

# 2005

## **Environmental Management Report**



# J-POWER Group Business: Outline

(As of the end of March 2005)

◆ **Founded (J-POWER)** September 16, 1952

◆ **Employees (J-POWER)** 2,144

◆ **Main business activities**

● **Wholesale power supply (J-POWER)**

Hydropower stations	59	Total output 8.55 GW
Thermal power stations (including geothermal)	8	Total output 7.82 GW
Transmission lines (total length)		2,404 km
Customers	10 general electric utilities (regional power companies)	

● **Other electricity business (J-POWER subsidiaries and affiliates)**

Wind power generation, wholesale power supply to general electric utilities via independent power producers (IPP), wholesale power supply to power producers and suppliers (PPS).

● **Ancillary business related to electricity (J-POWER subsidiaries and affiliates)**

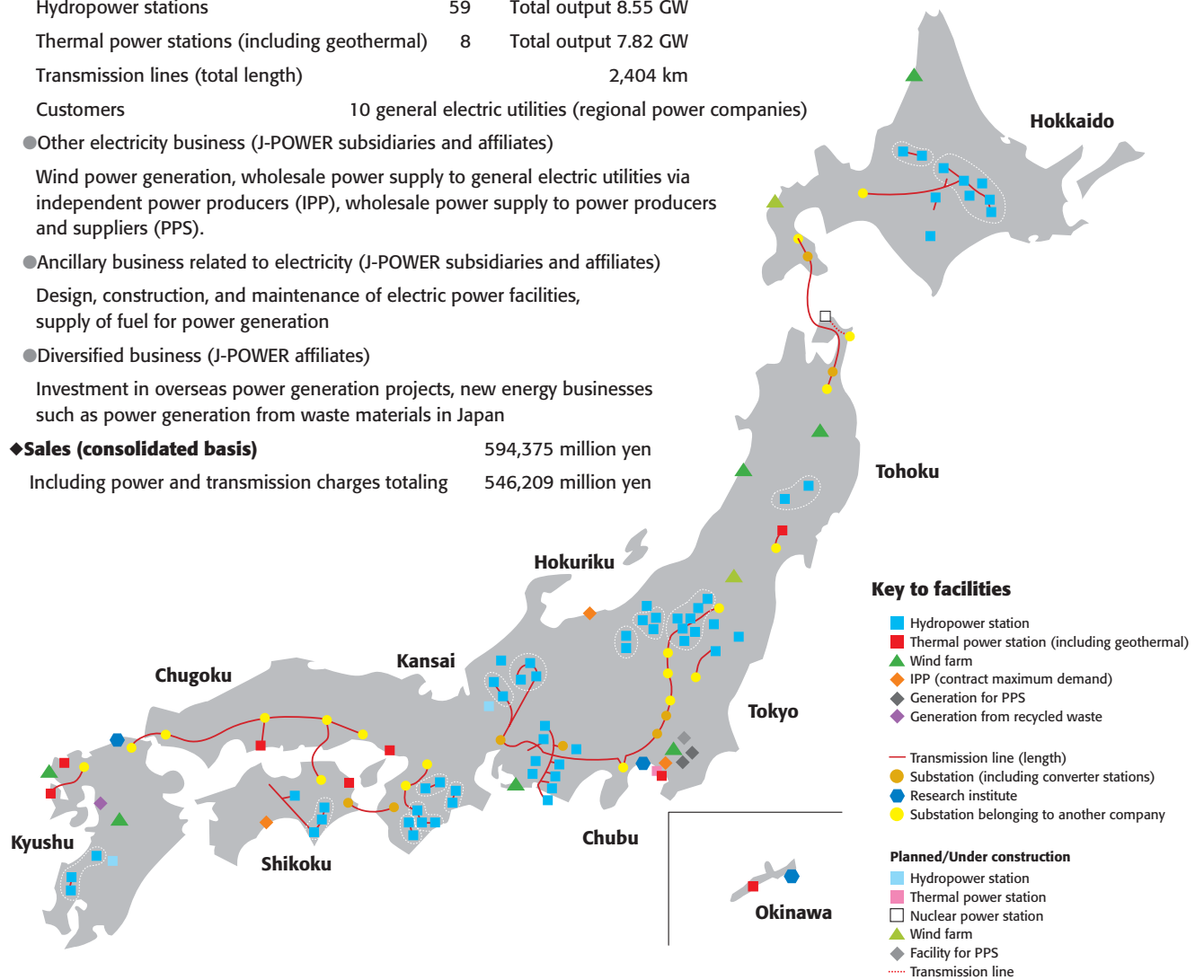
Design, construction, and maintenance of electric power facilities, supply of fuel for power generation

● **Diversified business (J-POWER affiliates)**

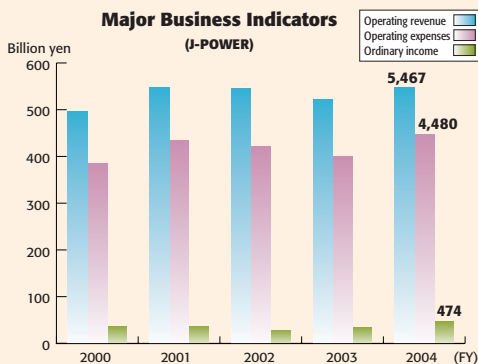
Investment in overseas power generation projects, new energy businesses such as power generation from waste materials in Japan

◆ **Sales (consolidated basis)** 594,375 million yen

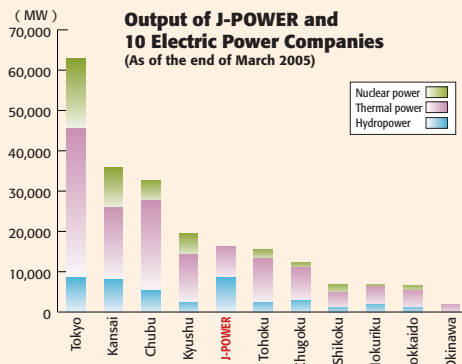
Including power and transmission charges totaling 546,209 million yen



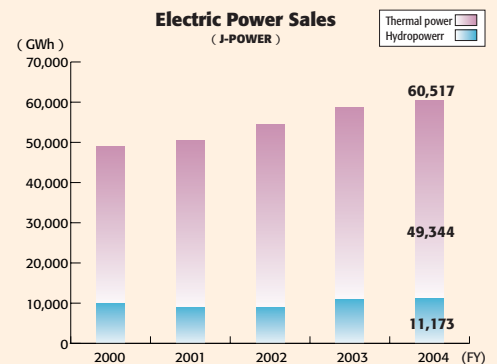
**Major Business Indicators (J-POWER)**



**Output of J-POWER and 10 Electric Power Companies (As of the end of March 2005)**



**Electric Power Sales (J-POWER)**



# Contents

1 J-POWER Group Business: Outline

3 Message from the President

4 Corporate Philosophy

## ENVIRONMENT

<b>Environmental Management</b>	5	Environmental Management Vision
	11	Fiscal 2004 Environmental Activities
	13	Power Generation and the Environment
	17	Business Activities and the Environment
	19	Environmental Accounting and Efficiency
<b>Efforts to Combat Climate Change</b>	21	CO <sub>2</sub> Emissions
	22	Maintaining and Improving Efficiency of Energy Use
	25	Developing Low-CO <sub>2</sub> -Emissions Power Sources
	27	Developing, Transferring, and Disseminating New Technologies
	28	Reducing Emissions of Greenhouse Gases Other than CO <sub>2</sub>
	29	Utilization of Kyoto Mechanisms and Other Approaches
<b>Efforts Relating to the Local Environment</b>	31	Reducing the Environmental Load
	33	Recycling and Reuse of Recyclable Resources
	36	Management of Toxic Chemicals
	37	Steps to Conserve the Natural Environment
	42	Pursuing Technological Research and Development
43	Transferring Environmental Technology Overseas	
<b>Ensuring Transparency and Reliability</b>	45	Environmental Management
	50	Green Purchasing
	51	Environmental Communication
<b>Group Companies' Efforts</b>	55	Group Companies' Business Activities
	56	Efforts Relating to Environmental Management
	57	Environmental Load Data
	58	Environmental Business

## SOCIETY

<b>Sincerity and Pride Underlie All Our Corporate Activities</b>	59	Compliance and Governance
		Respect for Human Rights, Prohibition on Discrimination
	60	Information Disclosure
	Dialogue with the General Public	
	Respect for Privacy	
<b>We Build Community Trust by Harmonizing Our Operations with the Environment</b>	61	Interacting with Local Residents
	63	Safety and Peace of Mind
	64	Community Activities
<b>We Continuously Refine Our Knowledge and Technologies to Be a Leader in These Areas</b>	66	Support for Employee Self-Development
		Employee Support System
<b>We Meet the Challenges of Tomorrow by Harnessing Our Unique Skills and Enthusiasm</b>	67	Comprehensive Policy on Developing Talent
		Human Resources Policy
	68	Maintaining the Mental and Physical Health of Employees
	Promoting a Comfortable Workplace	

## EXTERNAL EVALUATION AND OUTSIDE OPINIONS

69	Environmental Management Rating
70	Readers' Opinions
71	Independent Recommendations
72	Independent Review

## MATERIALS

73	Fiscal Year Data
75	Treaties and Laws Relating to Global Warming
79	Environmental Chronology
80	Glossary
83	List of Organizations and Offices
84	Table of Correspondences to GRI's 2002 Sustainability Reporting Guidelines

### Note concerning forecasts

The plans, strategies, and forecasts set out in this report have been formulated based on currently available information. Unforeseeable changes in various factors may cause results to differ from projections.

## Editorial Policies

- This report has been renamed the "Environmental Management Report" in order to further clarify our environmental management efforts following the establishment of the J-POWER Group Environmental Management Vision Basic Policy in 2004 and Action Program in 2005.
- The "Environment" section sets out environmental management efforts based on the J-POWER Group Environmental Management Vision Basic Policy, while the "Society" section sets out efforts relating to compliance, public interest activities, and employee development and wellbeing based on our corporate philosophy.
- Numerical data on corporate business activities and environmental efforts (inputs, business activities, and outputs) as well as data comparing fiscal 2004 performance with quantitative targets (pp. 17-18) were verified by the Shin Nihon Environmental Management and Quality Research Institute Co., Ltd. The results are shown on p. 72.
- Terms in this report marked ⓘ are listed in the glossary on pp. 80-82.
- The 2004 report was also issued in digest form, but in 2005 a separate

booklet has been produced to outline our environmental efforts in an easy-to-read format.

- This report is also available on the "Environmental and Social Activities" section of our website (scheduled for December 2005).

**Period covered:** April 2004 to March 2005 (some items include information pertaining to April 2005 and beyond)

**Scope:** J-POWER and J-POWER Group Companies (consolidated subsidiaries)

Where group company data is included, this fact is noted in the text

### Guidelines referred to:

- Ministry of the Environment Environmental Accounting Guidelines 2003
- Global Reporting Initiative (GRI) Sustainability Reporting Guidelines 2002

**Report issued since:** 1998

**Next report due:** August 2006 (tentative schedule)

## Message from the President

# We will work to ensure the coexistence of energy and the environment at the global and local levels and to fulfill our responsibilities as a corporate citizen

In October 2004 J-POWER was listed on the first section of the Tokyo Stock Exchange, reaching the final goal of a privatization process that spanned more than seven years. J-POWER's mission has always been to respond to the demands of the times by ensuring the constant supply of energy essential to our daily lives and economic activity, but privatization has given us the opportunity to expand our fields of activity in Japan and overseas while continuing to build a stronger base for our core business of wholesale power supply.

