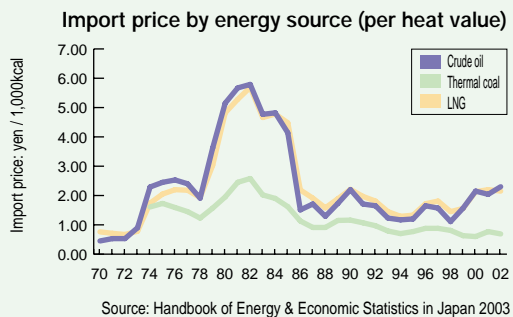


Confirmed mining reserves and coal production in the world (2003)



Coal price

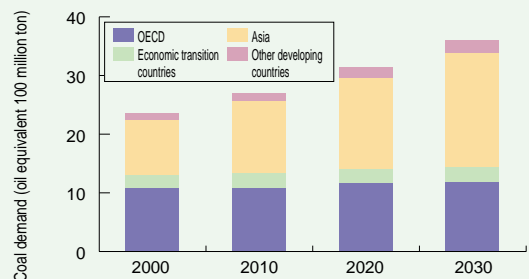
Observing an average price per heat value of imported energy over 30 years, it is found that the price of coal is cheaper and more stable than that of crude oil and LNG.



World's coal demand

The International Energy Agency (IEA) estimated that the world's coal demand was equivalent to 2.4 billion ton and accounted for 26% of all primary energy demand in 2000. In addition, the demand has been increasing at an annual rate of 1.4% and is expected to become equivalent to 3.6 billion ton in 2030. Observing regional consumption, coal consumption in Asia has doubled, and is expected to account for 54% of coal use in the world in 2030. In particular, China (2.2% per year) and India (2.4% per year) experience a remarkable growth in its consumption.

Projected world coal demand (reference scenario)



Coal demand for generating fuel accounted for 43% of all primary energy demand in 2000 and is expected to assume a share of about 41% also in 2030.

Hydroelectric Generation and the Environment

Features and current status of hydroelectric power generation

Hydroelectric generation, accounting for 10% of total power generation and for 20% of total power generation capacity in Japan, is a valuable domestic energy source taking advantage of rivers and geographic features, producing reliable renewable energy and, both qualitatively and quantitatively, having relatively little environmental impact and producing no CO₂ emissions. However, impacts on river environment (change of river ecosystem be associated with emergence of water reservoir and reduced water sections), treatment of earth and sand into water reservoir, water quality deterioration, etc have been noted



Okutadami Power Station (Fukushima and Niigata)

Future efforts

Our company recognizes that if hydroelectric power generation obtains higher reliability from society by taking measures for solving these problems, such as ensuring river maintenance flow and providing fishways and surface intake equipment, it can increasingly contribute to prevention of global warming and ensure supply of stable power, using its original strengths. We have accumulated know-how based on hydroelectric development of about 8,550,000 kW or more in about 59 small and large sites in the country (about 20% share of domestic hydroelectric generation and about 3% of all power sources) and international hydroelectric technological co-operations over 40 years. It will be actively involved in (engineering projects from survey planning to construction and operation) by applying (these knowledge and experiences) to small hydroelectric generation having little impact on the environment and by meeting needs of local authorities.

On the other hand, there are still many places in the world that are appropriate for hydroelectric generation and which can be developed further, economically. We wish to contribute to the further development of such hydropower stations through our consulting business.

J-Power's Typical Hydroelectric Power Stations

(Unit: MW)

	Name of site	Power Generating Capacity
General Hydraulic Power	Okutadami	560 (Domestic capacity No. 1)
	Tagokura	380 (Domestic capacity No. 2)
	Sakuma	350 (Domestic capacity No. 3)
	Tedorigawa No. 1	250 (Domestic capacity No. 6)
	Miboro	215 (Domestic capacity No. 7)
	Other (47 sites)	1825.5
	Total (7 sites)	3580.5
Pumped Storage Power	Shintoyone	1125
	Shimosato	1000
	Okukiyotsu	1000
	Okukiyotsu No. 2	600
	Other (3 sites)	1245
Total (7 sites)	4970	
Total of Overall Hydropower (59 sites)		8550.5

(Note) Not including test facilities of Pumped Storage Power (As of April 1st, 2004)

Nuclear Power Generation and the Environment

Nuclear power generation can play a key role in preventing global warming, since there are nearly zero CO₂ emissions from its generation of electricity.

We are planning the construction of a nuclear power plant (full MOX-ABWR: 1,383,000 kW) in Oma-machi, Aomori, aiming to use MOX fuel for the whole reactor core, as part of plutonium utilization program in light water reactors, based on the resolution passed by the Japan Atomic Energy Commission in August 1995.

The national authorities are currently evaluating the application for nuclear reactor approval of Oma Nuclear Power Station.



Wind Power Generation and the Environment

Wind power generation produces clean, renewable energy without CO₂ emissions and is a valuable domestic energy source for our resource-poor country.

Since the Tomamae Winvilla Wind Farm in Hokkaido (a pioneer of large-scale wind farms) started commercial operation in 2000, four new wind power sites with a total capacity of 78,050 kW (Nikaho Wind Farm in Akita, Tokyo Bayside Wind Power Plant in Tokyo and Green Power Kuzumaki Wind Farm in Iwate) have been developed. Four more wind power sites with a total capacity of 66,500 kW (at Setana in Hokkaido, Tahara in Aichi, Shikamachi in Nagasaki and Nishihara in Kumamoto) are now also under construction. We will actively promote further wind power initiatives.

In establishing a wind power site we first develop an eco-friendly plan and conduct an environmental impact assessment and landscape simulation before commencing construction.

Since wind power generation is characterized by large power variations, we are also promoting technological

developments aimed at leveling out such fluctuations, along with the provision of batteries at the Tomamae Winvilla Wind Farm as a company under a contract with NEDO.



Nikaho Kogen Wind Farm (Akita)

Biomass Power Generation and the Environment

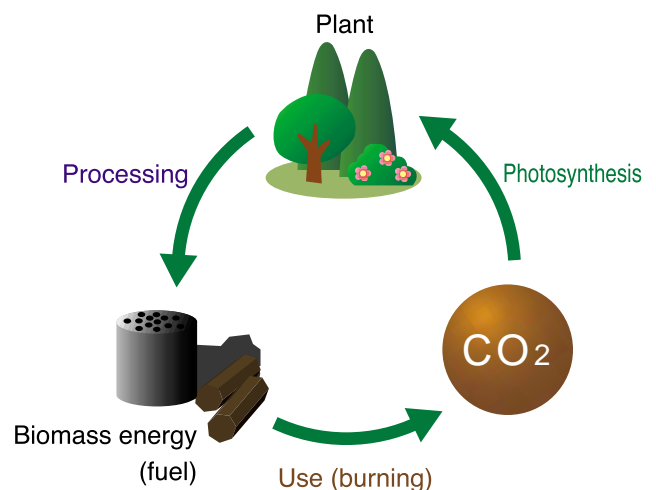
Biomass means those living organisms and their associated wastes, accumulated in the food chain by way of photosynthesis. Biomass is combustible due to the inclusion of carbon and hydrogen and remarkable as a new energy resource.

The carbon contained in biomass is initially fixed within growing plants through the process of photosynthesis. CO₂ produced by the burning of such carbon is not regarded as a contributor to the greenhouse effect due to the ongoing cycle of emission and fixation, as shown in the figure right.

Biomass resources are renewable and help the reduction of CO₂ emissions, so their utilization, dissemination and promotion are being reviewed. More widespread use of these resources are also expected to contribute to the formation of a recycling-based society.

We consider it most efficient and economical to burn large volumes of such material with coal in coal-fired power plants. We have already promoted the development of co-firing dry sewage sludge, or wood chip and with coal.

We are also working on the construction of biomass power plants, overseas, in order to promote the effective use of biomass energy as widely and positively as possible.





Environment Section

I . Environmental Management

1. J-POWER Group's Environmental Management Vision

Basic Policy

J-POWER Group will adhere to the following basic policy

Basic Stance

- As an energy supplier, we will contribute to the sustainable development of Japan and the rest of the world by harmonizing our operations with the environment and ensuring constant supplies of energy essential to human life and economic activity.

As an energy supplier, we will efficiently generate and continuously supply electric power essential to human life and economic activity by using limited resources such as coal in response to various needs in an effective manner. We will contribute to the sustainable development of Japan and the rest of the world by reducing environmental impacts associated with its business activities, by carrying out the reduction of environmental risks such as global warming and improving environmental efficiency (production per environmental impact) and by ensuring both environmental preservation and enhanced economic value.

Efforts to Global Environmental Issues

- In accordance with the "Principles of the United Nations Framework Convention on Climate Change,"* we will address global warming issues, considering cost effectiveness on a global scale. We will continue to reduce CO₂ emissions per electric power sales with a economically reasonable combination of maintenance and improvement of the efficiency of energy use, development of low CO₂ emission power sources, development/transfer/diffusion of new technologies and utilization of the Kyoto Mechanism. Furthermore, we will continue to work towards our ultimate goal of "Zero CO₂ emissions", through the recovery and fixation of CO₂.

Global warming is the most important issue to be tackled over the long-term, since human beings will be forced to use fossil fuels as key energy resources throughout this century. As measures against global warming are very expensive, it is desired to willingly adopt more cost-effective countermeasures and actions on a global scale and reduce larger amount of greenhouse gas emissions at lower cost, in order to realize the type of sustainable development that harmonize the environment with the economy, as specified in the United Nations Framework Convention on Climate Change on which the Kyoto Protocol is based.

We will continue to reduce CO₂ emissions per electric power sales with a economically reasonable combination and implementation of maintenance and improvement of the efficiency of energy use, development of low CO₂ emission power sources, development/transfer/diffusion of new technologies and utilization of the Kyoto Mechanism, taking account of global-scale cost effectiveness.

Furthermore, recognizing that it will be necessary within this century to recover and fix the CO₂ generated from the burning of fossil fuels in order to continuously supply energy to people throughout the world in a sustainable manner, we set our ultimate goal for technological development and demonstration at "Zero CO₂ Emissions".

* Article 3 (principle) 3, Framework Convention on Climate Change

"-lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost."



Masayoshi Kitamura
Chairperson,
Environmental Activities Promotion Board
Executive Managing Director

Briefing about the Basic Policy for Our Environmental Management Vision

J-POWER Group's Environmental Management Vision (above) is intended to explicitly show what we believe about our involvement in environmental management and to promote our corporate activities as an energy supplier. In developing this basic policy, we held a round-table discussion with experts in environmental management, including Ms. Sakita, and received constructive comments about our corporate activities from their independent perspectives.

This year, we shall develop action programs in line with this policy.

Efforts to Regional Environmental Issues

- We will take measures to reduce environmental impacts associated with our operations, make efforts for saving, recycling, and reuse of resources to limit the generation of waste, and foster good community relations.

Recognizing that safeguarding the people's environment and well-being is the basis of successful coexistence with local communities, both nationally and internationally, we will take measures to reduce the environmental impacts to air and water etc released from our own operations by the most up-to-date technologies and knowledge, limit and properly process all wastes generated by making constant efforts for saving, recycling, and reuse of limited resources and try to be trusted throughout the community by ensuring emergency preparedness for accidents and disasters.

Efforts to Transparency and Reliability

- We will ensure that all business activities comply with all laws and regulations, try to disclose a wide spectrum of environmental information and enhance communication with stakeholders.

We will make efforts to be trusted throughout the community by improving environmental management for all its business activities and ensuring our compliance with all laws and regulations, by increasing corporate transparency through disclosure of a wide range of environmental information, by enhancing communication with stakeholders and determining what business development and environmental activity is expected from them and by calling upon our whole group's skills and knowledge and continuously responding to stakeholder demands.

Action Program

- We will define specific mid and long-term challenges, targets and solutions in line with the above "basic policy" and make all efforts to accomplish them.

April 1, 2004

President

中塚喜彦

Comments on the Basic Policy for Our Environmental Management Vision

To constantly supply the energy required for human life and business activities is an important issue for society. I urge your company to ensure the supply of various kinds of energy, such as thermal, hydro, geothermal, wind and nuclear power, and to adhere to your basic policy in which global environmental problems are actively addressed.

In particular, you set "CO₂ Zero Emissions" as your ultimate target and present a plan for sustainable development in the form of "Environmental Efficiency", addressed from the viewpoints of both environmental preservation and economic value, which I believe leads to easily-comprehensible information disclosure. Greater importance is being placed on corporate social responsibility. With this in mind, I urge you to always disclose corporate information and environmental risks to a wide spectrum of society (including the general public, local residents near your sites and your employees) and to promote reliable corporate management that places importance on mutual communication.

It is also important that society should properly understand the characteristics of the various kinds of power resources, in order to develop a foundation for trust. I expect you to be actively involved in "energy education" in the future.



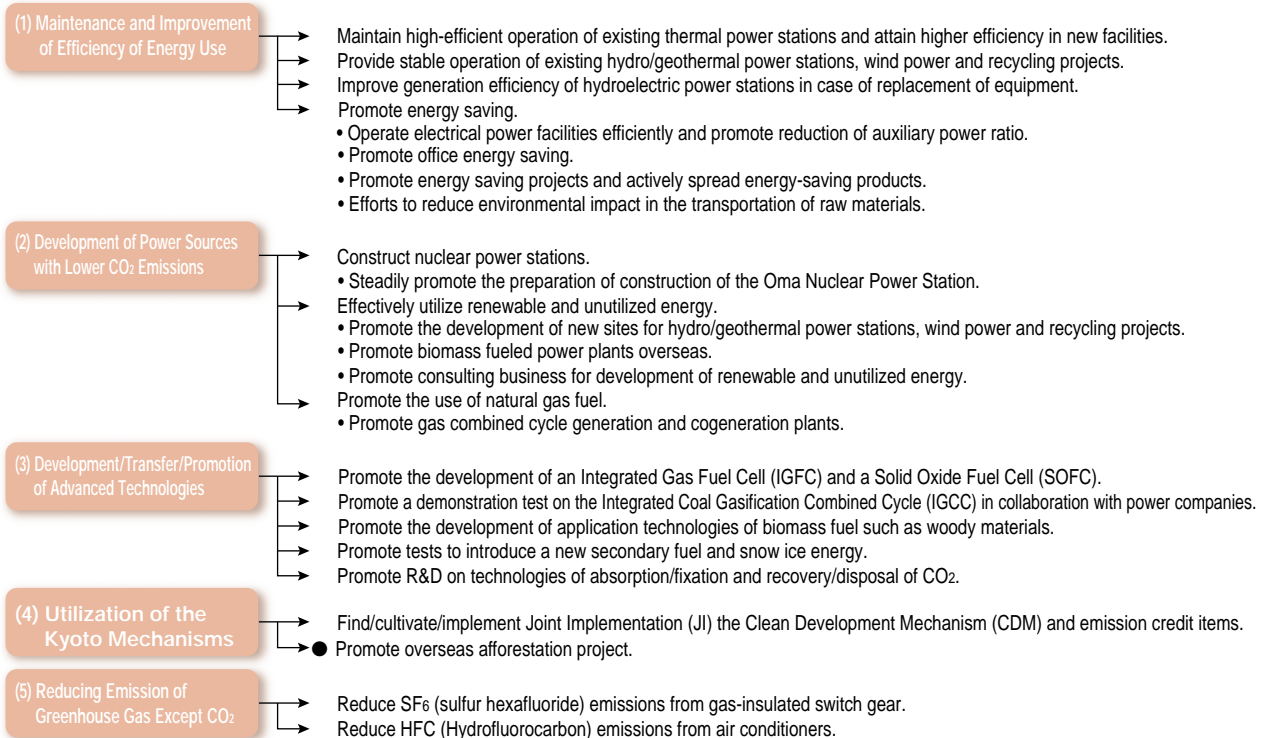
Yuko Sakita
Journalist and Environmental Counselor

2. Fiscal 2004 Environmental Action Guidelines

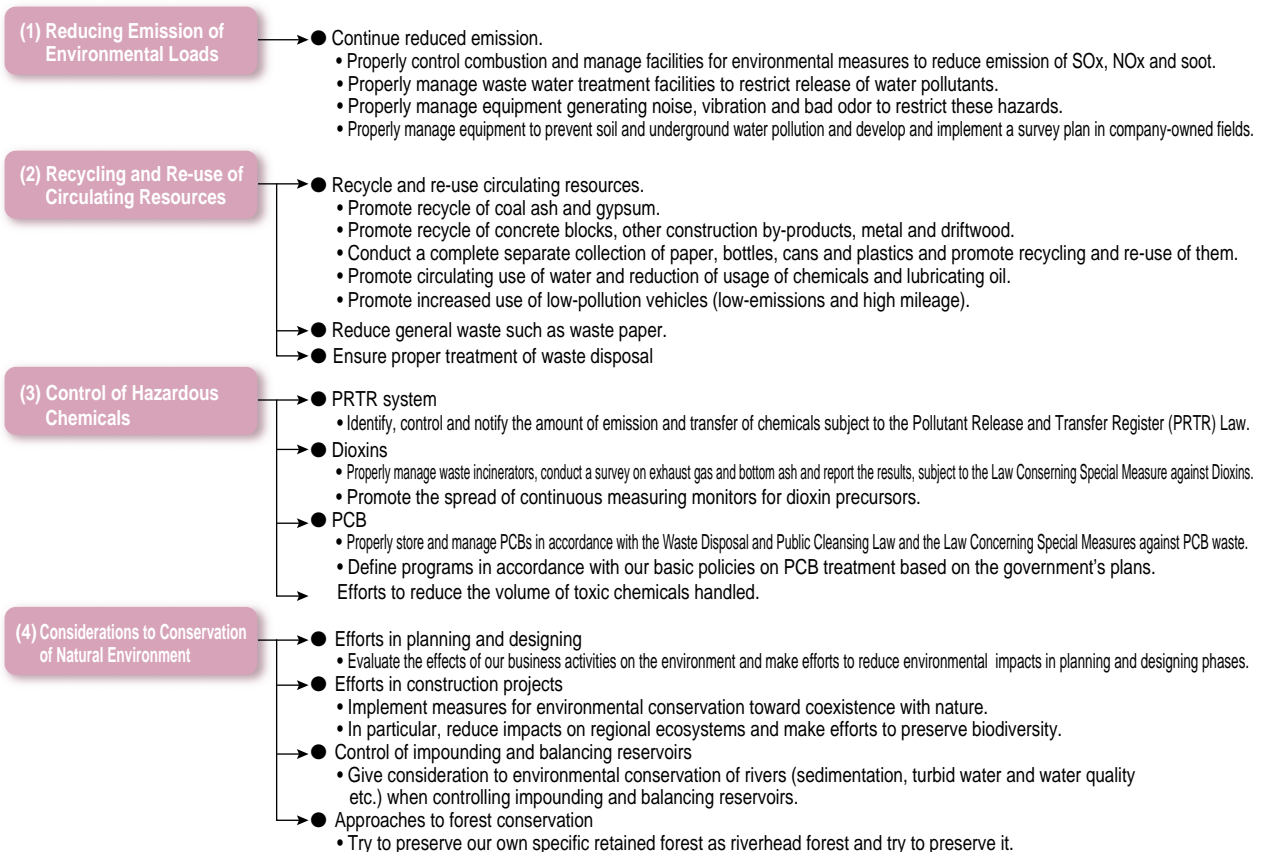
On March 2004, we reviewed the 2003 Action Guidelines, taking into account the performance evaluation carried out on our activities, social trends in the environment, and internal and external evaluations and comments.

We have developed their action plans in accordance with these guidelines, and are dedicated to working on these plans.

1. Efforts to Global Environmental Issues



2. Efforts to Regional Environmental Issues



(5) Environment-conscious Projects Overseas

- Promotion of overseas transfer of environmental protection technologies
 - Promote environmental protection technologies for thermal generation and technological transfer of hydroelectric power.
- Promote the cooperation for environment-conscious technologies such as wind power, solar, waste generation and energy saving.
- Formulation and implementation of proper environment-conscious development plans

(6) Promotion of Technological Research and Development

- Technological research and development for cleaning the aquatic environment, sediment treatment, effective use of sediment, and cleaning soil and ground water.

**3. Efforts to Transparency and Reliability
Expansion of Environmental Management**

(1) Improvement of Environmental Management Level

- Obtain ISO certification for J-POWER's thermal/geothermal power stations and prepare for the certification of hydro power stations.
- Enhancement of employees' awareness
 - Systematically implement education, study and training on environmental management.
- Expansion of group-wide environmental management through J-POWER's Group Environmental Management Promotion Council
 - Strengthen an environmental management system, in conjunction with major subsidiaries.
- Environmental accounting
 - Make efforts to improve a method to identify costs and conservation effects.
 - Promote a review of proper environmental efficiency indicators.
- Request that our trading partners assist with environmental management.
- Obtain certification of an environmental label introducing a lifecycle assessment method.

(2) Effective Operation of Environmental Management System

- Continuous improvement of environmental management system
 - Identify the real environmental loads and establish targets for environmental conservation.
 - Comply with laws and agreements and make efforts to accomplish targets.
 - Systematically implement environmental audit.
 - Review the current environmental management system and continuously improve it based on the results of environmental audit.
- Ensure environmental risk management and communication in case of emergencies.

(3) Promotion of Environmental Management Consulting Business

- Promotion of ISO-related consulting business

(4) Efforts to Green Purchasing

- Promote green purchasing efforts.

Communication with Society

(1) Publication of Environmental Information

- Improvement of environmental and social activities report
- Officially announce an environmental label (Type III).
- Public information on environmental conservation activities
 - Practice public relations on environmental conservation activities through newspapers, economic magazines and Web pages.
 - Disseminate information to visitors to offices and PR facilities about environmental conservation activities.

(2) Revitalization of Communication

- Utilization of environmental events
 - Make communication efforts in our offices and facilities.
- Diversification of external communication
 - Promote communication with society through outside monitors.

(3) Promotion of Social Activities Program

- Participation in regional activities for environmental conservation
 - Participate in cleaning up the surroundings of power stations, dams, roads and rivers and attend afforestation project ceremonies, in response to the environmental action month.
- Initiative in regional activities for environmental conservation

Quantitative Targets for Fiscal 2004

Action Guidelines	Quantitative Targets	
	Items	FY 2003 Targets Values
Reduction of emission of greenhouse gases	① Average of gross thermal efficiency in coal-fired thermal power	40% or more
	② Power consumption of electric light in head office building	Actively reduce (1.9 GWh or less)
	③ Development of renewable and unutilized energy	50,000 kW or more
	④ Recovery rate of SF ₆	98% or more
Approaches to absorption/fixation and recovery/disposal of CO ₂	⑤ Area of overseas afforestation project	3,000ha or more
Reduction of emission of environmental loads	⑥ SO _x emission intensity	0.25 g/kWh or less
	⑦ NO _x emission intensity	0.55 g/kWh or less
Waste reduction through recycling and re-use of resources	⑧ Coal ash recycling rate	65% or more
	⑨ Gypsum recycling rate	100%
	⑩ Driftwood recycling amount	9,000 m ³ or more
	⑪ Recycled papers purchasing rate	99% or more
	⑫ Waste of papers	Actively reduce (Head office building 40t or less)

Note: These numerical values are combined total values or average values relating solely to J-POWER, except for ② and ⑫ which are values from the headquarters building and ③ and ⑤ which are combined total values from all projects in which J-POWER and its group of companies participated.

3. Business Activities and the Environment (Fiscal 2003)

INPUT and OUTPUT in fiscal 2003 are as followed.

INPUT

Coal-fired thermal power stations use industrial water and chemicals as well as coal, along with heavy and light oil as auxiliary fuels.

Coal-fired Power Stations

Fuel

Coal (Wet)	18,410 thousand ton
Heavy Oil	69 thousand kl
Light Oil	26 thousand kl
Biomass (sewerage sludge fuel)	0.7 thousand ton

Water

Industrial Water	8,080 thousand m ³
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Main Resources

Limestone (CaCO ₃)	210 thousand ton
Ammonia (NH ₃)	12 thousand ton

Chemicals (100% basis)

Hydrochloric Acid (HCl)	997 ton
Sulfuric Acid (H ₂ SO ₄)	692 ton
Caustic Soda (NaOH)	5,700 ton

Hydroelectric Power Station

Amount of Intake Water for Power Generation	64.6 billion m ³
Electric Power Consumption for Pumped Strage	1,411 GWh

Geothermal Power Station

Steam	1,040 thousand ton
Hot Water	4,790 thousand ton

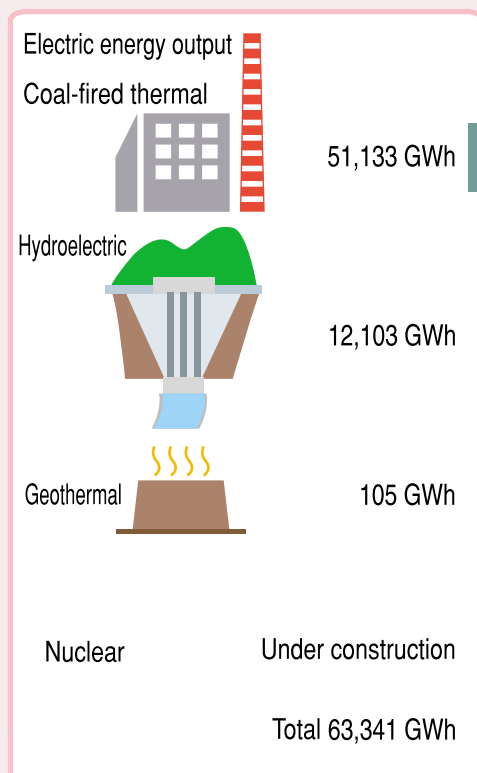
Usage for Offices

Electric Power Consumption	17,280 thousand kWh
Gasoline	372 kl
light oil	185 kl
Natural Gas (Automobile)	375 m ³ N
Copy Paper	25 million papers
Sanitary Paper	71 thousand papers

Business Activities

Electricity produced in our company's power stations is delivered to your families, factories, shops and hospitals through Electric Power Companies (EPCOs).

● Wholesale Electric Power Business



Energy and Resource-saving Activities

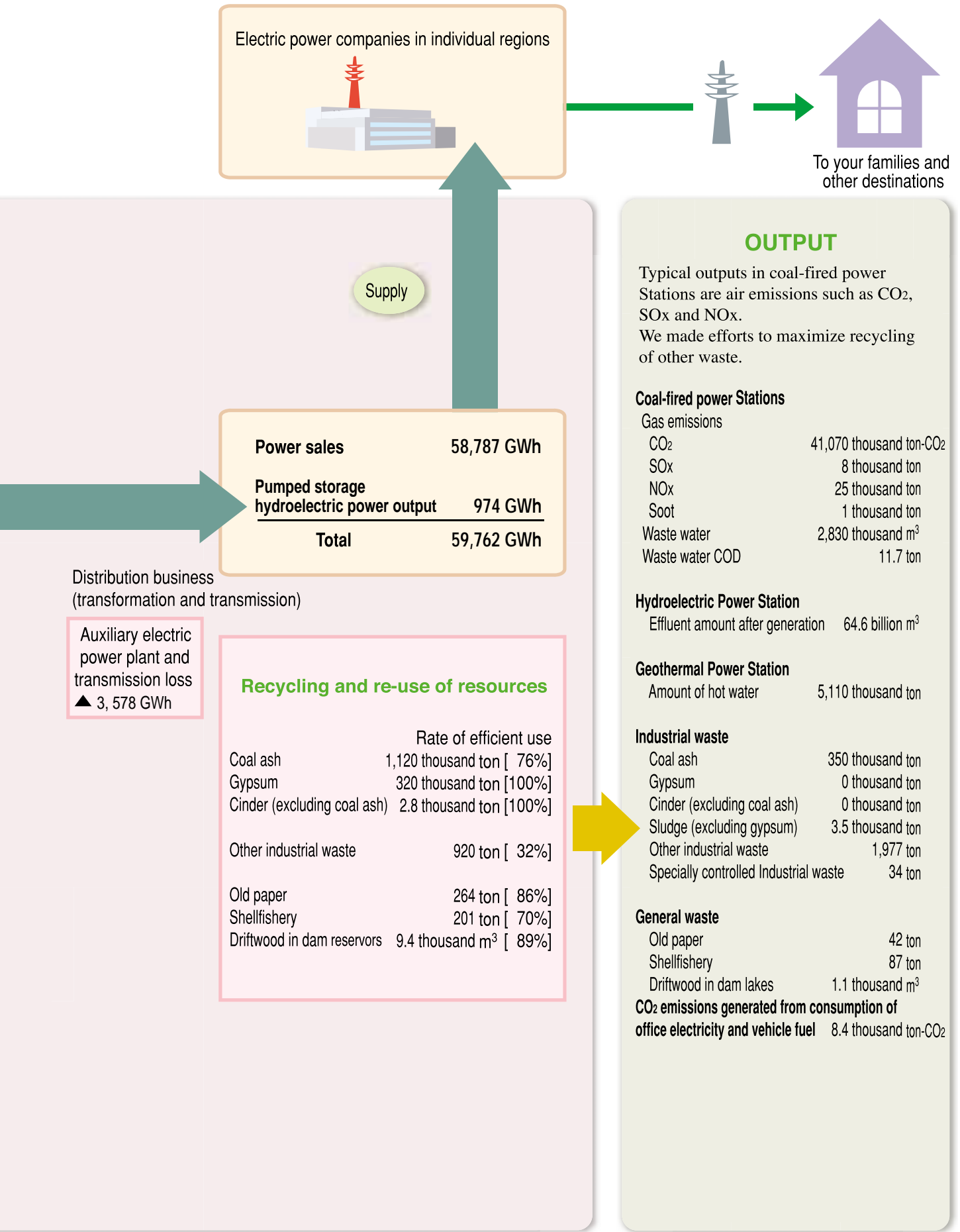
*Coal-fired power includes power generation using biomass fuel.

Not including data on INPUT and OUTPUT associated with the following business activities

- Domestic Generation (Wind Power, Waste-fuel, etc.)
- Overseas Power and Energy Investment (Overseas IPP Project etc.)
- Environmental Project (Investment, Afforestation Project etc.)
- Resource-related Service (New Fuel, Gas, Coal etc.)
- Engineering (Domestic and International Consulting Business etc.) and other services

Note: In hydroelectric power stations, river water is used, but after power generation, all the water used is returned to rivers.

Also in geothermal power stations, steam is used, but after power generation, hot water is returned underground through a returning well.



Electric power companies in individual regions



To your families and other destinations

Supply

Power sales	58,787 GWh
Pumped storage hydroelectric power output	974 GWh
Total	59,762 GWh

Distribution business (transformation and transmission)

Auxiliary electric power plant and transmission loss ▲ 3,578 GWh

Recycling and re-use of resources	
	Rate of efficient use
Coal ash	1,120 thousand ton [76%]
Gypsum	320 thousand ton [100%]
Cinder (excluding coal ash)	2.8 thousand ton [100%]
Other industrial waste	920 ton [32%]
Old paper	264 ton [86%]
Shellfishery	201 ton [70%]
Driftwood in dam reservoirs	9.4 thousand m ³ [89%]

OUTPUT

Typical outputs in coal-fired power Stations are air emissions such as CO₂, SO_x and NO_x. We made efforts to maximize recycling of other waste.

Coal-fired power Stations

Gas emissions	
CO ₂	41,070 thousand ton-CO ₂
SO _x	8 thousand ton
NO _x	25 thousand ton
Soot	1 thousand ton
Waste water	2,830 thousand m ³
Waste water COD	11.7 ton

Hydroelectric Power Station

Effluent amount after generation	64.6 billion m ³
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Geothermal Power Station

Amount of hot water	5,110 thousand ton
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Industrial waste

Coal ash	350 thousand ton
Gypsum	0 thousand ton
Cinder (excluding coal ash)	0 thousand ton
Sludge (excluding gypsum)	3.5 thousand ton
Other industrial waste	1,977 ton
Specially controlled Industrial waste	34 ton

General waste

Old paper	42 ton
Shellfishery	87 ton
Driftwood in dam lakes	1.1 thousand m ³

CO₂ emissions generated from consumption of office electricity and vehicle fuel 8.4 thousand ton-CO₂

4. Environmental Accounting and Efficiency

Environmental Accounting

Our company focuses on environmental accounting as an effective and efficient environmental management tool to develop our business activities while keeping the optimal balance between environment and economy. We

will aim at improving reliability and suitability in terms of cost and effectiveness by refining and augmenting these efforts and making information on environmental accounting and efficiency publicly available.

● Calculation Guidelines

Duration: 01/04/2003-31/03/2004

Release form: Refer to Environmental Accounting Guidelines 2002 of the Ministry of Environment (2002 version).

Scope: Company-wide cost (including depreciation costs)

¥ Labor/outsource/repair/chemicals costs associated with equipment operation and maintenance, recycling and disposal costs for waste, costs associated with R&D and international projects (outsource and labor costs) were mainly calculated.

¥ However, for upstream and downstream costs spent for global environmental conservation and green purchasing in hydroelectric power stations, the costs were judged to present a problem of their calculation scope and method, and were excluded also this year.

● Environmental Conservation Cost and Effectiveness

(Unit: Yen of billion)

Category	Main measures and efforts	Amount
Pollution control	Air pollution control (desulfurization/denitration, soot treatment), water pollution control (waste water treatment) etc.	23.68
Global environmental conservation	Measures for reduction of greenhouse gas emissions (maintenance of highly-efficient operation of coal-fired thermal plants, development of renewable and unutilized energy, management cost for energy saving equipment, emission control of greenhouse gas except CO ₂), efforts to absorption and fixation of CO ₂ (of forestation project overseas)	2.91
Resource recycling	Reduction of waste based on recycling and re-use of resources, treatment and disposal of waste	9.56
Management activities	Monitoring and measuring of environmental loads, labor costs for environmental conservation organizations, costs for environmental education	2.06
Research and development	High-efficient generation, use of fuel cell, fixation and recovery of CO ₂ , recycling of coal ash and gypsum	1.08
Social activities	Greening, environmental advertising, environmental beautification, participation in environmental groups, preparation of the Environmental and Social Activities Report	3.03
International projects	Overseas cooperation projects for environmental conservation technologies	1.45
Other	Pollution load charge	0.80
Total		44.57

Environmental conservation effectiveness
SOx emission: 8,400t, intensity: 0.17 g/kWh NOx emission: 25,000t, intensity: 0.49 g/kWh Dust emission: 1,000t
CO ₂ emission: 41.07 millions t-CO ₂ intensity: 0.86 kg-CO ₂ /kWh average Coal-fired thermal efficiency: 40.3% 59,000 kWh reduction of the usage of our head office building year-on-year 98% of SF ₆ recovery and renewable and unutilized 320,000 kW Overseas afforestation area: 2,200ha
Generation of coal ash: 1.47 million t, recycling rate of coal ash: 76% Generation of gypsum: 320,000t, recycling rate of gypsum: 100% Total driftwood recycling: 9,400 m ³ Generation of general waste in the head office: 30t, year-on-year 39% decline
Number of employees who participate in the internal environmental auditor training: 262 (cumulative total: 1,165) (Including group companies) Acquisition rate of recycle paper: 98.4%
Circulation of the environmental activity report: 8,000
Overseas consulting business volume: 14 (cumulative total: 226) Number of foreign trainees received: 25 (cumulative total: 2,005)

The denominator of SOx and NOx emission intensity in the table represents the electric energy output of coal-fired thermal power stations while the denominator of CO₂ emission intensity represents electric power sales from all power sources.