In recent years we have seen many major changes in social and business attitudes toward the electricity and energy fields both in Japan and around the world, but 2004 and 2005 have witnessed some particularly remarkable shifts. In Japan, following the amendment to the Electricity Utilities Industry Law made in 2003, neutral agencies set up to support the fair and transparent operation of electric power systems launched full-scale operations as did wholesale electricity exchanges designed to introduce market principles to electricity trading. On the international front, the Kyoto Protocol came into force following its ratification by Russia, and we entered a phase where countries need to show concrete results from their efforts to combat global warming. Furthermore, rising energy demand driven by remarkable economic growth in Asia and elsewhere is causing concerns in terms of both the world energy economy and environmental impact.

Under these circumstances, we at the J-POWER Group believe we need to further strengthen our basic environmental management stance to supply energy while promoting coexistence with the environment at the global and local levels, based on our corporate philosophy of contributing to the sustainable development of Japan and the rest of the world. Following privatization and listing on the stock exchange we have welcomed many new shareholders, and this has spurred us to listen even more closely to the views of all our stakeholders, including shareholders, customers, communities, and employees. I believe that fulfillment of our responsibilities as a corporate citizen lies at the

heart of the J-POWER Group's business activities.

Reflecting such a mindset, this report clarifies anew the meaning of "environmental management" in light of the J-POWER Group corporate philosophy. Based on the basic policy of our Environmental Management Vision, we have drawn up an action program showing goals relating to key issues and methods for achieving those objectives, and we have chosen the title "2005 Environmental Management Report." The report also outlines the J-POWER Group's environmental management efforts from various perspectives, with a focus on actual results.

I believe that this report will boost our environmental management by helping to establish broader communication with everyone in the community. I hope as many people as possible will have the chance to read it, and I will be delighted if readers frankly share their views with us.

September 2005



中垣喜彦

Yoshihiko Nakagaki  
President

# Corporate Philosophy

## 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.

● **Harmonizing Energy with the Environment**

● **Community Trust**  
● **Corporate Responsibility**

## Environmental Management Efforts

### J-POWER Group Environmental Management Vision

#### Basic Policy

● Basic stance:

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

- Efforts relating to global environmental issues
- Efforts relating to regional environmental issues
- Ensuring transparency and reliability

#### Action Program

J-POWER group targets: Goals for the entire group  
Segment goals: Each division and group company sets goals for its own business activities  
Environmental action guidelines: Set out issues to be addressed for each relevant fiscal year

## Social Initiatives

### Actions That Embody Our Corporate Philosophy

- Win trust through sincere corporate management
- Harmonious coexistence with local communities
- Building employees' skills and encouraging a pioneering spirit
- Creating work environments where employees can exercise their unique skills and fulfill their ambitions



## Environment

### Environmental Management

The J-POWER Group believes that energy production and the environment can coexist in harmony. In light of this corporate philosophy, our environmental management aims to enhance environmental responsibility while raising the economic value of our operations in order to further contribute to the development of a sustainable society. In 2004 we established a Basic Policy for achieving the J-POWER Group's Environmental Management Vision. Based on that policy we formulated an Action Program setting out mid-term goals, and we are now working toward those objectives.

#### Environmental Management Vision

The Environmental Management Vision is made up of the Basic Policy and the Action Program. The Action Program contains Corporate Goals, Segment Goals, and Environmental Action Guidelines.

#### Basic Policy

**The J-POWER Group adheres to the following basic policy.**

##### ❖ Basic Stance

As an energy supplier, we will contribute to the sustainable development of Japan and the world by harmonizing our operations with the environment and ensuring the constant supply 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 effectively using limited resources such as coal to meet diverse needs. We will contribute to sustainable development in Japan and the world as a whole by minimizing the environmental impact of our business activities, reducing environmental risks such as global warming and improving environmental efficiency by achieving higher productivity with lower environmental impact, thus enhancing both environmental responsibility and economic value.





---

## ❖ Efforts Relating to Global Environmental Issues

In accordance with the principles of the United Nations Framework Convention on Climate Change\*, we will cost-effectively address issues relating to climate change on a global scale. We will continue to reduce CO<sub>2</sub> emissions per unit of electric power sales through an economically reasonable combination of measures including maintenance and improvement of the efficiency of energy use; development of low CO<sub>2</sub> emission power sources; development, transfer and diffusion of new technologies; and utilization of the Kyoto Mechanisms. Furthermore, we will continue to work toward our ultimate goal of achieving zero emissions through the capture and storage of CO<sub>2</sub>.

Since fossil fuels will inevitably remain a key energy source this century, global warming is one of the most important long-term issues facing humankind. As measures against global warming will entail major costs, we must adopt highly cost-effective measures and actions on a global scale to make larger reductions in greenhouse gas emissions at lower cost if we are to achieve sustainable development that harmonizes environmental and economic needs. This principle is set out in the United Nations Framework Convention on Climate Change, on which the Kyoto Protocol is based.

We will continue to reduce CO<sub>2</sub> emissions per unit of electric power sales through an economically reasonable combination of measures that takes account of cost-effectiveness on a global scale. Such measures include maintenance and improvement of efficient energy use; development of low CO<sub>2</sub> emission power sources; development, transfer, and diffusion of new technologies; and utilization of the Kyoto Mechanisms.

Recognizing that it will be necessary within this century to capture and store CO<sub>2</sub> generated by the combustion of fossil fuels in order to keep supplying energy to people throughout the world in a sustainable manner, we have also set the ultimate goal of achieving zero CO<sub>2</sub> emissions. We will continue developing and testing technology to achieve that objective.

\* Framework Convention on Climate Change, Article 3, Paragraph 3 (Principles):

"...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."

---

## ❖ Efforts Relating to Local Environmental Issues

We will take measures to reduce the environmental impact of our operations by saving, recycling, and reusing resources to limit the generation of waste, and fostering good community relations.

We recognize that assuring attractive and safe living environments is the key to good community relations, both nationally and internationally, so we work hard to earn community trust. We use the latest technologies and know-how to minimize the environmental impact of our operations on the air and water around our power stations, as well as reducing and appropriately processing waste by saving, reusing, and recycling limited resources. In addition, we ensure we are prepared to deal with emergencies resulting from accidents or natural disasters.

---

## ❖ Ensuring Transparency and Reliability

We will ensure that our business activities comply with all laws and regulations, disclose a wide range of environmental information and enhance communication with stakeholders.

We work to earn the trust of society by improving our environmental management and assuring complete compliance with laws and regulations, as well as by increasing corporate transparency through disclosure of a wide range of environmental information. At the same time, we strive to enhance communication with stakeholders about environmental issues, calling upon the skills and knowledge of the entire J-POWER group to continue meeting stakeholder expectations in terms of our business development and environmental activities.

---

April 1, 2004

# Action Program

In accordance with the basic policy of the J-POWER Group Environmental Management Vision, we have formulated an action program setting out goals in respect of key issues or problems related to our business activities along with methods to achieve the goals. The entire group is now working toward meeting these targets.

## J-POWER Group Targets—Targets are formulated for the entire group

### ◆ Efforts Relating to Global Environmental Issues (Measures against Global Warming)

<b>Target</b>	We aim to reduce CO <sub>2</sub> emissions per unit of electric power sales in Japanese and overseas power plant operations to 10% below the 2002 level by fiscal 2010.
<b>Action</b>	We will implement the following measures by combining them economically, taking cost-effectiveness on a global scale into account.
<b>Category</b>	<b>Measure</b>
<b>Sustainability and improvement of energy efficiency</b>	<ul style="list-style-type: none"> <li>● Maintain high-efficiency operation of power facilities</li> <li>● Adopt energy efficient equipment in case of renewal</li> <li>● Lower the auxiliary power ratio in our plants through effective operation and management</li> <li>● Introduce high-efficiency technologies in new facilities</li> </ul>
<b>Development of various types of power generation with lower CO<sub>2</sub> emissions</b>	<ul style="list-style-type: none"> <li>● Promote development of Oma Nuclear Power Station</li> <li>● Promote development of renewable energy</li> <li>● Promote development of gas turbine combined cycle power generation</li> <li>● Promote development of gas cogeneration systems</li> </ul>
<b>Utilization of the Kyoto Mechanisms</b>	<ul style="list-style-type: none"> <li>● Procure emission reduction credits through Joint Implementation, CDM, and Emission Trading</li> </ul>
<b>Development, transfer, and dissemination of technologies</b>	<ul style="list-style-type: none"> <li>● Establish technologies for use of biomass fuel</li> <li>● Continuously promote technological developments that reduce CO<sub>2</sub> emissions to power sales volume over the long term               <ul style="list-style-type: none"> <li>● Develop technology to improve efficiency of coal-fired plants</li> <li>● Develop coal gasification technology and Integrated Gas Fuel Cell technology (IGFC)</li> <li>● Research and develop CO<sub>2</sub> sequestration technology</li> <li>● Research and develop renewable energies</li> </ul> </li> </ul>

### ◆ Efforts Relating to Local Environmental Issues (Formation of a Recycling-based Society)

<b>Target</b>	We aim to achieve a recycling rate of 97% across the J-POWER Group by fiscal 2010, toward our ultimate objective of zero industrial waste emissions.
<b>Action</b>	<ul style="list-style-type: none"> <li>● Promote the effective use of coal ash</li> <li>● Reduce all types of industrial waste emitted from the maintenance and operation of power plants</li> </ul>

### ◆ Ensuring Transparency and Reliability (Enhance Our Environmental Management Structure)

<b>Target</b>	We plan to introduce environmental management systems (EMS) for the entire J-POWER Group by the end of fiscal 2007.
<b>Action</b>	<ul style="list-style-type: none"> <li>● We aim to acquire ISO 14001 certification for all thermal power plants by the end of FY 2005.</li> <li>● We plan to implement an EMS for all consolidated subsidiaries by the end of fiscal 2007.</li> </ul>



# Segment Goals—Each division and group company sets goals for its own business activities

## ◆ Efforts Relating to Global Environmental Issues (Measures against Global Warming)

<b>Key items</b>	<ul style="list-style-type: none"> <li>● Thermal Power Division: High-efficiency operation of power plants and introduction of high-efficiency equipment in new plants</li> <li>● Hydropower Division: Improve productivity of hydroelectric power plants</li> <li>● Common issues: Energy conservation in buildings and offices, savings on vehicle fuel</li> </ul>
------------------	--

## ◆ Efforts Relating to Regional Environmental Issues (Air, Water, Waste)

<b>Key items</b>	<ul style="list-style-type: none"> <li>● Thermal Power Division: Reduce SOx and NOx emissions, reduce volume of water for industrial use, effective use of coal ash</li> <li>● Hydropower Division: Effective use of driftwood</li> <li>● Common issues: Reduce resource use in offices, cut waste</li> </ul>
------------------	---

## ◆ Ensuring Transparency and Reliability (EMS, Comprehensive Environmental Communications, and Green Procurement)


<b>Key items</b>	<ul style="list-style-type: none"> <li>● Acquire ISO 14001 certification, introduce EMS</li> <li>● Promote environmental communications, participate in environmental volunteer programs</li> <li>● Promote green purchasing/procurement (energy-saving office equipment, recycled paper, environmentally friendly vehicles, etc.)</li> <li>● Promote measures to prevent environmental damage from accidents</li> <li>● Thoroughgoing environmental education (e-learning, auditor training, etc.)</li> </ul>
------------------	--

Note: Key goals are outlined on the relevant pages below

### C O L U M N

#### The Challenge of Preventing Global Warming

The CO<sub>2</sub> emissions produced when we burn fossil fuels to generate power are the greatest load our operations place on the global environment. Therefore, we have made ongoing reduction of CO<sub>2</sub> emissions per electric power sales volume (CO<sub>2</sub> emissions intensity) part of our basic policy for addressing global environmental issues. The goals we have set out in this document will enable us to assess interim progress in our long-term efforts. We have made fiscal 2010 our initial checkpoint. Since CO<sub>2</sub> emissions are a global issue, in calculating such emissions intensity we have included wherever possible all power generation businesses we fund in Japan and overseas.