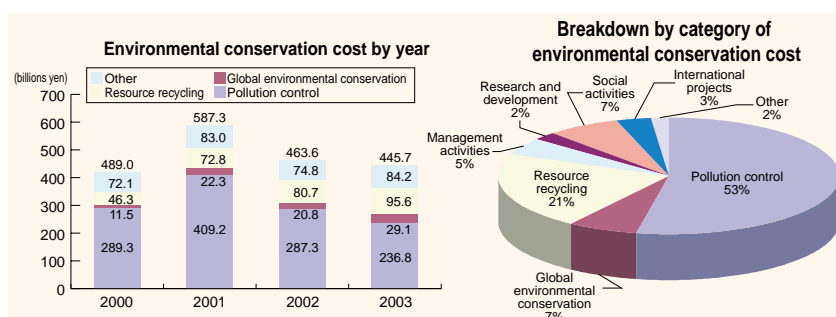
● Economic Effectiveness

(Unit: Yen of billion)

Category	Contents	Amount
Revenues	Sale of valuable resources of coal ash, gypsum and sulfuric acid	0.27
Reduction	Fuel cost reduction resulting from improvement of coal-fired thermal efficiency (introduction of USC)	1.25
	Disposal cost reduction from recycling of coal ash, gypsum sulfuric acid	4.06
Total		5.58

(1) Environmental conservation cost

The total cost for environmental conservation in the 2003 fiscal year was about 44.6 billion yen. The cost for "pollution control" (such as air and water pollution control) accounts for 53 % of the total cost.



(2) Environmental conservation effectiveness

Considering that the effects result from preventing environmental pollution, maintaining the current level of environmental loads and improving the environment, they were measured on a quantitative unit. For your information, these effects are equivalent

to the items that represent our features, in addition to quantitative target items in our Action Guidelines.

(3) Economic effectiveness

Effect to earnings and cost reduction by our efforts were calculated at about 5.6 billion yen.

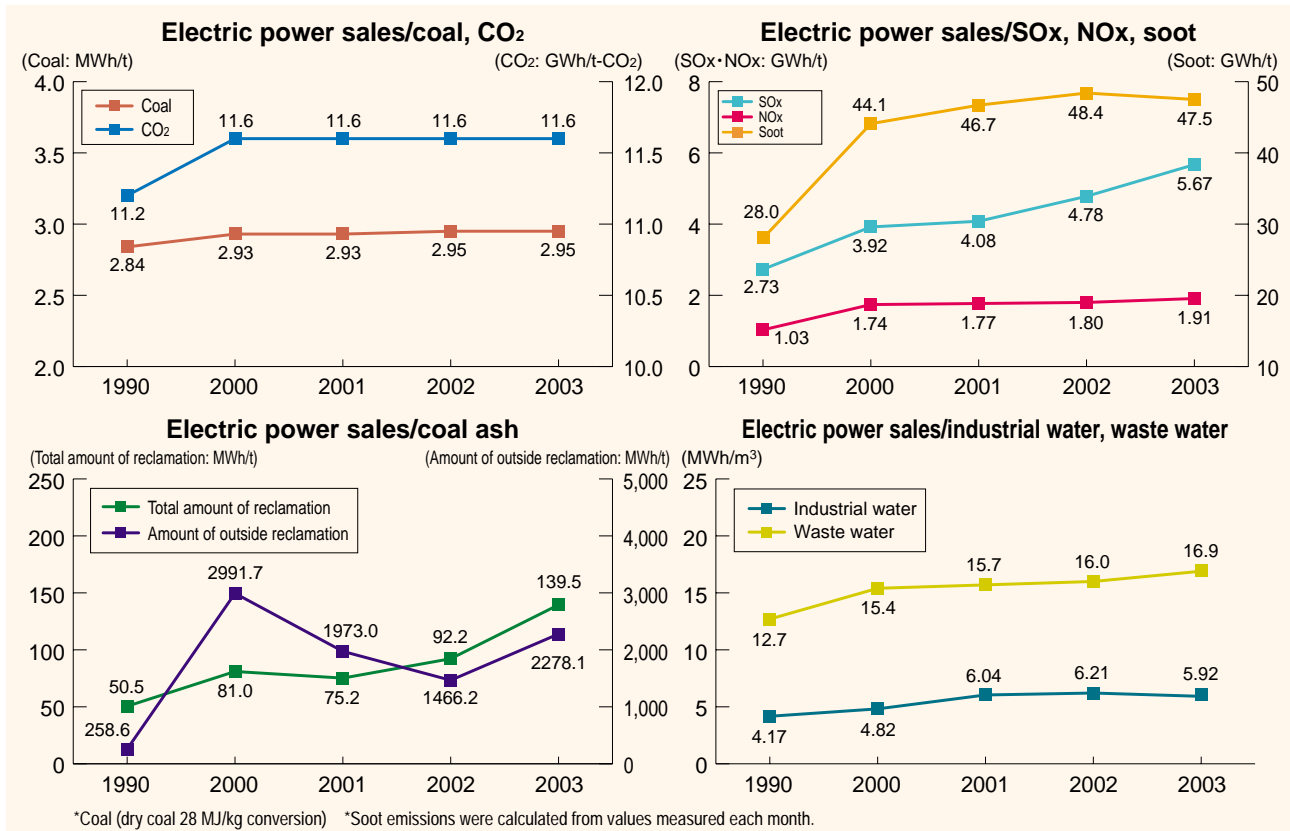
Environmental Efficiency

The basic policy of J-POWER Group's Environmental Management Vision (see p.7) produced an improvement in environmental efficiency (production/environmental load).

Target environmental indicators and desired values for environmental efficiency are currently being reviewed as part of the preparation of action programs. Calculations are based on data from fiscal 1990 onwards, with

electric power sales from our main business (coal-fired thermal power generation) divided by key environmental indicators (INPUT, OUTPUT) to evaluate the level of improvement in our environmental efficiency.

The higher value shows that more electricity is being produced and sold with less resource input and fewer emissions of environmental impact. It can be confirmed that the following items all showed an improvement:



Review on Integration of the Environmental Indicators

Our company is considering weighted integration of environmental indices in order to provide a more easily comprehensible indicator of environmental efficiency. Since September 2003, we have therefore participated in

the JEPIX (Japan Environmental Policy Index) Forum (prompted by International Christian University) that is a part of the 21st Century COE (worldwide research center) Research Project.

5. Environmental Management Organization and Its Efforts

Our company established the Environmental Management Rules on March 2000 with the aim of defining basic issues of environmental management using an environmental management system, in order to carry out company-wide environmental conservation activities based on our Corporate Philosophy.

Leaders and their functions defined by the rules are as followed.

Company-wide management organization

We have an “Environmental Activities Promotion Board”, led by an executive managing director, where general environmental management is discussed, coordinated and reported. The council consists of the heads of those divisions involved in the planning, construction and operation of electric power facilities, those services closely related to the environment, the managers of operations divisions, and representatives from head office. Environmental group, Thermal Power Dept. serves as a secretariat and has control over

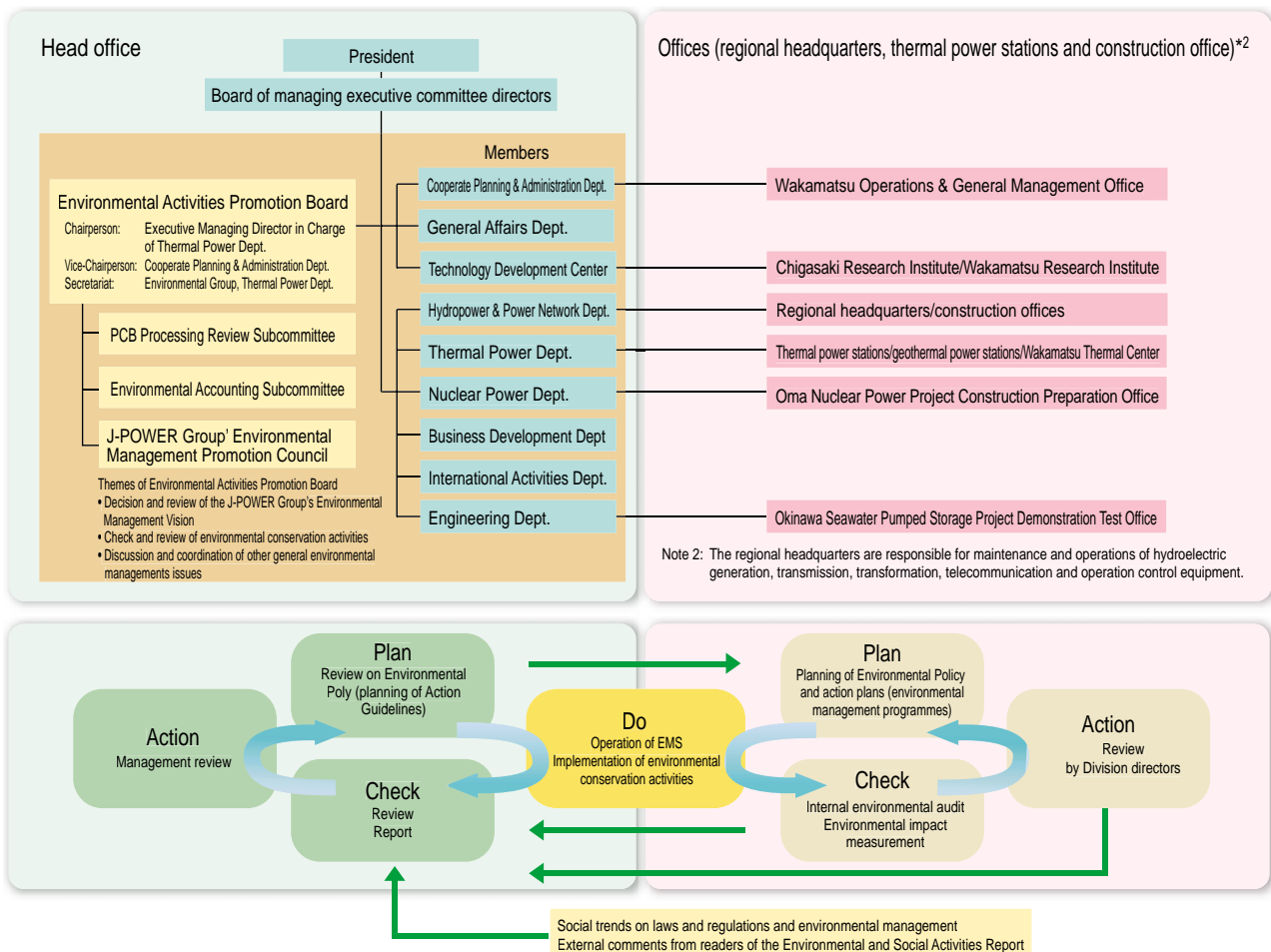
company-wide environmental activities.

In addition, the Environmental Management System (EMS), in conformity to ISO14001, international standards of environmental management, was introduced into all offices* to work on continuous improvement of environmental conservation activities.

The offices develop each environmental action plan for individual execution units based on our company-wide Environmental Policy and operate the EMS through the PDCA cycle shown in the following.

Note: Some small organizations are excluded.

J-POWER Environmental Management Organization Chart (Fiscal 2003)



Main Discussion Topics at the Environmental Activities Promotion Board

The Board discussed the J-POWER Group's Environmental Management Vision and many other issues, bringing important matters to the attention of the executive board.

Meeting date	Discussion	Main contents
The 1st 30 May 2003	6 discussions	"Review" annual report and environmental action plan and approach policies for environmentally related events and the activity status of J-POWER Group's Environmental Management Promotion Council
The 2nd 31 July 2003	2 discussions	Details released in the Environmental and Social Activities Report and the official announcement of environmental emergencies and unusual situations
The 3rd 24 Oct. 2003	3 discussions	Current state of progress in obtaining ISO14001 certification and the establishment of a communication system for emergencies and unusual situations
The 4th 20 Nov. 2003	1 discussion	Examination of the J-POWER Group's Environmental Management Vision
The 5th 22 Dec. 2003	2 discussions	Progress report on EMS operation and examination of the J-POWER Group's Environmental Management Vision
The 6th 16 Jan. 2004	1 discussion	Examination of the J-POWER Group's Environmental Management Vision
The 7th 12 Feb. 2004	1 discussion	Examination of the J-POWER Group's Environmental Management Vision
The 8th 24 Feb. 2004	4 discussions	Establishment of 2004 environmental action guidelines, and plan for PCB processing, and approach for conservation of riverhead forest.

Total: 20 discussions

Execution unit and outline of EMS

Each office establishes and operates EMS appropriate for planning/design, construction and maintenance/operation and try to continue to improve them. Group companies

maintaining electric facilities operate EMS in conjunction with our maintenance/operating offices (thermal and geothermal power stations, regional Headquarters).

* indicates offices that obtained ISO14001 certification.

Category	Office name	Outline
Planning/design	Engineering Dept.*	The departments constructed generating facilities, and introduced and operated EMSs to show consideration for the environment in a planning/design phase of a project in a new business area. They obtained ISO14001 certification on February 2001.
Construction work	Okutadami-Otori Hydro Project Construction Office ¹ Oma Nuclear Power Project Construction Preparation Office Oma Main-Transmission Line Project Survey Office / Chushi Main-Transmission Line Construction Office Sakuma-Higashi Main-Transmission Line Construction Office	EMS was introduced and operated to ensure the implementation of measures arising out of environmental impact assessment - such as the prevention of water pollution, noise and vibration and the reuse of by-products. Okutadami-Otori Hydro Project Construction Office obtained ISO14001 certification in September 1999 (the first acquisition by construction organization in Japan) and operated it through to September 2003 when they returned the certification upon completion of all work.
Maintenance/operation	Thermal power stations (Isogo, Takasuna, Takahara, Tachibanawan, Matsushima, Matsuura*, Ishikawa Coal) Regional Headquarters (Hokkaido, East, Chubu and West) Onikobe Geothermal Power Station	In accordance with environmental laws and environmental conservation agreements, the stations and offices introduced and operated EMSs to take measures for reduction of environmental impact of emission. Our company started to introduce the EMS into the Matsuura Thermal Power Station in 1998 and completed the introduction at the end of fiscal 2001. The station obtained the certification of ISO14001 on June 1999.
Other	Chigasaki Research Institute Wakamatsu Operations & General Management Office (including the Wakamatsu Research Institute and Wakamatsu Thermal Center) Okinawa Seawater Pumped Storage Project Demonstration Test Office ²	In addition, the EMS operated under a combination of our company and group companies was accepted by a regular review of the station, conducted in June 2004. Registration is now being expanded to all group companies in the station. Other thermal and geothermal power stations are also scheduled to acquire ISO14001 within this fiscal year.
	Head Office	The Head Office introduced EMS into its buildings, based on the recognition of the importance of approaches to energy and resource saving.
Total: 20 offices (At the end of March 2003)		

Note 1: Closed on November 2003. Note 2: Closed on March 2004.

Communication of Environmental Information to Employees

In order to improve both environmental management and employees' environmental awareness, information is always made

available through an electronic bulletin board, an environmental information net and a group newsletter ("J-POWERs").

Media	Title	Information contents
Electronic bulletin board	Environmental laws/regulations, data information	• Implementation and revision of the laws and regulations
	Information on environmental management and events	• Social trends • In-house environmental events • Environmental management system
	Plaza for nature, environment and animals/plants	• Free dialogue among employees (topics on nature and animals/plants, environmental management system etc.)
Intranet	Environmental information net	• Overall laws and regulations • Overall environmental management system • Environmental education and training



Environmental information net

The J-POWER Group Environmental Management Promotion Council

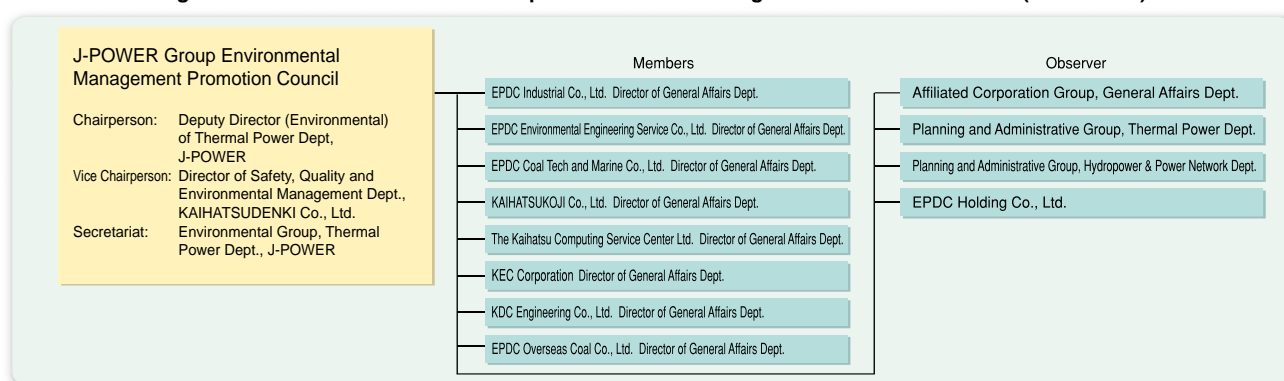
J-POWER established J-POWER Group Environmental Management Promotion Council in fiscal 2002. The Council held four meetings in fiscal 2003 to discuss how best to promote each company's environmental management system and J-POWER Group's Environmental Management Vision.

In addition, the Council held 9 environmental management briefings for the head office employees of each J-POWER group company as part of its environmental education and

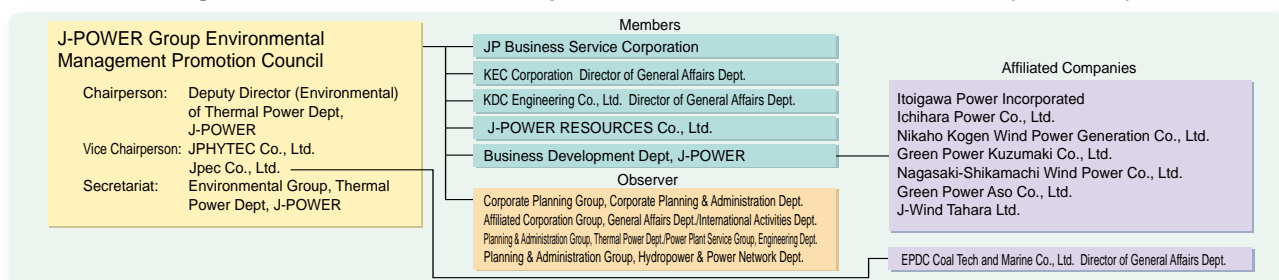
training.

In fiscal 2004, we reviewed our existing organization and, together with the development of the Basic Policy for J-POWER Group's Environmental Management Vision and reconstruction of its group companies, we are now promoting concerted group activities under the auspices of the "J-POWER Group Environmental Activities Promotion Council."

Organization Chart on J-POWER Group Environmental Management Promotion Council (Fiscal 2003)



Organization Chart on J-POWER Group Environmental Activities Promotion Council (Fiscal 2004)



Education and training

The head office and other offices frequently conduct internal and external training on the environment for employees in order to increase their understanding of environmental problems and foment their own sense of responsibility to the environment.

They started E-learning based environmental education for the

group's employees at the end of fiscal 2003.

The total number of employees that took the course for EMS internal environmental auditors reached 1,165 (including group companies' staff).

Environmental Training-related Results in Fiscal 2003

Class	Training items	Target	Frequency	Number	Main contents
Overall environmental management	Environment-related organizing activities	Environmental management representatives	21	About 510	J-POWER Group's efforts
	Environment-related organizing activities for affiliated companies	Board directors and employees of group companies	9	About 150	J-POWER Group's efforts
	Environmental management lecture	Staff of the head office	2	79	Environmental management, socially responsible investing
Basic training for EMS operation	Internal environmental auditor training	Environmental management representatives Internal environmental auditors	16	262	Requirements of ISO14001, internal environmental audit method
	Follow-up training for internal environmental auditors	Internal environmental auditors	1	15	Exercise for identifying nonconformity issues, simulation inspection
	Guidance training for new staff members	New staff members	2	22	Basic information on environmental issues, J-POWER Group's efforts
E-learning	Basic information on environmental issues	Staff of the head office	1	92	Global environmental issues, regional environmental issues
Various themes	Environmental lecture during the environmental month	Employees of the head office and affiliated companies	1	90	Title "Oedo Energy and Recycling Considerations"
	Lecture on global warming issues	Staff of the head office	1	70	Perspectives for the emission trade and the J-POWER Group's involvement
Total			54	About 1,290	

Acquisition of environment-related official licenses

Our power stations properly allocate staff owning official licenses, such as a manager in charge of pollution control, in order to facilitate daily operations for environmental conservation.

We will continue to instruct and support our employees to acquire various qualifications, with a view to improving their knowledge and skills.

As of April 2004

License	Number of licensed employees	License	Number of licensed employees	License	Number of licensed employees
Professional engineer Construction division (construction environment)	9	The specially controlled Industrial waste manager	278	Manager in charge of high-pressure gas manufacturing and protection (Class A, B and C)	485
Professional engineer Environmental section (environmental preservation planning)	2	Technical manager in charge of industrial waste final disposal site	48	Hazardous materials chief officer Class A	59
Senior Pollution Control Manager	5	Technical manager in charge of waste disposal facilities	20	Boiler technician (Grade Special, 1 and 2)	1 045
Manager in charge of pollution control Air (Type 1-4)	189	Qualified person for biotope planning and control (Grade 1 and 2)	2	Boiler mechanic	3
Manager in charge of pollution control Water quality (Type 1-4)	123	Qualified person for biotope construction and control (Grade 1 and 2)	3	Work supervisor for specific chemicals	754
Manager in charge of pollution control Noise	97	Qualified technician for landscape construction, Grade 1 and 2	29	Manager in charge of poisonous and deleterious substances (General and Specific)	6
Manager in charge of pollution control Vibration	39	Chief electrical engineer Class 1-3	747	Work supervisor for organic solvent	348
Manager in charge of pollution control General dust	3	Radiation protection supervisor Class 1 and 2	88	Sanitation manager Class 1 and 2	285
Manager in charge of pollution control Specific dust	1	Qualified person for electricity management	148	Certified measurer Environment	7
Manager in charge of pollution control Dioxins	10	Qualified person for heat management	230	Working environment measurement expert (Class 1 and 2)	13
				EMS auditor (Prov. auditor)	16

*The total number of J-POWER s employees that obtained various grades and classes of qualification was given.

Ordinary control and emergency response

We defined Risk Management Rules in August 2003 so as to establish a communication system for risk occurrence and prevention, in order to bring about social responsibility and strengthen risk preparedness abilities for protecting management resources against various

environmental disasters and emergencies. In addition, Environmental Management Rules were revised in order to improve the communication system for environmental emergencies.

Possible environmental emergencies
Emergencies infringe laws, regulations, ordinances and agreements concerning air pollution, water pollution, thermal water discharge, noise, vibration, offensive odor, soil pollution etc.
Spillage accidents such as the leakage of chemicals, oil and grease impact on the environment.
Waste is illegally dumped or improperly treated.
Anomalies occur in facilities due to earthquakes, natural disasters and fire, leading to situations to , above.
Turbid water and red tides in water reservoirs have potential social impact.

Comprehensive disaster-preparedness drill

In October 2003, we conducted a comprehensive disaster-prevention training program assuming Tokai Earthquake (involving initial response, actual operation and information transmission) in which 7 organizations participated, including our headquarters and East Regional Headquarter. In case of future large-scale earthquakes, safety confirmation system training for all employees and their families was also carried out.



Comprehensive disaster-preparedness drill

Actual Environmental Accidents

An environmental accident occurred in fiscal 2003, so measures were taken to prevent such a reoccurrence.

A hot water spill accident at Onikobe Geothermal Power Station
Hot water* pumped up from underground spilled into a nearby river on April 29 to 30, 2003.

The accident occurred when a connection on a hot water pipe became detached. Upon discovery, the use of the pipe was discontinued, stopping the leakage, and the accident was reported to the relevant

organizations and authorities. River water was analyzed downstream from the spill and the lower basin of the river was patrolled. As a result, no particular anomalies were detected.

In order to prevent such a reoccurrence, the connection method for all such pipes was modified.

* Rainwater infiltrating underground is heated and converted into high-temperature and high-pressure hot water.



Environmental Activities Status

1. Fiscal 2003 Environmental Activities Performance List

The main results of our environmental activities in fiscal 2003 are as followed.

Preventative Measures against Global Warming

Reference Page

Reducing emission of greenhouse gases

P. 21 ~ P. 30

Average thermal efficiency of 40.3% (target of 40.0% or more) was accomplished in coal-fired thermal power station. Hydroelectric power stations are operated stably throughout the country. The Okutadami-Otori expanded Hydro electric power station started operation. The Matsuura Thermal Power Station conducted a co-firing test for an actual unit using biosolid (sewage sludge) fuel. A biomass power plant started operation up in Thailand, and another plant was planned. The Green Power Kuzumaki Wind Farm started operation in Kuzumaki Town, Iwate. The Tomamae/Nikaho/Tokyo Bay Wind power stations are operated stably. A wind power company in Spain was acquired. Setana, Tahara, Shikamachi and Nishihara sites are under construction. Based on the review of the deployment plan of the Oma Nuclear Power Station, application for nuclear reactor installation approval was submitted. The power usage in offices was reduced. (The power consumption of electric light in the head office building represented 179 kWh) (target of 190 kWh or less). SF₆ recovery rate of 98% (target of 98% or more) was accomplished.

Efforts to the utilization of the Kyoto Protocol Mechanisms

P. 31 ~ P. 32

Promotion of the CDM project (7 projects for realization of CDM and 8 projects for implementation of a feasibility survey).

Approaches to CO₂ absorption fixation and recovery

P. 32

Trees were planted in the area of 2,200ha overseas (Australia and Ecuador) (Our target area was accomplished).

Efforts to Environmental Conservation

Law compliance, environmental impact assessment/monitoring, reducing emissions of environmental loads

P. 33 ~ P. 37

SO_x and NO_x emissions intensity of 0.17 g/kWh and 0.49 kWh respectively (targets of SO_x 0.25 or less and NO_x 0.55 or less) were accomplished in coal-fired thermal power. We have no cases that violate environmental requirements, laws or ordinances. Efforts are being made to reduce the environmental impact of emissions. A communication system for environmental emergencies and anomalies is being established.

Control of hazardous chemicals

P. 38

Chemicals were properly controlled and reported under the Pollutant Release and Transfer Register (PRTR) Law and Law Concerning Special Measures against Dioxins. It was confirmed that our policy for a treatment plan on high-level PCBs was in line with large-scale, national treatment plans.

Conservation of natural environment

P. 39 ~ P. 40

Initiatives were started for conservation of riverhead forest on company-owned land.

Overseas transfer of environmental conservation technologies

P. 41 ~ P. 42

16 overseas technological consulting activities were started. 25 overseas trainees were accepted. Promotion of IPP projects overseas. (15 projects for coal-fired thermal power, gas cogeneration, wind power, geothermal power and biomass are being promoted in 6 countries/areas.)

Numerical target. Since fiscal 2001, we have strengthened efforts for environmental conservation by setting numerical target for the following items:

Items	Unit	Fiscal 2003			
		Target	Performance	Evaluation	
Reducing emission of greenhouse gases	① Average of gross thermal efficiency in coal-fired thermal power	%	40 or more	40.3	
	② Power consumption of electric light in the head office building	GWh	Actively reduce (1.9 GWh or less)	1.79	
	③ Development of renewable and unutilized energy	MW	320 or more	320	
	④ Recovery rate of SF ₆	%	98 or more	98	
Efforts to absorption/fixation and recovery of CO ₂	⑤ Overseas afforestation project area	thousand ha	2.2 or more	2.2	
Reducing of emission of environmental loads	⑥ SO _x emissions intensity	g/kWh	0.25 or less	0.17	
	⑦ NO _x emissions intensity	g/kWh	0.55 or less	0.49	
Reducing of waste based on recycling and re-use of resources	⑧ Recycling rate coal ash	%	65 or more	76	
	⑨ Recycling rate gypsum	%	100	100	
	⑩ Recycling rate driftwood	thousand m ³	5 or more	9.4	
	⑪ Purchasing rate recycle papers	%	100	98.4	
	⑫ Generated amount of general waste such as paper waste in the head office building	ton	Actively reduce (50 or less)	30	

Note: These numerical values are combined total values or average values relating solely to J-POWER, except for ② and ⑫ which are values from the headquarters' build and ③ and ⑤ which are combined total values from all projects in which J-POWER and its group of companies participated.

Recycling and Re-use of Circulating Resources

Waste reduction and environmental recycling business

P. 43 ~ P. 46

76% of coal ash generated, or about 1.12 million t was recycled (target of 65% or more).
 100% of desulfurized gypsum was recycled (The target was accomplished).
 Driftwood of about 9,400 m³ was recycled (target of 5,000 m³ or more).
 The purchasing rate of recycled papers was 98.4% (Target of 100%: Not accomplished).
 Waste paper and other waste were reduced in our national offices and plants. The amount generated in the head office building represented about 30 ton. (target of 50 ton or less).

Technological Research and Development

Introduction of R&D results

P. 47 ~ P. 48

With the introduction of the ultra super critical (USC) pressure generation technology into coal-fired generation, high-efficiency operation is now being maintained at the highest international level.
 A demonstration test on the world's first sea water pumped storage power generation was completed.

Promotion of Engineering Research and Development in Progress

P. 49 ~ P. 50

A pilot plant test is being carried out on technology for high-efficiency coal use, aimed at producing an Integrated Gasification Combined Cycle (IGCC) using fuel cells, gas and steam turbines.
 Technological development and proposals for cleaning the aquatic environment.

Environmental Communication

Publication of environmental and social activities report

P. 51

The Environmental and Social Activities Report and its English version were continuously issued. The report was placed on our website.

Promotion of public relations campaign and environmental conservation activities

P. 51 ~ P. 56

An environmental public relations campaign was conducted. Environmental advertisements were released in newspapers, economic magazines, weekly magazines and subway platforms.
 The number of visitors to our PR facilities reached about 300,000.
 In response to the Environmental Month, cleanup activities were conducted around our offices and operating facilities.
 A green fair was held in the head office twice a year.

(Evaluation criteria 100% target accomplishment 80% target accomplishment × less than 80% target accomplishment)

Evaluation on fiscal 2003 efforts and future policies	Targets for fiscal 2004
High-efficient operation is maintained through the promotion of energy conservation and correct incineration control at each power plant.	40% or more
Energy-saving activities such as turning off the power during lunchtime are being encouraged.	Actively reduce (1.9 or less)
The Okutadami-Otori expanded power station, hydroelectric generation using river maintenance flow, Kuzumaki Wind Farm and biomass generation (Thailand) started operation. We aim at developing Shikamachi, Nishihara and Tahara wind power in fiscal 2004.	50 or more
Strict control of installment, inspection and removal of gas insulators and air conditioners is being implemented.	98 or more
Proper planting control was implemented with due attention to weather and noxious insects.	3.0 or more
Proper incineration control and environmental management measures are being implemented at each power station.	0.25 or less
	0.55 or less
The recycling rate is being improved by expanding supply to cement companies and using them for artificial upwelling projects.	65 or more
Efforts are being made to achieve 100% recycling.	100
Constant collection and reuse are being implemented.	9.0 or more
Work targets cannot always be accomplished due to outside circumstances. We requested understanding and cooperation with our efforts.	99 or more
More source segregation, such as the separate collection and recycling of mixed paper, is being ensured.	Actively reduce (40 ton or less in the head office building)

2. Preventative Measures against Global Warming

Global warming is one of the key concerns of our management and so we are voluntarily and actively promoting countermeasures.

Basic concept

Global warming is the most important issue to be tackled in the long term, since human beings cannot avoid to use fossil fuel as key energy resources throughout this century. As the cost to reduce greenhouse gas is expensive, it is desirable that more cost effective measures and actions should be adopted on a global scale, in order to reduce greenhouse gas emissions at lower cost and in order to realize sustainable development that protects both the environment and the economy.

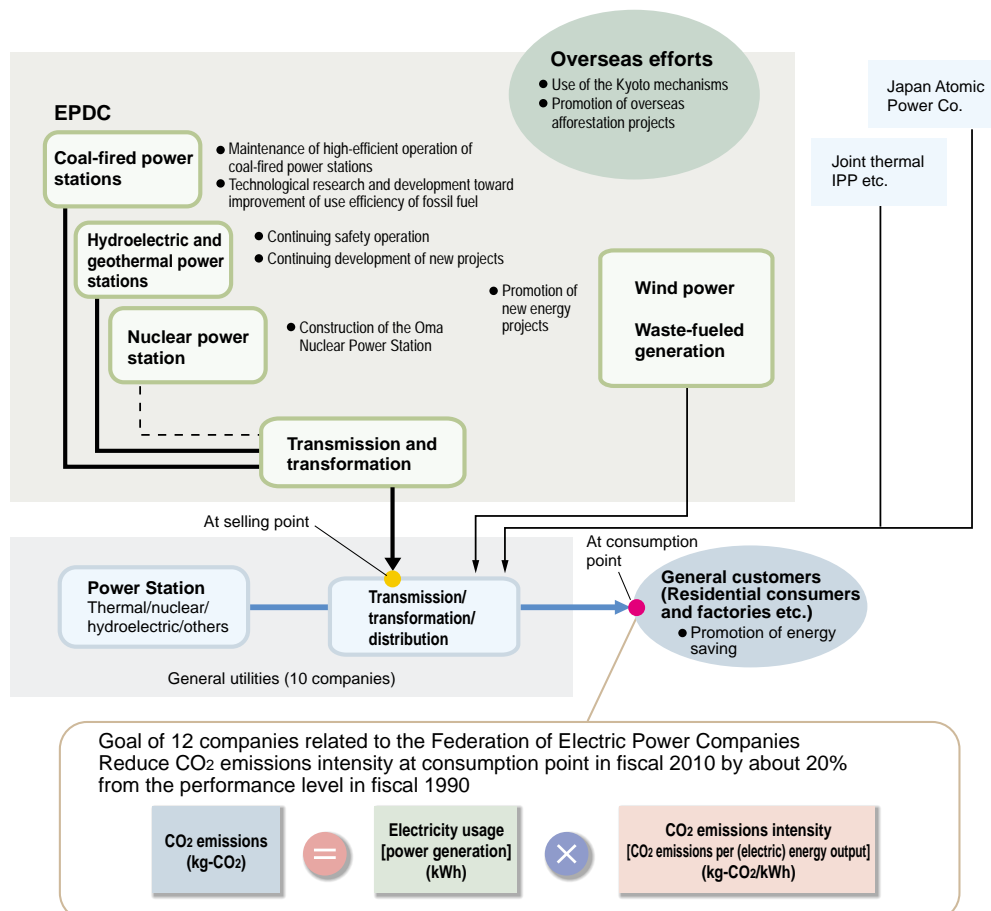
Based on this concept, and in consideration of global cost efficiency, we continue to reduce CO₂ emissions (Note 1) (per power sales) by implementing the following four measures in combination:

- (1) Maintenance and further improvement of efficient operation (such as the stable operation of hydroelectric power generation and efficiency improvement in thermal power generation).
- (2) Development of CO₂ lighter power sources (such as nuclear power and renewable energy sources).
- (3) Development, transfer and diffusion of technologies

- (such as high-efficiency coal combustion)
- (4) Use of the Kyoto Mechanisms under the Kyoto Protocol to address global warming efficiently on a global scale

In addition to these measures, we recognize that it will be necessary to remove and sequester the CO₂ from the flue gas of fossil fuel combustion within this century, in order to continue supplying energy to the world's people in a sustainable manner. We will make efforts to develop and demonstrate such technologies, setting "CO₂ Zero Emissions" as our ultimate goal.

Furthermore, as a collaboration of 12 electric utilities (Note 2) based on Federation of Electric Power Companies, we are addressing the challenging target of trying to reduce emissions intensity (emissions per unit of user end electricity) by approximately 20% from the fiscal 1990 level, by fiscal 2010. (Refer to p.77, "Environmental Action Plan by the Japanese Electric Utility Industry").