We have already been making efforts to reduce CO<sub>2</sub> emissions, including (1) improving efficiency of energy use, (2) utilizing renewable energies such as hydropower and wind power, (3) developing gas turbine combined cycle power generation  and other new technologies, and (4) moving ahead with nuclear power development. As well as conducting development work to introduce the latest technologies in these fields, we have been

sharing them with developing countries through technology tie-ups. We are also utilizing the Kyoto Mechanisms introduced under the Kyoto Protocol.

The actions we take to meet our goals are comprised of an economically reasonable mix of these measures. The Kyoto Mechanisms play an important role in this process. These mechanisms use market principles to enable measures to be taken worldwide at minimum cost, and their inclusion in the Kyoto Protocol was a groundbreaking development. We evaluate our efforts based on the price indexes established by the Kyoto Mechanisms and pursue a mix of the most highly cost-effective measures.

To move beyond the initial checkpoint we have established and reduce CO<sub>2</sub> emissions intensity on an ongoing basis over the long term, it will be essential to develop new technologies. Furthermore, we believe that transferring such technologies and encouraging their widespread use will lead to economically reasonable measures being taken on a global scale.

# Fiscal 2005 J-POWER Group Environmental Action Guidelines

## 1 Efforts Relating to Global Environmental Issues

### Maintenance and Improvement of Efficient Energy Use

- Maintain highly efficient operations at existing thermal power stations and boost efficiency in new facilities
- Ensure stable operation of existing hydro, geothermal, wind power, and recycling power stations
- Improve efficiency of hydro power stations when replacing equipment
- Promote energy saving
  - Manage power station operations efficiently and reduce auxiliary power ratio
  - Promote energy saving in offices
  - Promote energy saving projects and encourage widespread use of energy-saving products
  - Reduce environmental impact through efficient transportation of raw materials
  - Reduce environmental impact through use of public transport wherever possible and efficient use of corporate vehicles

### Development of Low CO<sub>2</sub> Emission Power Sources

- Construct nuclear power stations
  - Steadily prepare for construction of Oma Nuclear Power Station
- Effectively utilize renewable and unutilized energy
  - Promote the development of new hydro and geothermal power stations and new wind power and recycling projects at new sites
  - Promote biomass power plants overseas
  - Promote mixed use of biomass fuel in existing coal-fired plants
  - Expand consulting business for development of renewable and unutilized energy
- Encourage the use of natural gas
  - Promote gas turbine combined cycle power generation and cogeneration plants

### Development, Transfer and Diffusion of New Technologies

- Develop the Integrated Gas Fuel Cell (IGFC) and Solid Oxide Fuel Cell (SOFC)
- Conduct the Integrated Coal Gasification Combined Cycle (IGCC) trial in collaboration with power companies
- Promote micro-hydropower stations
- Promote R&D on CO<sub>2</sub> capture and storage

### Utilization of Kyoto Mechanisms

- Identify, cultivate, and utilize opportunities for Joint Implementation (JI), the Clean Development Mechanisms (CDM), and emissions trading
- Promote overseas afforestation projects

### Reducing Emissions of Greenhouse Gases Except CO<sub>2</sub>

- Reduce sulfur hexafluoride (SF<sub>6</sub>) emissions from gas-insulated switch gear
- Reduce hydrofluorocarbon (HFC) emissions from air conditioners

## 2 Efforts Relating to Regional Environmental Issues

### Reducing Emission of Environmental Loads

- Ongoing reduction of emissions
  - Control combustion and manage facilities for environmental measures to reduce emissions of SO<sub>x</sub>, NO<sub>x</sub>, and soot and dust
  - Manage waste water treatment facilities to restrict release of pollutants
  - Restrict noise, vibration, and odors through proper management of equipment
  - Prevent soil and underground water pollution through proper management of facilities and implementation of environmental surveys on sites owned

### Recycling and Reuse of Recyclable Resources

- Recycle and reuse recyclable resources
  - Promote effective use of coal ash and gypsum
  - Promote effective use of materials such as concrete blocks, scrap metal and driftwood
  - Separate paper, bottles, cans, and plastics prior to collection and promote the reuse and recycling of such materials
  - Promote water reuse and encourage reduced use of chemicals and lubricating oils
  - Promote reuse and recycling of waste materials from construction and demolition sites
- Reduce general waste such as waste paper
- Ensure proper disposal of waste materials

### Control of Hazardous Chemicals

- PRTR system
  - Identify, control, notify, and disclose the emission and transfer volumes of chemicals subject to the Pollutant Release and Transfer Register (PRTR) Law
- Dioxins
  - Properly manage waste incinerators, and conduct surveys of exhaust gas and bottom ash and report the results in accordance with the Law Concerning Special Measures against Dioxins
  - Promote widespread use of continuous measuring monitors for dioxin precursors
- PCBs
  - Properly store and manage PCBs in accordance with the Waste Management and Public Cleansing Law and the Law Concerning Special Measures against PCB Waste
  - Treat PCB waste in accordance with our basic policy, based on the government's regional waste-management program
- Strive to reduce volumes of hazardous chemicals handled

### Considerations to Conservation of the Natural Environment

- Planning and design initiatives
  - Evaluate the effects of our operations on the environment through monitoring and strive to reduce environmental impact right from the

- planning and design stages
- **Construction initiatives**
  - Take environmental conservation measures aimed at coexistence with the natural environment
  - Publicize efforts to reduce impact on regional ecosystems and preserve biodiversity
- **Control of reservoirs**
  - Consider conservation of river environments (sedimentation, turbid water, water quality, etc.) when controlling impounding and balancing reservoirs
- **Forest conservation initiatives**
  - Use riverhead forests owned by J-POWER for environmental conservation and education
- **Consider preservation of regional landscapes**

### Environment-conscious Projects Overseas

- **Promote overseas transfer of environmental protection technologies**
  - Promote transfer of environmental technologies for thermal generation and hydropower technology
  - Promote cooperation in environment-conscious technologies such as wind, solar, and waste generation as well as energy saving
- **Formulate and implement development plans based on appropriate level of environmental consciousness**

### Promotion of Technological R&D

- **Technology R&D for cleansing the aquatic environments, sediment treatment in reservoirs, and effective use of lakebed sediment**

## 3 Ensuring Transparency and Reliability

### (1) Continual Improvement of Environmental Management (Greater Reliability)

#### Improvement of Environmental Management Level

- Encourage Hydropower Division to acquire ISO 14001 certification and expand it to group companies
- Promote introduction and

enhance operation of EMS at major group companies

- **Raise employee awareness**
  - Systematically implement environmental management education and training
  - Introduce environmental report study groups at each J-POWER workplace and in group companies
  - Systematically implement environmental education via e-learning (including group company employees)
- **Environmental accounting**
  - Strive to improve methods of identifying costs and conservation benefits
  - Examine appropriate environmental efficiency indicators
- **Request cooperation of business partners in environmental activities**
- **Renew Eco-leaf environmental labeling using life cycle assessment method**

### Efficient Operation of EMS

- **Continuous improvement of EMS**
  - Identify actual environmental loads and establish targets and plans for environmental conservation
  - Comply with laws and agreements, strive to meet targets, and periodically evaluate and improve activities
  - Systematically conduct environmental audits and review EMS on the basis of audit results to achieve continual improvement
- **Undertake environmental risk management, ensure communication in case of emergency, and work to prevent environmental accidents**

### Promotion of Environmental Management Consulting Business

- **Conduct consulting business related to ISO 14001**

### Green Procurement Efforts

- Promote green procurement efforts in line with J-POWER Group guidelines
- Expand use of environmentally friendly vehicles (low emission, low fuel consumption)

### (2) Communication with Society (Greater Transparency)

#### Publication of Environmental Information

- **Improvement of Environmental Report**
  - Seek third-party verification of Environmental Report data (substances, energy, etc.) and strive for greater reliability
- **Publicizing of environmental conservation activities**
  - Publicize environmental conservation activities through media such as newspapers, business magazines, websites, and in-house publications for group companies
  - Publicize activities to visitors to offices and PR facilities
- **Speedily communicate and release information on accidents and incidents with environmental impact**

#### Active Communication

- **Environmental events**
  - Conduct environmental events in offices and other business units
- **Diversification of external communications**
  - Promote dialogue with society by seeking external rating of environmental efforts and publicizing the results

#### Promotion of Social Activities Program

- **Participate in regional environmental conservation activities**
  - Take part in municipal/regional clean-up and beautification programs, afforestation projects, etc. as part of environmental action month and similar initiatives
- **Take a leading role in regional environmental conservation activities**

## Fiscal 2004 Environmental Activities

During fiscal 2004 we undertook a variety of environmental initiatives. Here we outline some of the highlights.

### ◆ Three Wind Farms Begin Commercial Operation Total Domestic Wind Power Output Reaches 130 MW

Wind power generation is attracting plenty of attention as a clean energy source that produces no CO<sub>2</sub> emissions. We have been working on wind power development since Tomamae Winvilla Wind Farm in Hokkaido started commercial operation in December 2000. On February 28 and March 1, 2005, three new wind power plants came on-stream: Nagasaki Shikamachi Wind Farm, Aso-Nishihara Wind Farm, and J-Wind Tahara. Joint venture operating companies constructed and run these facilities, and the three new power plants bring the number of operational wind power plants we are involved with in Japan to seven, with a total output of approximately 130 MW. Two further facilities are planned, which will boost total output to around 210 MW and make J-POWER one of the leading wind power operators in Japan. We will continue proactive development in the wind power field to promote co-existence with local communities, environmental responsibility, and high reliability.



**Aso-Nishihara Wind Farm**

This wind farm, located on the outer rim of the crater of Mt. Aso, is one of the largest in western Japan. An easterly wind, the matsubori-kaze, often blows down from the slopes of Mt. Aso across this rolling landscape of moors and forests.

### ◆ All Coal-fired and Geothermal Plants Gain ISO 14001 Certification

To take a systematic and efficient approach to environmental conservation, in 1998 we began introducing environmental management systems (EMS) based on ISO 14001, the international standard for EMS. By the end of fiscal 2001, we had introduced such systems in all our business units throughout Japan.

In 1999 ISO 14001 certification was acquired by the Matsuura coal-fired power station (Nagasaki Prefecture) and the Okutadami-Otori Hydro Project Construction Office (Niigata Prefecture; first case in Japan of such certification being acquired by a construction project—certification expired when construction completed in 2003). This was followed by granting of certification to the Engineering Department in 2001. To further increase the transparency and reliability of our corporate activities, ISO 14001 was acquired for all thermal power plants (coal-fired and geothermal plants) in fiscal 2004. The facilities of JPec Co., Ltd., which operate EMS hand-in-hand with our power plants, are also included in the scope of certification.

Within the J-POWER Group, separate ISO 14001 certification has also been obtained by the Wakamatsu Environmental Lab at JPec's Wakamatsu Facility and by the IT Maintenance Business Division at KEC Corporation.

As of the end of fiscal 2004 ISO 14001 certification had been acquired by approximately 80% of J-POWER Group sites, calculated on the basis of electric power sales volume.

We will continue extending EMS introduction to other group companies. By encouraging the Hydropower Division and all group companies to acquire ISO certification, we will raise the level of environmental management and further increase transparency and reliability.



ISO 14001 certification for the Takasago thermal power plant

### ISO 14001 Certification Dates for All Coal-fired and Geothermal Plants

No.	Power Plant	Max. Output	Date of Certification
1	Matsuura Thermal Power Station (Matsuura-shi, Nagasaki Prefecture)	2,000 MW	July 23, 2004*
2	Takehara Thermal Power Station (Takehara-shi, Hiroshima Prefecture)	1,300 MW	November 26, 2004
3	Tachibanawan Thermal Power Station (Anan-shi, Tokushima Prefecture)	2,100 MW	December 17, 2004
4	Ishikawa Coal-fired Power Station (Uruma-shi, Okinawa Prefecture)	312 MW	December 24, 2004
5	Isogo Thermal Power Station (Yokohama-shi, Kanagawa Prefecture)	600 MW	December 24, 2004
6	Onikobe Geothermal Power Station (Naruko-cho, Miyagi Prefecture)	12.5 MW	January 28, 2005
7	Matsushima Thermal Power Station (Saikai-shi, Nagasaki Prefecture)	1,000 MW	January 28, 2005
8	Takasago Thermal Power Station (Takasago-shi, Hyogo Prefecture)	500 MW	February 25, 2005

\* Date certification extended to JPec Co., Ltd.



### ◆ Trial of Hydro-agri Micro Hydropower System

In cooperation with the Nasunogahara Land Improvement District Association (Tochigi Prefecture) and Nakagawa Hydropower, Co., Ltd. J-POWER has begun to trial the hydro-agri micro hydropower system, which effectively utilizes unused hydro energy from waterfalls in existing irrigation channels to generate electricity. For the trial, a power generation system has been installed on an existing two-meter waterfall in an agricultural irrigation channel. The particular feature of this system is that no new water channel construction is required and on-site installation work can be completed in a short period. As well as seeking further sites where this system can be installed, we will work toward commercializing the hydro-agri system so that it can be utilized more widely for development of unused hydro energy sources.



Hydro-agri trial facility

### ◆ Technical Collaboration for Taio Mini Hydropower Station in Nakatsue-mura (currently Nakatsue-mura, Hita-shi), Oita Prefecture

The Taio Mini Hydropower Station started operation on April 1, 2004 (Operator: Nakatsue-mura, Max. output: 66 kW). J-POWER provided technical assistance and was contracted to carry out every step of the project, from planning to oversight of the construction.

Located on the upper reaches of the Chikugo river system, this power station uses an existing erosion-control dam to provide water intake of up to 0.57 m<sup>3</sup>/s (of which 0.07 m<sup>3</sup>/s is required to maintain water levels in the river). As well as supplying electricity to the rest area for the Taio Kinzan goldmine museum, a popular sightseeing spot, the facility sells surplus power to Kyushu Electric Power Co., Inc. and is authorized under the RPS system.



Sufficient water to maintain river levels is released from the spillway (Taio Mini Hydropower Station, Oita Prefecture)

### ◆ System Certification under the Eco-leaf Environmental Labeling Program

On October 13, 2004, our wholesale power business obtained system certification under the Eco-leaf environmental labeling program for measuring environmental impact. The certification was announced on the website of the Japan Environmental Management Association for Industry (JEMAI), which manages the program.

The ISO categorizes environmental labeling into Types I, II, and III. Our certification is in the Type III category, showing that our environmental data is calculated by the LCA method and certified by a third party.



No. BF-02-001  
Eco-leaf environmental labeling

### ◆ Ichihara Power Starts Operation of PPS Gas Turbine Combined Cycle Thermal Power Station

Ichihara Power Co., Ltd., a joint venture between J-POWER and Mitsui Engineering & Shipbuilding Co., Ltd. (MES) has started operation of its Ichihara Power Station (located on the MES Chiba site) as a power producer supplier (PPS) project using natural gas to generate electricity for supply to a specific operator.

This facility, which is the first gas turbine combined cycle power station in the J-POWER Group, teams two gas turbines with one steam turbine to achieve a high efficiency rate of approximately 50%.



Ichihara Power Station (Chiba Prefecture)

#### Outline of Ichihara Power Station

<b>Location</b>	Ichihara-shi, Chiba Prefecture (on Chiba site of Mitsui Engineering & Shipbuilding Co., Ltd.)
<b>Type of power plant</b>	Gas turbine combined cycle
<b>Output</b>	110 MW
<b>Fuel</b>	Natural gas

### ◆ Pilot Plant Producing Coal Gas Suitable for Fuel Cells Runs Successfully for 852 Hours

A pilot plant set up at the Wakamatsu Research Institute in Fukuoka Prefecture is testing technology for producing coal gas suitable for fuel cells. As part of trials to verify the technology's reliability, tests were run to confirm the capacity of the plant to operate continuously for long periods, and the facility was successfully operated for 852 straight hours. Total operating time now amounts to more than 3,000 hours, and steady progress is being made toward practical application of the technology.



Pilot plant testing technology to produce coal gas suitable for fuel cells (Fukuoka Prefecture)

# Power Generation and the Environment

The primary business of J-POWER is to produce and supply electric power essential to daily life and economic activity. In this section we set out our thoughts on the relationship between the environment and various types of power generation: coal-fired and hydroelectric generation, which play the largest role in our operations; and nuclear, wind, geothermal, and biomass power generation, which are fields we are currently developing.

## Coal-fired Power Generation and the Environment

### ◆Cleaner Coal-fired Power Generation

J-POWER is a leading company in coal-fired power generation in Japan, operating seven stations throughout the country with a total generation capacity of 7.81 million kW—roughly equivalent to 20% of the total capacity of all coal-fired power stations owned by Japanese electric power companies.

Coal is a highly economic fossil fuel with stable supply, but emissions of sulfur oxide, nitrogen oxide, and soot and dust in the process of combustion have been a problem. We believe the most effective way to minimize the environmental impact of these emissions is to upgrade power stations to generate clean electricity by adopting comprehensive flue gas treatment technology. As well as installing equipment with the world's top-class thermal efficiency in our power stations, we have introduced cutting-edge environmental technology such as soot removal, desulfurization, and denitrification systems.

As a result, our newest coal-fired power stations have achieved a lower level of environmental impact, equivalent to that of clean gas-fired stations. Moreover, we are now transferring these environmental protection technologies overseas.

### ◆Global Perspective

As the fossil fuel with by far the greatest recoverable reserves, coal can be a resource that humankind will continue using long after others are exhausted. It accounts for approximately one quarter of total world primary energy demand, and around 40% of electricity production. Coal consumption is expected to keep rising in the future. There is a marked trend toward increased consumption to drive economic growth in developing countries, and this has become a major issue in terms of measures against global warming. Another issue is the large number of outmoded and inefficient power stations still in use in Europe and the United States.

If the latest Japanese technology adopted by J-POWER is shared with developing countries and used to replace obsolete facilities in industrialized countries, world CO<sub>2</sub> emissions will be reduced significantly. By developing high-efficiency coal-burning technology to make our own coal use more efficient while also transferring it overseas, Japan can take truly global measures against the problem of global warming.

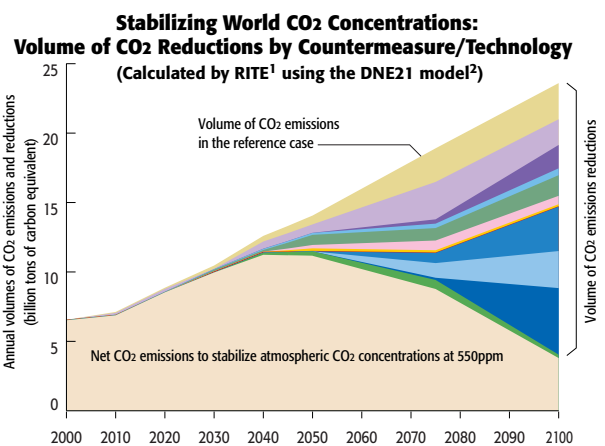
For J-POWER, addressing global warming while using coal responsibly is a global issue, and we will continue working toward resolutions from the perspective of securing sustainable development for Japan and the world as a whole.

### ◆Capture and Storage of CO<sub>2</sub>

To achieve the ultimate objective of the United Nations Framework Convention on Climate Change, namely "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system," J-POWER believes in the long-term necessity of CO<sub>2</sub> capture and storage. The chart below shows a simulation of countermeasures and technologies that will be required to stabilize world CO<sub>2</sub> concentrations and suggests that enormous volumes of CO<sub>2</sub> capture and storage (depleted gas field injection, aquifer injection, and ocean sequestration) will be required from around the middle of this century to 2100.

Technologies already exist to capture and store CO<sub>2</sub> resulting from the combustion of fossil fuels, and trials are being planned and conducted in many parts of the world. The International Energy Agency and the global community are keeping a close eye on such projects, since these technologies represent a substantive solution to the global warming problem. However, it will take quite some time to overcome issues such as making the technology more economic and securing sites for CO<sub>2</sub> storage so that the technologies can be widely used.

J-POWER recognizes that capture and storage of CO<sub>2</sub> resulting from combustion of fossil fuels will ultimately become a means of solving the global warming issue. As well as developing our own technologies related to CO<sub>2</sub> capture and storage, we are continuously working toward CO<sub>2</sub> zero-emissions through the use of such technologies.



Notes: 1. Research Institute of Innovative Technology for the Earth  
2. An integrated energy/environmental/economic optimization model jointly developed by RITE and the University of Tokyo

Energy saving	Biomass	Aquifer injection
Fossil fuel conversion	Wind	Ocean sequestration
Nuclear	Solar	Afforestation
Hydroelectric/geothermal	Enhanced oil recovery	Net volume of CO <sub>2</sub> emissions
	Depleted gas field injection	

Source: Document produced by the Energy Supply and Demand Subcommittee, Advisory Committee for Natural Resources and Energy, Ministry of Economy, Trade and Industry, October 2004.

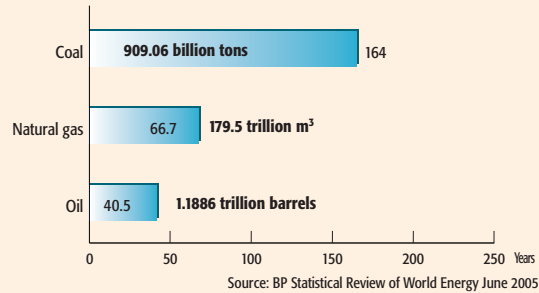


## Stable Supply of Coal

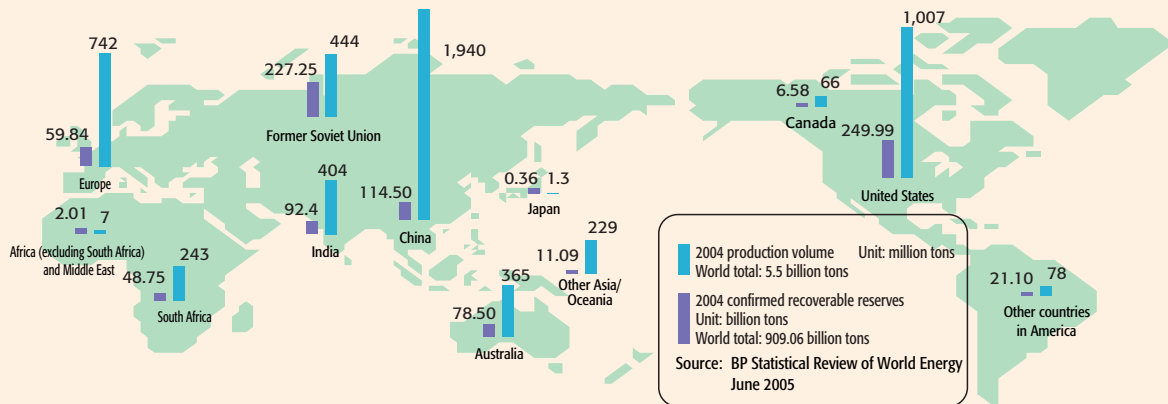
Recoverable reserves of coal are estimated to total 909.06 billion tons, enough to last 164 years. Compared to oil reserves sufficient for just 41 years (1.1886 trillion barrels) and natural gas reserves for 67 years (179.5 trillion m<sup>3</sup>), ample reserves of coal remain. Moreover, they are distributed widely around the world in areas including the U.S., Australia, China, and Europe, offering outstanding stability of supply to a country like Japan that depends on imports for most of its energy.

By contrast, approximately 62% of all oil reserves are concentrated in the Middle East, and Japan depends on that region for as much as 90% of its oil imports. The risk of supply disruptions due to international disputes and other unpredictable factors is high.