Actual CO2 emissions

CO2 emissions and CO2 emission intensity of all power sources (Note 3) remained almost constant from fiscal 1990 to 1999.

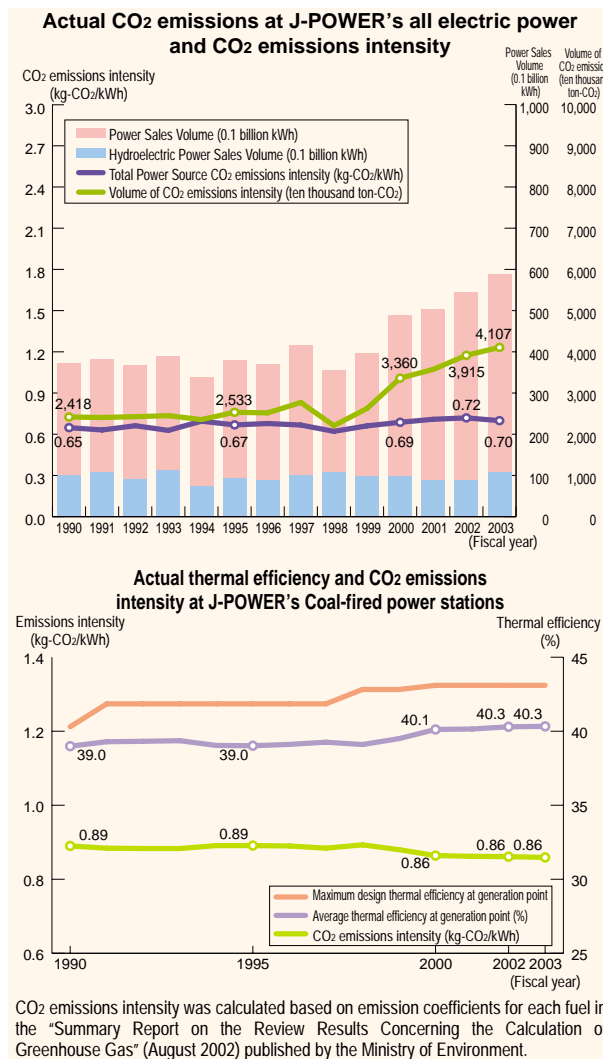
CO2 emissions have increased since fiscal 2000, with the startup of a new, large coal-fired thermal power station and high levels of operation in existing coal-fired thermal power stations.

As a result, in fiscal 2003 electric power sales reached about 58.8 billion kWh (about 8% up over the previous year). CO2 emissions reached 41.07 million t (about 5% up over the previous year).

On the other hand, CO2 emission intensity for all power sources dropped to 0.70 kg CO2/kWh (about 3% down over the previous year) due to the high levels of operation of hydroelectric power stations.

Focusing on coal-fired thermal power generation, it can be seen that both designed maximum thermal efficiency and average thermal efficiency have been increasing with the construction of each new power station, rewarding our efforts to improve thermal efficiency. As thermal efficiency increases, the CO2 emission intensity of coal-fired thermal power (Note 4) is gradually decreasing.

In fiscal 2003, the emission intensity dropped to 0.86 kg CO2/kWh.



Note 1: CO2 emissions per power sales

CO2 emissions from the use of electricity can be determined by multiplying the customers' power consumption by end-user CO2 emission intensity. Since power consumption is increased or decreased in response to various circumstances beyond the electric utilities' direct control (such as weather conditions and the customers' electricity demand) the electric utilities employ an end-user CO2 emission intensity target against which their efforts can be measured. Since our company is a wholesaler, we use of CO2 emissions per power sales as our index.

Note 2: 12 companies related to the Federation of Electric Power Companies

10 members of the Federation of Electric Power Companies (Hokkaido Electric Power Co., Tohoku Electric Power Co., Tokyo Electric Power Co., Chubu Electric Power Co., Kansai Electric Power Co., Chugoku Electric Power Co., Shikoku Electric Power Co., Kyushu Electric Power Co., Okinawa Electric Power Co.) +J-POWER+ Japan Atomic Power Co.

Note 3: CO2 emissions intensity at all electricity power

CO2 emissions intensity at all electricity power generation plants = CO2 emission ÷ Power sales at all electricity power generation plants

Note 4: Coal-fired thermal CO2 emissions intensity

CO2 emissions intensity = CO2 emissions in coal-fired power stations ÷ Power sales in coal-fired power stations

Reducing Emissions of Greenhouse Gas

Maintaining highly-efficient operation of coal-fired power stations

Our coal-fired power stations have traditionally tried to improve their thermal efficiency through the promotion of energy savings and the introduction of new technologies such as USC (Ultra Super Critical Pressure technology). The thermal efficiency at generation point in fiscal 2003 reached 40.3% (the same point as in the previous fiscal year).

The improvement of thermal efficiency results not only in the reduction of fossil fuel but also leads to greater

environmental conservation and accompanying economic effects such as reducing of CO₂, SO_x and NO_x emissions, reduction of waste and chemicals and reducing generation of coal ash and gypsum.

Share of our power stations introducing USC	
Unit number	4/14 (All units)
Rated power	47%
Power sales in fiscal 2003	57%



Isogo Thermal Power Station (Kanagawa Prefecture)



Audible inspection of pumps (Isogo Thermal Power Station)

Stable operation of hydroelectric power stations

Hydroelectric power is valuable as clean domestic energy for our country reducing harmful effects to the environment, for instance, no emission of CO₂. (See “Hydroelectric Generation and the Environment,” p.5).

Our company has 59 hydroelectric generating facilities

with a total electric energy output of 8,550,000 kW, and the hydroelectric energy output in fiscal 2003 reached 12,103 GWh. The effectiveness of hydroelectric generation ^(note) is equivalent to reduction of about 4.5 millions ton-CO₂ emission.



Sakuma Power Station (Shizuoka Prefecture)



Inspection of gas pressure of switches (Sakuma Power Station)

Note: The effectiveness of nuclear, hydro, geothermal and wind power on reduction of CO₂ emissions, in this section, is calculated by average intensity (kg CO₂/kWh) for all type of power resource, nationwide.

Stable operation of geothermal power stations

Geothermal power stations produce power by collecting and using huge thermal energy existing in volcanoes and underground around them as hot water and steam.

In spite of small power output, geothermal generation releases less CO₂, and is expected to play a vital role in producing renewable energy.

Our company has generated power in the Onikobe Geothermal Power Station (power capacity: 12,500 kW, Miyagi Prefecture) since 1975, and electric energy output of 105 GWh in fiscal 2003. The effectiveness of geothermal generation is equivalent to reduction of

about 40,000 ton- CO₂ emissions.



Onikobe Geothermal Power Station (Miyagi Prefecture)

Efforts to generation using biomass fuel

Use of wood biomass

Our company has started the development of a co-firing technology for applying wood biomass to coal-fired power stations, in collaboration with Research Institute of Innovative Technology for the Earth (RITE).

Thinned wood is assumed as an object of this development. The promotion of recycling of the wood will lead to not only global environmental conservation but also revitalization of a forest industry.

Thus far, the amount of domestic wood biomass was

investigated and its characteristics were analyzed. Furthermore, a basic test on mixed firing with coal in a small experimental apparatus as fuel was conducted, and it was confirmed that there were no problems with co-firing biomass.

In May 2004, the Matsuura Thermal Power Station (Nagasaki) started a co-firing test for an actual unit that will continue for about 6 months.



Matsuura Thermal Power Station (Nagasaki Prefecture)



Wooden biomass chip

Use of biosolid (sewerage sludge) fuel

Biosolid fuel is produced by mixing waste cooking oil with sludge generated in waste water treatment plants, heating the mixture and removing water from it. And it has the same heat generation rate as that of coal. Our company is promoting co-firing this fuel, in addition to wood biomass.

Thus far, its fuel characteristics has been analyzed, and a basic test on mixed firing in a small experimental apparatus was conducted to identify its basic features when burning it with other coal fuel.

Since August 2003, we have continued to conduct a co-firing test for an actual unit in the Matsuura Thermal Power Station, Nagasaki. This is the first such trial in the country. After approx. 1 year's operation, this has

confirmed that fuel can be successfully burnt at a maximum co-firing rate of 1%. If 1% biosolid fuel is co-fired in unit 1 at the Matsuura plant, CO₂ emissions could be reduced by about 50,000 t per year.



Appearance of biosolids



Storage silo



Kazuhiko Hayakawa

Engineering Group, Thermal Power Business Division

Biomass is expected to be a new energy source so it is important for not only our company but also our society to use it effectively. We will actively promote the effective use of biomass.

Power Generation project using biomass fuel in Thailand

Our company promoted the Power Generation IPP project using biomass fuel with EGCO, the largest private power generating company in Thailand which started commercial operations in May 2003.

Thailand is the 6th rice producing country in the world. The northeastern region of this country, particularly Roi-Et Province is a leading grain belt where rice husks after milling rice is burned in fields, and has had the problem of disposing the husks.

This project is intended to recycle about 76,000 ton of rice husks annually as fuel for power generation, and is our first biomass-fueled project at home and abroad. The annual electric energy output of this station (calculations) will reach 64.39 GWh on an annual basis, which represents the effectiveness of CO₂ reduction

equivalent to about 30,000 ton.

The station has implemented measures for environmental conservation such as installment of electric precipitators and waster water treatment equipment, in order to give considerations to surrounding environment.

We are developing a biomass-fueled generation program (23MW) in which waste wood and chips from a sawmill for rubber trees are used as fuel to produce electricity in Yara Province, Thailand (about 1,000 km south from Bangkok) and supply power to the Electricity Generating Authority of Thailand (EGAT). This project allows EGAT to limit the fuel consumption of its thermal power stations and also to reduce annual CO₂ emissions of about 60,000 t.



Rice husk

Specifications of the Roi-Et Thermal Power Station

Point	Roi-Et, Roi-Et Province, Thailand
Fuel	Rice hulls generated from rice milling plants
Power generating capacity	9,950 kW
Environmental equipment	Multi-cyclone Electric precipitator Waste water treatment equipment
Startup	May 2003

Specifications of the Yara Thermal Power Station

Point	Yara Province, Thailand
Fuel	Rubber tree wastes from local sawmills
Power generating capacity	23,000 kW
Environmental equipment	Multi-cyclone Electrostatic precipitator Waste water treatment equipmet
Startup	Due August 2005

Promotion of wind power generation

In addition to the commercially operated Tomamae Winvilla and Nikaho Kogen Wind Power farms, the "Tokyo Bayside Wind Power Plant" (commonly known as Tokyo Kazaguruma) was established on a landfill on the central breakwater near Odaiba in March 2003. This was based on a pilot project for the prevention of global warming organized by the Tokyo Metropolitan Government. In December 2003, the Green Power Kuzumaki Wind Farm was completed in Kuzumaki

Town, Iwate, and started commercial operation. Four more wind power plants are currently under construction. We acquired a business company from the Gamesa Group in Spain on March 2003 and are now operating its power stations.

The total annual power generation from operating power stations in Japan is planned to reach about 166.5 GWh, equivalent to a reduction in CO₂ emissions of about 70,000 t.



Tokyo Bayside Wind Power Plant (Tokyo)



Wind Farm (Galicia, Spain)

(Operating)

	Tomamae Winvilla Wind Farm (Tomamae Town, Hokkaido)	Nikaho Kogen Wind Farm (Nikaho Town, Akita)	Tokyo Bayside Wind Power Plant (Tokyo)	Green Power Kuzumaki Wind Farm (Kuzumaki Town, Iwate)	Monte Seiciocando, Cerradocando, Oteriodocto Wind Power Plant (Galicia Province, Spain)
Farm capacity	30,600 kW	24,750 kW	1,700 kW	21,000 kW	64,210 kW
Windmill generator	Single unit power generating capacity 1,650 kW 14 units Single unit power generating capacity 1,500 kW 5 units	Single unit power generating capacity 1,650 kW 15 units	Single unit power generating capacity 850 kW 2 units	Single unit power generating capacity 1,750kW 12 windmills	Single unit power generating capacity 660 kW 96 units Single unit power generating capacity 850 kW 1 units
Annual power generation (planned value)	About 59 GWh Residential customer (Approx. 17,000 households)	About 51 GWh Residential customer (Approx. 15,000 households)	About 2.5 GWh Residential customer (Approx. 800 households)	About 54 GWh Residential customer (Approx. 16,000 households)	About 180 GWh Residential customer (Approx. 55,000 households)
Startup	December 2000	December 2001	March 2003	Scheduled on December 2003	Scheduled on December 2003
J-POWER's stake share	100%	67%	50%	100%	50% (Funded through our subsidiary)

(Under construction)

	Tahara Bayside Wind Farm (Tahara City, Aichi)	Nagasaki Shikamachi Wind Farm (Shikamachi Town, Nagasaki)	Aso Nishihara Wind Farm (Nishihara Village, Kumamoto)	Setana Bayside Wind Farm (Setana Town, Hokkaido)
Farm capacity	22,000 kW	15,000 kW	17,500 kW	12,000 kW
Windmill generator	Single unit power generating capacity 2,000 kW 11 units	Single unit power generating capacity 1,000 kW 15 units	Single unit power generating capacity 1,750 kW 10 units	Single unit power generating capacity 2,000 kW 6 units
Annual power generation (planned value)	About 40 GWh Residential customer (Approx. 12,000 households)	About 28 GWh Residential customer (Approx. 8,000 households)	About 23 GWh Residential customer (Approx. 7,000 households)	About 35 GWh Residential customer (Approx. 10,000 households)
Startup	Due March 2005	Due end of February 2005	Due end of February 2005	Due Fiscal 2005
J-POWER's stake share	66%	70%	81%	100%

RPS system (Renewable Portfolio Standard)

A new law (the RPS system) was enforced in April 2003 obliging general electric utilities to use a set amount of new energy sources as a contribution towards both a constant supply of energy and environmental conservation.

New energy sources specified in the law include electricity obtained from wind, solar and geothermal power and from hydropower (conduit types of 1,000 kW capacity, or less) and biomass in facilities approved by the government.



Tomoaki Washio
Wind Power Development Group, New Business Division

Environmental surveys are also essential for wind power generation and the wind power generation that produces of clean energy without CO₂ emissions. We continue to seek the best windmill layout for each region, with the aim of ensuring harmonious coexistence with nature.

Construction of a nuclear power stations

We are planning the construction of a nuclear power plant (full MOX-ABWR: 1,383,000 kW) in Oma-machi, Aomori, aiming to use MOX fuel for the whole reactor core.

Application for nuclear reactor installation approval was submitted in March 2004. (Its start of operation is scheduled for March 2012). We promise to promote the construction

plan for the reactor, paying the closest attention to safety measures, environmental conservation and its coexistence with local communities. Oma Nuclear Power Station has the merit of the reduction in CO₂ emissions estimated to be equivalent to about 3.3 million ton-CO₂, annually (assuming the capacity factor to be 80%).

Environmental Conservation Measures in Preparation for the Construction of Oma Nuclear Power Station

We are undertaking environmental conservation measures in preparation for the construction of Oma Nuclear Power Station in accordance with the procedures specified in the “Environmental Impact Evaluation on Oma Nuclear Power Station”. We are also taking environmental considerations, improvement and enhancement activities into account by means of an environmental management system (established on October 17, 2000).

	Item	Details
Facility measures	Protection of land animals and vegetation	About 29 % of the site is designated as a non-alteration zone and is to be preserved in its natural state.
	Ensuring migration pathways for small animals	In the replaced national highway <ul style="list-style-type: none"> • Installation of conduit that small animals can move below the highway • Installation of inclined gutter to make it to climb up of small animals easily
Measures under construction	Measures to prevent water pollution	<ul style="list-style-type: none"> • Installation of pollution diffusion prevention sheets and execution of water quality monitoring in sea area • Neutralizing seawater in placing concrete in the sea • Draining water after leading and skimming water into settling pond in the site
	Measures to prevent noise and vibration	<ul style="list-style-type: none"> • Selection of machinery with low noise and vibration. • Implementation of measures necessary for noise prevention, following the assessment of noise levels
	Measures to dispose of soil and rock under construction	Soil and rock by excavating and dredging are used for reclamation, backfill and fill. And the soil disposal area is planted after being filled with surplus soil.
	Measures to prevent dust	<ul style="list-style-type: none"> • Wash facilities for construction vehicles • Watering and cleaning construction routes • Installation of dust prevention fences and nets
	Measures to prevent road traffic noise	<ul style="list-style-type: none"> • Designation of routes to be used by construction vehicles • Reduction in road usage through the use of marine transport
	Disposal and effective use of Industrial waste	<ul style="list-style-type: none"> • Correct disposal in accordance with laws and regulations • Recycling of chipped timber and roots as seeding materials



Covered crossing conduits below the road (for small animals to move)



Protective barrier to prevent the spread of pollution



Survey of rare animals

As part of the environmental monitoring program, air quality, vibration, noise and water quality have all been constantly monitored since April 2000, when preparation for the construction started. All come from with recommended values as specified in the environmental impact evaluation.

Environmental surveys of rare animals and vegetation are conducted whenever appropriate in order to ensure the protection of animals and vegetation at planned power station sites.



Tsugu Iwaki
Civil and Architectural Engineering Group, Oma Nuclear Power Project
Construction Preparation Office.

We monitor environmental impacts associated with preparation for the construction and strive to reduce these impacts, aiming at the construction of a power station that harmonizes with the rich natural resources facing the Tsugaru Strait.

Efforts to the reduction of environmental impacts in the transportation of raw materials

Reduction of Environmental Impacts through the Upsizing of Coal Carriers

Each year we import more than 10 million tonnes, or more, of coal from overseas (Australia, China, Indonesia etc.)

A coal carrier is usually a vessel with a capacity of around 60,000 dwt. We are promoting the upsizing of

our bulk carriers.

Upsizing allows a reduction in the amount of fuel oil consumed per weight of coal.

Accordingly, environmental impacts associated with transportation (CO₂, sulfur oxides, nitrogen oxides etc.) will be reduced.



Coal carrier (BLUE ISLAND)

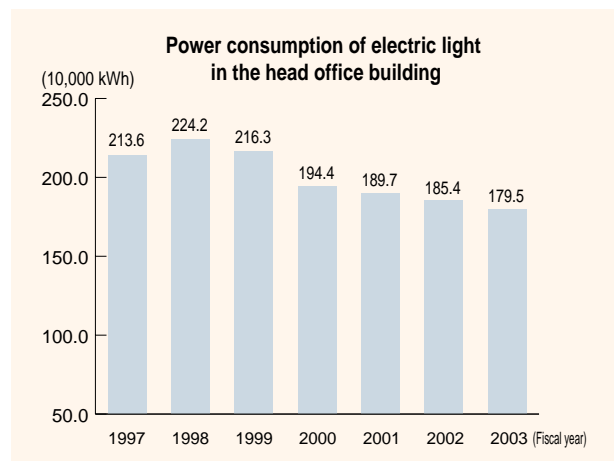
List of Our Dedicated Coal Carriers

Carrier name	Deadweight tonnes (movable capacity)	Built year
Soryumaru	86 868	1995
Shohomaru	87 996	1995
Kurotakistanmaru	87 890	1995
Suireimaru	89 000	1996
SOUTHERN CROSS	73 939	1997
BLUE ISLAND	152 398	2000
Tsunomine	152 400	2000

Promotion of energy saving

Energy saving in the head office building

The energy saving measures taken in the head office building based on EMS include utilization of cooling waste heat, combination of waste heat collection in computer rooms and load-level management by installment of regenerative heat pumps and complete extinction at the time of non-required light. Additional installment of inverters in lighting apparatus of the head office building in fiscal 1999 produced the effectiveness of energy saving equivalent to about 237,000 kWh (about 11% reduction) in fiscal 2000, in comparison with an average of energy consumption for three years from 1997 to 1999. In addition, as a result of energy saving efforts, electricity usage in fiscal 2003 reached 1.795 GWh, 3.2% decline from the previous year.



Solar panel for indoor hot-water supply (on the roof of the head office building)

Energy saving activities

Our individual offices work on energy saving activities such as light extinction during lunch time and complete reduction of stand-by power based on EMS, as part of easy and immediate approaches to prevention of global warming. The power consumption in fiscal 2003 in the head office, our branches and construction sites reached 17.28 GWh (17.81 GWh in fiscal 2002), about 3% decline from the previous year.

Furthermore, efforts were made to economize in vehicle

use. The amount of fuel (gasoline and light oil) used by our own cars reached about 557 kl in fiscal 2003, down by 15% from the 655 kl used the previous year.

The CO₂ emission from office power consumption and car use is equivalent to about 8,400 ton-CO₂.



Junichiro Hoshino

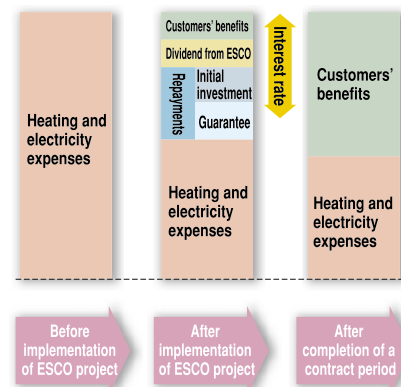
General Affairs Group, General Affairs Dept.

Head office supports the “survey on clarification by energy consumption and diagnosis on energy saving” carried out at the request of the Bureau of Environment, Tokyo Metropolitan Government. The results of this survey are used for data analysis and statistical processing, and as references to help promote an effective energy conservation system for the future.

Promotion of energy saving projects

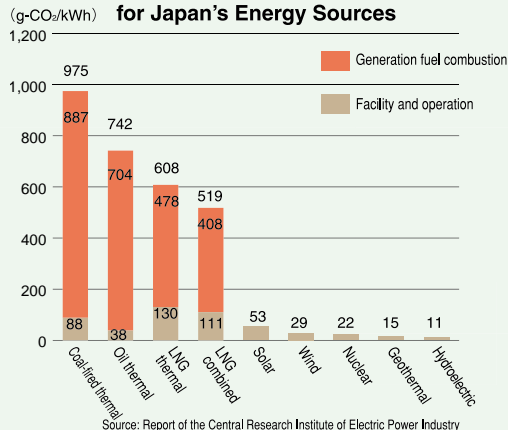
Our company not only promotes measures for main power supply but also invests in the First Energy Service Company, Limited (ESCO, established in March 1997), a first energy service company in Japan, with a deep understanding of the importance of energy saving.

In addition, we are working on selling energy saving equipment and consulting with our group companies. (Refer to p.74.)



Source: Energy Conservation Center “Recommendation of ESCO projects”

Lifecycle Assessment (LCA) of CO₂ Emissions Intensity for Japan's Energy Sources



Source: Report of the Central Research Institute of Electric Power Industry

Reference: Lifecycle Assessment (LCA) CO₂ Emissions Intensity for Japan's Energy Sources

CO₂ emissions over the entire lifecycle of different energy sources in Japan are indicated in the chart on the left side. In this chart, the CO₂ emissions are calculated for all energy consumed for material mining to construction of generating facilities, fuel transportation and refining, operation and maintenance of the facilities, in addition to combustion of generation fuel.

Our company participated in the LCA review committee of the Federation of Electric Power Companies consisting of electric utilities in order to examine LCA for CO₂ and other indicators.

Reducing emission of greenhouse gas except CO₂

The Framework Convention on Climate Change covers five types of greenhouse gas except CO₂. These types of greenhouse gases released from electric utilities affect global warming while their influence level is about 1/500 of that of CO₂ ^(Note).

SF₆ of the greenhouse gas is not emitted during its use due to consumption in confined states, but some of it may be released during equipment check and removal. Our company collects and reuses the gas to ensure the reduction of SF₆ emissions with the aim of 98% or more collection rate. The collection rate of SF₆ in fiscal 2003 reached 98%.

Note: Based on the “Environmental Action Plan by the Japanese Electric Utility Industry”, the Federation of Electric Power Companies of Japan (September 2003).

Measures for reducing emission of greenhouse gas except CO₂

Targeted gas	Measures for reducing emission
Sulfur hexafluoride (SF ₆)	SF ₆ is used as gas insulators for gas-insulated devices. SF ₆ emissions are reduced through ensured collection and reuse of the gas while checking and removing the equipment.
Hydrofluorocarbon (HFC)	HFCs are used as refrigerants for air conditioners. The replacement of CFCs under regulation with HFCs is expected to proceed, but our company is working on emission reduction of HFCs, through leakage prevention, collection and reuse of the gas during installation and repair of equipment.
Perfluorocarbon (PFC)	Our company never emits PFCs.
Nitrous oxide (N ₂ O)	N ₂ O emissions are reduced to the maximum amount through improvement of thermal efficiency in coal-fired power stations.
Methane (CH ₄)	The concentration of CH ₄ in flue gas of coal-fired power stations falls under the level of air environmental concentration. The gas is not released substantially.

Possession and consumption of specific CFCs and halons

Category		2003-year end (t)	Applications
Specific CFCs	Possession	2.5	For refrigerant
	Consumption	0.0	
Halons	Possession	3.9	Fire extinguisher
	Consumption	0.0	
Other CFCs	Possession	9.5	For refrigerant
	Consumption	0.1	
Total	Possession	15.7	
	Consumption	0.1	
Alternative HFCs	Possession	1.4	Fire extinguisher
	Consumption	0.0	

● Protection of ozone layer

The ozone layer, present in the upper stratosphere (at a height of 20-40 km height from the ground), is a great contributor to protection of every life by absorbing hazardous ultraviolet rays. Due to the fact that specific CFCs and halon gases may deplete the ozone layer and have serious effects on human health and ecosystem, it is mandatory to reduce the production and consumption of the gas on an international basis.

Our company is not subject to immediate regulation as being one of the users, but we identify the amount of possession and consumption of the gas on a regular basis and makes efforts to control it.

Reference

Substances depleting the ozone layer are chemically stable and contain chlorine or bromine within their molecules, for instance, specific CFCs and halons. This gas is an intense greenhouse gas, together with HFCs, PFCs and SF₆. Under the Law concerning to Protection of the Ozone Layer (law concerning to protection of the ozone layer based on regulation of specific substances), control subjects based on the Montreal Protocol are defined as “specific substances” and the production and consumption of these substances are being phased out according to the regulation schedule.

As a result, the production and consumption of halons and specific CFCs were totally eliminated at the end of 1993 and 1995, respectively. The production of other substances depleting the ozone layer will be fully phased out.

Efforts to the Utilization of the Kyoto Protocol Mechanisms

Significance of the Kyoto mechanisms and J-POWER's policies for utilization of these mechanisms

The Kyoto mechanisms were introduced for enhancement of economic efficiency in order to accomplish the goals established by the Kyoto Protocol. (see p.76) Japan, which is said to have the highest cost for achieving its target, will receive great benefits from the Kyoto mechanisms.

Prior to the acceptance of the Kyoto Protocol in June

2002, the Japanese government revised the “Guideline for Measures to Prevent Global Warming” (refer to page 75) and characterized the use of the Kyoto mechanisms by companies as “effective measures for ensuring the reduction of CO₂ emissions from energy activities.” Accordingly, we are now actively promoting the use of these mechanisms (JI, CDM and emission trading).

Discovery, cultivation and implementation of JI and CDM projects

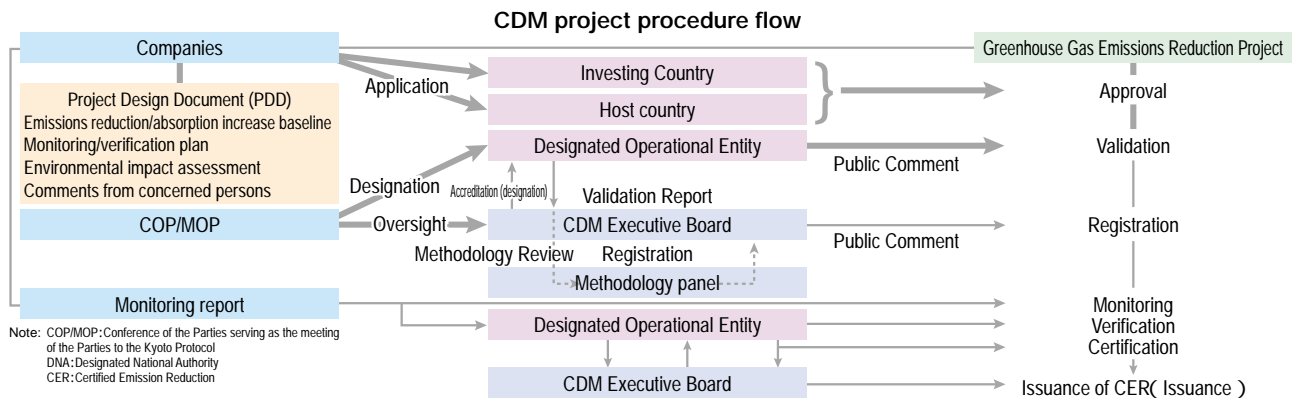
We identify, develop and implement projects leading to the reduction of greenhouse gas emissions, utilizing both JI and CDM.

In fiscal 2003, we focused on the promotion of CDM

projects. We developed our own CDM projects while participating in other companies' projects as an investor and CER (Certified Emissions Reduction) buyer, promoting CDM projects jointly.

The CDM Project Process

The procedure for obtaining credits on CDM projects is shown in the following flow chart.



Our Own Development of CDM Projects

One of our CDM project was approved by the Japanese government in May 2003, in order to develop a biomass-fueled generation program (23MW) as a CDM project in Yara Province, Thailand in which waste wood and chips from a sawmill for rubber trees are used as fuel.

Focusing on greenhouse gases with larger greenhouse

effect, we also promote projects for capture and treatment of those gases and conduct surveys on these projects. We are preparing for the commercialization of a project involving the capture and flaring of methane gas from landfills in Argentine and Chile.

Development of CDM Projects with partners in Developing Countries

We identify potential CDM programs from among projects planned in developing countries and promote efforts for developing these CDM programs in association with local companies, acting as an investor and a CER buyer.

In fiscal 2003, we prepared and released 6 project design

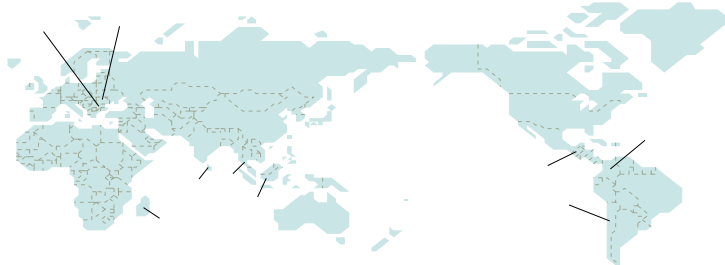
documents (PDD). Three small scale CDM projects and baselines and monitoring methodologies for 3 normal-scale CDM projects were submitted to the CDM Executive Board. One project was evaluated as category A (approved) and registered, while 2 other projects were evaluated as category B (further modification required).

Feasibility Studies

In order to identify potential JI/CDM projects, we conducted feasibility studies on wind power generation and district heat supply projects in Eastern Europe. We also conducted 6 surveys in cooperation with other

companies including a project for the collection of mine methane gas and the production of electric power in China.

CDM projects under development and JI/CDM feasibility study implementation projects in fiscal 2003



CDM projects under development

Biomass power generation project in Thailand
Hydropower generation project in Guatemala
Hydropower generation project in Columbia
Small hydropower generation project in Brazil
Plant fuel switching project in Chile
Cogeneration project in Chile
City gas leakage prevention project in Chile

JI/CDM feasibility study implementation projects

District heat supply project in Bulgaria
Wind power generation in Rumania
Methane gas capture and utilization project in waste processing plants in Rumania
Abundant forest afforestation project in Madagascar
Hydropower generation project in Sri Lanka
LNG plant CO₂ separation and recovery project in Indonesia
Coal mine methane gas capture / cogeneration project in China
Coal mine methane gas capture / power generation project in China

Activities towards utilization of the Kyoto Mechanisms

Working in partnership with the Norwegian company Point Carbon (a world leader in analysis and forecast of emission trading markets) we began providing information to the experts in Japan in October 2003. In addition, we established "GHG Solutions", focusing on web-based services that provide information to Japanese companies interested in addressing to global warming to find the solutions together.

Prior to these activities, we co-sponsored the Southeast

Asian CDM Forum hosted by the Asian Development Bank (ADB) and the International Emissions Trading Association (IETA), in September.

Among our activities to promote efforts to acquire emission credits, we are participating in Dexia-Fondelec Energy Efficiency and Emissions Reduction Fund, together with the European Bank for Reconstruction and Development (EBRD), that is aiming at investment in energy conservation projects in Eastern Europe.

*Dexia-Fondelec Energy Efficiency and Emissions Reduction Fund

Approaches to CO₂ Absorption plus Sequestration, and Recovery

Promotion of overseas afforestation projects

Afforestation is an effective method for absorption and fixation of CO₂ in the air. Our company established joint ventures in Australia and Ecuador to promote planting projects with the aim of final afforestation area of 10,000 ha. Because planted trees are to be used for paper as raw materials in future, natural forest that is currently cut for paper materials can be protected.



Afforestation in Australia



Afforestation in Ecuador

Country name	Joint company name (constituent company name)	Initiation year	2003 afforestation area (accumulation)	CO ₂ sequestration in fiscal 2003	Final target area
Australia	BPFL (note 1) (Oji Paper Co., Ltd., Itochu Corp., Kodansha Ltd. Publishers, EPDC Overseas Coal Co., Ltd., JP Resources Co., Ltd., Seiho Co., Ltd. and J-POWER)	1998	About 1,100ha (6,100ha)	About 140,000 t CO ₂	About 10,000ha
Ecuador	Eucalyptus Pacifico Co., Ltd. (WALTS INTERNATIONAL Co., Ltd., Mitsubishi Paper Mills, Ltd., Sumitomo Corp., EPDC Environmental Engineering Service Co., Ltd. and J-POWER)	2001	About 1,100ha (2,300ha)	About 70,000 t CO ₂	About 10,000ha

Note 1: Brisbane Plantation Forest Company of Australia Pty., Ltd.

Research and development toward absorption and fixation of CO₂

Our company conducts Japan-Australia joint demonstration tests on a technology to develop forests that can fix a great amount of CO₂ in a short term in a site of the closed Ensham Coal Mine, Queensland Province, Australia.

In addition, we conduct research into the optimal location of monitoring points for the geological

sequestration of CO₂. Started in fiscal 2002 under our three-year plan, this research is intended to predict the behavior of underground CO₂ reservoirs, using fluid flow simulations, and to optimize CO₂ monitoring. (Both projects were commissioned by the New Energy and Industrial Technology Development Organization.)

3. Efforts to Environmental Conservation

Law Observance

In fiscal 2003, we had no cases that violated environmental requirements, laws or ordinances. No instances occurred where agreement values on environmental conservation were exceeded.

Main environmental laws

Law name	Main business related with the laws
Environmental Impact Assessment Law Electricity Utilities Industry Law	Prediction and assessment of environmental impacts of power plant construction on surrounding regions
Air Pollution Control Law	Control of SO _x , NO _x and dust emissions resulting from operating power plants
Water Pollution Control Law	Control of waste water from power stations to public water areas
Noise Regulation Law	Control of noise from operation of power stations and substations and construction of facilities
Vibration Regulation Law	Control of vibration from operation of power stations and substations and construction of facilities
Offensive Odor Control Law	Control of offensive odor from operation of power stations and substations
Factory Location Law	Greening of sites such as power stations
Industrial Water Law	Pumping of underground water used as power generation
Natural Parks Law	Construction of power stations, substations, transmission facilities and communication equipment in national parks
River Law	Intake of water from rivers for power generation and construction of generating facilities in river areas
Pollutant Release and Transfer Register (PRTR) Law	Management of release to the environment of chemicals used in power stations
Waste Management and Public Cleansing Law	Proper management of waste generated from business activities
Law Concerning the Improvement of Pollution Prevention Systems in Specific Factories	Selection of manager in charge of pollution control in power plants

Conclusions of environment-related agreement

Environment-related agreements consist of the following measures and actions (although varying somewhat with site and regional characteristics). Quantitative standards on air and water quality are as specified.