### Confirmed Recoverable Reserves



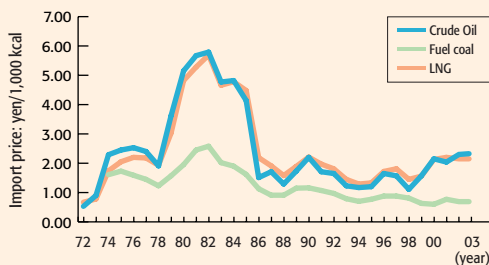
### Coal: Confirmed Recoverable Reserves and Production Volume (2004)



## Coal Prices

Looking at average prices per unit of calorific value for imported energy over the last 30 years, it is found that coal prices have been both cheaper and more stable than oil and LNG prices.

### Import Prices by Energy Source (per unit of calorific value)



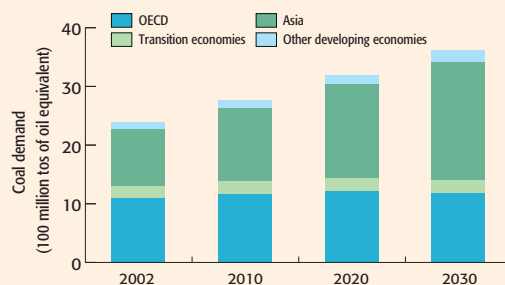
Source: 2004 EDMC Handbook of Energy & Economic Statistics in Japan

## World Coal Demand

According to International Energy Agency (IEA) statistics, as of 2002 world coal demand was equivalent to 2.4 billion tons of oil and represented 23% of total primary energy demand. Demand is expected to increase by 1.5% annually after 2002 and to be equivalent to 3.6 billion tons of oil by 2030. Considered by region, coal consumption in Asia has doubled and is likely to represent 55% of world coal consumption by 2030. Growth in consumption is particularly marked in China (2.3% annually) and India (2.6% annually).

As of 2002 coal represented 44% of total fuel demand for electricity generation and this demand is predicted to grow by 1.9% annually. By 2030 coal is forecast to account for approximately 42% of total fuel demand for electricity generation.

### Projected World Coal Demand (reference scenario)



Source: World Energy Outlook 2003 (IEA)

## Hydroelectric Power and the Environment

### ◆Hydroelectric Power: Renewable and Reliable

Hydroelectric generation, which accounts for approximately 10% of total power generation and around 20% of generation capacity in Japan, is an indigenous energy source that takes advantage of the country's rivers and geographic features. Since it produces no CO<sub>2</sub> emissions and has a relatively low environmental impact, hydroelectric power is one of the most reliable forms of renewable energy in both qualitative and quantitative terms.

However, some impact on river environments—such as changes in ecosystems associated with reservoirs and reduced water sections—has been noted, along with issues including treatment of earth and sand flowing into reservoirs, and deterioration of water quality.



Okutadami Power Station (Fukushima and Niigata Prefectures)

### ◆Future Measures

J-POWER is taking steps to resolve the outstanding issues surrounding hydroelectric power by preserving river maintenance flows, providing fishways, and setting up surface intake equipment.

We recognize that hydroelectric power stations can increasingly contribute to preventing global warming and ensuring stable power supplies.

In the course of constructing 59 large and small hydroelectric power facilities in Japan with capacity of more than 8,550 megawatts (about 20% of total domestic hydroelectric capacity) and a 40-year track record in international hydroelectric power technology cooperation, we have amassed a great deal of know-how. We will actively apply this knowledge and experience in developing small-scale hydroelectric power plants with low environmental impact, meeting the needs of local authorities with services ranging from surveys and planning to construction and operation.

At the same time, there are still many places in the world where hydroelectric power is appropriate and will contribute to economic development. Through our consulting business, we aim to assist with such projects.

## Nuclear Power Generation and the Environment

Nuclear power generation can play a key role in preventing global warming, since it produces no CO<sub>2</sub> emissions during generation of electricity.

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

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



Oma Nuclear Power Station, Aomori Prefecture (Image of completed plant)

## Geothermal Power Generation and the Environment

Although geothermal power generation can provide only small volumes of power, it is an important renewable energy source, since it is indigenous and produces almost no CO<sub>2</sub> emissions. We have been operating the Onikobe Geothermal Power Station in Miyagi Prefecture since 1975.

Located in the circum-Pacific volcanic zone, Japan has some of the highest levels of volcanic activity in the world.

Geothermal power generation takes advantage of the vast reserves of underground thermal energy found around volcanoes. Steam and hot water are brought to the surface from these geothermal reservoirs to drive steam-powered turbines and, after use, returned to their original location deep underground.

## Wind Power Generation and the Environment

Wind power generation produces clean, renewable energy ⚡ without CO<sub>2</sub> emissions and is a valuable domestic energy source for a resource-poor country like Japan.

The Tomamae Winvilla Wind Farm in Hokkaido was a pioneer among large-scale facilities in Japan when it started commercial operation in 2000. Since then, we have developed further wind farms around Japan in the Hokkaido, Tohoku, Tokyo, Chubu, and Kyushu regions.

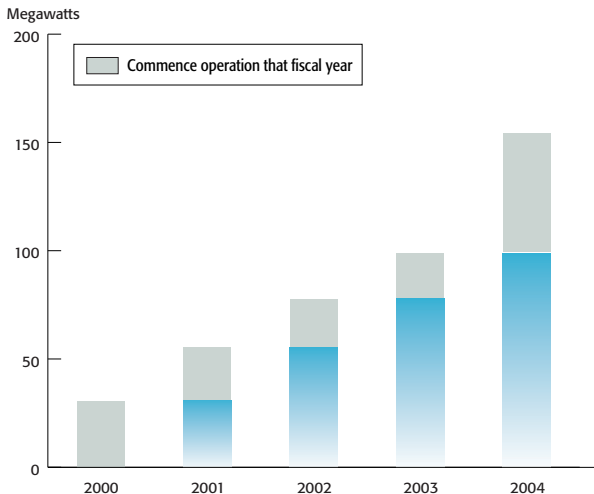
While wind power generation is environmentally friendly, careful planning is required to avoid detrimental effects on the landscape and on ecosystems for rare fauna and flora. By positioning windmills and determining power cable routes based on the results of landscape simulations and environmental surveys, we constantly make every effort to address such issues.

Since wind power generation is characterized by large power variations, we are developing new technologies aimed at leveling out such fluctuations by installing batteries at the Tomamae Winvilla Wind Farm under a contract with the New Energy and Industry Development Organization (NEDO).



Tomamae Winvilla Wind Farm (Hokkaido)

### Total Generating Capacity of J-POWER Group Wind Farms



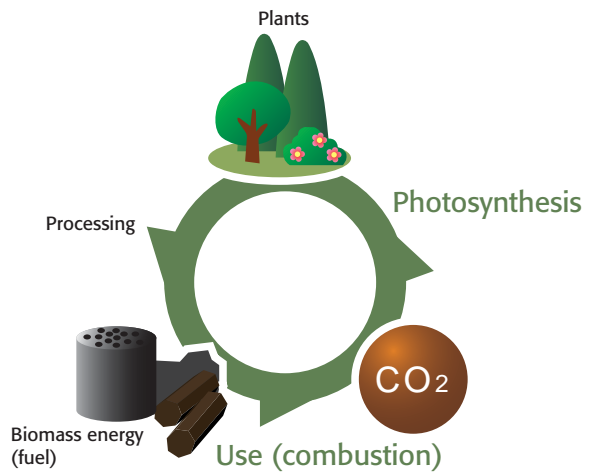
## Biomass Power Generation and the Environment

Biomass refers to all organic material, including plants (which capture and store solar energy via photosynthesis) and other biological organisms (which capture and store energy via the food chain), along with their excrement. Since biomass contains carbon and hydrogen it produces energy when burned, and is thus attracting attention as a new source of energy.

Moreover, since the carbon contained in biomass was originally captured from the atmosphere via photosynthesis during the plant growth process, burning such material is not regarded as producing new emissions of CO<sub>2</sub>. Consequently, using biomass as a substitute for fossil fuels results in a net reduction of CO<sub>2</sub> emissions.

Since many biomass resources are currently untapped, effective use of such resources is expected to help create a recycling-based society.

We consider that the most efficient way to use large amounts of biomass material economically is to burn them in thermal power plants. We are therefore promoting effective use of biomass by developing technology for mixing dried sewage sludge and wood chips with coal and working on the construction of biomass power plants overseas. We will continue to actively promote widespread use of biomass energy.



Biomass fuel (chaff)

# Business Activities and the Environment

Our inputs and outputs in fiscal 2004 are as follows.

## Input

In addition to coal, inputs to coal-fired thermal power stations include heavy and light oil as auxiliary fuels, as well as industrial water and chemicals.

### ◆Coal-fired Power Stations

(including Wakamatsu Research Institute)

#### Fuel

Wet coal	19.08 million tons
Heavy oil	60 thousand kl
Light oil	27 thousand kl
Biomass (dried sewage sludge)	0.5 thousand tons

#### Water

Industrial water	8.17 million m <sup>3</sup>
------------------	-----------------------------

### Main Resources and Chemicals (100% basis)

Limestone (CaCO <sub>3</sub> )	240 thousand tons
Ammonia (NH <sub>3</sub> )	12 thousand tons
Hydrochloric acid (HCl)	967 tons
Sulfuric acid (H <sub>2</sub> SO <sub>4</sub> )	898 tons
Caustic soda (NaOH)	6,200 tons

### ◆Hydroelectric Power Stations

Water intake for power generation	64.3 billion m <sup>3</sup>
Electric power consumption for pumped storage	2,000 GWh

### ◆Geothermal Power Station

Steam	900 thousand tons
Hot Water	4 million tons

### ◆Offices/Other Business Units

#### Electric Power Consumption

Research Institute (Wakamatsu facility only)	21.27 GWh
Offices	15.64 GWh

#### Water

650 thousand m<sup>3</sup>

#### Fuel (Vehicles, boats, heating, emergency generators, etc.)

Gasoline	342 kl
Diesel	182 kl
Kerosene	128 kl
City gas	63 thousand m <sup>3</sup> N
LPG	27 tons

#### Copy paper (A4 equivalent)

26 million sheets

#### Sanitary paper

56 thousand rolls

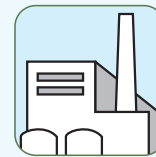
Note: River water is used in hydroelectric power stations, but all water is returned to rivers after power generation. Similarly, natural steam is used in geothermal power stations but hot water is returned underground after power generation via a returning well.

## Business Activities

The electricity produced in our power plants is delivered to households, factories, shops, and hospitals throughout Japan via Electric Power Companies (EPCOs).