- Air pollution control measures
- Noise and vibration control measures
- Water pollution control measures
- Accident actions
- Waste water treatment measures
- Offensive odor control measures
- Nature protection measures

Environmental agreements in our thermal power stations

Name	Targeted power stations	Counterpart
Memorandum of Environmental Conservation Agreement	Isogo Thermal Power Station	Yokohama City
Memorandum of Pollution Control Agreement	Takasago Thermal Power Station	Takasago City, Hyogo
Memorandum of Agreement Concerning to Environmental Protection	Takehara Thermal Power Station	Takehara City, Hiroshima
Environmental Conservation Agreement	Matsushima Thermal Power Station	Oseto Town, Nagasaki
Memorandum of Environmental Conservation Agreement	Matsuura Thermal Power Station	Matsuura City, Nagasaki, Imari City, Saga
Memorandum of Environmental Conservation Agreement	Ishikawa Coal-fired Power Station	Ishikawa City, Okinawa
Memorandum of Environmental Conservation Agreement	Tachibanawan Thermal Power Station	Anan City, Tokushima

With construction of a new No.2 unit (600,000 kW, scheduled to start up in 2009) in the Isogo Thermal Power Station, the agreement on environmental conservation was revised on March 31, 2004.

The 2002 case in which a standard value under a prefectural ordinance was exceeded.

In September 2002, the manganese concentration in effluent from the final landfill site for coal ash from the Isogo Thermal Power Station ^(Note) exceeded the allowable level specified by Kanagawa prefectural ordinances.

In order to ensure environmental conservation, we now treat manganese in penetrating water at a waste water treatment plant provided on-site and only release it after confirming that it has no quality problems. We also hold discussions with related administrative organizations, whenever necessary, and take the appropriate measures to remove the root causes of manganese contamination. We make earnest efforts promoting various surveys, including test bores and water-quality studies, in order to determine the cause and implement earth coverage as part of the preliminary countermeasures.

Note:

Excess over standard value:

On September 19, 2002, manganese concentrations in effluent reached 1.1 mg/l at the final landfill site in Chigasaki City, Kanagawa, exceeding the standard value of 1 mg/l or less, specified by the prefectural ordinance on environmental conservation in Kanagawa.

Environmental Impact Assessment and Monitoring

J-Power conducts environmental impact assessment (EIA) in advance of the establishing, modifying, and expanding of power stations. We survey the current situations of the surrounding natural (air, water, soil and ecosystem, etc.) and social (industry, land use, transportation etc.) environments, and then predict and assess in advance the impacts of the power projects. We open the results of EIA and obtain comments from the public and local governments to take proper measures.

In addition, under present environmental impact assessment system, we must continue environmental monitoring for a certain period after power stations start operation. Based on this rule, we continue the necessary surveys so as to confirm that the impacts on the environment fall within the range of original assessment. (See the “Outline of Environmental Impact Assessment Law”, p.79).



Environmental monitoring after startup of the power stations (sea area)



Air observing station near Tachibanawan Thermal Power Station (Anan City, Tokushima Prefecture)



Environmental monitoring after startup of the power stations (land area)



Telemeter display equipment (Health and Environment Center, Tokushima)

J-POWER s Environmental Impact Assessments

No.	Prefecture	Project	Date
1	Fukushima	Shimogo	Feb. 1974
2	Shizuoka	Sakuma No.2	Jan. 1978
3	Niigata	Aburuma River	Jun. 1978
4	Nagano	Hayakido	Aug. 1981
5	Fukushima	Tadami	Nov. 1981
6	Gifu	Tokuyama	Dec. 1982
7	Hokkaido	Kumaushi	May 1983
8	Hokkaido	Satsunai	Aug. 1986
9	Shizuoka	Akiba No.3	Aug. 1987

No.	Prefecture	Project	Date
10	Okinawa	Seawater Pumped Storage Project Demonstration Test	Jan. 1989
11	Fukushima	Kurotani	Feb. 1989
12	Iwate	Isawa Unit 2	Jun. 1991
13	Niigata	Okukiyotsu Unit 2	May 1992
14	Fukushima	Okutadami and Otori Expansion Projects	Sept. 1995
15	Nagasaki	Matsushima Unit 1 and 2	Jan. 1976
16	Hiroshima	Takehara Unit 3	Feb. 1980
17	Nagasaki	Matsuura Unit 1 and 2	Apr. 1981
18	Okinawa	Ishikawa Unit 1 and 2	Dec. 1982

Date: Submission of the Environmental Impact Statement.

No.	Prefecture	Project	Date
19	Hiroshima	Takehara No.2 unit's Fuel Conversion	Feb. 1991
20	Tokushima	Tachibanawan Unit 1 and 2	Oct. 1994
21	Kanagawa	New Isogo Unit 1 and 2	Aug. 1996
22	Aomori	Oma	Sept. 1999
23	Okayama	Honshi Interconnection Line	May 1983
24	Gunma	Tadami Trunk Line, Phase III	Apr. 1995
25	Shizuoka	Sakuma Higashi Trunk Line	Nov. 1995
26	Aomori	Oma Trunk Line	Jun. 2000
27	Fukushima	Nunobiki Kogen	Jun. 2003

Hydroelectric Thermal Nuclear Power Transmission Lines Wind Power

This table includes not only the EIA based on EIA Law but also the EIA based on the other legal regulation such as Public Waters Reclamation Law, Forest Law, prefectural and municipal ordinances, etc.

Reducing Emissions of Environmental Loads

Air pollution control

Coal burning in coal-fired power stations brings about sulfur oxides, nitrogen oxides and soot. In order to remove these pollutants, combustion methods are improved while flue gas desulfurizer, flue gas denitrificator and electrostatic precipitator are installed. These equipments, whose performance depend on the dates they are installed, employed the latest technology at the time of installation thus removing the pollutants with higher efficiency.

The operation of the equipments is automatically controlled through installment of a measuring instrument that can continuously monitor the status of the flue gas. In addition, our operators watch the status around the clock and are prepared to respond to abnormal events immediately.

In fiscal 2003, emissions and emission intensity for these materials were almost the same as in the previous fiscal year.

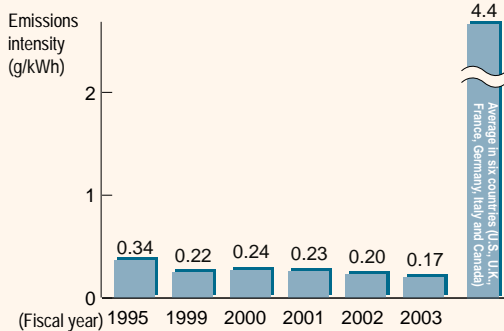
Emissions intensity per intensity Unit Output in our coal-fired power stations are significantly lower that those in the US and major European countries.

2003 Fiscal Year Results

Items	(Removal) Efficiency of equipment	Emissions	Emissions intensity
SOx	67 - 99%	84,000 ton	0.17 g/kWh
NOx	68 - 87%	250,000 ton	0.49 g/kWh
Soot	99% (Design value)	1,000 ton	0.02 g/kWh

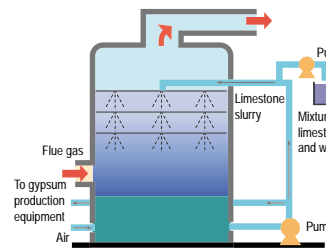
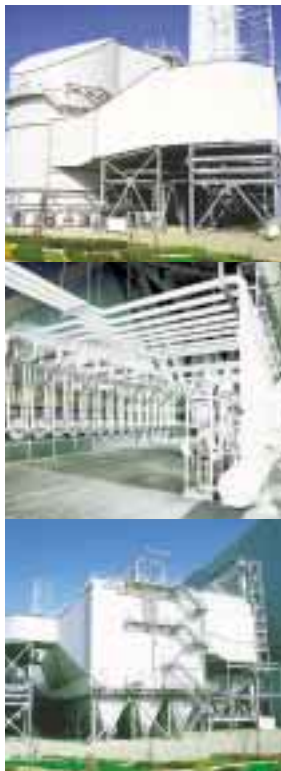
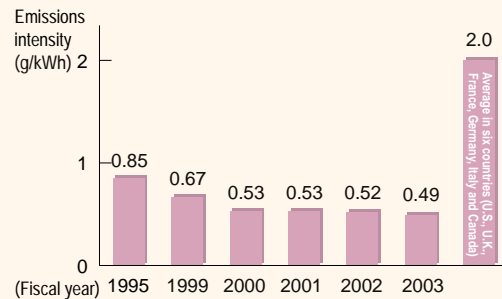
Note: A denominator of emissions intensity in texts and charts represents power generation in coal-fired power plants.

Trend and Comparison of SOx Emissions Intensity



Note: The average in six countries was calculated based on OECD ENVIRONMENTAL DATA COMPENDIUM 1999 and ENERGY BALANCES OF OECD COUNTRIES 1994-1995, 1996-97. (Target: Thermal power stations)

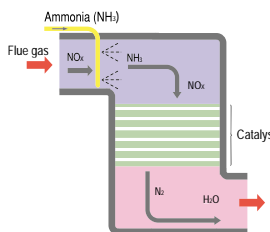
Trend and Comparison of NOx Emissions Intensity



Mechanism of wet type flue gas desulfurizer

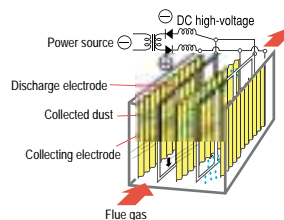
- Lime stone is pulverized to produce a mixture with water (lime stone slurry). Spraying the mixture into flue gas, the lime stone slurry reacts with sulfur oxides in flue gas and become gypsum.

For dry type flue gas desulfurizer units, refer to p.47.



Mechanism of flue gas denitrificator

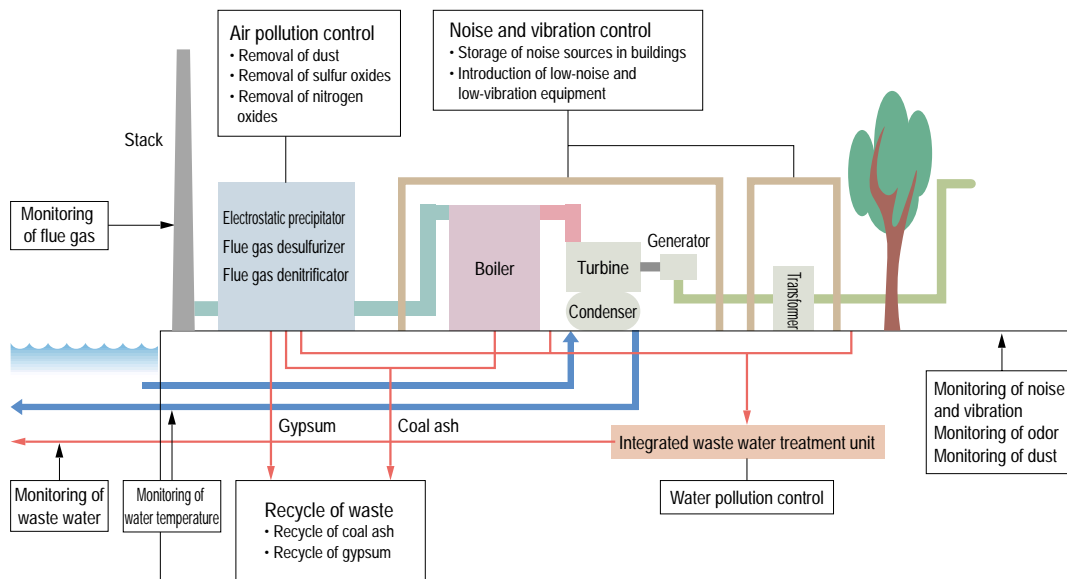
- Injecting ammonia to flue gas containing nitrogen oxides, bring flue gas into contact with metal-based catalyst (substance provoking chemical reaction).
- Nitrogen oxides in flue gas reacts chemically with the catalyst and decompose into nitrogen and water.



Mechanism of electrostatic precipitator

- When flue gas is passed between high voltage electrodes, soot is negatively charged and attached to the positive electrode. Dust that accumulates on the collecting electrode is removed by periodically tapping electrodes so that it falls to the bottom of the precipitator. This principle is the same one on which plastic sheet is charged with static electricity by rubbing it, to attach small paper and dust particles.

Environmental conservation measures in coal-fired power stations



Water pollution control

Waste water treatment equipments are installed in all coal-fired power stations to properly treat waste water from flue gas desulfurizers. Metals and organics contained in wastewater are removed in an integrated waste water treatment plant through coagulation, sedimentation and filtration. Treated water is properly monitored with continuous monitoring by an automatic measuring equipment and periodic analysis, and the pollution level of the water is confirmed to be well below the limits specified by the Water Pollution Control Law and environmental conservation agreements.

Noise and vibration control

In coal-fired power stations, there are noisy and vibrating equipments such as boilers, turbine and fans. We are making efforts to control noise and vibration by introducing low-noise and low-vibration machines inside buildings. In addition, we employ low-noise and low-vibration outdoor facilities in thermal and hydroelectric power stations and install sound-proof covers and walls on the facilities as required. The levels of noise and vibration are periodically measured at the boundary of a power station site and confirmed to fall below the regulatory limit.

Greening measures

Specimen trees, evergreen trees, lawns and seasonal flowers are planted at coal-fired thermal power stations and 20% or more of the site is greened to provides habitats for wild birds, insects and small animals.

Offensive odor control

Flue gas denitrification units in coal-fired power stations use ammonia. So that ammonia may not affect surroundings, we take all possible measures such as periodic checks, performance tests and ordinary inspections on equipment using ammonia. Particular attention is paid to preventing leakage of ammonia when being received and stored. The degrees of offensive odor are periodically measured at the boundary of a power station site and confirmed to fall below the regulatory limit.

Warm water discharge countermeasures

Coal-fired power stations intake sea water to cool steam used for power generation and discharge warm water. The warm water is properly controlled by using intake and release system appropriate for site conditions, so that it may not impact on marine life. The temperature of warm water is monitored around the clock to observe the regulatory limits specified by the agreements.

Dust countermeasures

We install closed conveyors or indoor coal stockyards and provide wind shielding or water spraying as required by geometrical and meteorological conditions, so that dust may not fly during coal handling operations such as unloading, transporting and storing in coal-fired power stations.

Soil pollution control

Actual condition survey on soil pollution

Based on the Environmental Impact Assessment Law enforced in 1999 (Until that time, the Environmental Impact Assessment System in 1977 used to be conducted under the Ministry of Economy, Trade and Industry) and guidance of local governments, our company has implemented environmental impact assessments in advance before construction of power stations and other facilities for a long time, and conducts actual condition survey on soil pollution within construction sites as part of such assessments and confirm in advance that the sites have no pollution. (Refer to “Environmental Impact Assessment and Monitoring”, p.34.)



Survey of soil pollution

Actual survey on soil pollution

- Point name: Tachibanawan Thermal Power Station (Anan City, Tokushima Pref.)
- Survey time: January 1992
- Survey place: Tree points within the planned construction site of the station
- Survey items: Mercury, Cadmium, Lead, PCB. Hazardous substances specified under the “Environmental Criterion on Soil Pollution”
- Survey results: All item results are confirmed to fall below the “Environmental Criterion on Soil Pollution” and show no problems.

Prevention of soil pollution

When preparing for construction of power stations, we implement equipment design in accordance with the Fire Defense Law and various laws, for instance, installing mounds around heavy oil and chemicals tanks and pipes in order to prevent their leakage or separating the hazardous substances to treat them in a waste water treatment unit, so that the substances could not spill to sea areas and surrounding areas if they should leak.

In terms of operation of power stations, in order to keep chemicals and hazardous substances used from leaking to surroundings, we take measures necessary for avoiding soil and underground pollution, defining handling methods and emergency cares regulated by EMS and strictly controlling them while providing educational training for plant staff.

When storing PCB waste, we also stringently control the waste to prevent any spillage from equipment using PCB and storage containers while storing it in an indoor facility sealed with concrete walls and floors so that it may not penetrate into soil should it leak.

Relation with laws

Based on increasing concerns about the effects of soil pollution on health and intensified social requirements for the establishment of soil pollution countermeasures, the “Soil Pollution Measures Law” was enforced in February 2003. Under the law, potentially polluted lands will be investigated at a certain time to identify soil pollution situations, and based on the survey results, sites of factories related to specific facilities using abolished hazardous substances will be specified as lands subject to the law.

Currently, we have no land at operational sites subject to the law, but are planning to survey potential soil pollution studies at all domestic organizations’ sites, on a voluntary basis, from fiscal 2004 to 2005.

Control of Hazardous Chemicals

Pollutant Release and Transfer Register (PRTR) Law

The PRTR is “a system on which the amount of chemical substances released to the environment and the amount of substances transferred with waste are registered and disclosed.” The law was established in 1999, and under the law, the identification of targeted chemicals was launched in fiscal 2001.

Our company use chemical substances for painting and feed water treatment in thermal power stations, and has traditionally

properly controlled these substances, identifying and recording the amount of their purchase and use.

The release and transfer results of substances in fiscal 2003 are as follows.

We make efforts to aim at reducing their usage and properly control, complying with the specified procedures for their use.

We also try to reduce the amount of dioxins released of through adequate control of incinerator.

Chemicals Release and Transfer Totals for Fiscal 2003

Chemicals	Purpose	Handled volume	Released to the environment	Transferred as waste
63: Xylene	Paint dilutions for machine and equipment	6.25 t/y	3,600 kg/y	0.0 kg/y
179: Dioxins	Incineration of waste	-	0.19 mg-TEQ/y	2.1 mg-TEQ/y
253: Hydrazine	Treatment of boiler water for thermal power generation	4.80 t/y	0.0 kg/y	0.0 kg/y
307: Polyalkyl ether	Surface-active agent for coal-storage yards	3.00 t/y	0.0 kg/y	0.0 kg/y

- The amount of handling in offices 1t or more of specific chemicals for a year were counted.
- The amount released of dioxins from waster incinerators were totaled.
- The values, in accordance with the law, are a total of the results registered by each office.

Countermeasures against dioxins

We chip driftwood so that it can be reused. There are 3 sites with incinerators (corresponding to specified facilities for driftwood treatment as defined by the Special Law concerning Special Measures against Dioxins). At these specified facilities, driftwood and other wastes are separated and the correct combustion temperatures for each are controlled and maintained.

The law specifies that the concentration of dioxins in flue gas should be measured at least once a year and that the results must be reported to local governments. In fiscal

2003, the results from all our incinerators fell below the legal regulatory limit.

In addition, in order to reduce the emission of dioxins it is important to promote the reuse of waste and to reduce waste emissions.

Offices Possessing Incinerators

Koide Power Administration Office (Niigata Pref.), East Regional Headquarters
Kouchi Power Administration Office (Kouchi Pref.), West Regional Headquarters
Tachibanawan Thermal Power Station (Tokushima Pref.)

Control of PCBs

Due to their excellent heat resistance and insulation, PCBs used to be widely used in electrical equipment (such as insulation in transformers) but with increasing environmental concerns about their harmful effects their production and import were prohibited in 1974 and owners were obliged to strictly control their use and storage. We install storage warehouses for electrical equipment containing PCBs and implement strict storage and manage. In July 2001, Law concerning Special Measure against PCB Waste was enforced, necessitating the proper treatment of PCBs.

Trace PCB Mixing Problems

After the prohibition on PCB use, trace amounts of PCBs (in about 60% of the cases detected the concentration is 5.0 ppm or less) were found accidentally mixed into heavy equipment. The national authorities informed the press of this in July 2002. We inspected all equipment using insulating oil and confirmed that some equipment contained traces of PCB. For this reason, such equipment is now strictly

As of June, 2003, the amount of stored insulating oil (containing high-level PCBs) was equivalent to about 139 kl.

Storage site	Site number
Coal-fired power stations	3
Hydroelectric power stations (Including substations)	28
Others	2

Our Basic Policy for the PCB Treatment

- To conduct the treatment of PCB, a negative legacy, at an early date, and work for the environmental restoration.
- To carry out the PCB treatment on the basis of the national plan for the treatment in wide area.

managed and reported to the authorities under the relevant law. A national review committee is currently considering the cause of PCB contamination and methods of tracing PCB pollutants. We take all measures necessary to avoid any risks associated with PCB contamination.

Conservation of Natural Environment

Harmonization with river environment in hydroelectric power stations

For our hydroelectric power stations, we are promoting construction of the stations harmonized with nature while also making efforts for harmonization with river environment.

Water quality control in dams

When typhoons and concentrated torrential rains cause landslide upstream, a large amount of muddy water will flow into a large water reservoir. For this reason, power generation discharge may prolong river turbidity.

In order to prevent the prolonged turbid water, we discharge turbid water early and also install “surface intake equipment” in a dam where turbid water may remain stored for a long term, one that can intake surface water at a relatively low turbidity.

- Dams where surface intake equipment has already been installed (Ikahara, Kazeya and Yanase Dams).
- Dam under construction (Sakamoto Dam: Scheduled to be completed in fiscal 2005)

Discharge for river maintenance flow

Downstream from a dam in a hydroelectric power station, due to the decline of river discharge from the dam to an outlet of the station, we discharge water for river maintenance in order to mitigate the effects after discussing with the organizations concerned including the Ministry of Land, Infrastructure and Transport. These discharge efforts were conducted in an area of 527km comprising 30 hydroelectric power station until the end of fiscal 2004.

Approaches to forest protection

Focusing on forest diversity, we decided to take measures to protect our own riverhead forest. On December 2002, we established “provisional guidelines for conservation of riverhead forest” and started conservation efforts in fiscal 2003.

Removal of sediment in reservoirs

A great amount of earth and sand flow into dam lakes and are deposited there every year. To control sedimentation and maintain adequate water storage capacity we therefore implement measures such as dredging, earth and sand removal from the lakes and earth and sand movement in the lakes. In fiscal 2003, we removed about 1,120,000 m³ of silt from ten dams, about 50% of the earth and sand removed then being reused for aggregates and reclamation materials.



Sakamoto Dam's surface intake facilities under construction (Nara Prefecture)



Maintenance flow discharge from Nanairo Dam (Wakayama, Mie Prefecture)



Removal of sedimentation in the Akiba Dam (Shizuoka Prefecture)



Manager for sediment control measures in the Sakuma water reservoir
Manabu Tanaka
Sakuma Power Administration Office, Chubu headquarter

Sakuma power station is the largest hydroelectric station about electric energy in Japan, must cope with sediment earth and sand flowing from an upstream basin into a water reservoir. For this reason, we endeavor to both prolong the life of the water reservoir and give special consideration to the natural environment.

Symbiosis with rare animals and vegetation

Being conscious of the needs to preserve biodiversity, we are working carefully on survey, planning, construction and operation so as to ensure coexistence with rare animals and plants.

Okutadami/Otori Expansion Project - Golden eagle

J-Power's expanded Okutadami-Otori Power Stations, which had been under construction since July 1999, entered into operation in June 2003.

This project is a re-powering project of existing power stations. Utilizing the existing Okutadami and Otori Dams, additional waterways and turbine-generators were constructed, adding about 290,000 kW to the existing power capacity.

In order to ensure the implementation of environmental conservation measures, we obtained ISO14001 certification of the project construction office. It was the first record of this certification of a construction office in Japan. We enhanced promotion of environmental morale of the office staffs and construction workers, elevation of the standard of environmental management and continuous reduction of environmental impacts. We thoroughly implemented the following environmental conservation measures:

- Minimization of modified area, utilization of existing dams
- Minimization of noise and vibration, consideration to lighting and color of the structures
- Reuse and recycling of construction by-products, complete proper treatment of waste
- Conservation of river water quality.

In order to protect the golden eagles (*Aquila chrysaetos*), one

of the "Category I-B" endangered species in the "Red Data Book" issued by the Ministry of Environment), all construction works within a radius of 1.2 km from their nest were suspended during their nesting period (from November to next June). We established an advisory committee composed of experts of fauna and flora including predatory birds. Based on the advisory opinions of the experts, we implemented various measures for symbiosis with the nature such as monitoring and protection of the rare bird species and restoration of the wetland environment.

In 2003, in recognition of our environmental activities in this project, the Japan Society of Civil Engineers gave J-Power the "Technical Prize" entitled, "Preservation of the natural environment and technical challenges overcome in the process of redevelopment of a hydropower station (Okutadami-Otori Hydro Project Construction) with a view toward breeding and coexisting with golden eagles".



The young golden eagle (photographed on July 16, 2003, 30 days after leaving the nest)

Demonstration Test in a Sea Water Pumped Storage Power Generation in Okinawa – Protected Environment Area

From fiscal 1987 to 2003, in commission of METI, J-Power carried out the world's first demonstration test of sea water pumped storage generation in Kunigamison Village, Okinawa Is. Since many rare animal species endemic to this island were found around the project site, J-Power promoted the project so as to make the pilot plant friendly to the surrounding natural environment. For example, we tried to restore the environment of the spoil disposal area, of which capacity is 45,000 m³ as a biotope. The topography was formed similar to the surrounding mountainous terrain, and

about 30,000 native trees were planted on it.

Through subsequent environmental monitoring, it was confirmed that the natural environment was successfully restored. The results were documented ("From the forest of Yambaru - The record of endeavor for coexistence of development and nature") as a contribution to future environmental protection measures.

In fiscal 1999, in recognition of our accomplishments in this area, the Japan Society of Civil Engineers gave J-Power the "technical prize".



"From the forest of Yambaru"



The biotope on the spoil disposal area

Overseas Transfer of Environmental Conservation Technologies

Our efforts to overseas technological cooperation projects

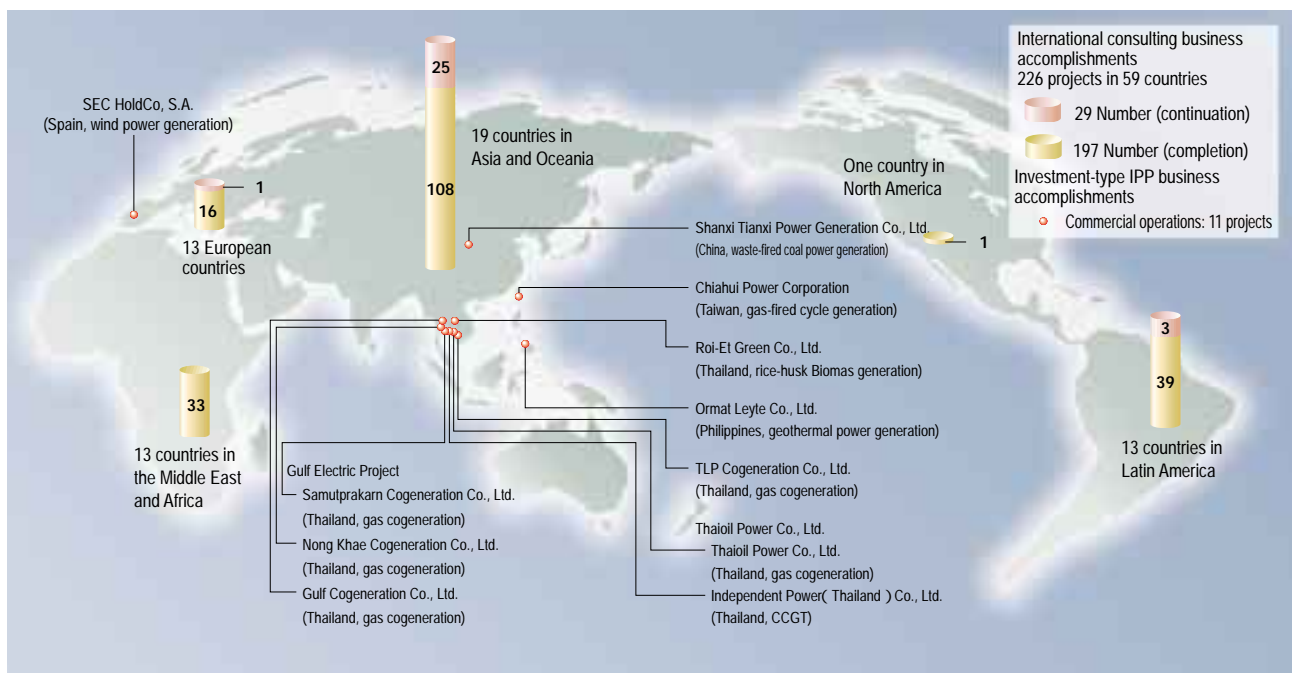
History and Accomplishments

Our international technological cooperation projects began in the early 1960s. Since then we have, through our overseas consulting business, been able to promote many international cooperation projects. Making use of our accumulated technical expertise, we have successfully dispatched governmental experts to

counterpart organizations and received trainees from developing countries for 40 years.

As of the end of fiscal 2003, a total of 226 international consulting projects had been implemented in 59 countries.

International consulting and IPP projects implemented around the world



(As of the end of March, 2004)

Main international projects

As part of our program for the overseas transfer of environmental protection technologies for thermal power generation, we proposed SO_x and NO_x reduction technologies for EU countries and presented optical SO_x reduction measures to East European countries suffering

from acid rain. We also conducted tests on high-sulfur coal desulfurization technologies in China (commissioned by the Ministry of Economy, Trade and Industry).



Rehabilitation Project of the 4th Thermal Power Plant in Ulaanbaatar



Study on the Reuse of Methane Gas from a Waste Landfill Site in Rumania

Recent main international projects

	Project Name	Country Name	Project period	Project outline
Thermal power	Rehabilitation Project of the 4th Thermal Power Plant in Ulan Bator	Mongolia	Nov.2001 ~ Oct.2006	Management of repair of power stations
Thermal power	Study on Prevention of the Release of Coal Dust at Janamanjung	Malaysia	Oct.2003 ~ Dec.2003	Develop measures to control the release of coal dust from a coal-storage yard at a thermal power station.
Hydropower	Yuncan Hydroelectric Power Project	Peru	May1998 ~ Sep.2004	Detailed design and management of construction of dams and power stations
Hydropower	Upper Kotmale Hydro Power Project	Sri Lanka	Nov.2003 ~ Nov.2009	Tender support for the construction of dams, power stations and construction management
Transmission and distribution	Transmission and Distribution Development Project in Paraguay's Metropolitan Area	Paraguay	Aug.1996 ~ Nov.2005	Detailed design and construction management for transmission lines, new substations and distribution grids
Technical standards	The Study for Establishment of Electric Power Technical Standards and Guidelines in Cambodia	Cambodia	Oct.2002 ~ Jan.2004	Intellectual support on electric power technology upgrade and other development projects
Environmental management	Support for Preestablishment of EMS by Electricity in Vietnam	Vietnam	Nov.2003 ~ Jan.2004	Support for establishing an environmental management system.
Waste	Feasibility Study on CHA Gas Extraction and Utilization from Landfill	Rumania	Oct.2003 ~ Mar.2004	Develop measures for Utilization methane gas generated from a waste landfill site.
Solar power	Demonstration Research Project Dispersed Power Generation System Technologies Photovoltaic Wind Power and Advanced Storage Batteries	China	Oct.2003 ~ Mar.2005	Conduct a demonstration test on wind power, advanced batteries and mini-grids.
Wind power	North Luzon Wind Power Generation Project	Philippines	Sep.2002 ~ Jun.2004	Support for a tender for construction of a wind power plant
Energy conservation	Project for Establishing a System for the Diffusion and Promotion of Energy Conservation	Sri Lanka	Mar.2004 ~ Oct.2004	Recommend optimal systems, organizations and policies for the promotion of energy conservation.

Promotion of overseas IPP projects

In response to the worldwide privatization and deregulation of electric utilities we have engaged in various overseas projects. As of the end of fiscal 2003, we were involved in 15 projects in 6 countries/regions with international IPP projects utilizing high-efficiency techniques developed for national thermal power

stations and environmental preservation technologies aimed at striking a balance between the environment and the economy. We are working with local staff at the Bangkok office, established on September 2002, in order to develop a smooth and stable business operation for investment projects.



Roi-Et Hull-fired Thermal Power Station



Chiahui Gas-Fired Power Station

Future business and contributions to sustainable development

In our international consulting business, under difficult situations over ODA, we are working on entering into areas where our technologies such as water supply and irrigation, focusing on an electric power field using ODA, and also aiming at developing our business in non-ODA areas such as private development projects. In

addition, we will address international investments under right portfolio strategies.

Our belief is that increasingly promoting this type of international technological cooperation through consultation and investment will contribute to sustainable development, worldwide.

Reception of overseas trainees

Fiscal year 2003: 25
Total: 2,005



Overseas trainees participating in workshops



Kazuyuki Yamada

Consulting Thermal G, International Business Division

Through my daily involvement with operations, I feel that the prospects for overseas environmental cooperation are wide open for the type of joint project involving a major player, a secondary partner, our staff and local staff.

4. Recycling and Re-use of Circulating Resources

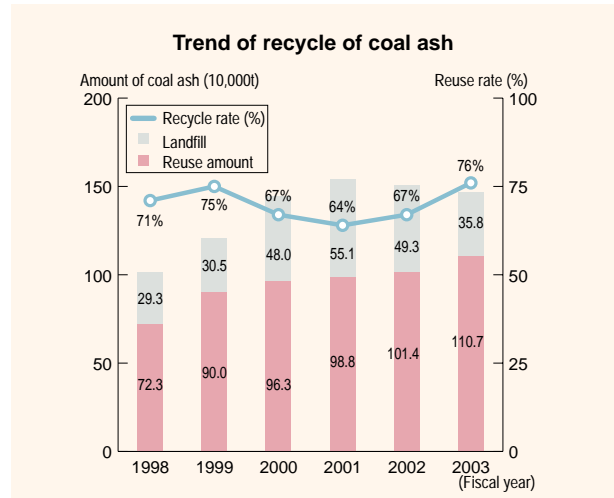
Reduction of Waste

Recycle of coal ash

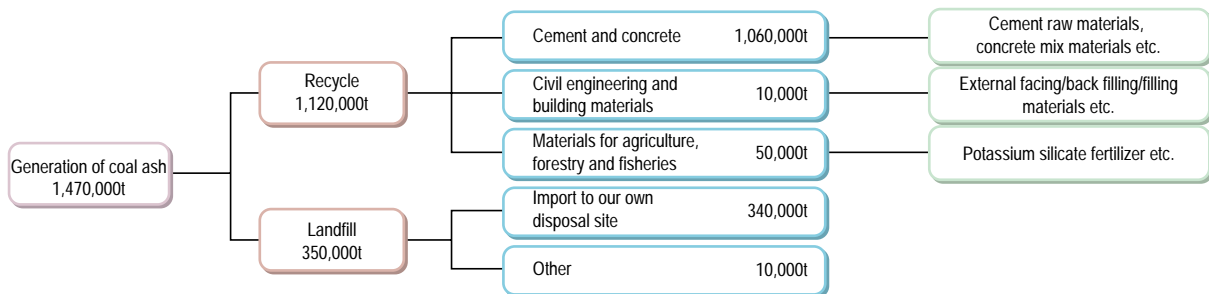
Our dominant waste is coal ash. The ash is generated as residue when coal is burned in coal-fired power stations. The amount of coal ash generated in fiscal 2003 reached 1,470,000t and 76% of the ash, 1,120,000t of the coal ash was recycled.

Coal ash is mainly recycled for use as cement raw materials and concrete mix materials and also for civil engineering and building materials and materials for agriculture, forestry and fisheries. In particular, in the area for agricultural and marine material, one of our group company produces silicate potassium fertilizers in its fertilizer mill and sells them.

Most of coal ash that cannot be recycled is reclaimed in our four disposal sites (Chigasaki City, Kitakyushu City, Matsuura City and Ishikawa City).



Breakdown of recycle of coal ash (Fiscal 2003)



Coal Ash Used for Artificial Upwelling Projects

A first-ever national undersea artificial upwelling project (creating artificial submarine mountains) has started at two sites in Nagasaki.

As a means of recycling coal ash, large blocks have been used to construct artificial undersea mounds to promote upwelling and improve fisheries.

The mounds, each 10 meters or more length and height, have been constructed using ashcrete blocks (hardened coal ash) on the seabed at around 100 m depth. These “mountains” produce a current upwelling that raises minerals to a height where photosynthesis can occur so creating a food chain of “minerals phytoplankton-zooplankton-minerals” in the ocean. This can be expected to increase fish catches.

Based on the results of previous demonstration projects, construction of these artificial submarine mountains was started at two sites at Tsushima and Uku in Nagasaki in

fiscal 2003, as part of a large fishing ground establishment project. This project is planned to last for three years, from fiscal 2003 to 2005. As part of this project, more than 20,000 t of coal ash will be used at each site. During fiscal 2003, about 15,000 tons of coal ash were delivered to the two sites from our Matsuura Thermal Power Station.

For reference, the Ashcrete Co., Ltd.*, provides the ashcrete mixing technology and leases construction equipment for this project.

*Joint venture by J-POWER, Hazama Corporation, SEIBU Construction Co., Ltd., Tokyo Electric Power Co., Inc. and Idemitsu Kosan Co., Ltd.



Recycle of gypsum

Our company recycles gypsum, by-products generated from operation of wet type flue gas desulfurization units in coal-fired power stations as raw materials for gypsum boards and cement. In fiscal 2003, it recycled about 320,000t of the by-products and maintained the rate of utilization of 100%.



Gypsum board

Reuse and recycle of construction by-products

Our company is promoting the use of construction by-products together with our contractors to recycle concrete blocks and cut trees and utilize soil generated from construction works.

For cut trees from the Sakuma Higashi Trunk Line Partial Reconstruction, all the trees are reused as follows:

Trunks available for lumbers are shipped to the market.

Trunks available for hurdle piles are used as earth retaining hurdles.

Trunks/branches/roots are chipped except the above, and the chipped materials are mixed with greening materials, used for prevention of flourishing and mulching of weeds.

Using greening mix materials produced, our company implements slope greening works.



"Trunk chipping and slope greening works", Sakuma-Higashi Main-Transmission Line Construction Office (Shizuoka Prefecture)

Recycle of driftwood

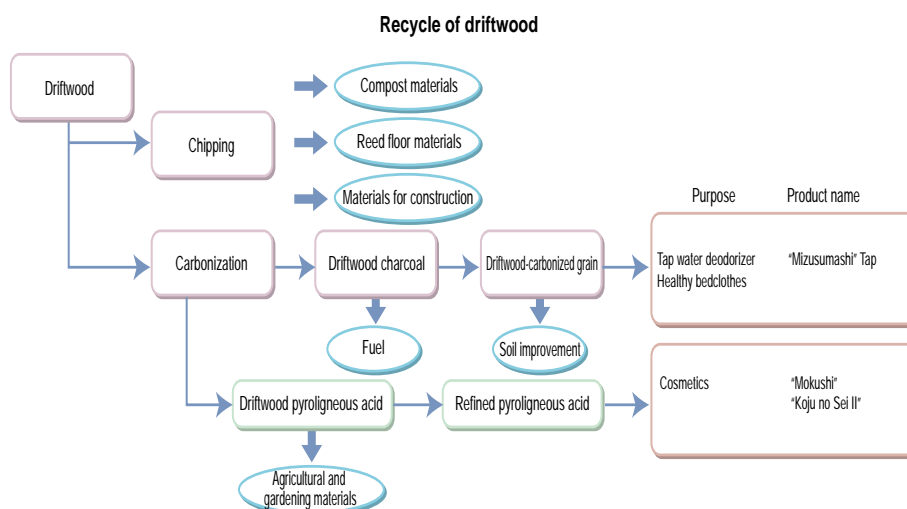
Our company collects driftwood flowed into dams of hydroelectric power stations for production of charcoal and acquisition of pyroligneous acid and reuse them as building materials and fertilizers by chipping.

In fiscal 2003, due to higher demand for road slope

spraying materials, driftwood collected and stored in the previous year was processed, and 9,400 m³ of the driftwood was recycled.



Driftwood entering the reservoir (Sakuma Dam)



Office efforts

Our company is working on versos of old paper, separate collection of paper, cans, bottles and plastics and reuse of envelopes on a company-wide scale in order to reduce general waste. We are promoting sorting of general waste such as paper by familiarizing ourselves, based on the head office's EMS. The amount of waste generated in fiscal 2003 reached 30 t: a 39%



Separate collection box

decline from the previous year brought about through the separate collection, sorting and recycling of mixed paper from the head office building.



J-POWER Head Office

Green Purchasing

Purchasing green products

Our company is working to use of recycled hygienic paper and copy paper and employment of energy-saving OA equipment such as PCs and copying machine. With full enforcement of the Law on Promoting Green Purchasing, we developed the Green Purchasing Guidelines in order to promote the priority of purchasing more green products in fiscal 2001. In fiscal 2003, we purchased green products in 12 areas, and as a result, the purchasing rate of recycled paper for copying reached 98.4%.

Main green products purchased in fiscal 2003

Area	Item
Paper	Copy paper, hygienic paper (toilet paper)
Purchased print materials	Print materials (report documents etc.)
Stationary	Mechanical pencils, office envelope (bearing company name), ballpoint pens, highlighter pens, files, recycled boxes, etc.
OA equipment	Computers (PC, printer), copying machine
Public works	Low-noise construction machine (backhoe shovels, bulldozers, etc.)

Introduction of low-emission vehicles

For our company-owned cars, we are also promoting the purchase of low-emission vehicles designated as targeted items under the Green Purchasing Guidelines. We have adopted 71 low-emission vehicles (about 20% of the company fleet) as of the end of fiscal 2003. When changing existing cars or purchasing new cars, we convert them to low-emission vehicles in principle ^(Note).

Note: Hybrid car, natural gas car, electric car, methanol car, certified fuel-efficient and low-emission gasoline-powered vehicle



Natural gas car

Environmental Recycling Business

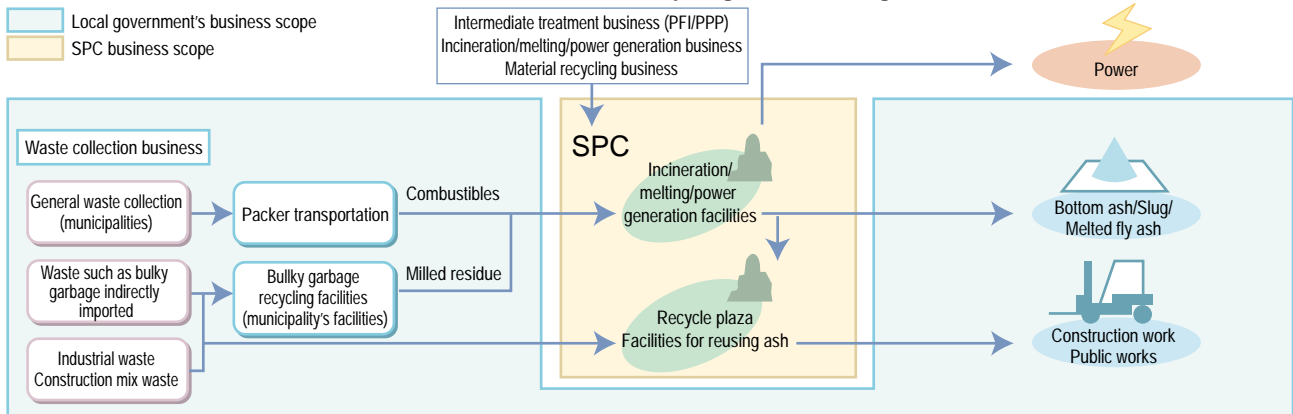
Environmental recycling business

Our company is aiming at social contributions in terms of proper treatment of waste, environmental measures and promotion the use of unutilized energy. In particular, based on long-term contracts with regional EPCOs (Electric Power Companies), we have implemented a package of capital investment, design, construction, maintenance and management concerning to infrastructures such as power generation (transmission) facilities. Making full use of these experiences, we are actively working on development and

operation of public infrastructures in environmental recycling areas through the PFI (Private Finance Initiative)/PPP (Public Private Partnership) projects.

Note: The PFI (Private Finance Initiative) and PPP (Public Private Partnership) are methods to implement business and projects on construction, maintenance, management and operation of public facilities by utilizing private resources, management capabilities and technological skills, etc.

PFI/PPP Environmental Recycling Business Image



Examples

- Waste-fueled power generation/intermediate waste treatment project (participation in Omuta recycling generation and other PFI projects)
- Establishment and management project for a water purification plant's waste water treatment facility (participation in a specific project for the Samukawa water purification plant's waste water treatment facility and the increased reuse of soil generated by water purification)
- PFI advisory (PFI advisory activities for waste heat recovery facilities etc.)
- Study on PFI project contract and risk sharing
- Feasibility study on PFI projects

Development of simple and continuous dioxin measuring method

Our company has worked on the development of a simple measuring method for dioxins jointly with EPDC Environmental Engineering Service Co., Ltd. As a result, we were successful in continuously determining the concentration of dioxins in an indirect manner by measuring organic halogen compounds in flue gas of an incinerator. We commercialized this simple measurement

method and started to sell the measuring unit (product name: OHC-201) on January 2002. This unit is expected to contribute to reduction of dioxin emissions.



OHC-201



Tsuyoshi Watabe (in charge of sales of OHC-201)
 Recycle Business Marketing & Merchandising Group, Business Development Division

I consider that this product is useful for emission and effluent monitoring and also for operation control (such as cost and operation optimization by controlling the injection rate of activated charcoal used in the removal of dioxins). It is hoped that the adoption of this product will contribute to environmental protection.

5. Technological Research and Development

We have made efforts to develop a range of advanced techniques that have placed us in the forefront of electric power generation and have contributed to the development of electric power technology in Japan by applying them to our own facilities. We have continued to develop more efficient and economical power generating systems earnestly to create new business, aiming to be “Number One” in the fields of “Energy” and “Environment.”

Introduction of Research and Development Results

The following is our recent main technological research and development results and their introduction in the areas of “Energy” and “Environment.”

Coal-fired Thermal Power Generation

World’s best generation efficiency

With the aim of achieving enhanced efficiency of thermal power generation, we have improved the steaming conditions (temperature and pressure) in thermal power stations step by step while ensuring reliability, safety and economy of heat resistant alloy materials for boilers and turbines. We firstly adopted the USC turbine into the Unit 2 of the Matsuura Thermal Power Station and then into our other generating facilities, and accomplished the world’ top level of generation efficiency.

This remarkable efficiency provides less effect on the environment such as reduction of coal usage and reduced emissions of environmental load substances while contributing to economical power supply.

*Joint research companies

(Turbine) Mitsubishi Heavy Industries, Hitachi, Toshiba

(Boiler) Mitsubishi Heavy Industries, Babcock-Hitachi, Ishikawa-Harima Heavy Industries

*Awarded the 1999 Japan Society of Mechanical Engineers Prize



Matsuura Unit 2 USC Turbine

Substantial reduction of industrial water

A large amount of industrial water is used in wet type flue gas desulfurization units in coal-fired power stations. Since 1980, with the support of the government, we have promoted research and development into dry type flue gas desulfurization and introduced the first one into the new No.1 unit of Isogo Thermal Power Station. As a result, we have been able to reduce water consumption by 99% and power consumption by 44%, respectively, in comparison with those of wet type flue gas desulfurization units.



Dry type flue gas desulfurization unit (Desulfurization tower), Isogo Thermal Power Station

Hydroelectric Power Generation

Redevelopment of existing dams

We developed the new great deep-water provisional coffering method in which a new intake point is opened in a dam without lowering the level of storage water, in order to maintain dam capabilities and minimize environmental effects on surrounding areas when redeveloping existing dams, and applied the method to the Extension Construction of the Okutadami Power Station that boasts the highest storage water in Japan. The need for this type of technology is expected to increase now that the government has established a policy for the exhaustive utilization of existing dams.

*Joint development companies: Kajima Corp., Toyo Construction

* 2003 Japan Society of Civil Engineers “Technology Prize”



Provisional coffering, Okutadami Dam

Pumped storage power generation using sea

Our company is conducting a demonstration test on the world's first sea water pumped storage power generation facility (maximum capacity: 30,000 kW) in the main land of Okinawa, commissioned by the government.

Commissioned by the government, we conducted a demonstration test on the world's first sea water pumped storage power generation unit (maximum output: 30,000 kW) on the main island of Okinawa. Seawater pumping provides much advantage in conditions of location but faces various challenges due to the use of salty water. In order to solve these problems, new technologies such as seawater lining by rubber sheets, seawater detection system, FRP water pressure pipelines and special stainless steel pumping turbines were developed and adopted. The effectiveness of these systems were proven through

a 5-year commissioning process, starting from fiscal 1999. We have continued these tests in conjunction with the Okinawa Electric Power Co., Ltd., since the start of fiscal 2004.

*1999 Japan Society of Civil Engineer "Technical Prize"



Demonstration test on sea water pumped storage power generation

Power Generation in Reuse Incinerator

Generation using waste

Our company established a waste-fuel generation system superior in economic and environmental characteristics with the use of "Refuse Derived Fuel (RDF)" made of general waste and introduced the RDF technology into the Omuta Recycle Power Station. In our demonstration test, we confirmed that the combustion of RDF restricted boiler corrosion and allowed for the higher efficiency of power generation, or 35% in refuse power generation, and furthermore, we developed an advanced flue gas treatment technology that can remove dioxins and heavy metals, in addition to soot, SOx and NOx.



Full view of test unit for power generation technology using RDF

Recycling and Environment

Recycling of coal ash

Coal has an ash content of about 10%. About 1.5 million ton of coal ash is generated by us each year. We try to recycle the ash and reuse it, mainly as a raw material for cement production. As well as promoting this effective

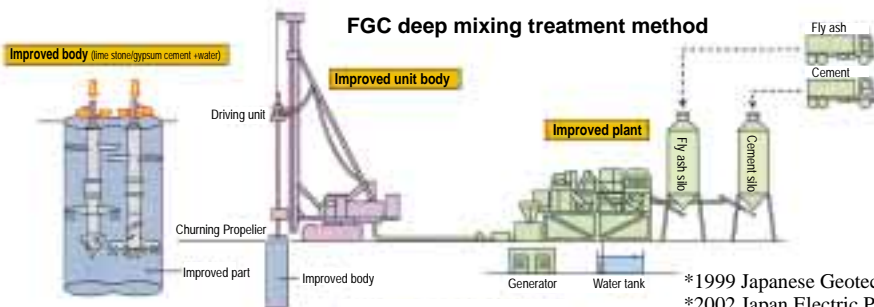
use we are actively working on the research and development of other applications for the ash.

Application coal ash to civil engineering

works

Our company has developed recycle technologies for coal ash through the application of the ash to

construction of power stations. Currently, we offer consistent engineering services from survey, design to supply of coal ash and construction management.



*1999 Japanese Geotechnical Society "Technology Development Prize"
*2002 Japan Electric Power Civil Engineering Association "Technology Encouragement Prize"

- Application coal ash to agriculture (See p.74.)
- Application coal ash to fisheries (See p.43.)

Promotion of Engineering Research and Development in Progress

Here, an introduction is given to some representative examples of our engineering research and development programs in the fields of “Energy” and “Environment” in recent years. As to Biomass Fuels and CO₂

Energy Field

Coal gas production from coal

J-Power is proceeding the EAGLE project centered on Coal Gasification and Gas clean up as one of the Coal based High Efficiency Power Generation technologies. Full name of EAGLE is coal Energy Application for Gas, Liquid and Electricity, it is aimed to establish Integrated coal Gasification Fuel Cell (IGFC) combined with Fuel Cell, Gas Turbine and Steam Turbine. 150t/d EAGLE pilot plant test has been started on March 2002, it is scheduled to conduct Performance and Reliability test for 5 years.

Solid Oxide Fuel Cell (SOFC)

Solid Oxide Fuel Cell (SOFC) promises high-efficiency and reliability that utilizes wide variety of fuels in a wide range of capacity from dispersed to large-scale power generation as a substitute for thermal power plant.

SOFC can be expected to realize a combined cycle system that allows substantial reduction in CO₂ emissions by integrating coal gasification. A modular structure for the system is currently being scaled up after substantial revision. The system is being further developed with a view to verifying its long-term reliability and establishing a systematization technology.

Environmental Field

Sediment treatment technology

Reservoirs will silt up and reduce those capacity as soil flows in and sediments. On the other hand, soil is not supplied in sufficient quantities from the upper reaches to the downstream parts with devastating consequences: Deepening of the riverbed, erosion of the riverbanks, and changes in the riverside environment.

As the solution to this matter, new sediment management system has been developed that uses the soil sedimentation to form a banked-up terrace immediately below the dam and utilizes the dam's discharge function to flush the soil terrace downstream in flood periods. This system is being developed through hydraulic model experiments, numerical fluid analysis and field observations.

* A joint research with Delft Hydraulics, Netherlands, and HR Wallingford, UK.

Technology development for cleaning the aquatic environment

J-POWER is in the process of developing and proposing a new technology for the purification of the aquatic environment. The technology is based on a novel concept that combines the solutions suggested on our Environmental Community Site¹⁾ and our Bed Material Purification Technique using natural materials²⁾.

¹⁾ This Internet site provides opportunities for promoting environmental protection by gathering and sending out information on the local environment via the Internet.

²⁾ Utilize natural porous materials (charcoal from drift wood, volcanic rubble, etc.) for improving the bed. This technique is expected to provide a natural cleaning effect by forming aerobic benthic life.

Absorption/fixation, please refer to their separate introductions in p.24 and p.32 respectively.



Coal Energy Application for Gas, Liquid & Electricity pilot plant



Pressurized 10 kW module



Bed-load transport experiment using hydraulic model



Experimental Cleaning Facilities on the Lake

Supercritical Water Utilization Technology Research

Supercritical water (374°C, 22 MPa or more) is expected to be able to facilitate various chemical reactions such as hydrolysis and oxidation. Utilizing these characteristics, we are developing recycling technologies such as processing of biomass and high-performance waste water treatment.



Experimental apparatus for supercritical water reaction tests

Production of plastics from wood waste

This technology is intended to utilize lignin and cellulose that are extracted from the unused thinning woods and/or other woods wastes. Lignin and cellulose are the main components in wood. Lignin is used as raw materials for an alternative to oil based plastics (wood plastics). Moreover, cellulose is hydrolyzed into sugars that can ferment to lactic acid. Lactic acid is interesting as raw materials for biodegradable plastics. The demonstration plant was built by collaboration with 8 companies* in Wakamatsu Research Institute and has been tested to verify the process for extraction of lignin from wood waste.

*Collaboration companies: Functional Wood Material Research Association's members, Ebara Corporation, Taisei Corporation, Toyo Jushi Co., Ltd., Kokuyo Co., Ltd., Maruto Instrument Co., Ltd., Cosmo Engineering Co., Ltd., Nagoya Port Lumber Warehouse Inc.



Functional wood material production demonstration plant (supported by the Forestry Agency)

Production of plastics from food waste

Poly-lactic acid known as biodegradable plastics is manufactured by polymerization of lactic acid that produced by fermentation of food waste. (Food waste is discharged from food processing plants, hotels, department stores and so on). The demonstration plant was built by collaboration with 5 companies* in "Kita-kyushu Eco-town" Area and has been tested to verify the process for production of poly-lactic acid from food waste.

*Collaboration companies: Kitakyushu Foundation for the Advancement of Industry Science and Technology, Ebara Corporation, Organo Corporation, Musashino Chemical Laboratory, Ltd. and Environmental Technology Service Co., Ltd.



Food waste (oil alternative) plastics production demonstration plant (supported by the Ministry of Agriculture, Forestry and Fisheries)

Shozo Kawasaki Environment Science Laboratory, Chigasaki Research Institute



J-POWER has applied and developed a lot of technologies for protecting the environment through the construction and operation of its power stations. We research and develop those technologies for realizing the society that is harmonized with the environment.

Toshinori Yasutomi EAGLE Technology Development Group, Wakamatsu Research Institute



We are doing its research to establish the coal gasification technology acceptable for fuel cells with coal feed 150t/day pilot plant aiming to implement the IGFC system.

Number of Industrial Properties

	Power Generation Field	Recycling Technology Field	Environmental Technology Field	Others	Total
Sole Application	6	-	-	9	15
Joint Application	16	5	14	95	130
Total	22	5	14	104	145

6. Environmental Communication

It is our official policy to promote initiatives to improve environmental conservation and foster communication with local communities as a way of building trust and good community relations. Furthermore, as a wholesale electric utility, we endeavor to maintain good public relations with our electricity end users, with whom we might otherwise have little direct contact.

Publication of Environmental and Social Activities Report

We have issued the “Environmental Activities Report” annually, since fiscal 1998. This report’s title was changed to the “Environmental and Social Activities Report” in fiscal 2003 and is now in its seventh year of issue. In fiscal 2004, a digest version of this report was also released. Its English version has been issued since fiscal 2002.

The contents of this report are available on our website: <http://www.jpowers.co.jp>



English version

PR Activities

Advertisement

Our corporate advertisement and many other ads are displayed in newspapers, economic magazines, weekly magazines and at transport facilities.

We have reported our active involvement in an endeavor to address global warming and other environmental issues in the “Re View Series” issued since February 2004. (Ad copy: “Think New, Think Renew”).

Advertisements on “Rice hull-fueled power generation,” “Afforestation Project,” “Bio solids” and “Coal gasification” have been published in newspapers.

A commercial emphasizing our commitment to environmental protection has been released through our sponsored TV program “Sound Sonority”(NTV).

Newspaper advertisement



Rice hull-fueled power generation (published in February 2004)



Afforestation project (published in March 2004)



Biosolids (published in March 2004)

TVCM



Coal gasification technology (published in May 2004)



Environmental "Giant Tree" Section

Main brochures

We are publishing "Corporate Brochure" and "Annual Report" every year, and distributing them to people for explanation of our activities. Our efforts in environmental conservation appear also in these brochures. Besides, "Oshiete 'J-POWER'" (Tell Me

About J-POWER)" explains our business, which is not well known to the public yet, in an easy-to-understand manner, and "J-POWER wa chikara mochi (My J-POWER, the Mighty)" for children are also published and distributed at power stations and various events.



Corporate Brochure



Annual report



"Tell Me About J-POWER" (in Japanese)

"My J-POWER, the Mighty" (in Japanese)



In-house Public Relations Magazine "J-POWERS"

Our public relations magazine "Dengen" was published as a J-POWER company magazine until March 2004. In April 2004, however, it was revised as the in-house public relations magazine "J-POWERS" for J-POWER Group employees. Since then, this new magazine has been published monthly with the objective of communicating the views of the top management from each of the Group's companies, sharing information within the group and ensuring good communications between employees.



J-POWER company magazine "Dengen"



In-house public relations magazine "J-POWERS"

PR Houses run by J-Power

We now have 15 PR facilities, which a total of about 300,000 people made use of in fiscal 2003.

Open-type Power Station

Okukiyotsu Pumped Storage Power Station No. 2 in Niigata Prefecture is an open-type power station, where visitors can see and touch hydraulic power generators and power distribution panel, with “OKKY,” an exhibition facility built next to it (Visitors during the Fiscal 2003: 21,547).



Okukiyotsu exhibition facility "OKKY"

“Dam Side Park MIBORO”

The “Dam Side Park MIBORO” in Gifu Prefecture was opened in April, 2001, with PR facility introducing the history of Miboro Dam construction and the dramatic story of the birth of “Syokawa Cherry Trees” and a restaurant where people can dine while enjoying the view of Miboro Dam (Visitors during the Fiscal 2003: 119,386).



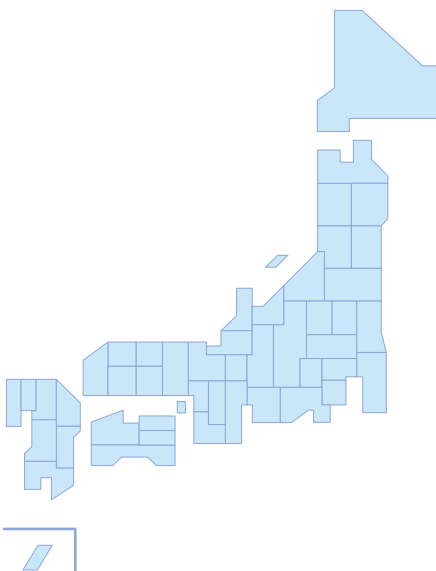
“Dam Side Park MIBORO”

“J-POWER Yonden Wonderland”

J-POWER Yonden Wonderland was opened in December 2002, on the opposite shore of the Tachibanawan Thermal Power Station in Tokushima Prefecture. A former spoil disposal area for the construction of this station has become a recreation land for local people due to joint development by Shikoku Electric Power Co., Inc. and J-POWER (Visitors during the Fiscal 2003: 65,159).



“J-POWER Yonden Wonderland”



J-POWER's PR Facilities

Name	Address
① Onikobe Exhibition House	〒989-6941 2-5 Onikobe-aza-Arao-dake, Naruko Town, Tamatsukuri-County, Miyagi 986-6941
② Okutadami Electric Power House	〒946-0082 1317-3 Oaza-Imokawa-aza-Otori, Yunotani Village, Kita-Uonuma-County, Niigata 946-0082
③ Okukiyotsu Exhibition Facility “OKKY”	〒949-6212 502 Oaza-Mikuni-aza-Tsuschibayama, Yuzawa Town, Minami-Uonuma-County, Niigata 949-6212
④ Tadami Exhibition House	〒968-0421 2476-230 Oaza-Tadami-aza-Atoyama, Tadami Town, Minami-Aizu-County, Fukushima 968-0421
⑤ Shimogo Exhibition House	〒969-5208 847-1 Oaza-Konumazaki-aza-Hanjo-otsu, Shimogo Town, Minami-Aizu-County, Fukushima 969-5208
⑥ Numappara Exhibition House	〒352-0111 897-6 Itamuro-aza-Takinosawa, Kuroiso City, Tochigi 352-0111
⑦ Sakuma Electric Power House	〒431-3901 2252 Sakuma, Sakuma Town, Iwata County, Sizuoka 431-3901
⑧ Tedorigawa Dam Exhibition House	〒920-2336 18-1 Higashi-Niguchi-Ho, Oguchi Village, Ishikawa-County, Ishikawa 920-2336
⑨ Dam Site Park MIBORO	〒501-5505 140-1 oaza-Maki, Shirakawa Village, Ono-County, Gifu 501-5505
⑩ Takehara Thermal Power Exhibition House	〒729-2311 3035-13 Nishi-Nagahama, Tadanoumi Town, Takehara City, Hiroshima 729-2311
⑪ J-POWER Yonden Wonderland	〒779-1620 1 Funabata, Fukui-Town Anan City, Tokushima 779-1620
⑫ MATSUURA Energy Plaza	〒859-4506 458-1 aza-Sezaki, Shirahama-men, Shisa-Town, Matsuura City, Nagasaki 859-4506
⑬ Matsushima Thermal Power PR Room	〒857-2531 2573-3 Matsushima-Uchigo, Oseto Town, Nishi-Sonogi-County, Nagasaki 857-2531
⑭ J-POWER Fureai House (J-POWER Interaction House)	〒859-2101 3985-9 aza-Uchikomi, Kamiko, Tsuruta Town, Satsuma-County, Kagoshima 859-2101
⑮ Teida Hall	〒904-1103 3-4-1 Akasaki, Ishikawa City, Okinawa 904-1103

Syokawa-Zakura (Syokawa Cherry Trees)

The two gigantic cherry trees standing at the observation terrace at lakeside of Miboro are Azuma-higan Cherry (*Prunus subhirtella* var.) said to be more than 450 year old. Formerly, they were in two temples, Shoren-ji and Korin-ji, in Nakano-area, now at the bottom of the lake, and have been loved by village people for centuries. The first president of our company when visited here in 1959 while the dam construction works were ongoing, felt the sorrow of getting these gigantic trees submerged, and asked Mr. Shintaro Sasabe, the late leading authority of cherry studies and known as “Doctor of Cherry,” to transplant them. The grand-scale transplantation work without parallel in any other country and was seen as “impossible” by a number of specialists, completed in December, 1960. Then, they were named “Syokawa-Zakura (Syokawa Cherry Trees).” They are taken care of by our company and do not fail to bloom every spring offering grandiose scene to visitors.



Transplantation Work



Present view of Syokawa-Zakura

Development of Environmental Conservation Activities

Events during the Environmental Month

June of every year is the Environmental Month specified by the government. This month is especially dedicated to reviewing the way society and corporates are supposed to exist, thinking in workplaces and communities about how we can contribute to the environment, and moving on to take actions. In the fiscal 2003 too, we planned events to keep pace with this movement and performed diversified events including organizing lecture meetings at our head office and other offices, cleaning local beaches and roads, and participating in afforestation project events organized by local governments.

Display of the President’s Message and Poster from the Ministry of the Environment.

In preparation for Environment Month, our president’s message and a poster from the Ministry of the Environment are being displayed in all offices and plants to help improve the environmental awareness of all employees.



Event	Contents and number of offices participated
Lecture meeting, Speech, Exempla, etc.	Lecture meetings organized by J-POWER: 7; Speech/Exempla: 9; Study meetings: 8, Attending in Lecture meetings: 5
Environmental Fair, Environmental Panel Exhibition	Green Fair: 1; Environmental Panel Exhibitions: 3; Participation to Environmental Fair: 1
Photo Exhibition on Environmental Conservation, Competition of Slogans	Environmental Photo Exhibition: 1; Competitions of Slogan: 1
Environmental Video Show	Video Show for Environment Education: 16
Poster display, offering environmental information, etc.	Displaying the President's Message and Posters of Environment Month:
Forest volunteer and Nature Watching Excursions	At all the offices in Japan, Delivering Pamphlets: 2; Display Theme of Environment Month: 1 Forest Volunteer: 5; Nature Watching Excursions: 2
Environmental beautification activities, etc.	Beach Cleaning: 10; Cleaning in the neighborhood areas: 33; Improvement of Workplaces: 30; Tree and Flower Planting, Distribution of seedlings, etc.: 21
Promotional activities for recycling	Promotional activities for recycling: 16
Activities for prevention of global warming	Promotional activities for energy-saving: 13; Stopping Vehicle Engine Instead of Idling at Stops Activities: 13; Implementation of 'No-Car-Day': 2
Office environment measuring	Illumination and other measurings: 12
Tour in environment-related facilities	Tours in waste disposal facility, etc.: 13
Others	No-Smoking-Hour, etc.: 5; Implementations of Open House Events: 1

Scenes of events held during the Environment Month



Environmental lecture presentation by Mr. Eisuke Ishikawa (Head Office)



Iwaya coast clean up, Wakamatsu Operation & General Management Office (Fukuoka Prefecture)



Environmental Panel exhibition on Yokohama City, Isogo Thermal Power Station (Kanagawa Prefecture)

Holding of Green Fair

Twice in 2003, in June and October, at the place in front of our head office entrance, we held “Green Fair,” an exhibition and sale of environment-conscious products made from byproducts created from our power generation business. Through this event, we invited general public to see and touch directly the environment-conscious products our group companies are manufacturing and understand more about our environmental conservation activities. At the same time the local specialties displayed from those places where more our power stations are located enabled them to get information knowledge about those places.



“Green Fair” (Head office)

Holding of Green Fair

Date	Number of visitors	Raised donation (Japanese Yen)	Organizations to which donations were made
Jun. 2003	806	57,698	All amount donated to the Japan Fund for Global Environment (Japan Environment Corporation)
Oct. 2003	381	33,215	All amount donated to Green Fund (National Land Afforestation Promotion Organization)

Afforestation project’s activities with local people

Kitahon Power Administration Office (Hokkaido) has been participating in the “Full-of-Flowers Movement” organized by the local town community, in June every year, planting *Salvia splendens* along the National Route 5 in cooperation with local primary

school children since 1991.

A total of 50 people, including our employees, planted about 30,000 flowers.



Kitahon Power Administration Office (Hokkaido)



Kitahon Power Administration Office (Hokkaido)

Afforestation project activities with local people

Each organization promotes afforestation activities with the help of local people. Some of these activities are described.

- The Kitayamagawa Power Administration Office held a afforestation project ceremony in March 2004 as part of a joint effort with Owase City, the Owase Fisheries Cooperative's staff and the Mie Prefectural Fishery Cooperative.

This ceremony started three years ago when, in discussions with the local fisheries cooperative and other concerned staff, the local community expressed the desire to help restore deteriorated mountain areas. About 40 of our employees participated in this, the fourth year of the ceremony, and planted 40 mountain cherry seedlings in the Owase city forest, at Tochikawara.



Afforestation project ceremony jointly carried out by Owase Fisheries Cooperative's staff and other concerned persons. Kitayamagawa Power Administration Office (Mie Prefecture)

- 10 volunteers from the Chubu Regional Headquarters and the Sakuma Power Administration Office participated in a afforestation project ceremony held by the Tenryugawa Fisheries Cooperative in April 2003.

On that day, 280 broad-leafed tree seedlings (mountain cherry, zelkova, white oak, maple, etc.) were planted at Kusakidani, on the Shinkaisawa headwaters flowing into the lake at Akiba Dam.



Afforestation project ceremony carried out by the Tenryugawa Fisheries Cooperative. Sakuma Power Administration Office (Shizuoka Prefecture)



Participation and co-operation for the Totsugawa Village's Beautification Campaign (Planting cherry nursery trees) Totsugawa Power Station (Nara Prefecture)



Forest volunteers' participation in "Okayama's Coexistence Forest" activities. Western Transmission Line Maintenance Center (Okayama Prefecture)

- A group of more than 30 volunteers from the "J-POWER Forest Club" (consisting of J-POWER Group's employees) supports the activities of the nature conservation committee of "Takao-no-morizukuri no kai (Association for fostering forest of Takao)", part of the Japanese Alpine Club, and participates in voluntary forestry activities as a member of this committee.

The group fosters the national forest of Kogesawa at Uratakao, Hachioji City, Tokyo. J-POWER Group's employees are actively working to promote environmental conservation and health.



J-POWER Forest Club participation in the "Takao-no-morizukuri no kai" Afforestation project ceremony.



Society

Our company has a social existence which can only exist with the support given from our customers, shareholders, employees, people of communities, clients, and all other relevant people. Based on such a fundamental basis of recognition, we are developing activities with society based on various measures, we are developing our activities in cooperation with society.

1. Involvement in Society

J-POWER Fureai-Concert (J-POWER Interaction Concert)

We organize the “J-POWER Fureai-Concert (J-POWER Interaction Concert)” which has been held on more than 80 occasions in various parts of the country since 1992. Mainly in the areas where our facilities are located, we hold authentic classic concerts and invite local residents. These concerts aim at local PR activities, supports for local responses, and the promotion of understanding of our corporate image, through this communication activity by music.

During the Fiscal 2003, we organized five concerts in the locations shown below.



J-POWER Fureai-Concert (J-POWER Interaction Concert)

Site in charge of organization	Date	Location	Number of visitors (persons)
Takasago Thermal Power Station	Sept. 23, 2003	Takasago City Culture Hall	761
Kitayamagawa Power Administration Office	Sept. 28, 2003	Miyama Town Chuo Kominkan (Central Community Center)	451
Kamishihoro Power Administration Office	Sept. 23, 2003	Ashoro Town Community Center	197
Minami Kyushu Power Administration Office	Nov. 4, 2003	Tsuruta Town Chuo Kominkan (Central Community Center)	350
Isogo Thermal Power Station	Jan. 25, 2004	Yokohama Minato Mirai Main Hall	1,316

Open day at Power Stations and other offices

Coal-fired power stations and some other offices held “Open day” to promote community involvement.