### ◆Electric energy output

#### Coal-fired thermal\*



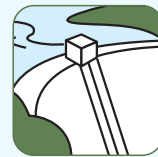
52,600 GWh

Geothermal



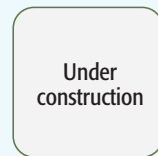
100 GWh

#### Hydroelectric



12,900 GWh

Nuclear



Under construction

Total 65,600 GWh

\* Includes power generation using biomass fuel

### ◆Auxiliary power for operation and transmission loss

- 3,700 GWh

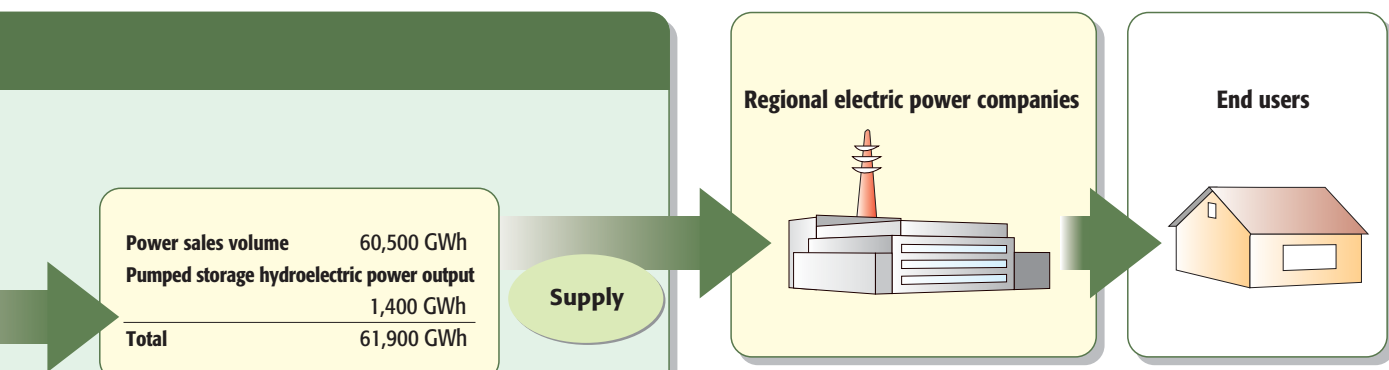
### ◆Quantitative Targets

The numerical targets below have been set since fiscal 2001

	Item
Emission reduction of greenhouse gases	1. Average coal thermal efficiency of coal-fired stations ♪ (generation point) (%)
	2. Electricity consumption for head office lighting (MWh)
	3. Development of reusable/unutilized energy ♪ (MWh)
	4. SF <sub>6</sub> ♪ recovery rate (%)
Efforts to absorb, store, and capture CO <sub>2</sub>	5. Overseas afforestation area (thousand hectares)
Emission reduction of environmental loads	6. SO <sub>x</sub> ♪ emissions intensity (g/kWh)
	7. NO <sub>x</sub> ♪ emissions intensity (g/kWh)
Reduction of waste materials through reuse and recycling of resources	8. Coal ash recycling rate (%)
	9. Gypsum recycling rate (%)
	10. Amount of driftwood recycled (thousand m <sup>3</sup> )
	11. Recycled paper purchase rate (%)
	12. Amount of general waste (such as paper) generated by head office (tons)

Notes:

1. Numerical targets are totals or averages for J-POWER as a whole (non-consolidated basis). However, figures for items 2 and 12 are for head office only, while figures for items 3 and 5 are totals for all operations undertaken, including those by group companies.



**◆ Recycling and reuse of resources**

	Rate of efficient use (%)
Coal ash	1,470 thousand tons <b>(91)</b>
Cinder (except coal ash)	3 thousand tons <b>(100)</b>
Gypsum (desulfurized byproduct)	370 thousand tons <b>(100)</b>
Sulfuric acid (desulfurized byproduct)	13 thousand tons <b>(100)</b>
Other industrial waste <sup>②</sup>	2.4 thousand tons <b>(59)</b>
Waste paper	236 tons <b>(87)</b>
Shells, etc.	235 tons <b>(56)</b>
Driftwood in dam reservoirs	12.5 thousand m <sup>3</sup> <b>(89)</b>

## Output

Typical outputs from coal-fired power stations include atmospheric emissions such as CO<sub>2</sub>, SO<sub>x</sub>, and NO<sub>x</sub>. Every effort was made to recycle waste.

**◆ Coal-fired power stations (including the Wakamatsu Research Institute)**

**Atmospheric emissions**

CO <sub>2</sub>	42.24 million t-CO <sub>2</sub>
SO <sub>x</sub>	10 thousand tons
NO <sub>x</sub>	27 thousand kl
Soot and dust <sup>③</sup>	1 thousand tons

**Waste water** 3 million m<sup>3</sup>

**Waste water COD <sup>③</sup>** 12.4 tons

**◆ Hydroelectric power stations**

Water discharged after generation 64.3 billion m<sup>3</sup>

**◆ Geothermal power stations**

Amount of hot water 4.26 million tons

**◆ Industrial waste**

Coal ash	150 thousand tons
Sludge (excluding gypsum)	8,900 tons
Other industrial waste	1,600 tons
Industrial waste subject to special control <sup>③</sup>	8 tons

**◆ General waste**

Waste paper	35 tons
Shells, etc.	187 tons
Driftwood in dam reservoirs	1,600 m <sup>3</sup>

**◆ CO<sub>2</sub> emissions generated from consumption of electricity and fuel at offices** 8,400 t-CO<sub>2</sub>

to step up our environmental conservation efforts.

Target (fiscal 2004)	Results (fiscal 2004)	Target achieved (fiscal 2004)
40 or above	40.4	Yes
Active reduction (to 1,900 or below)	1,790	Yes
50 or above	55	Yes
98 or above	99	Yes
3 or above	2.8	Almost
0.25 or below	0.20	Yes
0.55 or below	0.50	Yes
65 or above	91	Yes
100	100	Yes
9 or above	12.5	Yes
99 or above	96.7	Almost
Active reduction (to 40 or below)	28	Yes

2. See p. 33 for more details on item 8 "Coal ash recycling rate."  
 3. Volume of driftwood is the gross volume collected in driftwood receptacles (including spaces).



# Environmental Accounting and Efficiency

J-POWER regards environmental accounting as an important tool for environmental management. Through ongoing disclosure of environmental accounting data, we aim to further enhance the reliability and adequateness of information on cost and effectiveness. The basic stance outlined in the Basic Policy section of the J-POWER Group Environmental Management Vision sets the goal of improving environmental efficiency (reducing environmental load per unit of production), and we continue to work toward achieving that objective.

## Environmental Accounting

In calculating the overall cost and effectiveness of our environmental conservation activities in fiscal 2004 in light of the nature of our business, we referred to the Environmental Accounting Guidelines 2005 issued by the Ministry of the Environment.

### ◆ Calculation Guidelines

- Period: April 1, 2004 to March 31, 2005
- Format: In accordance with Environmental Accounting Guidelines 2005 issued by the Ministry of the Environment
- Scope: Company-wide costs (including depreciation costs)

- Costs were calculated focusing on expenses for: personnel/contracting/repair/chemicals associated with operating and maintaining equipment; waste recycling and disposal; R&D; and overseas projects (contracting and personnel expenses).
- However, upstream and downstream costs associated with the contribution of hydroelectric power generation to measures against global warming, and with green purchasing efforts, were deemed to present problems in terms of calculation scope and method and thus were excluded from calculations again in fiscal 2004.

### ◆ Environmental Conservation Cost and Effectiveness

(Unit: billion yen)

Category	Main measures and efforts	Amount
Pollution control	Air pollution control (desulfurization/denitrification, soot and dust treatment), water pollution control (waste water treatment), etc.	19.61
Global environmental conservation	Measures to reduce greenhouse gas emissions (maintaining high-efficiency operation of coal-fired plants, developing renewable and unutilized energy sources, management costs for energy-saving equipment, emission control for greenhouse gases except CO <sub>2</sub> ), efforts to absorb and store CO <sub>2</sub> (overseas afforestation projects)	3.08
Resource recycling	Waste reduction through reuse and recycling, treatment and disposal of waste	10.51
Management activities	Monitoring and measurement of environmental load, labor costs for environmental conservation organizations, costs for environmental education, etc.	1.83
Research and development	High-efficiency generation, use of fuel cells, storage and capture of CO <sub>2</sub> , recycling of coal ash and gypsum, etc.	0.51
Social activities	Tree-planting, environmental advertising, environmental beautification, membership of environmental groups, preparation of environmental report, etc.	3.62
International projects	Overseas cooperation projects for environmental conservation technologies	1.32
Other	Pollution load levy	0.88
	<b>Total</b>	<b>41.36</b>

Environmental conservation effectiveness	FY 2003	FY 2004
SOx emissions (thousand tons)	8.4	10.4
NOx emissions (thousand tons)	25.0	26.6
Soot and dust emissions (thousand tons)	1.0	1.0
CO <sub>2</sub> emissions (million tons CO <sub>2</sub> )	41.07	42.24
Average coal-fired thermal efficiency (%)	40.3	40.4
Head office lighting electricity consumption (MWh)	17,950	17,850
SFe recovery (%)	98	99
Development of renewable and unutilized energies (MW)	320	55
Overseas afforestation (ha)	2,200	2,800
Coal ash generated (thousand tons)	1,470	1,620
Gypsum generated (thousand tons)	320	370
Driftwood recycled (thousand m <sup>3</sup> )	9.4	12.5
Waste generated by head office (tons)	30	28
Employees completing internal environmental auditor training (cumulative total)	262 (1,165)	387 (1,552)
Recycled paper purchase rate (%)	98.4	96.7
Environmental activity report (circulation)	Full report Digest	8,000 —
Overseas consulting projects (cumulative total)	14 (226)	22 (248)
Foreign trainees accepted (cumulative total)	25 (2,005)	34 (2,039)

### ◆ Economic Effectiveness

(Unit: billion yen)

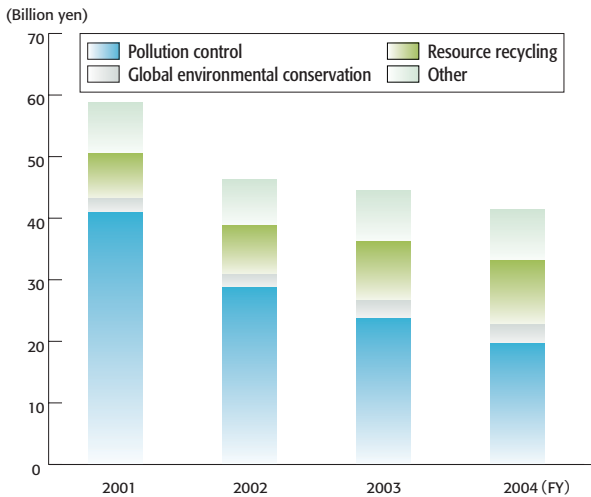
Category	Details	Amount
Revenue	Sales of valuable resources: coal ash, gypsum, sulfuric acid	0.36
Cost-reduction	Reduction in fuel costs due to improved coal-fired thermal efficiency (introduction of USC)	1.36
	Reduction in disposal costs due to recycling of coal ash, gypsum and sulfuric acid	4.36
	<b>Total</b>	<b>6.08</b>



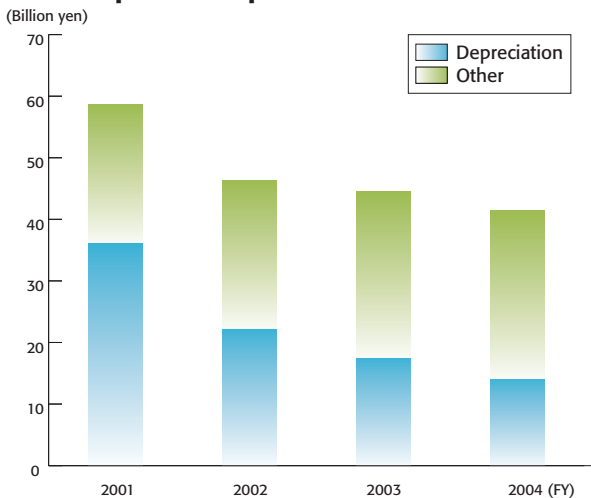
**◆Environmental Conservation Cost**

The total cost of environmental conservation in fiscal 2004 was approximately 41.4 billion yen, 3.2 billion less than in fiscal 2003. The difference is largely due to reduced depreciation costs. Costs for pollution control (such as air and water pollution control) accounted for 48% of the total.

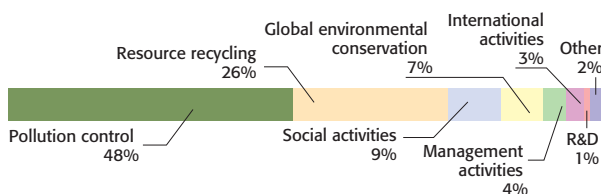
**Environmental Conservation Costs: Comparison by Fiscal Year**



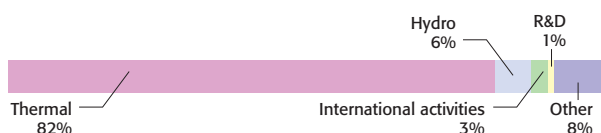
**Proportion of Depreciation and Other Costs**



**Environmental Conservation Costs: Breakdown by Category**



**Environmental Conservation Costs: Breakdown by Division**



**◆Environmental Conservation Effectiveness**

The effects of preventing environmental pollution, maintaining current levels of environmental load, and improving the environment were measured quantitatively. In addition to the quantitative targets set out in our Action Guidelines, the effects show items particular to J-POWER activities.