On that day, each coal-fired power station and offices held various events such as facility visits in which many people participated.

Many participants commented that they enjoyed visiting

those parts of the power plants not usually seen and that their children could also learn about them. We continue to hold these events in order to help local people understand our operations and to provide opportunities for communication with local communities.



Isogo Thermal Power Station (Kanawaga Prefecture)



Matsushima Thermal Power Station, (Nagasaki Prefecture)



Takehara Thermal Power Station (Hiroshima Prefecture)

Fiscal 2003 Open day at Power Stations and some other offices

Event date	Organizer	Number of participants
Jun. 8, 2003	Takehara Thermal Power Station	3,500
Aug. 24, 2003	Wakamatsu Operations & General Management Office, Wakamatsu Research Institute, Wakamatsu Thermal Center	2,200
Aug. 31, 2003	Matsuura Thermal Power Station	1,000
Oct. 13, 2003	Matsushima Thermal Power Station	1,800
Nov. 3, 2003	Isogo Thermal Power Station	700
Nov. 9, 2003	Ishikawa Coal-fired Power Station	1,800
Nov. 23, 2003	Takasago Thermal Power Station	1,500
Dec. 23, 2003	Chigasaki Research Institute	2,000
Mar. 28, 2004	Tachibanawan Thermal Power Station	3,500



Chigasaki Research Institute (Kanagawa Prefecture)

Each organization promotes social activities. Some of these activities are described below.

Joint Activities with NPOs

The Chigasaki Research Institute participates in the “Sennokawa Clean Campaign” jointly organized by NPOs in Chigasaki City. As part of these activities, the institute conducted an educational campaign on how to measure river water quality, in conjunction with a group from “Ikinokore Kawano Oendan (Supporters for river conservation).”



“Sennokawa Clean Campaign” activities, Chigasaki Research Institute (Kanagawa Prefecture)

Clean-up of the Kanagawa marathon course, and a voluntary aid station, and cheering on the competitors



Isogo Thermal Power Station (Kanagawa Prefecture)

J-POWER CUP Soccer Competition



Takasago Thermal Power Station (Hyogo Prefecture)

Energy Class in Oma Junior High School



Oma Nuclear Power Project Construction Preparation Office (Aomori Prefecture)

Local Fire Brigade at the Matsushima Thermal Power Station Extinguishing a House Fire

Quick work by Local Fire Brigade at the Matsushima Thermal Power Station helped extinguish a house fire on the island in October 2003. The brigade received a letter of appreciation from the Mayor of Oseto.



Local Fire Brigade at the Matsushima Thermal Power Station (Nagasaki Prefecture)

Voluntary Activity for the Wakafuji National Athletics Meet

A boat race was held at Tenryu Boat Park (on Funagira Dam Lake) in September 2003. The J-POWER Group conducted voluntary rescue activities (observing from a small boat) during an official exercise for this race.

Sakuma Power Administration Office (Shizuoka Prefecture)

Voluntary Snow Removing Activity

The J-POWER Group helped Yuzawa Town’s snow removal executive committee to remove snow accumulated around houses when their members were unable to clear it away on their own.

Okukiyotsu Power Administration Office (Niigata Prefecture)

2. Compliance

In April 2003, focusing on compliance with our “Corporate Philosophy” and “Corporate Conduct Rules” we adopted a specific “Compliance Code” as the basis of our staff operations. Each of our employees and officers will comply with the laws and in-house regulations and promote sound corporate activities in accordance with common sense and social responsibility.



Compliance Guidebook



Compliance lecture presentation

3. Relationship with our Employee

New Proposal Scheme for Operations Improvements and Ideas

An in-house suggestion system comprising the “Performance Improvement Suggestion” and “Idea Award” schemes.

In April 2003, focusing on compliance with our “Corporate Philosophy” and “Corporate Conduct Rules” we adopted a specific “Compliance Code” as the basis of our staff operations.

Each of our employees and officers will comply with the laws and in-house regulations and promote sound

corporate activities in accordance with common sense and social responsibility.

The “Idea Award” scheme, under which “suggestions for the improvement/streamlining of general operations (not limited to those of the employee)” are actively sought, has been promoted since fiscal 2000.

A number of excellent suggestions were submitted in fiscal 2003, as follows:

System	Suggestion Number	Excellent Suggestion
Performance Improvement Suggestions	195	Highest award (president's award) 2
“Idea Award”	234	Gold prize 1



Awards ceremony for operational improvement proposals

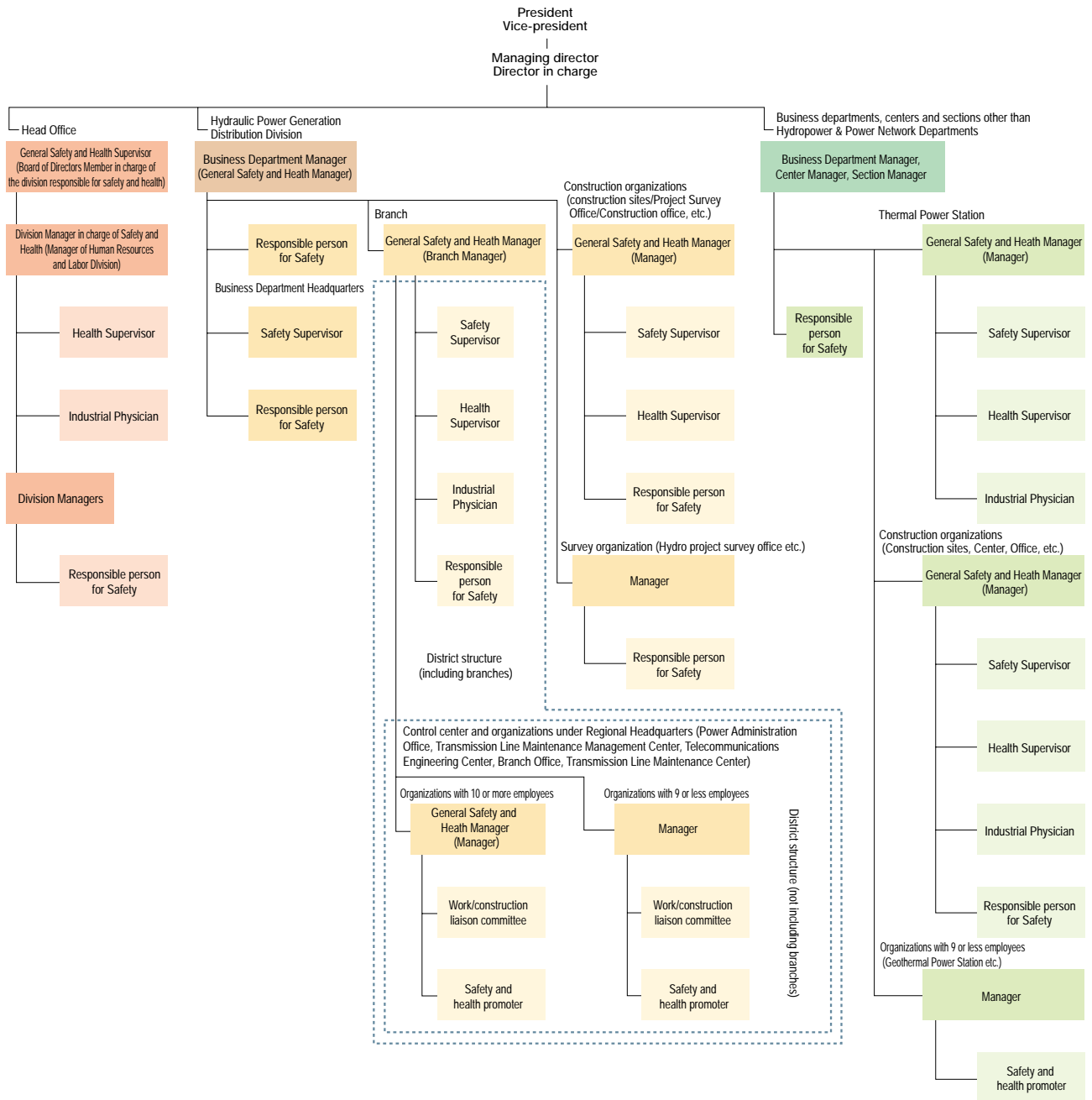
Efforts to Safety and Health

Based on the Management Regulations for Safety and Health established in January 1993, we have defined detailed regulations on occupational safety and health management, education and the prevention of occupational accidents and public disasters, in order to focus on safety and prevent occupational injury. By focusing on “our employees’ mental and physical health” as a basic goal and promoting “mental and

physical health through medical examination and review of lifestyles” and “a comfortable workplace” as key points in the 2003 safety and health operations plan, we have made strenuous efforts to improve the health of our employees and establish a safe and comfortable workplace environment.

Safety and health management system

Safety and Health Management Organization Chart



Safety and Health Management System

Beside the stratified and functional trainings implemented internally, we are actively participating in outside training carried out by Japan Industrial Safety and Health Association in order to improve the safety technology level among our employees.



On-site training of simulated labor accident

Fiscal 2003 Training Accomplishments

Description of training	Main organizing body (Organizer)	Number of trainings carried out	Cumulative number of participants
Stratified and functional training	Human Resources and Labor Division	11	309
On-site training of simulated labor accident	d.o.	1	322
Training for the safety and health education trainers, etc.	Japan Industrial Safety and Health Association	20	41
Human Resources Training	Central Research Institute of the Electric Power Industry	9	1307

Safety patrol

We are carrying out the safety patrol by the Human Resources and Labor Division Manager and Branch Office Managers centered on large scale constructions and periodical inspection works for the purpose of preventing labor accident.

Furthermore, we aim to prevent the recurrence of serious occupational injuries by conducting special investigations into their background and the factors involved.



Morning assembly before periodic inspection at power station

Safety and health and other committees

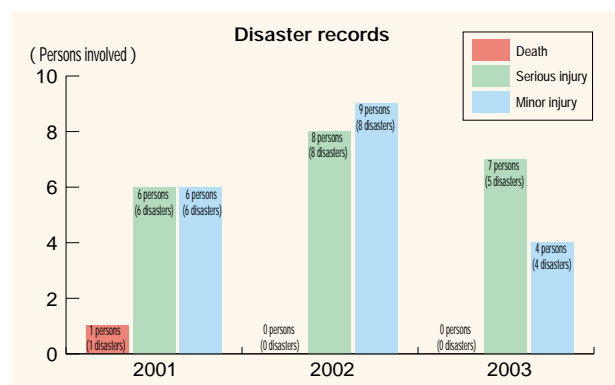
We have safety and Health Committee meetings where opinions and comments about our whole safety and health management system are heard. In addition, each organization has its own safety and Health Committee which collects opinions and comments from a staff representative for safety management activities.



Safety and Health Promotion Liaison Committee

Labor accident in our company and subcontractors of relevant works

In fiscal 2003, we focused on accident prevention, making “Setting priorities” our basic goal and adopting the “Prevention of frequent accidents (such as falling/slipping, being caught/entangled, flying/falling and electric shock)” and the “Establishment of an integrated safety and health management system” as key topics. As a result, the number of accidents decreased by about 40 % from the previous fiscal year.



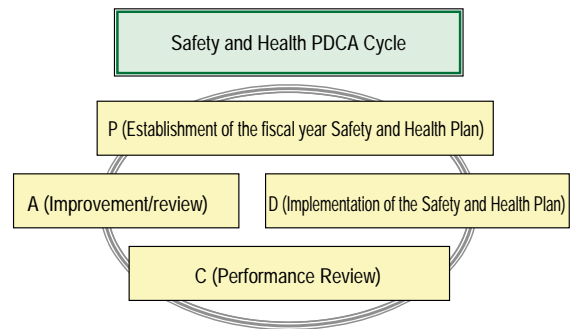
Organization of the safety and health promotion committee

In order to prevent occupational accidents and ensure our contractors' well being, we have a safety and health promotion committee where health and safety items are

discussed and coordinated once a month.

Administration of the labor safety and health management system

We revised the safety and health management rules and introduced and institutionalized a labor safety and health management system in April 2002, as part of the ongoing healthcare improvement process. This system has been in continuous use ever since.



General health management center

A General Health Center (including clinic, health counseling room and dental clinic) has been established for our head office employees and affiliated companies' staff. Doctors, district nurses, nurses, national registered dietitians, dental hygienists and clinical psychotherapists are available to provide thorough examinations in the

clinic, various health examinations and health counseling (on mental health, nutritional/health/athletic instruction and sexual harassment) in the health counseling room, and dental examination/counseling in the dental clinic.

Consultation, Legal Health Diagnosis and Comprehensive Medical Examination

We conduct regular health examinations, diagnosis and special medical checkups as required under the Industrial Safety and Health Law. In addition, we urge all employees to have comprehensive medical examinations, dental and ophthalmic check-ups (The range of services available is shown in the following table).

Consultation

(Unit: %)

Item	Fiscal 2002	Fiscal 2003
Spring health diagnosis	95	94
Comprehensive medical examination	63	67

* Figures in % stand for the ratio of the number of employees who had undergone medical diagnosis against the total number of employees supposed to undergo the diagnosis (for comprehensive medical examination: 35 year-old or older)



Health Counseling Room, Safety and Personal & Employee Relationship Dept.
 District nurse: Kozue Shida (left), Yuko Ishikawa (center)
 National registered dietitian: Mitsuko Oya (right)

J-POWER Group runs a health maintenance and promotion project (for both mental and physical health) that gives instruction on healthy living, how to stop smoking and improved dietary habits to help prevent disease and stay healthy.

Efforts to implement the THP (Total Health Promotion Plan) project

We implement company-wide athletic, health, nutrition and mental health programs in a concerted effort with affiliated companies in order to improve physical fitness and help prevent lifestyle-related diseases.

Efforts to improve mental health

The changing workplace environment and work stress can adversely affect our employees' minds and bodies. In order to address this in an appropriate manner we have industrial physicians, specialist medical examiners, counselors and hygienists available in the General Health Management Center.



THP physical fitness measurement

Efforts to prevent sexual harassment

Sexual harassment may cause unacceptable harm to an individual's self-improvement by damaging its dignity, honor and personality, and bring worse workplace environment. The company is, therefore, actively campaigning against sexual harassment by distributing pamphlets, videotapes etc. Special consultants are also on hand to provide advice.



A pamphlet appealing the campaign against sexual harassment.

Workplace safety for VDT users

In accordance with the "Guidelines for Labor Health Management of VDT Work" (Ministry of Health, Labour and Welfare, revised in April, 2002) we try to ensure a comfortable workplace environment for VDT operators by displaying posters raising awareness about the risks of VDT work, promoting regular "J-POWER Relaxation Exercises and carrying out ophthalmologic health checks, etc.

Separation of Smoking Areas in the Workplace

To prevent passive smoking in workplaces we established "guidelines for company-wide measures against smoking" under which smoking is not allowed in offices and company-owned cars. We promote these guidelines to all employees in order to maintain a comfortable working environment.



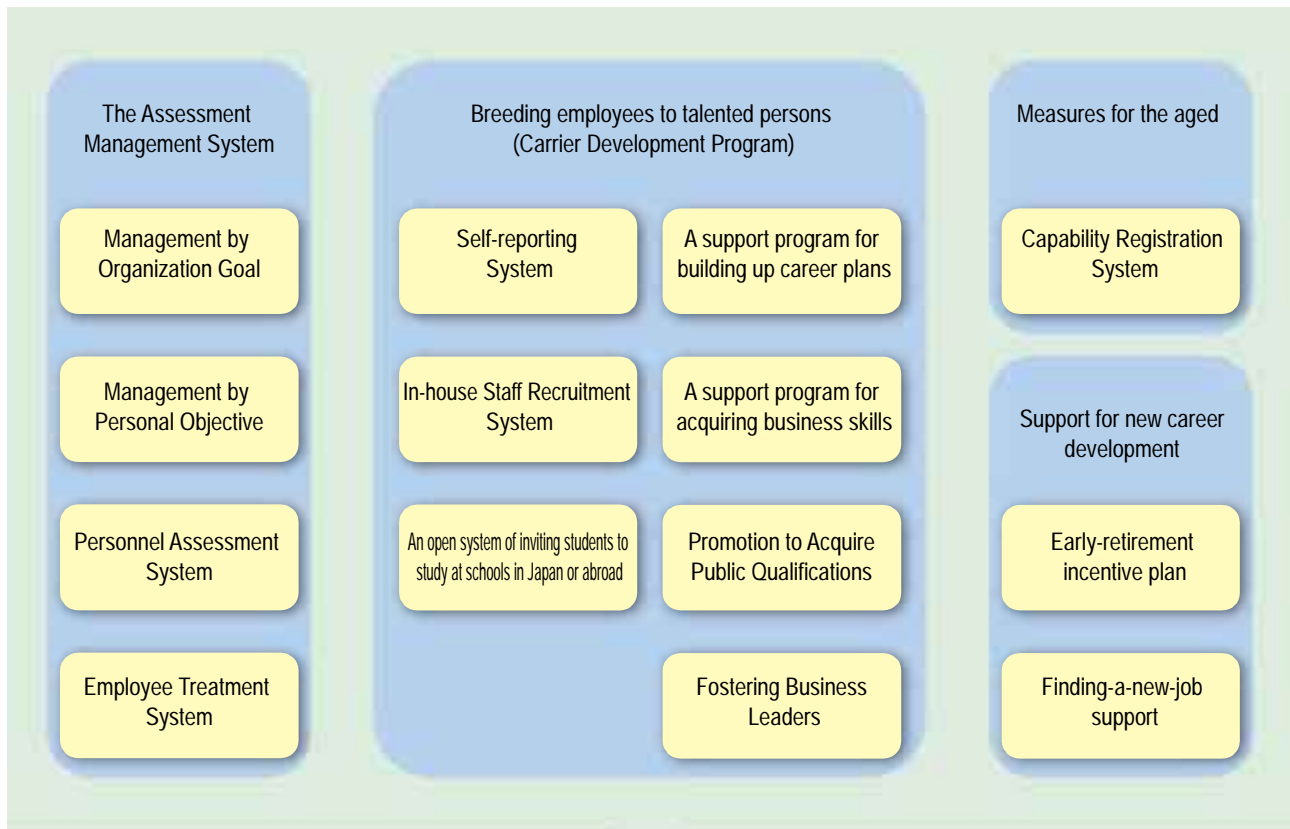
Smoking room (head office)

Breeding employees to talented persons and making the best use of them

The slogans of this company are :“All our business activities start with sincerity and pride” “Continued self-improvement breeds wisdom and technology” “Consolidate our rich personality with our passionate mettle to challenge the future”. The talented persons are the foundation of a corporation. If you wish to stay ever

growing in the business, you must strive for developing sincere and rich personalities, which can help you proceed onward. We take various measures to develop such human resources achieving our management policy goals.

Various Measures for the Development and Use of Human Resources in Combination with Management Policy and Self-realization



Accomplishments/challenging jobs, applying for more challenging positions, support for career formation, support for new career development, etc.



Hisashige Senba

Education and Training Group, Personnel and Employee Relations Department

Making the best use of human resources as management capital is of increasing importance. With this in mind, we provide various training courses to help develop employees' abilities based on the Career Development Program.



External Evaluations and Opinions

1. Environmental Management Rating

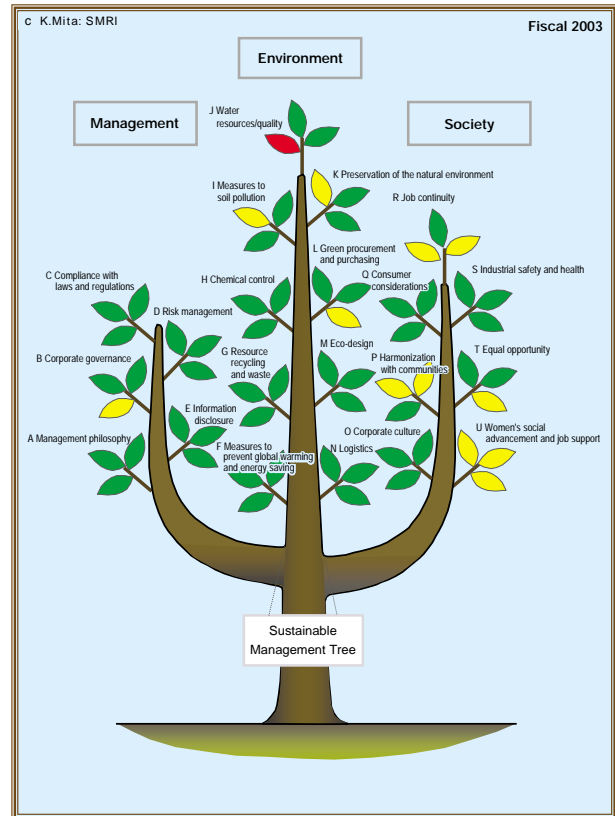
We were rated on our fiscal 2003 environmental management by the NPO Corporation, the Sustainable Management Forum's Sustainable Management Rating Institute.

This rating is intended to make comprehensive evaluations on corporate social responsibilities and sustainable management. It includes 63 evaluation categories including "strategy," "mechanisms" and "results," aspects for "management soundness" (5 items), "environmental response" (9 items) and "ethical and social response" (7 items).

The evaluation included a preliminary questionnaire with 189 questions and 371 requirements and a two-day review. Furthermore, our commitment of corporate environmental management policies was confirmed by direct interview with our president.

The results of the evaluation are shown in the "tree" on the right. Fifty items were rated as A (excellent, green leaf), 12 items as B (good, yellow leaf) and 1 item as C (acceptable, red leaf).

We will take this social evaluation seriously, participate in future rating reviews and promote improvements based on the valuable feedback received.



2. Winning Environmental Report Awards (Encouragement Prize)

-Okutadami-Otori Hydro Project Construction Office Environmental Report-

On January 16, 2004, the 7th Environmental Report Awards Ceremony was held, organized by the Global Environmental Forum and the National Association for Promotion of Environmental Conservation. Our report on "Accomplishments for Environmental Conservation at the Okutadami-Otori Hydro Project Construction Office, 2003 Environmental Report", prepared by the Okutadami-Otori Project Hydro Construction Office, was given an encouragement prize.

The review noted the wealth of description included on

relevant environmental factors and concluded that the report provided an excellent example of how a construction office can carry out an environmental report in a limited amount of time.

Furthermore, due to the participation of university students (trainees) as external viewpoint in the preparation of the report, it was considered a valuable communications tool.



Environmental report



7th Environmental Report Awards Ceremony

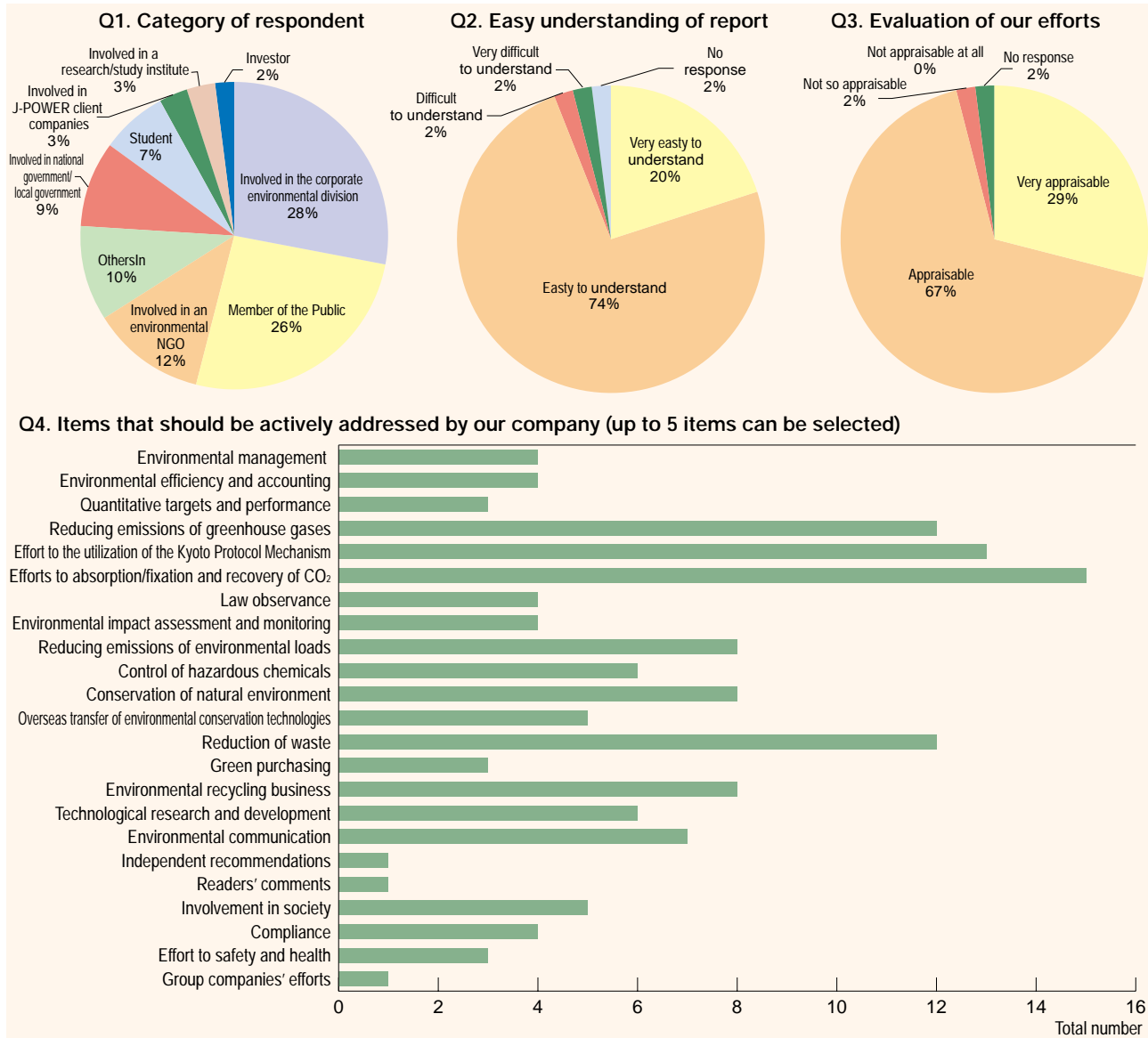


Testimonial

3. Readers' Comments

We received many comments on our 2003 Environmental and Social Activities Report (issued on August 2003). We will bear these comments in mind when preparing future reports and promoting further environmental management.

Questionnaire results (as of the end of June 2004. Total respondents: 45)



Q5. Detailed actions expected

Typical opinions	Our approaches
Reducing greenhouse gas emissions and an appeal for their further reduction (corporate environmental division)	We endeavor to maintain and improve efficiency of energy use through the efficient operation of our thermal power stations, to develop hydropower and other power sources with reduced CO ₂ emissions, to promote new technologies and to undertake global initiatives such as the Kyoto Mechanism. In addition, we report on all our activities in our annual environmental and social action report.
Efforts to achieve zero waste emissions (corporate environmental division)	Coal ash comprises 99% of our industrial waste. We promote the effective use of this ash as cement, fertilizers and other raw materials as part of our corporate alliance with domestic and overseas companies.
Absorption, fixation and recovery of CO ₂ (public)	We promote overseas afforestation and carry out research into the underground storage of CO ₂ .
Conversion to natural energy (public)	We continue to develop wind power at unobstructed sites for transmission systems that are economically feasible. We are also developing co-firing systems utilizing biomass.
Information disclosure on problem matters (environmental NGOs)	We continue to disclose information through our environmental and social activities reports.
Solutions to overseas energy problems (students)	We promote efforts such as overseas technology consulting, the dispatch of governmental experts and involvement in IPP projects.
Development of new low-pollution generation methods (national government/local government)	We promote a clean and high-efficiency combined cycle system in which coal, an abundant worldwide natural resource, is gasified and combined with a fuel cell to generate power.

Estimation and opinion outside the company



Independent Review

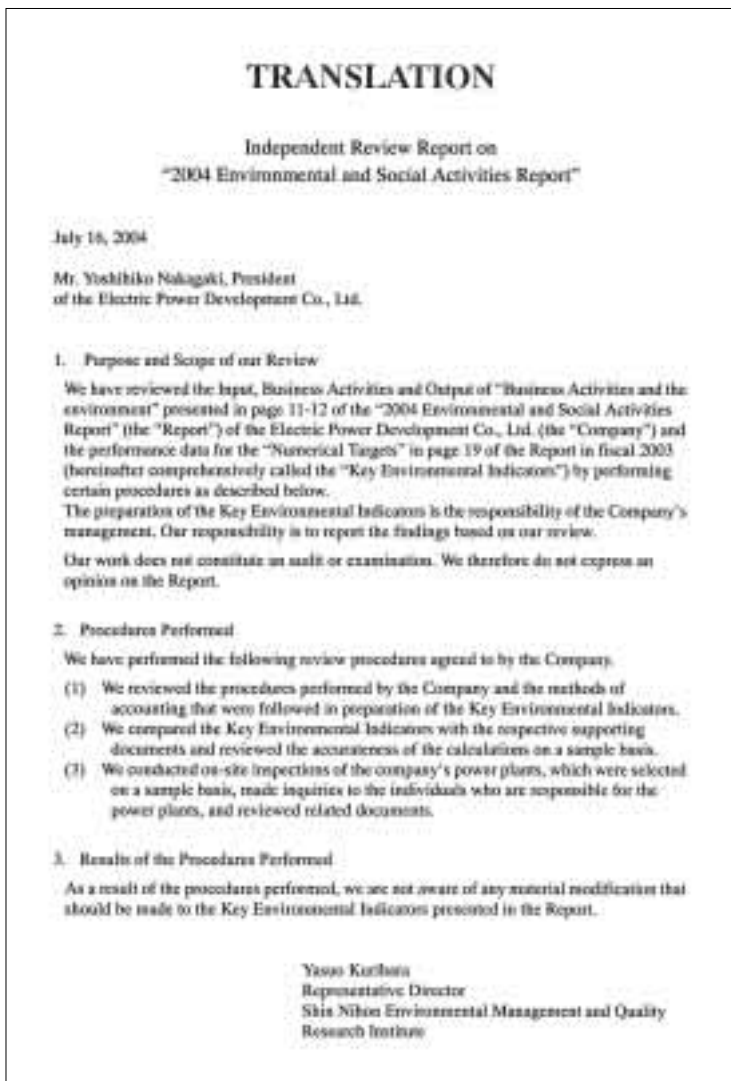
Independent Review of the “2004 Environmental and Social Activities Report”

Our key environmental indicators on “2004 Environmental and Activities Report” was reviewed and verified by an independent organization, the Shin Nihon Environmental Management and Quality Research Institute.

The following items were reviewed:

- (1) Availability of supporting evidence
- (2) Verification of the facts by way of interviews
- (3) The accuracy of all descriptions given

Review scene



Head Office



Sakuma Power Administration Office (driftwood processing facility)



Matsuura Thermal Power Station (central control room)



Environmental Chronology

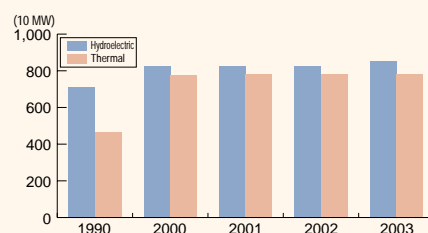
Era	World Movements	Movements in Japan	Movements of our company
1950 1960			1952 Establishment of our company 1960 Shokawa-cherry Trees at Miboro transplanted. 1964 Pollution Control Agreement concerning Isogo Thermal Power Station concluded with Yokohama City. (Yokohama Method)
1970	1972 United Nations Conference on the Human Environment (UNCHE) held in Stockholm. 1975 Washington Convention (Convention on International Trade in Endangered Species, CITES) entered into force.	1967 "Basic Law for Environmental Pollution Control" promulgated. 1968 "Air Pollution Control Law" promulgated. 1968 "Noise Pollution Regulation Law" promulgated. 1970 "Water Pollution Control Law" promulgated. 1970 "Waste Management (Disposal) and Public Cleansing Law" promulgated. 1971 "Offensive Odor Control Law" promulgated. 1974 "Amended Air Pollution Control Law" amended and promulgated. (Regulation of total emission introduced.) 1975 "Vibration Regulation Law" promulgated. 1977 Notification of Ministry of International Trade and Industry (former name of Ministry of Economy, Trade and Industry) regarding the Ministerial Meeting on Assessment issued.	1973 Numappara Power Station started operation. (Wetland conservation) 1975 Takasago Thermal Power Station No.1, flue gas Desulfurization System completed. (Japan's first full-type flue gas desulfurization system) 1976 Totsukawa Power Station No.1, Water intake improved to surface intake facility. 1977 Funagira started operation. (Fish ladder installed.)
1980	1985 Vienna Convention for the Protection of the Ozone Layer adopted.	1984 Implementation Outline of "Environmental Impact Assessment" decided at Cabinet Council.	1980 Yanase, Water intake improved to selective intake facility. 1982 Takehara Thermal Power Station No.1, Flue Gas Denitrification System installed.
1988	1988 Inter-governmental Panel on Climate Change (IPCC) instituted.		1986 Isogo Thermal Power Station won "Pollution Prevention Award" from Kanagawa Prefecture. 1987 Ishikawa Coal-fired Thermal Power Station, selected as Public Color Prize Ten Environmental Winners. 1988 Takasago Thermal Power Station won "Agency for Natural resources and Energy Administrator's Prize" (Energy saving)
1990	1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro.	1990 "Global Warming Prevention Action Plan" decided.	1990 "Committee for Coping Global Environmental Problem" institutionalized. 1990 Nishi-Yoshino Power Station No.1 started discharging for river maintenance flow (First existing hydraulic power station of our company) 1990 Tagokura Power Station started producing driftwood charcoal. 1990 Takehara Thermal Power Station won "Agency for Natural resources and Energy Administrator's Prize" (Energy saving)
1993		1993 "Law on Temporary Measures to Promote Business Activities for the Rational Use of Energy and the Utilization of Recycled Resources" promulgated. 1993 "Basic Environmental Law" promulgated.	1993 "Environmental Activities Promotion Board" institutionalized. 1993 "Denpatsu Environmental Action Guidelines" established. 1993 Fluidized bed incineration technology development won the Japan Institute of Energy's Technology Division Prize
1994	1994 Framework Convention on Climate Change entered into force.	1994 "Basic Environmental Plan" decided at Cabinet Council.	1993 Driftwood charcoal, driftwood pyrolytic acid, and driftwood 'daruma' won "Minister's Prize" of Ministry of International Trade and Industry. (Recycling idea) 1993 Wakamatsu Operations & General Management Office won "Fiscal 1993 Kanda Prize" for its development of super high temperature turbine. 1994 Kumaushi Power Station won "Good Design Prize" from Ministry of International Trade and Industry.
1995	1995 First Conference of the Parties of Framework Convention on Climate Change (COP1) held in Berlin.		1994 Huang Dao Power Station in China started test run of high sulfur coal desulfurization demonstration test.
1996	1996 Second Conference of the Parties of Framework Convention on Climate Change (COP2) held in Geneva.	1995 "Law for Promotion of Sorted Collection and Recycling of Containers and Packaging" promulgated.	1995 Takehara Thermal Power Station No.2 shifted to fluidized bed boiler.
1996	1996 ISO14001 "Environmental Management System" formulated.	1997 "Environmental Impact Assessment Law" promulgated.	1997 Okukiyotsu Power Station No.2 won Engineering Prize from the Japan Society of Civil Engineering (Cohabitation with local community/Open Type Power Station)
1997	1997 Third Conference of the Parties of Framework Convention on Climate Change (COP3) held in Kyoto.	1998 "Law concerning the Rational Use of Energy" amended and promulgated.	1998 "New J-POWER Environmental Action Guideline" established. 1998 Australian afforestation operation undertaken.
1998	1998 4th Conference of the Parties of Framework Convention on Climate Change (COP4) held in Buenos Aires	1998 "Law concerning the Promotion of the Measures to Cope with Global Warming" promulgated.	1998 Matsuura Thermal Power Station No.2 won "Agency of Industrial Science and Technology Administrator's Prize" for its micro-filtration type flue gas desulfurization waste water treatment system. (Prevention of air pollution)
1999	1999 5th Conference of the Parties of Framework Convention on Climate Change (COP5) held in Bonn.	1999 "Law concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management" promulgated.	1999 Matsuura Thermal Power Station acquired ISO14001 certification.
		1999 "Law concerning Special Measures against Dioxins" promulgated.	1999 Oma Nuclear Power Station Plan incorporated in the Government's Basic Plan for development of electric power resources. 1999 Okutadami, Otori Additional Construction Office acquired ISO14001 certification. (First construction organization in Japan)
2000	2000 6th Conference of the Parties of Framework Convention on Climate Change (COP6) held in the Hague.	2000 "Basic Law for Establishing the Recycling-Based Society" promulgated.	1999 Matsuura Thermal Power Station No.2 Generator turbine won "the Japan Society of Machinery Engineers Prize" (Improvement of combustion efficiency, etc.) 2000 "Environmental Management Regulation" formulated. 2000 "J-POWER Environmental Policy" formulated.
			2000 Okinawa Seawater Pumped Storage Project Demonstration Test Office won Engineering Prize from the Japan Society of Civil Engineering (Protected Environment Area), and got recognition for Energy PR Facility/PR Activity winning "Steering Committee Chairman Prize"(Promotional activities for understanding of environmental problem)
			2000 Tomamae Winvilla Wind Farm started operation. 2000 "The Japanese Geotechnical Society of Civil Engineering Development Prize" awarded for deep chemical mixing method utilizing coal ash.(Cyclic use of resources)
			2000 Tachibana-wan Thermal Power Station won "the Japan Society of Civil Engineering Prize" (measures for Peripheral environmental conservation and harmonizing, reuse of sea floor dredging earth, recycle of coal ash in large quantity, etc.)
	2001 Resumed Session of 6th Conference of the Parties of Framework Convention on Climate Change (COP 6 Resumed Session) held in Bonn.	2001 Inauguration of Ministry of the Environment following the reorganization of ministerial offices.	2001 Construction Division acquired ISO14001 certification.
	2001 7th Conference of the Parties of Framework Convention on Climate Change (COP7) held in Marrakesh.	2001 "Law concerning Special Measures against PCB Waste" enforced.	2001 Nikaho Kogen Wind Farm started operation.
	2001 The Operational Rules for the Kyoto Protocol adopted.	2002 "Law concerning the Rational Use of Energy" amended.	2001 Isogo Thermal Power Station selected as Public Color Prize Ten Environmental Winners.
	2002 World Summit on Sustainable Development held in Johannesburg.	2002 "Outline concerning the Promotion of the Measures to Cope with Global Warming" revised.	2002 EMS based on ISO14001 introduction into the whole company completed.
	2002 8th Conference of the Parties of Framework Convention on Climate Change (COP8) held in New Delhi.	2002 "Law concerning the Promotion of the Measures to Cope with Global Warming" amended.	2002 Isogo Thermal Power Station New No.1 generator started operation.
	2003: 9th Conference of the Parties (COP9) was held (Milano).	2002 "Kyoto Protocol" ratified. 2002 "Nature Conservation Law" promulgated. 2003 "Law concerning the Measures against Soil Pollution" enforced. 2003 "Renewable Portfolio Standard (RPS Law)" was enforced. 2003 "Environmental Education Promotion Law" was enforced.	2002 "the Japan Institute of Energy's Prize" awarded for ash circulating type PFBC technology development. (Improvement of desulfurization efficiency and combustion efficiency, reduction of coal ash, etc.) 2002 Omuta Recycle Power Station started operation. 2003 Tokyo Bayside Wind Power Plant started operation. 2003 Omuta Power Recycle Station won "New Energy Grand Prix/New Energy Foundation Prize"
			2003 The Okutadami-Otori Hydro Project won the "Award of Japan Society of Civil Engineers" in recognition of its contributions to natural environmental conservation and challenging technological development.