**◆Economic Effect**

Efforts contributing to earnings and cost reductions are calculated to have had a positive economic effect of approximately 6.1 billion yen.

**Environmental Efficiency**

The Basic Policy section of the J-POWER Group Environmental Management Vision sets out our basic stance of reducing environmental risk and improving environmental efficiency (production per environmental load) while at the same time enhancing both environmental responsibility and economic value to contribute to sustainable development in Japan and the world as a whole.

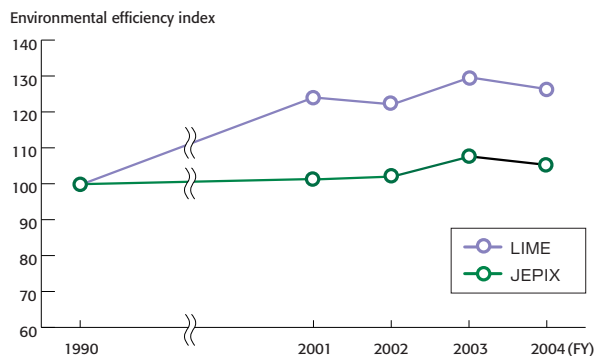
In this section, various environmental load factors have been calculated according to weighted coefficients and totaled to provide an overall index of environmental efficiency. This integrated approach enables environmental efforts in all business activities to be evaluated according to a single numerical index.

A number of such integrated approaches have been developed overseas, such as Eco-indicator 99 in the Netherlands, EPS 2000 in Sweden, and BUWAL 297 in Switzerland. In Japan, similar methods have been developed taking account of the country's particular characteristics. These include JEPIX (which uses policy targets as indicators) and LIME (which uses human health and damage to ecosystems as indicators).

We have evaluated our efforts to date according to these two methods. While the two methods differ in the coefficients applied to individual environmental factors, the trend of improvement in environmental efficiency since 1990 can be clearly seen.

Details on production per environmental load are included on the pages outlining the relevant business activities.

**Environmental Efficiency According to Integrated Indices (electric power sales volume per environmental load)**



Note: The environmental efficiency indices use a base figure of 100 representing the overall index (electric power sales volume per environmental load) in FY 1990.

# Efforts to Combat Climate Change

With humanity obliged to continue relying on fossil fuels as its primary energy source through this century, the problem of global warming is the most serious issue to be tackled over the long term. J-POWER regards measures to combat global warming as a top management priority and is pursuing such actions vigorously.

## CO<sub>2</sub> Emissions

Japan's total annual CO<sub>2</sub> emissions were approximately 1.26 billion t-CO<sub>2</sub> (actual FY 2003 emissions), of which about 30% was generated by power stations in general and about 3% by J-POWER specifically.

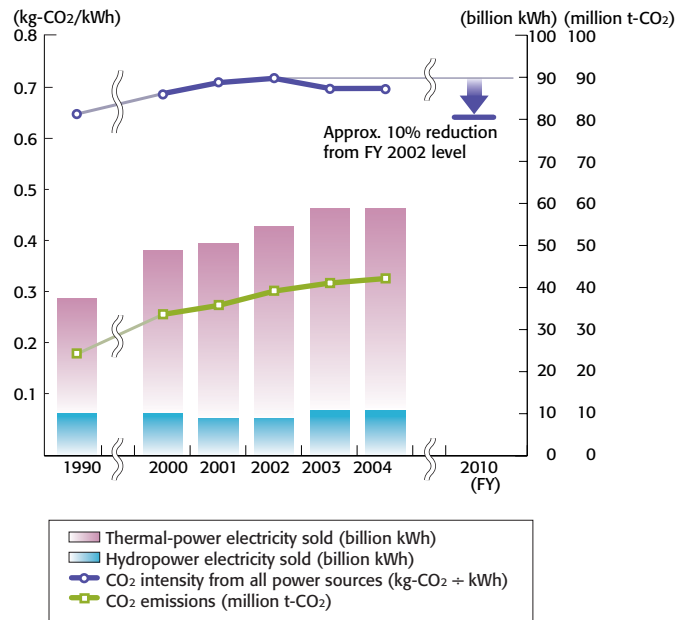
J-POWER takes this situation seriously, and in response to it, we have compiled the Action Program (see pp. 7-8) that systematizes our efforts heretofore, focusing on maintaining and improving efficiency of energy use; developing less-CO<sub>2</sub>-emissions power sources; developing, transferring, and disseminating technologies; and utilizing the Kyoto Mechanisms. Under the program, J-POWER has pledged to "work to achieve around a 10% reduction from the fiscal 2002 level of annual CO<sub>2</sub> emissions per unit of electricity sold by J-POWER Group electric power businesses in Japan and overseas by fiscal 2010."

### ◆CO<sub>2</sub> Emissions and Intensity

In fiscal 2004, electricity sold by J-POWER was roughly 60.5 billion kWh, an increase of about 3% over the previous year. Owing to intensive utilization of coal-fired power plants, resulting from growing electricity demand and lower utilization of nuclear power, CO<sub>2</sub> emissions rose to 42.22 million t-CO<sub>2</sub>, an increase of about 3% from the previous year. As a result, the CO<sub>2</sub> emissions intensity\* for all power sources combined was 0.70 kg-CO<sub>2</sub>/kWh, approximately the same as the year previous.

\* CO<sub>2</sub> emissions intensity for all power sources = CO<sub>2</sub> emissions from power generation ÷ electricity sold from all power sources.

### J-POWER CO<sub>2</sub> Emissions and CO<sub>2</sub> Intensity from All Power Sources



Note: CO<sub>2</sub> emissions were formerly calculated using heat value of fuel at time of procurement, but for this report we have recalculated emissions as far back as 1990 using actual heat value at time of combustion.

### CO<sub>2</sub> Emissions per Unit of Electricity Sold

CO<sub>2</sub> emissions from electricity use are calculated by multiplying the amount of electricity that consumers use by CO<sub>2</sub> intensity at the point of consumption. Because electricity consumption varies greatly according to circumstances beyond the electric utilities' control, such as to weather conditions and the conditions of electricity usage by customers, electric utilities commonly use CO<sub>2</sub> intensity at the point of consumption, which more accurately reflects their own efforts, as an indicator of the impact of those efforts. Since J-POWER is an electricity wholesaler, it looks at the amount of electricity sold to general electric utilities instead of electricity used by consumers, and uses CO<sub>2</sub> intensity emissions per unit of electricity sold as an indicator of the success of its efforts.

### Goal of 12 FEPC-Affiliated Companies

In addition to our individual efforts, J-POWER has adopted the goal jointly established by the 12 companies affiliated with the Federation of Electric Power Companies of Japan\* "to reduce CO<sub>2</sub> intensity at the consumption point by about 20% from the level of fiscal 1990 by fiscal 2010" (see p. 77, Environmental Action Plan of the Electric Power Industry).



#### \* 12 FEPC-affiliated companies:

10 FEPC members companies (Hokkaido Electric Power Co., Tohoku Electric Power Co., Tokyo Electric Power Co., Chubu Electric Power Co., Hokuriku Electric Power Co., Kansai Electric Power Co., Chugoku Electric Power Co., Shikoku Electric Power Co., Kyushu Electric Power Co., Okinawa Electric Power Co.) plus J-POWER and Japan Atomic Power Co.

## Maintaining and Improving Efficiency of Energy Use

The energy-use efficiency of J-POWER's coal-fired power-generating facilities is among the highest in the world, thanks to the company's development and active incorporation of its own cutting-edge technology. In its hydropower and other facilities as well, J-POWER strives for stable operations and works to further improve equipment efficiency when upgrading those facilities. In addition, the company as a whole is continually working to devise energy-saving measures.

### Maintaining Efficient Operation of Coal-fired Power Stations

J-POWER is taking measures to reduce auxiliary power for operations in its coal-fired power stations, while working to maintain high-efficiency operation through the introduction of new technologies, such as ultra super critical (USC)  technology. In fiscal 2004, our gross thermal efficiency  (at the point of generation) was 40.4% (as compared with 40.3% in FY 2003).

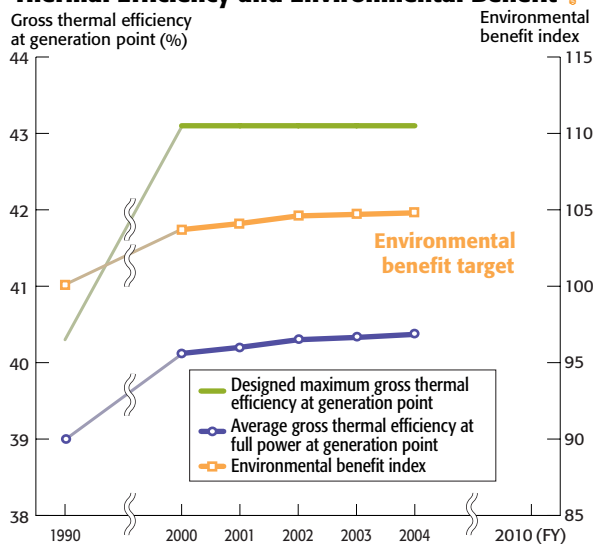
Although thermal efficiency of coal-fired power generation equipment declines with age, J-POWER is working to maintain and improve efficiency of energy use by installing high-efficiency equipment in our new plants and minimizing the aging process in existing equipment.

J-POWER Plants Using USC	
Number of units	4 out of 14 (all units)
Rated output	47%
Electricity sold in FY 2004	51%



Isogo Coal-fired Thermal Power Station (Kanagawa Prefecture)

### Coal-fired Power Stations: Thermal Efficiency and Environmental Benefit



Note: Environmental benefit index: 100 = FY 1990 environmental benefit (electricity sold ÷ energy input)

### Stable Operation of Hydroelectric Power Stations


In Japan, hydroelectric power is a precious domestic energy source. It is also clean energy with a relatively small impact on the environment, emitting no CO<sub>2</sub> during generation (see p. 15, Hydropower and the Environment).

J-POWER has hydroelectric power facilities at 59 locations throughout Japan for a total generating capacity of 8.55 million kW, and the electric power sales volume was 11.173 billion kWh in fiscal 2004. The emissions reduction benefit\* of our hydropower generation is approximately 4.9 million t-CO<sub>2</sub>.



Sakuma Power Station (Shizuoka Prefecture)

### Stable Operation of Geothermal Power Stations

Although geothermal power generation can only produce electric power on a small scale, it produces almost no CO<sub>2</sub> emissions, and for this reason is expected to play a definite role as a renewable energy  source henceforth.

J-POWER has been generating electricity at its Onikobe Geothermal Power Station (Miyagi Prefecture; capacity 12,500 kW) since 1975. In fiscal 2004, the electric energy output was 84 million kWh. The CO<sub>2</sub> emissions reduction benefit of our geothermal generation is approximately 40,000 t-CO<sub>2</sub>.



Onikobe Geothermal Power Station (Miyagi Prefecture)

\* For purposes of this report, CO<sub>2</sub> emissions-reduction benefit is calculated by comparing the emissions intensity for nuclear power, hydropower, geothermal power, or wind power with the average emissions intensity for electricity from all power sources in Japan (kg-CO<sub>2</sub> ÷ kWh).

## Promoting Energy Conservation

### ◆Energy Conservation Activities

As part of our effort to prevent global warming, in each of its locations J-POWER rigorously implements such energy-saving policies as lights off during lunch break and reducing power supply to equipment on standby. In addition, we are installing energy-saving equipment in every new office.