Fiscal Year Data

The following data represent annual values or year-end values in each fiscal year.

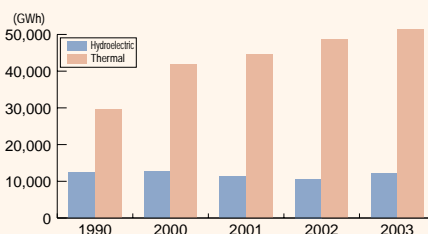
Power facilities (maximum output)

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Hydroelectric	10 MW	709	826	826	826	855
Thermal	10 MW	465	775	782	782	782
Coal-fired	10 MW	464	774	781	781	782
Geothermal	10 MW	1	1	1	1	1
Total	10 MW	1,174	1,601	1,609	1,609	1,637



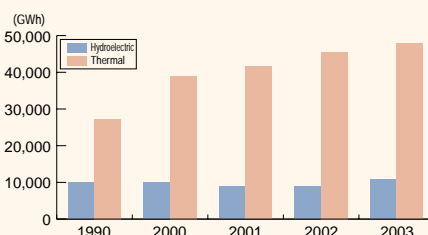
Amount of electric energy output

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Hydroelectric	GWh	12,451	12,550	11,333	10,624	12,103
Thermal	GWh	29,551	41,945	44,544	48,679	51,237
Coal-fired	GWh	29,452	41,840	44,439	48,599	51,133
Geothermal	GWh	99	105	105	80	104
Total	GWh	42,002	54,495	55,877	59,303	63,340



Amount of power sold

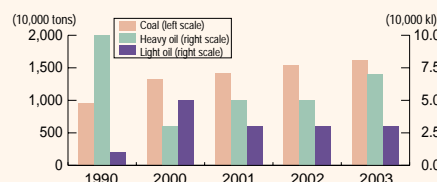
	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Hydroelectric (Excluding Pumped Storage)	GWh	10,046	9,929	8,873	8,902	10,850
Thermal	GWh	27,293	38,987	41,529	45,527	47,937
Coal-fired	GWh	27,206	38,892	41,434	45,453	47,841
Geothermal	GWh	87	95	96	74	96
Total	GWh	37,338	48,915	50,403	54,429	58,787



Amount of fuel consumed

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Coal (dry coal 28 MJ/kg conversion)	10,000 tons	956	1,330	1,412	1,543	1,621
Use intensity (coal-fired thermal)	t/GWh	351	342	341	340	339
Heavy Oil	10,000 kl	10	3	5	5	7
Light Oil	10,000 kl	1	5	3	3	3

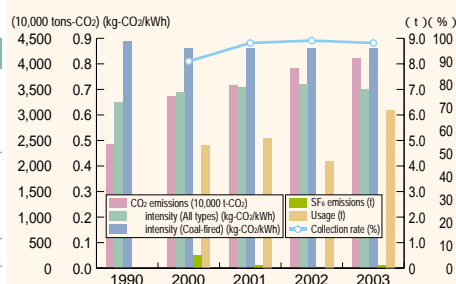
Note: The denominator for use intensity represents power sales from thermal power stations.



Greenhouse gas emissions

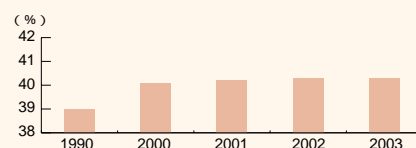
	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
CO ₂ Emissions	10,000 tons CO ₂	2,418	3,360	3,574	3,915	4,107
intensity (All types)	kg-CO ₂ /kWh	0.65	0.69	0.71	0.72	0.70
intensity (Coal-fired)	kg-CO ₂ /kWh	0.89	0.86	0.86	0.86	0.86
SF ₆ Emissions	t	-	0.5	0.1	0.0	0.1
Handled	t	-	4.8	5.1	4.2	6.2
Recovery Rate	%	-	90	98	99	98
HFC Emissions	t	-	0.0	0.0	0.0	0.0

Note: The denominator for emission intensity represents power sales.



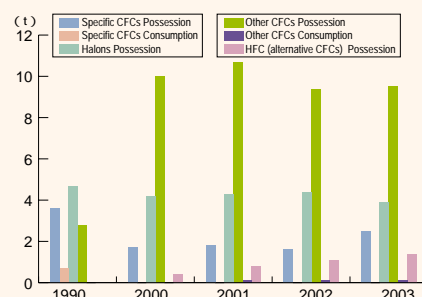
Average thermal efficiency of coal-fired power stations (at the generating end)

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Average Thermal Efficiency (at the generating end)	%	39.0	40.1	40.2	40.3	40.3



Usage of specific freons

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Specific freons Possessed	t	3.6	1.7	1.8	1.6	2.5
Consumed	t	0.7	0.0	0.0	0.0	0.0
Specific halons Possessed	t	4.7	4.2	4.3	4.4	3.9
Consumed	t	0.0	0.0	0.0	0.0	0.0
Other freons Possessed	t	2.8	10.0	10.7	9.4	9.5
Consumed	t	0.0	0.0	0.1	0.1	0.1
Alternative freons (HFCs) Possessed	t	-	0.4	0.8	1.1	1.4
Consumed	t	-	0.0	0.0	0.0	0.0



Emissions of SOx, NOx and soot

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
SOx Emission	1000t	9.9	9.9	10.2	9.5	8.4
Emissions intensity (Coal-fired)	g/kWh	0.34	0.24	0.23	0.20	0.17
NOx Emission	1000t	26.4	22.3	23.4	25.2	25.0
Emissions intensity (Coal-fired Thermal)	g/kWh	0.90	0.53	0.53	0.52	0.49
Soot Emission	1000t	1.0	0.9	0.9	0.9	1.0
Emission intensity (Coal-fired Thermal)	g/kWh	0.03	0.02	0.02	0.02	0.02

Note: Soot emission calculations were based on monthly measurements. Note: The denominator of emissions intensity represents power generation from coal-fired thermal power stations.

Achievements of Coal Ash and Plaster Recycle

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Created Volume of Coal Ash	10000 t	125.7	144.3	153.9	150.7	146.5
Volume of Coal Ash Recycled	10000 t	71.9	96.3	98.8	101.4	111.9
Coal Ash Recycle Rate	%	57	67	64	67	76
Created Volume of Plaster	10000 t	-	33.1	35.4	33.0	35.5
Plaster Recycle Rate	%	100	100	100	100	100

Driftwood Effective Use

	Unit	-	FY2000	FY2001	FY2002	FY2003
Volume Effectively Used	m ³	-	7,500	5,000	15,000	9,400

Office Power Consumption

	Unit	-	FY2000	FY2001	FY2002	FY2003
Power Consumed by Office (Company total)	10 MW	-	1,796	1,797	1,781	1,728
Head Office Power Consumption	10 MW	-	890	866	884	881
Electric Lights/Plug Outlets	10 MW	-	194	190	185	179

Fuel Consumption by Vehicle Use

	Unit	-	FY2000	FY2001	FY2002	FY2003
Gasoline	kl	-	517	452	438	372
Gas Oil	kl	-	182	176	217	185
Natural Gas	1000 m ³ N	-	4	1	0.5	0.4
Vehicle Number	Vehicles	-	459	417	390	362

Green product purchasing

	Unit	-	FY2001	FY2002	FY2003
Purchased Volume of Copier Paper	10000 sheets	-	2,560	2,617	2,492
Purchased Volume of Recycled Copier Paper	10000 sheets	-	2,380	2,560	2,453
Recycled Copier Paper Purchase Rate	%	-	93	98	98.4

Achievements of Overseas Technological Cooperation Projects

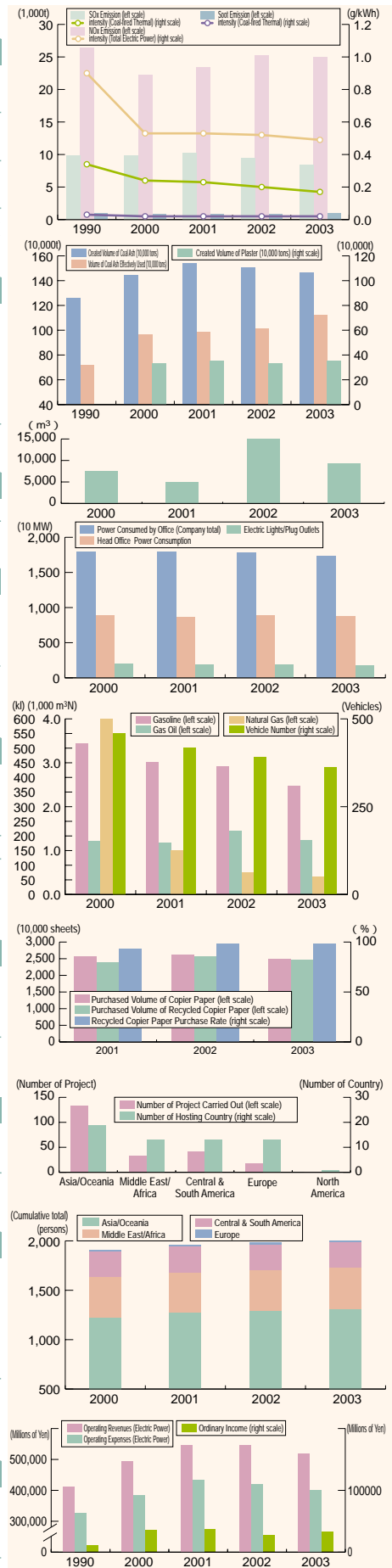
	Unit	Asia/Oceania	Middle East/Africa	Central & South America	Europe	North America	Total
Number of Project Carried Out	Number of Project	133	33	42	17	1	226
Number of Hosting Country	Countries	19	13	13	13	1	59

Achievement of Hosting Foreign Trainees

	Unit	-	FY2000	FY2001	FY2002	FY2003
Total Number of Hosted Foreign Trainees	persons (Cumulative total)	-	16(1,908)	53(1,961)	19(1,980)	25(2,005)
Asia/Oceania	persons (Cumulative total)	-	12(1,223)	48(1,271)	17(1,288)	20(1,308)
Middle East/Africa	persons (Cumulative total)	-	3(407)	2(409)	1(410)	3(413)
Central & South America	persons (Cumulative total)	-	1(260)	2(262)	1(263)	2(265)
Europe	persons (Cumulative total)	-	0(18)	1(19)	0(19)	0(19)

Business Turnover

	Unit	FY1990	FY2000	FY2001	FY2002	FY2003
Operating Revenues (Electric Power)	Millions of Yen	412,637	495,307	547,733	546,209	518,978
Operating Expenses (Electric Power)	Millions of Yen	325,514	384,937	434,241	421,541	400,754
Ordinary Income	Millions of Yen	11,879	35,334	36,883	27,275	33,522



Group Companies' Efforts

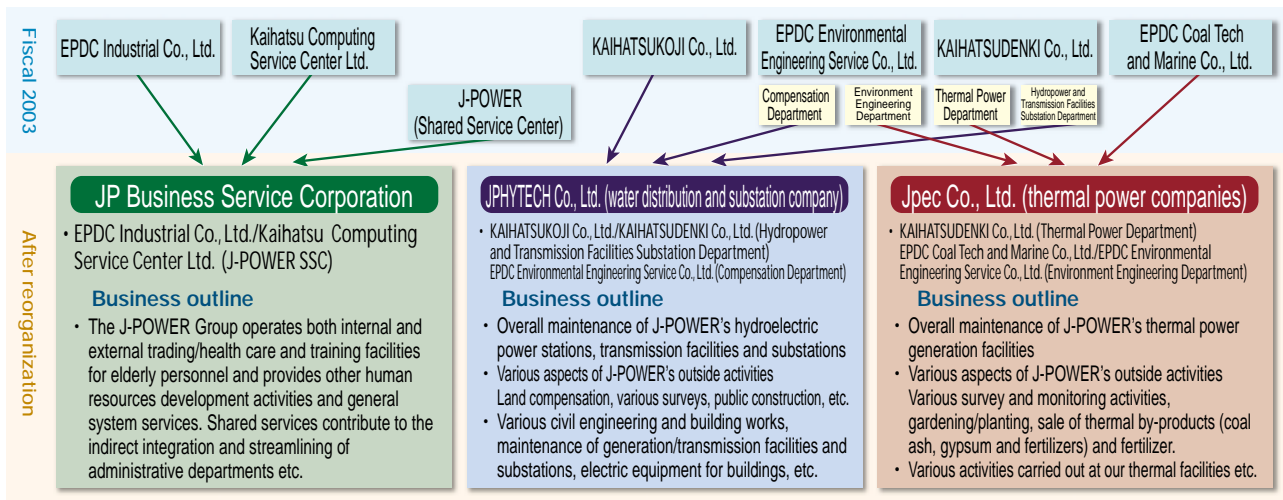
With the reorganization of the J-POWER Group in April 2004, the main group companies began their individual environmental conservation activities under a new environmental management system. These companies currently develop and offer a range of environmental products and services. Some of the companies' efforts are presented as follows:

Reorganization of our main group of companies

In order to upgrade and unify group operations and further strengthen our efforts for cost reduction, 6 of the 9 main companies were consolidated into 3 companies

in April 2004. At present, we have 6 main group companies.

J-POWER Group's Reorganization Overview



KEC Corporation, KDC Engineering Co., Ltd. and EPDC Overseas Coal Co., Ltd. operate as before. Denpatsu Holding Company was merged into J-POWER.

EPDC Overseas Coal Co., Ltd. was renamed J-POWER RESOURCES Co., Ltd. on July 1, 2004.

Environmental management

JPHYTECH Co., Ltd. and Jpec Co., Ltd. established a basic environmental policy and an environmental management system to assist their conservation activities.

These companies also conduct environmental management activities at their local offices, in association with J-POWER.

JPHYTECH Co., Ltd.

Basic Environmental Policy

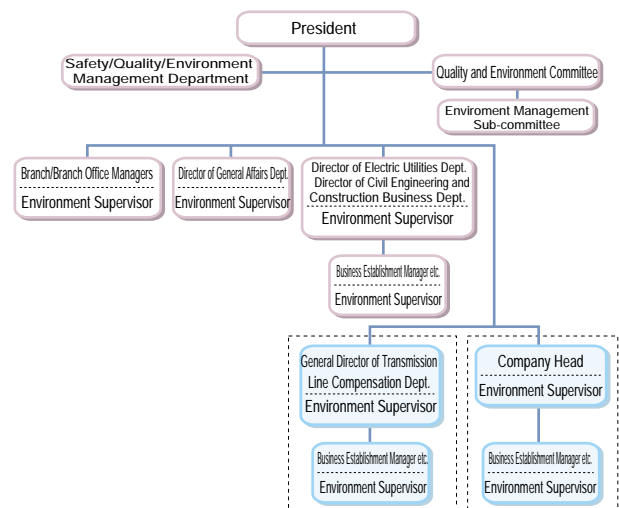
We endeavor to reduce environmental impacts resulting from our operations and to contribute to society.

Action Guidelines

1. We are acquiring ISO 14001 certification as a member of the J-POWER Group.
2. Each employee understands the environmental impact associated with our business activities and makes all out efforts to reduce their impact.
3. We comply with all environmental laws and various related rules within the laws.
4. We make efforts reducing, reusing and recycling the waste.
5. We promote energy and resource conservation.
6. We collaborate with local communities in environmental beautification.

Osamu Iwashita
President, JPHYTECH Co., Ltd.
April 1, 2004

JPHYTECH Environmental Management System



Fiscal 2003 activities of each group company

Main Group Companies' Accomplishments

- Each company developed environmental management rules.
- During Environment Month, each company's offices participated in community activities, in collaboration with J-POWER.
- KAIHATSUDENKI Co., Ltd. held environmental lectures as one of its Environment Month activities.
- Each company developed a company-wide electricity conservation campaign.
- Each company participated in a training course for internal environmental auditors, organized by J-POWER.
- Kaihatsu Computing Service Center Ltd. offered about 10 surplus laptops to a welfare organization.
- KDC Engineering Co., Ltd. contributed to the collection of old paper and newspapers by a neighborhood association.
- EPDC Overseas Coal Co., Ltd. continued to implement a afforestation project in Australia.
- EPDC Environmental Engineering Service Co., Ltd. obtained ISO 14001 certification in August 1997 and continues operation at Biochemical Technology Center.



Cleaning activities by staff of Miboro Dam Local Office



Internal environmental auditing

Jpec Co., Ltd.

Basic Environmental Policy

We carry out company-wide environmental management activities contributing to the realization of a recycling-based society.

Jpec Co., Ltd. (a member of the J-POWER Group) actively promotes efforts for environmental conservation and the realization of a sustainable, recycling-based society through our business activities (construction, operation and maintenance of thermal and geothermal power stations, the commercial recycling of coal ash, environmental investigation/research and greening/gardening).

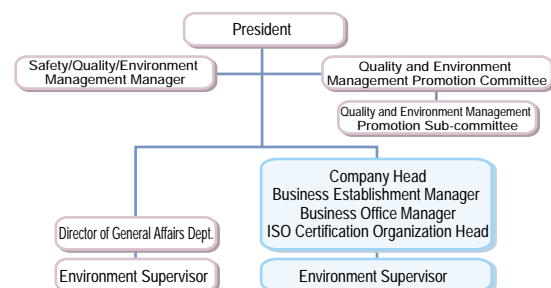
Action Guidelines

1. Each of our employees understands the environmental impacts associated with our business activities and is actively engaged in environmental management.
2. We comply with all environment conservation-related laws and rules.
3. We endeavor to save energy and resources.
4. We collaborate with local communities in trying to improve the local environment.
5. We make efforts at reducing, reusing and recycling the waste in order to lessen environmental impacts.
6. We communicate this policy to all our employees, educate and raise their awareness about the policy and continue to improve our environmental management system.

*1 Tsuneo Nakazawa
President, Jpec, Co., Ltd.
April 1, 2004

* The signature was changed to Masamichi Ono on July 1, 2004.

Jpec Environmental Management System



Companies' main environmental impact data

Data from Group Companies and Offices

We requested that all group companies provide environmental impact data to the J-POWER Group's Environmental Management Promotion Council in order to identify the actual types of environmental impact

Target Company List
<ul style="list-style-type: none"> • EPDC Industrial Co., Ltd • KAIHATSUDENKI Co., Ltd. • EPDC Environmental Engineering Service Co., Ltd. • EPDC Coal Tech and Marine Co., Ltd. • Kaihatsukoji Co., Ltd. • Kaihatsu Computing Service Center Ltd. • KEC Corporation • KDC Engineering Co., Ltd.

*The target companies are listed in the table under their company name, as of fiscal 2003. From fiscal 2004, they were reorganized as shown on page 71.

Group Company Data on Coal-fired Power Stations

This thermal power station started operation as part of the TAIHEIYO CEMENT CORPORATION in July 2001. In April 2003, Itoigawa Power Incorporated Co., Ltd. (an Independent Power Producer 80% funded by J-

Thermal Power Station Outline

- Location: Itoigawa City, Niigata
- Power generation facilities: Coal-fired steam
- Maximum output: 134 MW



Itoigawa Power Station

occurring. This data will be used as the basis of our efforts to further reduce environmental impacts.

Main Data

(Input)	
• Electric power consumption	4.38 million kWh
• Fuel (gasoline and light oil)	1,121 kl
• Office paper	14 million sheets
(Output)	
• CO ₂	46,000t-CO ₂

*Each value in the table is a sum of all figures reported by each company.

*CO₂ emission is calculated from electric power and fuel consumption

POWER and 20% funded by the TAIHEIYO CEMENT CORPORATION) began joint generation of wholesale power at the station.

Main Data

(Input)	
• Coal	215,000t
• Heavy oil	700kl
• Limestone	3,200t
(Output)	
• Electric Power sales	545millionkWh
• CO ₂	540,000t-CO ₂
• Coal ash	37,900t (recycled as all-cement materials)
Emissions	
• SO _x	Annual average 43 ppm
• NO _x	Annual average 53 ppm
• Dust	Annual average 0.9 mg/m ³ N

* This Concentration represents 6% O₂ conversion.

JP Business Service Corporation

Water-saving valve, "Savestar".

We sell the "Savestar" water-saving valve, promoting it with the three key phrases of "Eco-friendly," "Saved Water Resources" and "Cost Reduction."



Savestar

Contact: Market Development Business Dept., JP Business Service Co., Ltd.
Tel: 03-3642-9817
Website: <http://www.jpbs.co.jp/>

JPHYTECH Co., Ltd.

JPHYTECH conducts energy-saving diagnoses on facilities and installs various energy-saving products as part of its environmental conservation business.



Energy-saving equipment "EcoSyphil" and "NeoLux"

Contact: Energy-saving and Engineering Group, Electricity Business Dept., JPHYTECH Co., Ltd.
Tel: 03-3234-0468
Website: <http://www.jphytec.co.jp/>

Epure Co., Ltd.

A large amount of driftwood is carried into dam reservoirs in mountainous areas. This driftwood is usually collected and removed but, after investigating and researching the most effective use for such driftwood, we found that it could be converted into high-quality charcoal. We produce and sell skincare products - derived from "driftwood charcoal and pyroligneous acid" - that are friendly to both nature and human beings.



Pyroligneous acid



Koju No Sei II

Customer service representative, Epure Co., Ltd.
Free dial: 0120-669-884
Website: <http://www.epure.co.jp/>

Jpec Co., Ltd.

(Environmental Engineering Service)

The Environmental Engineering Department has long offered proven environmental survey and analysis, garden greening and management services. It provides unique environmental solutions such as survey/planning/design/construction and management for the conservation and creation of natural environments as an example biotopes, and cleaning agents (Novaclear) with little water pollution.



Conservation and creation of natural environment



Ion aqua cleaning agent "Novaclear"

Contact: Environmental Engineering Dept., Jpec Co., Ltd.
Tel: 03-5203-0361
Website: <http://www.jp-ec.co.jp/>

Thermal Power Section Recycling Business

We sell coal ash, gypsum, by-products and products from coal-fired power stations. We also produce the world's first "citrate soluble silicate potassium fertilizer" (consisting mainly of coal ash) and carry out resource effective use.



Superblend

Contact: Fertilizer Business Group, Thermal Power Section Recycling Business Dept., Jpec Co., Ltd.
Tel: 03-5203-0371
Website: <http://www.jp-ec.co.jp/>

KDC Engineering Co., Ltd.

We carry out a wide variety of operations such as investigation/analysis and prediction with a view to harmonizing development with the environment. In addition, we conduct high-precision survey and analysis to determine the best methods for water purification, based on our past experience with underground geological survey technologies.

(A designated survey organization under the Law: Concerning the Measures Against Soil Pollution: Environment 2003-1-815)
Contact: KDC Engineering Co., Ltd.
Tel: 03-5371-9588
Website: <http://www.kdc.co.jp/>

Outline of “Guideline for Measures to Prevent Global Warming”

In 2002, the Japanese government developed new “Guidelines for Measures to Prevent Global Warming” outlining measures with which to achieve the target of 6% reduction in greenhouse gas emissions (compared to 1990 levels) as defined in the Kyoto Protocol. The government also revised the “Law Concerning the

Promotion of Measures to Cope with Global Warming” in accordance with the Kyoto Protocol. Since then, various measures based on these Guidelines have been promoted. The first evaluation of progress is currently being carried out. The measures will be reviewed, based on the results of this evaluation.

Basic perspectives

We will prepare and establish mechanisms that contribute to the balance between the environment and the economy by fostering technological innovation and creative initiatives in business circles, in order to link the efforts to prevent global warming to economic revitalization and employment creation.

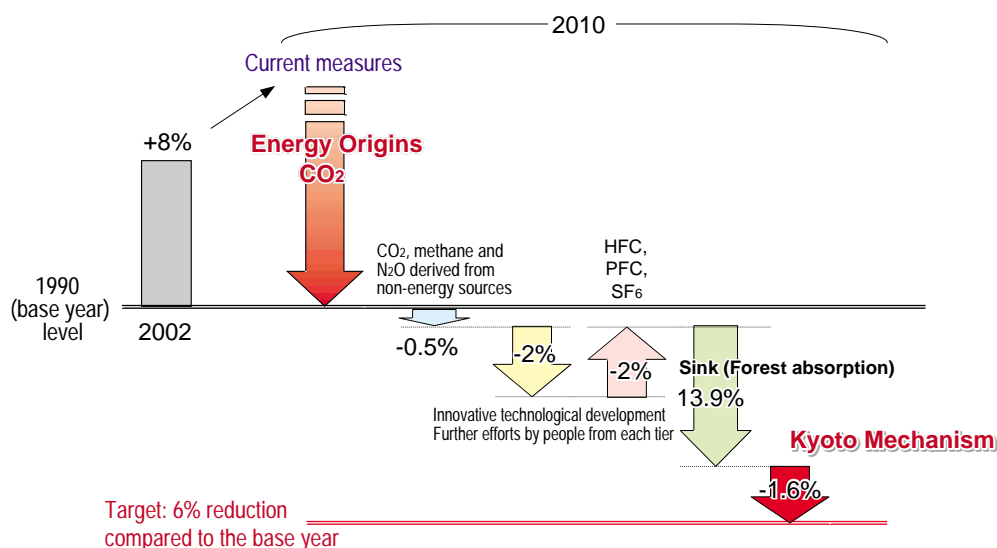
We will undertake assessment and review of the progress of measures being taken at regular intervals (in 2004, 2007), and take necessary measures step by step.

It will by no means be easy to achieve the targets of the Kyoto Protocol, thus it is essential that all entities, from

national government to local governments, businesses to the people, join forces with all their might and in their respective roles to achieve the goals. From this viewpoint, we will continue to promote voluntary initiatives of businesses and at the same time strongly advance the measures particularly in the residential and commercial sector and transportation sector.

We will continue to make the utmost effort to establish a common regime in which all countries including the United States and developing countries will participate.

Targets (by category) in the Guidelines for Measures to Prevent Global Warming (2002)



Outline of the Framework Convention on Climate Change

The United Nations “Framework Convention on Climate Change” defines an international framework for the prevention of global warming. The Convention was adopted at the first “World Summit on Sustainable Development (Global Environment Summit)” held in Rio de Janeiro, Brazil, in June 1992 and entered into

force on March 21, 1994. Currently, 188 countries and 1 region ratify the Convention.

The Convention’s ultimate target is stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

Principles

1. Protection of the climate system on the basis of equity and in accordance with their common but differentiated responsibilities
2. Considerations for special circumstances
3. Implementation of precautionary measures*

4. Right and obligation to promote sustainable development
5. Cooperation to promote a supportive and open international economic system

*Full text of Principle 3

The parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-

economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested parties.

Outline of Kyoto Protocol

Outline of Kyoto Protocol

The Kyoto Protocol sets targets for controlling emissions of greenhouse gases in the countries of those parties included in Annex I ^(Note). It was adopted in the Third Conference of the parties (COP3) in December 1997 and is to enter into force when 55 or more Parties to the Convention,

incorporating Parties included in Annex I which accounted in total for at least 55 per cent of the total carbon dioxide emissions for 1990 of the Parties included in Annex I.

Note: this includes 35 developed countries (including 11 economy in transition countries) and the European Community

Designated Greenhouse Gas: Total six gases, namely, CO₂, Methane, N₂O (nitrogen monoxide), HFC (hydrofluorocarbon), PFC (perfluorocarbon) and SF₆ (sulfur hexafluoride).

Commitment Period: 2008-2012 (The First Commitment Period)

Target: To reduce average emissions of greenhouse gases by at least 5% (compared to 1990 levels) within the commitment period by the parties included in Annex I.

The parties included in Annex I promise to meet the reduction targets defined in Annex B of the Kyoto Protocol. Japan's reduction target is 6%.

The land use, land-use change and forestry sector: Limited to the change in land utilization and afforestation, reforestation and deforestation in the forestry sector in and after 1990, the increase of absorption can be accounted for to help meet emissions targets. The details are supposed to be decided before the COP9 in December, 2003.

Kyoto Mechanism: These aim to maximize the cost-effectiveness of climate change mitigation by allowing Parties to pursue opportunities to cut emissions, or enhance carbon sinks, more cheaply

abroad than at home.

* Emissions Trading:

International trading on the assigned amount of emissions (or reduction amounts based on CDM/JI). The parties included in Annex I can add the assigned amount (or reduction amount based on CDM/JI) obtained from other parties to their own assigned amount.

* Joint Implementation (JI)

Under the Joint Implementation, the parties included in Annex I can conduct a joint project for GHG emissions reductions and distribute them among the parties involved. This mechanism enables to generate emission reduction between 2008 and 2021. Detailed rules for the mechanism were adopted in the Marrakesh Accords and are awaiting the enforcement of the Kyoto Protocol.

* Clean Development Mechanism (CDM)

Under the CDM, the parties included in Annex I can conduct a joint project for GHG emissions reductions in developing countries and distribute them reductions obtained among the parties involved. This Mechanism enables to generate reductions after 2000.

Present situation of Kyoto Protocol

The breaking away of the United States, the largest GHG emitter in the world, from Kyoto Protocol in 2001 has once caused a concern that the entry into force of Kyoto Protocol could be impossible. However, the subsequent international cooperation has enabled the Operational Rules for Kyoto Protocol to be adopted during the COP7 held in November of the same year,

and the world started to move toward the entry into force of Kyoto Protocol.

The Japanese government accepted the Kyoto Protocol in June 2000, after the necessary legal revisions to ensure its commitment. If Russia ratifies it, the condition for Kyoto Protocol will come into force.

"Environmental Action Plan in Electric Power Industry" is the summary of the policy and plan of electric power industry for tackling problems including Global Warming, and we are going to update it every year based on the achievements, movements in Japan and abroad and other factors.

This action plan was incorporated in the "Voluntary Environmental Action Plan of Japan Federation of Economic Organizations" established in June 1997 by Japan Federation of Economic Organizations. The "Environmental Voluntary Action Plan of Japan Federation of Economic Organizations" and each

voluntary action plan of industries comprising this plan. The progress of this plan is supposed to be reviewed by different councils and other organizations of the government.

Also, the "Voluntary Environmental Action Plan of Japan Federation of Economic Organizations" (then) was positioned as "forming one of the cores" in the "General Policy for Promoting Anti-Global Warming Measures" summarized by the government as concrete policies and measures for the GHG Reduction Target of 6% in Kyoto Protocol.

Measures to cope with Global Warming

The target for CO₂ emission reduction

The electric utility industry has set the following CO₂ emission goal. By fiscal 2010, we aim to further reduce CO₂ emissions intensity (emission per unit of user end electricity) by approximately 20% from the fiscal 1990 level, to about 0.34 kg of CO₂/kWh. While total electricity consumption is expected to increase 40% over

the fiscal 1990 level by fiscal 2010, the increase in total CO₂ emissions is projected at only 12%.

Item	Fiscal 1990 (result)	Fiscal 2000 (result)	Fiscal 2001 (result)	Fiscal 2002 (result)	Fiscal 2005 (est.)	Fiscal 2010
Electricity power consumption (100 million kWh)	6,590	8,380	8,240	8,410	8,530	[est.] 9,200
CO ₂ emissions (100 million tons of CO ₂)	2.77 [0.02]	3.17 [0.11]	3.12 [0.13]	3.42 [0.17]	3.1	[est.] 3.2
CO ₂ emissions intensity (user end electricity) (kg- CO ₂ /kWh)	0.421	0.378	0.379	0.407	0.36	(Target) 20% reduction vs. FY 1990 (about 0.34)

* CO₂ emissions intensity (user end electricity) = CO₂ emissions ÷ energy consumption

* Estimates for fiscal 2005 and 2010 are based on fiscal 2003 energy supply plans.

* The figure includes CO₂ emissions from power purchased from cooperative thermal power plants and IPPs (independent power producers). Figures in parentheses represent total CO₂ emissions from the power purchased from IPPs and household generators isolated from other types of supply.

* Figures for fuel-specific CO₂ emission coefficients represent the numerical data published in the Ministry of the Environment's Report on Comprehensive Total Greenhouse Gas Emission Estimate Investigation (August 2002).

Measures to be taken for reducing the CO₂ emission

Measures by the electric utility industry to suppress CO₂ emission can be broadly classified into “supply side” and “demand side” measures. Following is a summary of

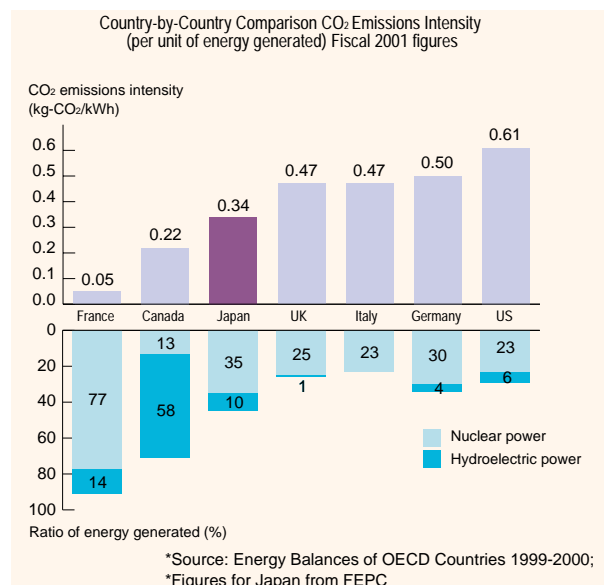
Supply-side measures

- Expand introduction of nuclear power generation, which emits no CO₂ to generate power, and of liquefied natural gas (LNG), which emits comparatively little CO₂ increased use of nuclear power generation.
- Developed and application of natural energy sources such as hydroelectric, geothermal, solar and wind power.
- Enhancing the efficiency of thermal power generation by introducing combined-cycle systems and high-efficiency coal-fired thermal power generation, as well as improving the efficiency of power facilities by reducing transmission/distribution power losses.

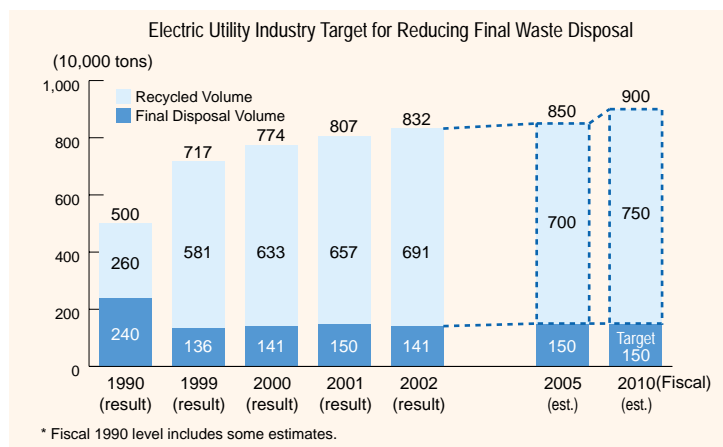
Demand-side measures

- PR activities on energy conservation measures for customers, development and application of highly efficient, energy-conserving appliance like heat pumps, and using unutilized energy sources.
- Promotion of load leveling management by the use of regenerative heat systems, etc.

each. The outline is shown as follows:



Wastes Reduction and Recycling



Trends in Recycling of Major Types of Waste and Byproducts

Sort			Fiscal 1990	Fiscal 2000	Fiscal 2001	Fiscal 2002
Wastes	Combustion residue Dust and soot Coal ash	Volume generated	347	544	582	605
		Recycled volume (Recycling rate)	137 (39%)	420 (77%)	446 (77%)	474 (78%)
		Volume generated	40	36	39	33
	Construction waste materials	Recycled volume (Recycling rate)	21 (53%)	30 (83%)	34 (87%)	31 (94%)
		Volume generated	14	15	15	17
	Scrap Metal	Recycled volume (Recycling rate)	13 (93%)	15 (96%)	14 (94%)	16 (96%)
Byproducts		Volume generated	85	157	153	160
	Recycled volume (Recycling rate)	85 (100%)	157 (100%)	153 (100%)	160 (100%)	

* Wastes include products of value.

* Figures for construction waste material and scrap metal in fiscal 1990 are estimates.

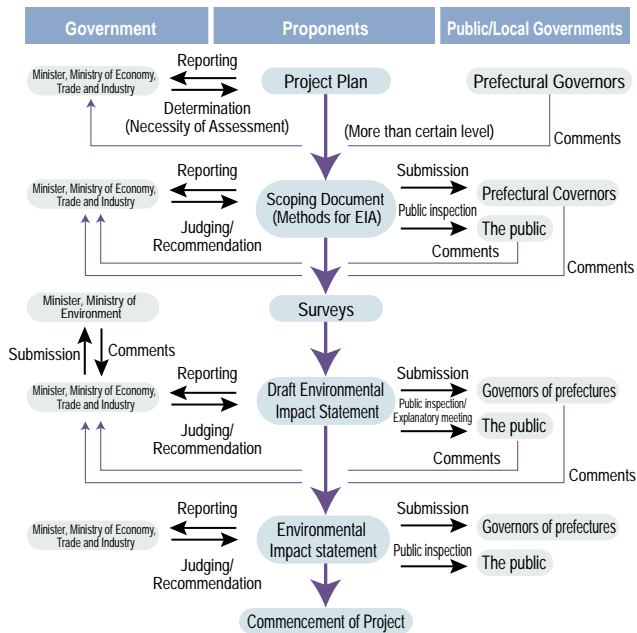
* Gypsum from desulfurization process is all sold.

* Reutilization rates are calculated on an actual volume basis. (Figures for the volume generated and recycled volume are rounded to the nearest ton.)

Materials of FEPC (Sept. 2003)

Outline of the Environmental Impact Assessment Law

The Process of Environmental Impact Assessment (Electric Power Project).



The Environmental Impact Assessment Law, enacted in June 1999, stipulates the proponent of a project, of which scale is large and environmental impacts may be significant, must implement survey, prediction and assessment of the impacts exerted on the environment when the project is executed. The EIA Law also stipulates the procedure base on which the relevant prefectural governors, the relevant cabinet ministers and Japanese nationals express their comments on the methods and results of the EIA, and the project proponent is obliged to implement appropriate measures to feedback the results of the EIA to the plan of the project.

As for the power stations, environmental impact assessments had been carried out for the past twenty years following the Environmental Assessment System decided by the Ministerial Council Decision of the Ministry of International Trade and Industry (then). However, in accordance with enactment of the Environmental Impact Assessment Law, the Electricity Utilities Industry Law was modified in conjunction with it. Now, environmental impact assessments are performed abiding by these two laws.

J-Power has conducted Environmental Impact Assessments based not only on the EIA Law but also on the other legal regulations such as Public Waters Reclamation Law, Forest Law, prefectural and municipal ordinances, etc.

Terminology and Index

The pages indicate main descriptions.

A

ABWR: Advanced Boiling Water Reactor P. 5, 27

Annex B States P. 76

They are countries (expressed as “developed countries” in this report) that indicated their emissions reduction numerical targets from 2008 to 2012 in comparison with the 1990 level and committed to them, defined in Annex B, the Kyoto Protocol.

Annex I States P.76

They are countries (expressed as “developed countries” in this report) that committed to emissions-reduction of greenhouse gas, defined in Annex I, the Framework Convention on Climate Change.

Ashcrete P. 43

B

Biomass P. 6, 9, 11, 19, 24, 35, 31, 32

Biotope P. 23, 70

Biotope is a coined term of Bio (organism) and Tope (space, place) in German and an ecosystem or a habitat space where wild fauna and flora co-exist. It essentially refers to a wide-ranging natural ecosystem. Recently, in most cases, it also refers to an artificial space where plants, fish and insects co-exist.

C

CDM: Clean Development Mechanism P. 3, 9, 31, 32, 76

Chlorofluorocarbon (CFC) Alternatives P. 30

CFC alternatives have been used in place of chlorofluorocarbon, ozone-depleting substances. The substitutes are used for manufacturing process of semi-conductors and for refrigerators, but their warming effect is thousands to ten thousands times that of CO₂. For this reason, they were designated as a reduction target by the Third Conference of the Parties (COP3) for the Framework Convention on Climate Change held in Kyoto on December 1997.

Chemical Oxygen Demand (COD) P.12

The amount of oxygen that is consumed for oxidizing water contaminants (typically organic matters). COD is used for a pollution index on sea areas and lakes and ponds.

Coal Ash
P. 9, 10, 11, 12, 13, 14, 19, 23, 33, 43, 48, 73, 74,78

C

Designated Operational Entity (DOE) P. 31

The organization is trusted by the commission of Clean Development Mechanism (CDM) and designated by the United Nations Secretariat as an entity that reviews effective CDM proj-

ects, examines emission reductions of projects and certifies projects.

Dioxins P. 38, 46
Polychlorinated-diben-zo-p-dioxins (PCDDs), polychlorinated dibenzofuran (PCDF) and coplaner polychlorinated biphenyl (coplaner-PCB) are collectively called Dioxin. They are hazardous substances in trace amounts present in the environment. Since they potentially had significant effects on human life and health, their release from waste incinerators is being limited under the Special Law for Countermeasures against Dioxin forced on January 2000.

Driftwood P. 10, 12, 13, 19, 20, 44

E

Environmental Accounting P. 10, 13
It is a mechanism to understand correctly company's environmental conservation investment and cost being traditionally difficult to be reflected in financial analysis, and their effectiveness and disclose it. This method allows companies to quantitatively address their own environmental conservation and to improve cost effectiveness of the conservation in undertaking activities while enabling stakeholders to compare and examine an approach to their environmental efforts on the same basis by obtaining data on corporate environmental account through environmental activity reports.

Environmental Action Plan of the Electric Utility Industry P. 77
The plan is a voluntary action plan prepared jointly by the 12 members of the Federation of Electric Power Companies, so that electric utilities may address environmental conservation measures voluntarily and actively. Under the plan, they establish specific goals for global warming countermeasures and creation of recycling-based society. They follow up the plan to ensure its transparency on an annual basis and publish the results.

Environment Assessment P. 34, 37, 79

Environmental Audit P. 10, 15, 17

Environmental Conservation Agreement (Agreement on Environmental Pollution Control) P. 33

Environmental Efficiency P. 7, 10, 13, 14
It is a method to quantify efforts to reduced usage of water, electricity and raw materials used in business activities, reduced generation of waste, wastewater and exhaust gas, law compliance and environmental pollution control and implement comparative evaluation on those activities.

Environmental Management Systems (EMS) P. 15, 16, 17, 18, 28

Electrostatic Precipitator (EP) P. 35

F

FGC Deep Mixing Method of Soil Stabilization P. 48
This is a construction method to use mixed slurry of coal ash, gypsum and cement to improve soft ground.

Flue Gas Denitrification unit P. 35

Flue Gas Desulfurization Units P. 35, 44

Framework Convention on Climate Change P. 7, 75, 76

Fuel Cell P. 9, 20, 49
Fuel cell is a system that generates electricity by supplying outside hydrogen and oxygen and using their chemical reaction. It has higher total energy efficiency and is effective in saving energy and reducing CO₂ emissions due to the availability of higher power generation efficiency and efficient use of waste heat. It emits less air pollutants due to the absence of a combustion process while having superior environmental features such as low noise due to that generators have no rotary parts.

Full MOX-Advanced Boiling Water Reactor (ABWR) P. 5, 27

The conventional "thermal plutonium effort" is planned to use MOX fuel up to a third in overall nuclear fuel, whereas "Full MOX" will be used in a full nuclear.

G

General Waste P. 9, 45
Waste except industrial waste is defined as general waste under the PCB Special Measures Law, which is classified into "life general waste" from homes and "business general waste" from business and eating /drinking establishments.

Geothermal Generation P. 9, 11, 12, 18, 24

Global Warming P. 3, 5, 6, 7, 19, 21, 75

Green Purchasing P. 20, 45
It means purchasing products and services in favor of minimal burdens on the environment, focusing on their environmental impacts as well as their price, quality, convenience and design.

H

Hydrofluorocarbons (HFC) P. 30
HFCs are chemicals that have been used for electric refrigerators and car air-conditioners and so on since around 1991 as ozone-friendly alternatives responding to regulations on CFCs and HCFCs. They are artificial greenhouse gas. Their greenhouse effect is 12 to 12,000 times that of CO₂.

I

Industrial Waste P. 12, 46
This type of waste represents ash, sludge, waste oil/acid/alkali/plastic and other waste in waste associated with business activities. The waste is properly treated under the PCB Special Measures Law.

Industrial Waste Subject to Special Control P. 12
The "Waste Management and Public Cleansing Law" defines explosive, toxic and infectious industrial waste as industrial waste subject to special control in order to strictly control it. It includes waste oil with a low firing point, medical waste, PCB waster, waste asbestos and sludge containing highly concentrated heavy metals.

Integrated Coal Gasification Fuel Cell Combined Cycle (IGFC) P. 9, 20, 49
IGFC is a triple complex generation system integrating three generation modes of a fuel cell, a gas turbine and a steam turbine and is an ultimate power generating system in coal-fired thermal generation.

IPP: Independent Power Producer P. 5, 42
IPPs are non-wholesale electric utilities that supply electricity to

general electric utilities.

ISO14001 P.16, 17, 40, 72
It is one of a series of ISO14000, an international standard for environment management developed by the International Standards Organization (ISO) and defines the requirements for the Environment Management System (EMS).

J

Jl : Joint Implementation P.3, 9, 31, 32, 41, 76

K

Kyoto Protocol Mechanisms P. 3, 7, 19, 21, 31,41, 76

Kyoto Protocol P. 3, 7, 31, 76

L

Life Cycle Assessment (LCA) P. 10, 29
This is a method to quantitatively and objectively evaluate input resources and energy, released environmental burdens and their environmental effects on the earth and ecosystems, through all phases from collection of resources for the product, its production, use, disposition and transportation.

Low-emission Vehicle P. 9, 45

M

Methane (CH₄) P. 30
It is a main component of natural gas. It is also generated from decay and fermentation of organic matters. It is emitted as part of greenhouse gas, and its emission follows that of CO₂. Its greenhouse effect is 21 times that of CO₂.

N

Nitrogen Oxides (NO_x) P. 3, 9, 10, 12, 13, 14, 19, 23, 28, 35, 36, 48, 70, 73

When matters are burned, nitrogen in the air and nitrogen compounds in substances are coupled with oxygen, which always generates nitrogen oxides (NO_x). High temperature combustion from boilers of power stations and plants, and from motor engines, produces nitric oxide (NO) that is also oxidized and becomes stable nitrogen dioxide (NO₂), and released into air. In addition, NO_x initiates UV photochemistry by ultraviolet ray and produces photochemical oxidants such as ozone.

Nitrous Oxide (N₂O) P. 30
It is referred to nitrogen oxide. It is one of typical greenhouse gases such as carbon dioxide, methane, ozone in troposphere, chlorofluorocarbon (CFC). Its greenhouse effect is 310 times that of CO₂. It is said to be a result from matter burning and nitrogen fertilizer application.

O

ODA: Official Development Assistance P.42
ODA refers to resources and technical assistance offered by the government and institutions concerned for the purpose of economic progress and improved welfare. The programs of ODA are implemented by the Ministry of Foreign Affairs, the Japan International Cooperation Agency (JICA) and the Japan Bank for International Cooperation (JBIC).

Ozone Layer P. 30

P

PCB: Polychlorinated Biphenyl P. 9, 19, 38
It is a chlorinated organic compound that was commercially produced for the first time in 1929. It had been used for various purposes with the help of its stability, heat resistance and insulation. However, it was made clear that PCB was persistent in the environment, easy to accumulate in organisms and had chronic toxicity. For this reason, it was prohibited from production, import and new use in 1974 under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances. It was stipulated that PCB waste in storage should be defused till 2016 by the PCB Special Measures Law enforced on July 2001.

PDCA Cycle P.15
The cycle consists of Plan, Do, Check and Action elements. Also in the Environment Management System (EMS), it is fundamental to repeat this cycle for continuous improvement.

Perfluorocarbons (PFC) P. 30
PFCs are chemicals that have been used to manufacture semiconductors since 1980s. They are artificial greenhouse gas. Their greenhouse effect is 5,700 to 11,900 times that of CO₂.

PFI: Private Finance Initiative P. 46
This initiative is a method on which public services such as infrastructure improvements traditionally provided by the central and local governments are offered by private sectors with their own capitals. It is being noted that the method has the effect of providing social-infrastructure improvements without increasing financial burdens on the government and also creates opportunities to increasing public works for firms.

(Power) retail liberalization P. 1
The Amended Electric Utilities Industry Law bill was passed on May 1999 and enforced on March 2000. Under the law, other companies could enter into an electric retail market traditionally dominated by regional electric power companies (EPCOs) (national 10 EPCOs). This enabled customers to select power suppliers including the regional EPCOs at their option where appropriate.

Power Generation (Thermal) Efficiency P. 3, 19, 21, 22, 23, 41, 47
It is an indicator showing how much of the amount of heat from a boiler is shifted to electricity.

PPP: Public Private and Partnership P.46

PRTR: Pollutant Release and Transfer Register P. 9, 19, 38

Protected Environment Area P. 40

Pumped Storage Hydroelectric Generation P. 5, 6, 9, 11, 19, 24

R

RDF: Refuse Derived Fuel P. 48

Renewable Energy P. 5, 6, 9, 10, 19, 24
It is energy generated from natural phenomena such as solar, hydroelectric, wind and wave power and biomass, in contrast to fossil fuel such as limited resources on the earth, coal and oil.

River-head Forest P. 9, 19 39

River maintenance flow P. 39
The flow rate is a river effluent established after collectively

evaluating the requirements necessary for recovering and creating favorable river environment such as improved fish habitat per river and enhanced river landscape, in order to eliminate reduced water sections by hydroelectric generation as part of conservation of river environment and recovery of clear streams.

S

Seawater Pumped Storage Power Generation

P. 39, 48

Pumped hydropower uses sea as an upper or lower retention reservoir. The advantages include that it requires no fresh water such as river water and lower dams and that the plants have a higher possibility of being constructed near power demand places due to being sited along a coast. The Agency for Natural Resources and Energy is implementing a first demonstration test for the sea pumped hydropower in the world.

Sink (Absorbing source)

P. 76

SOFC : Solid Oxide Fuel Cells

P. 9, 49

Soil Pollution

P. 37

It means that soil and groundwater are contaminated or under a contaminated state with hazardous substances. There are two cases of contamination; one case in which pollutants are mixed directly into soil due to leakage of raw materials and waste land-fill and dumping and another case in which soil is indirectly contaminated through air and water pollution.

Soot

P. 3, 9, 12, 13, 14, 35

The Air Pollution Control Law categorizes sources of air suspended solids as followed; substances generated after matter burning as "soot", substances generated or scattered after pulverization and buildup of matters as "dust" and substances generated from car operation as "Suspended particulate matter".

SP : FSpecial Purpose Company

P. 46

Sulfur Hexafluoride (SF₆)

P. 9, 10, 13, 19, 30

It is a compound of Fluorine and Sulfur, and does not occur naturally in nature and artificially produced. Due to its chemical stability and superior insulation performance, it is used as insulation gas for breakers by electric utilities. Its greenhouse effect is 22,200 times that of CO₂.

Sulfur Oxide (SO_x)

P. 3, 9, 10, 12, 13, 14, 19, 23, 28, 35, 36, 47, 70, 73

It is a generic term of oxide of sulfur and abbreviated to SO_x. It includes sulfur dioxide (SO₂), sulfur trioxide (SO₃) and sulfuric acid mist (H₂SO₄). When coal and heavy oil are burned in plants and thermal power stations, sulfur contents present in the fuel are emitted as sulfur oxide (SO_x), included in exhaust gas and being one of contributors to acid rain, which causes air pollution.

Supercritical Water

P. 50

If water exceeds a critical point of high temperature and pressure (374°C and 22.1 MPa), it is placed in a "super critical state". The state will allow even water-soluble matters to be insoluble in water and to promote their oxidation. Organic matters can be ultimately split into water and carbon dioxide.

Sustainability Report Guidelines

P. 0

They are the guidelines of Sustainability Report which considers not only the environmental sides but also the sides of social and economy in terms of sustainable development. This guideline is developed by the United Nations Environment Programme and the Global Reporting Initiative, an international NGO consisted of environmental groups, institutional investors, accountants associations and firms in various countries.

Sustainable Development

P. 7, 75

The World Commission on Environment and Development's 1987 Report defined that "sustainable development refers to development that can meet the desire of the current generation without deteriorating the future generations' ability to satisfy their own desires." In addition, "The New World Conservation Strategy", jointly prepared by the International Union for Conservation of Nature and Natural Resources (IUCN), the United Nations Environment Programme (UNEP) and the World Wildlife Fund (WWF) in 1991, defined that "people's life quality should be improved under their current environment within capacity limitations of various ecosystems supporting their life".

T

Thermal Plutonium

P.5

This is process in which the plutonium recovered by reprocessing the spent nuclear fuel is mixed with uranium to produce Mixed Oxide Fuel (MOX) which is mainly used for LWR power generation purposes.

U

Ultra Super Critical (USC)

P. 23, 47

W

Warm water discharge

P. 36

Steam generated after rotating turbines for thermal and nuclear generation is cooled in a condenser and returned to water that is circulated to a boiler for reuse. Seawater is used as cooling water for this condenser in Japan's most power plants. Seawater after cooling steam is called thermal effluent because it is heated through the condenser and is returned to sea from an outlet.

Wind Power

P. 6, 19, 25, 26

Location and Telephone of Organizations and Offices

Name	Location	Phone Number	
Head Office	104-8165 6-15-1, Ginza, Chuo-ku, Tokyo	03-3546-2211	
Hydropower & Power Network Department	Hokkaido Regional Headquarters	060-0003 Daido Seimei Building, Kitasanjo Nishi 3-chome, Chuo-ku, Sapporo City, Hokkaido	011-221-8445
	Northern Regional Control Center	041-1102 703, Aza Togeshita, Nanae Town, Kameda-gun, Hokkaido	0138-65-9861
	Kitahon Power Administration Office	041-1102 703, Aza Togeshita, Nanae Town, Kameda-gun, Hokkaido	0138-65-5821
	Kamishihoro Power Administration Office	080-1408 228-3, Aza Kamishihoro Higashi-2-sen, Kamishihoro Town, Kato-gun, Hokkaido	01564-2-4101
	Hokkaido Transmission Line Maintenance Center	041-1102 703, Aza Togeshita, Nanae Town, Kameda-gun, Hokkaido	0138-65-5821
	Kamishihoro Transmission Line Maintenance Center	080-1408 228-3, Aza Kamishihoro Higashi-2-sen, Kamishihoro Town, Kato-gun, Hokkaido	01564-2-4104
	Hokkaido Telecommunication Engineering Center	041-1102 703, Aza Tougeshita, Nanae Town, Kameda-gun, Hokkaido	0138-65-5821
	East Regional Headquarters	350-1162 151, Oaza Minami Otsuka, Kawagoe City, Saitama	049-246-9711
	East Regional Control Center	350-1162 151, Oaza Minami Otsuka, Kawagoe City, Saitama	049-248-4551
	Kawagoe Power Administration Office	350-1162 151, Oaza Minami Otsuka, Kawagoe City, Saitama	049-242-6678
	Numappara Power Administration Office	325-0111 897-6, Aza Takinosawa, Itamuro, Kuroiso City, Tochigi	0287-69-0505
	Tagokura Power Administration Office	968-0421 1604, Aza Arayashiki, Oaza Tadami, Tadami Town, Minamiaizu-gun, Fukushima	0241-82-2251
	Shimogo Power Administration Office	969-5208 847-1, Aza Hanjo Otsu, Oaza Onumazaki, Shimogo Town, Minamiaizu-gun, Fukushima	0241-68-2221
	Towa Power Administration Office	028-0122 15, Taninai 9-ku, Towa Town, Waga-gun, Iwate	0198-44-2111
	Koide Power Administration Office	946-0011 889, Aza Sakanoshita, Oaza Koidejima, Koide Town, Kitauonuma-gun, Niigata	02579-2-0990
	Okukiyotsu Power Administration Office	949-6212 502, Aza Dobayama, Oaza Mikuni, Yuzawa Town, Minamiuonuma-gun, Niigata	025-789-2707
	Nishi Tokyo Power Administration Office	195-0051 160-1, Shinkoji 2-go, Machida City, Tokyo	042-735-5753
	East Transmission Line Maintenance Center	350-1162 151, Oaza Minami Otsuka, Kawagoe City, Saitama	049-242-6677
	Kanto Telecommunication Engineering Center	350-1162 151, Oaza Minami Otsuka, Kawagoe City, Saitama	049-246-9754
	Tohoku Telecommunication	980-0811 Sendai Daichi Seimei Tower Building, 4-6-1, Ichiban-cho, Aoba-ku, Sendai City, Miyagi	022-267-2551
	Chubu Regional Headquarters	486-0815 3030, Jusanzuka, Jusanduka-cho, Kasugai City, Aichi	0568-81-2300
	Central Regional Control Center	486-0815 3030, Jusanzuka, Jusanduka-cho, Kasugai City, Aichi	0568-85-5651
	Nagoya Power Administration Office	486-0815 3030, Jusanzuka, Jusanduka-cho, Kasugai City, Aichi	0568-81-3220
	Sakuma Power Administration Office	431-3901 2690, Sakuma, Sakuma Town, Iwata-gun, Shizuoka	0539-65-0071
	Kuzuryu Power Administration Office	912-0214 36-17, Nagano, Izumi Village, Ono-gun, Fukui	0779-78-2131
	Miboro Power Administration Office	501-5505 162-1, Aza Yokohira, Maki, Shirakawa Village, Gifu	05769-5-2311
	Chubu Transmission Line Management Center	486-0815 3030, Jusanzuka, Jusanduka-cho, Kasugai City, Aichi	0568-81-2048
	Shizuoka Transmission Line Maintenance Center	420-0068 69, Tamachi 4-chome, Shizuoka City, Shizuoka	054-252-7277
	Chubu Telecommunication Line Management Center	486-0815 3030, Jusanzuka, Jusanduka-cho, Kasugai City, Aichi	0568-81-3251
	West Regional Headquarters	530-6691 Nakanoshima Center Building, 6-2-27, Nakanoshima, Kita-ku, Osaka City, Osaka	06-6448-5921
	West Regional Control Center	793-0010 2810, Iioka, Saijo City, Ehime	0897-53-1371
	Kiwa Power Administration Office	648-0016 622-2, Shimohyogo, Suda-cho, Hashimoto City, Wakayama	0736-33-1602
	Totsukawa Power Administration Office	637-1333 5-3, Ohara, Totsukawa Village, Yoshino-gun, Nara	07466-2-0058
	Kitayamagawa Power Administration Office	639-3806 751, Oaza Shimoikehara Unosu, Shimokitayama Village, Yoshino-gun, Nara	07468-5-2158
	Owase Sub-branch Office	519-3667 3276, Oaza Minamiura, Owase City, Mie	05972-2-1028
	Kouchi Power Administration Office	781-6445 177, Nagayama, Kitagawa Village, Aki-gun, Kochi	0887-38-4003
Sameura Sub-branch Office	781-3618 80, Yoshino, Motoyama Town, Nagaoka-gun, Kochi	0887-82-0289	
Minami Kyushu Power Administration Office	868-0022 860-13, Ganjoji-machi, Hitooyoshi City, Kumamoto	0966-24-3100	
West Transmission Line Maintenance Center	711-0933 1600-1, Kojimakayo, Kurashiki City, Okayama	086-472-6511	
Hashimoto Transmission Line Maintenance Center	648-0016 622-2, Shimohyogo, Suda-cho, Hashimoto City, Wakayama	0736-32-0961	
Fukuoka Transmission Line Maintenance Center	812-0011 Nihon Seimei Hakata-ekimae Building, 3-2-1, Hakata-ekimae, Hakata-ku, Fukuoka City, Fukuoka	092-472-3736	
Kansai Telecommunication Engineering Center	648-0016 622-2, Shimohyogo, Suda-cho, Hashimoto City, Wakayama	0736-33-3601	
Shikoku Telecommunication Engineering Center	793-0010 2810, Iioka, Saijo City, Ehime	0897-55-2263	
Kyushu Telecommunication Engineering Center	812-0011 Nihon Seimei Hakata-ekimae Building, 3-2-1, Hakata-ekimae, Hakata-ku, Fukuoka City, Fukuoka	092-472-3736	
Oma Main-Transmission Line Project Survey Office	035-0035 1-10, Hon-machi, Mutsu City, Aomori	0175-22-8177	
Chushi Main-Transmission Construction Office	793-0010 2810, Iioka, Saijo City, Ehime	0897-53-4871	
Sakuma-Higashi Main-Transmission Office	412-0042 Dream Palace, 518-1, Hagiwara, Gotemba City, Shizuoka	0550-84-6464	
Ibigawa Hydro Project Survey Office	501-0603 675, Kamiminamigata, Ibigawa Town, Ibi-gun, Gifu	0585-22-0722	
Kumagawa Hydro Project Survey Office	868-0022 860-13, Ganjoji-machi, Hitooyoshi City, Kumamoto	0966-24-3100	
Thermal Power Department	Isogo Thermal Power Station	235-8510 37-2, Shinisogo-cho, Isogo-ku, Yokohama City, Kanagawa	045-761-0281
	Takasago Thermal Power Station	676-0074 4-1, Umei 6-chome, Takasago City, Hyogo	0794-47-1301
	Takehara Thermal Power Station	729-2394 1-1, Tadanouminagahama 2-chome, Takehara City, Hiroshima	0846-27-0211
	Tachibanawan Thermal Power Station	779-1631 3, Kokatsu, Tachibana-cho, Anan City, Tokushima	0884-34-3221
	Matsushima Thermal Power Station	857-2531 2573-3, Matsushimacho, Oseto Town, Nishisonogi-gun, Nagasaki	0959-22-2111
	Matsuura Thermal Power Station	859-4595 458-1, Aza Sezaki, Shirahamamen, Shisa-cho, Matsuura City, Nagasaki	0956-72-1201
	Ishikawa Coal-fired Power Station	904-1103 3-4-1, Aza Akasaki, Ishikawa City, Okinawa	098-964-3711
	Onikobe Geothermal Power Station	989-6802 16-10, Aza Suezawa Nishi, Naruko Town, Tamatsukuri-gun, Miyagi	0229-82-2141
	Wakamatsu Thermal Center	808-0111 1, Yanagasaki-machi, Wakamatsu-ku, Kitakyushu City, Fukuoka	093-741-0931
	Nuclear Power Department	Oma Nuclear Power Project Construction Preparation Office	039-4601 20, Aza Omataira, Oaza Oma, Oma Town, Shimokita-gun, Aomori
Aomori Branch Office		030-0802 Sumitomo Seimei Aomori Yanagimachi Building, 1-2-20, Hon-cho, Aomori City, Aomori	017-722-4772
Cooperate Planning & Administration Department	Wakamatsu Operations & General Management Office	808-0111 1, Yanagasaki-machi, Wakamatsu-ku, Kitakyushu City, Fukuoka	093-741-0931
	Hokuriku Office	930-0004 Toyama Kogin Building, 5-13, Sakurabashi-dori, Toyama City, Toyama	076-442-1151
	Chugoku Office	730-0013 Central Building, 15-10, Hacchobori, Naka-ku, Hiroshima City, Hiroshima	082-221-0423
	Sendai Office	980-0811 Sendai Daichi Seimei Tower Building, 4-6-1, Ichiban-cho, Aoba-ku, Sendai City, Miyagi	022-267-2551
	Takamatsu Office	760-0023 GE Edison Building Takamatsu, 1-4-3, Kotobuki-cho, Takamatsu City, Kagawa	087-822-0821
	Fukuoka Office	812-0011 Nihon Seimei Hakata-ekimae Building, 3-2-1, Hakata-ekimae, Hakata-ku, Fukuoka City, Fukuoka	092-472-3736
Technology Development Center		253-0041 1-9-88, Chigasaki, Chigasaki City, Kanagawa	0467-87-1211
	Chigasaki Research Institute	253-0041 1-9-88, Chigasaki, Chigasaki City, Kanagawa	0467-87-1211
	Wakamatsu Research Institute	808-0111 1, Yanagasaki-machi, Wakamatsu-ku, Kitakyushu City, Fukuoka	093-741-0931

*Not including branch office

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EPDC Beijing Office (China)	Chang Fu Gong Office Building, Jia-26, Jian Guo Men Wai Da Jie, Beijing 100022 PRC
EPDC Bangkok Office (Thailand)	Nantawan Building, 161 Rajdamri Road, Lumpinee Pathumwan, Bangkok 10330 Thailand
Kuala Lumpur Office (Malaysia)	32, 1st Floor, Jalan 28/70 A Desa Sri Hartamas 50480 Kuala Lumpur
Yuncan Hydropower Project Office (Peru)	Calle Morelli No.109, 3ro. Piso, San Borja, Lima 41, PERU
Pururia Pumped Storage Power Project Office (India)	WESEB PPSP Administrative Bld., Patherdhi Village, P.O. Baghmundi, Purulia Dist., West Bengal State 723152 INDIA
Upper Kotmale Hydro Power Construction Supervision Office (Sri Lanka)	304-1, Union Place, P.O.Box 2014, Colombo 2, Sri Lanka
Dai Ninh Hydro Power Construction Supervision Office (Vietnam)	Dai Ninh Ninh Gia-Duc Trong-Ram Dong VIETNAM

Introduction of the Main J-POWER Group Companies

Company Name	Main Operations	Location	Website
JP Business Service Co., Ltd.	The J-POWER Group operates both internal and external trading/health care and training facilities for elderly personnel and provides other human resources development activities and general system services. Shared services contribute to the indirect integration and streamlining of administrative departments etc.	Koto-ku, Tokyo	http://www.jpbs.co.jp
JP High Tech Co., Ltd.	<ul style="list-style-type: none"> • Overall maintenance for J-POWER's hydroelectric stations, transmission facilities and substations • Various aspects of J-POWER's outside activities: land compensation, various surveys, public construction, civil engineering, various works and maintenance for generation/transmission facilities and substations, electrical equipment for buildings, etc. 	Chiyoda-ku, Tokyo	http://www.jphytec.co.jp
Jpec Co., Ltd.	<ul style="list-style-type: none"> • Overall maintenance for J-POWER's thermal power generation facilities • Various aspects of J-POWER's outside activities: various surveys and monitoring activities, gardening/planting, sale of thermal by-products (coal ash, gypsum and fertilizers), various works for thermal facilities etc. 	Chuo-ku, Tokyo	http://www.jp-ec.co.jp
KEC Corporation	Construction and maintenance of electrical facilities and communications equipment	Bunkyo-ku, Tokyo	http://www.kec.co.jp
KDC Engineering Co., Ltd.	Civil engineering, general building, design and construction, management of power generation facilities	Nakano-ku, Tokyo	http://www.kdc.co.jp
JP Resources Co., Ltd.	Coal survey/ exploration/development and investment	Chuo-ku, Tokyo	http://www.eoc.co.jp

Precautions on Future Perspectives

All plans, strategies and perspectives presented in the report are judgments based on currently available information. Various factors affecting future development may therefore lead to different results.



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