In fiscal 2004, the total electricity consumed at our head, branch, and construction offices was 15.64 million kWh.

We have recently begun gathering data on the consumption of kerosene and gas at its offices as well. In fiscal 2004, company offices consumed a total of 128 kl of kerosene, 63,090 m<sup>3</sup>N of city gas, and 26,558 kg of LP gas.

We are also working to reduce the number of motor vehicles used and increase the efficiency of their operation. In fiscal 2004, fuel consumption for company-owned vehicles (gasoline and diesel fuel) amounted to approximately 451 kl, a reduction of about 19% from fiscal 2003 (557 kl).

CO<sub>2</sub> emissions from our offices' consumption of electricity, kerosene, and gas, together with motor vehicle use, totaled approximately 8,400 t-CO<sub>2</sub> in fiscal 2004.

Beginning in fiscal 2005, in order to meet the office CO<sub>2</sub> emissions reduction goal set forth in the action plan for the J-POWER Group Environmental Management Vision, J-POWER will have energy conservation audits carried out by specialists at each of the major offices of each member company to further cut back on energy consumption through equipment upgrades as well as operating procedures.

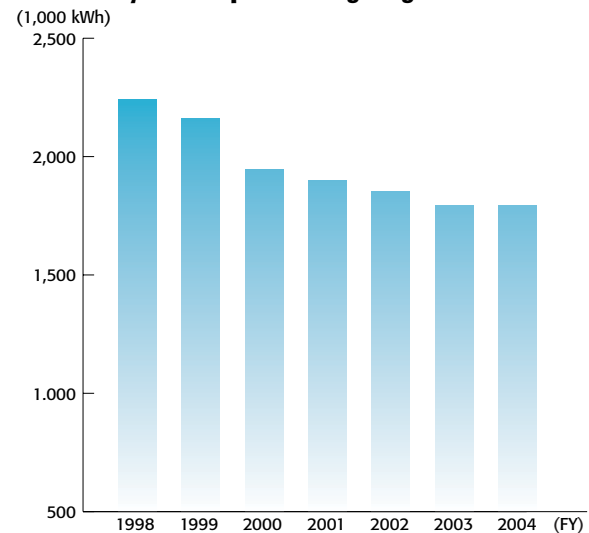
### ◆Energy Conservation at J-POWER's Head Office

In accordance with J-POWER's EMS ♻️, the company has developed an energy conservation policy for its head office involving the use of exhaust heat from air conditioners and the recovery of exhaust heat from computer rooms, together with electrical load leveling through installation of regenerative heat pumps and strict enforcement of the "lights off when not in use" policy.

We reaped major energy-saving benefits by equipping the lighting at our headquarters with inverters in fiscal 1999. In fiscal 2000, electricity consumption dropped by 237,000 kWh, or about 11%, from average annual usage in the three fiscal years from 1997 to 1999. In

fiscal 2004, as a result of ongoing energy-conservation efforts, electricity consumption fell to 1.785 million kWh, a 0.5% drop from the previous year.

### Electricity Consumption for Lighting at Head Office



### ◆Promotion of Energy Conservation

While J-POWER's energy conservation activities center on supply-side measures, we are also keenly aware of the importance of demand-side efforts. For this reason, we, including our affiliated companies, offer energy auditing and consulting services, as well as sales and installation of energy-saving equipment, both domestically and overseas.

Domestically, J-POWER offers energy audits and certain types of energy-performance contracting for national and local government, national universities, schools, hospitals, office buildings, home improvement centers, and so on. As of the end of fiscal 2004, we had performed about 70 energy audits. In addition, we provide performance evaluation and sales support for quality energy-saving products (such as the EcoSylphi for ensuring even indoor temperatures, high-efficiency capacitors and light bulbs, etc.)

Overseas, we conduct feasibility studies on JI ♻️/CDM ♻️ projects and provide consulting services that make full use of our accumulated experience and know-how.



Solar panels for the indoor hot-water supply system in J-POWER headquarters (roof of head office building, Tokyo)



## Efforts Relating to Transport of Raw Materials

### ◆Reducing Environmental Load by Enlarging Coal Carriers

J-POWER imports more than 10 million tons of coal per year from overseas (Australia, China, Indonesia, etc.)

While typical coal carriers have a carrying capacity of about 60,000 t, we have contracted with shipbuilders to build larger dedicated bulk carriers for us. Two new coal carriers were completed in fiscal 2004.

The use of larger coal carriers cuts back on the amount of fuel oil consumed per unit of coal transported and reduces the environmental load of transport (emissions of CO<sub>2</sub>, sulfur oxides, nitrogen oxides, etc.).



Dedicated coal carrier *Blue Island*

#### J-POWER Dedicated Coal Carriers

Name	Tonnage (carrying capacity)	Year completed
<i>Shoho-maru</i>	87,996	1995
<i>Kurotakisan-maru</i>	87,890	1995
<i>Suirei-maru</i>	89,000	1996
<i>Blue Island</i>	152,398	2000
<i>Tsunomine</i>	152,400	2000
<i>Southern Cross</i>	88,125	2004
<i>JP Azure</i>	88,111	2005

### Launch of the *JP Azure*

March 2005 saw the completion of J-POWER's dedicated coal carrier, the *JP Azure*.

#### ●Origin of the Name

To navigators heading for the port of Yokohama after it was opened to international traffic in the mid-nineteenth century, the blue cliffs of Honmoku were a landmark that showed them where to put in. Today, the blue tower boiler of J-POWER's Isogo Coal-fired Power Station (Kanagawa Prefecture), standing at the mouth of the harbor, provides a landmark reminiscent of the Honmoku cliffs. The name *JP Azure* is a reference to this landmark.

#### ●Safe and Efficient Design

The *JP Azure*, equipped with five holds and five large hatch covers, is designed to facilitate unhurried unloading and make for efficient cargo handling. It is

### ◆Reducing Environmental Load through Marine Transport of Coal Ash

Coal ash is the residue generated by the burning of coal in coal-fired power stations. J-POWER ships some 1.5 million tons of coal ash every year from its power stations to a variety of locations so that it can be put to good use as a raw material for cement, concrete admixture, land reclamation material, and so on.

Approximately 90% of this coal ash is transported by dedicated carriers and other ships. The use of maritime transport reduces the environmental load of shipping, such as CO<sub>2</sub> emissions, as compared with truck or train transport.



Dedicated coal-ash carrier *Seisho-maru*

#### J-POWER Dedicated Coal-ash Carriers

Name	Tonnage (carrying capacity)	Year completed
<i>Matsushima-maru</i>	1,406	1980
<i>Takehara-maru</i>	2,349	1991
<i>Seisho-maru</i>	2,300	1995
<i>Kishin-maru</i>	1,566	2002

also well equipped with mooring drums for safe coal unloading.

#### ●In Tune with the Global Environment

The paint covering bottom of the *JP Azure* contains no substances harmful to marine life, and every measure has been taken to address the discharge of water containing coal dust into the harbor. With the *JP Azure*, maritime transport is conducted with due consideration not only for the oceans but for the global environment as a whole.

#### ●World-class Safety Technology

The *JP Azure* features the most stringent safety technology. In addition, the ship is fitted with the most reliable cutting edge navigation equipment available today.



Dedicated coal carrier *JP Azure*

## Developing Low-CO<sub>2</sub>-Emission Power Sources

J-POWER is moving forward with the construction of a nuclear power station as a low-CO<sub>2</sub>-emissions power source. At the same time, it is embracing the use of such alternative energy sources as wind power and biomass power generation. We are also working on micro-hydropower, one of the few natural resources remaining in Japan. In addition, it is moving forward with the construction of gas-turbine combined-cycle power stations, characterized by high efficiency of energy use.

### Construction of a Nuclear Power Plant

J-POWER is planning the construction of a nuclear power plant (full MOX-ABWR ☞; 1,383MW) in Oma-machi, Aomori Prefecture aiming to use MOX fuel ☞ for the whole reactor core (scheduled to start operation in March 2012).

We are promoting the construction plan for the reactor, paying rigorous attention to safety measures, environmental conservation, and its coexistence with local communities. Oma Nuclear Power Station is expected to have the merit of annual reduction equivalent to about 3.2 million ton-CO<sub>2</sub>, in CO<sub>2</sub> emissions (assuming the capacity factor to be 80%).

Overseas, J-POWER has been operating a wind power plant in Spain, following the acquisition of a business corporation from that country's Gamesa Group in March 2003.

The total planned annual output from our domestic wind power facilities is approximately 257.5 million kWh, representing an emissions-reduction benefit of approximately 110,000 t-CO<sub>2</sub>.

### Moving Forward with Wind Power

In fiscal 2004, J-POWER launched commercial wind power generation at three locations: Nagasaki-Shikamachi Wind Farm (Nagasaki Prefecture), Aso-Nishihara Wind Farm (Kumamoto Prefecture), and J-Wind Tahara (Aichi Prefecture). As a result, the installed capacity of J-POWER's domestic wind power facilities now totals 130,000 kW.

Meanwhile, two more wind power plants are currently under construction in Japan.

#### Koji Asuka

Wind Power Group, Business Development Department



Wind power, a clean energy source that generates no CO<sub>2</sub> emissions, is drawing attention as an important means of preventing global warming. Each day we work hard to monitor the equipment and make sure the windmills are running smoothly.

J-POWER Group Wind Farm

	Wind farm	Power generating capacity (kW)	Wind turbine unit numbers and capacity	Annual power generation (planned value)	Start-up date	J-POWER's share
In operation	Tomamae Winvilla Wind Farm (Tomamae-cho, Hokkaido)	30,600	14 X 1,650 kW 5 X 1,500 kW	59 million kWh 17,000 households	Dec. 2000	100%
	Nikaho Highland Wind Farm (Nikaho-machi, Akita)	24,750	15 X 1,650 kW	51 million kWh 15,000 households	Dec. 2001	67%
	Tokyo Bayside Wind Power Plant (Tokyo)	1,700	2 X 850 kW	2.5 million kWh 800 households	Mar. 2003	50% (non-consolidated subsidiary)
	Monte Sexio-Cando, Serra Do Cando, and Outeiro Do Coto Wind Farm (Galicia, Spain)	64,210	96 X 660 kW 1 X 850 kW	180 million kWh 55,000 households	Mar. 2003	50% (through J-POWER subsidiary)
	Green Power Kuzumaki Wind Farm (Kuzumaki-machi, Iwate)	21,000	12 X 1,750 kW	54 million kWh 16,000 households	Dec. 2003	100%
	Nagasaki-Shikamachi Wind Farm (Shikamachi, Nagasaki)	15,000	15 X 1,000 kW	28 million kWh 8,000 households	Feb. 2005	70%
	Aso-Nishihara Wind Farm (Nishihara-mura, Kumamoto)	17,500	10 X 1,750 kW	23 million kWh 7,000 households	Feb. 2005	81%
	Tahara Bayside Wind Farm (Tahara-shi, Aichi)	22,000	11 X 2,000 kW	40 million kWh 12,000 households	Mar. 2005	66%
Under construction	Setana Seaside Wind Farm (Setana-cho, Hokkaido)	12,000	6 X 2,000 kW	35 million kWh 10,000 households	Jan. 2006	100%
	Koriyama Nunobiki-kogen Wind Power Plant (Koriyama-shi, Fukushima)	65,980	32 X 2,000 kW 1 X 1,980 kW	124.8 million kWh 35,000 households	FY 2006	100%



## Efforts toward Power Generation Using Biomass Fuel

### ◆Utilization of Woody Biomass

From fiscal 2001 to 2004, J-POWER was involved in a joint project with the Research Institute of Innovative Technology for the Earth (RITE) to develop technology for the co-firing of woody biomass in coal-fired power stations.

In this R&D project, the biomass to be co-fired is wood from the thinning of forests. The effective use of such lumber could aid not only in the protection of the global environment but also in the revitalization of the lumber industry.

Thus far the research has involved quantitative study of woody biomass resources in Japan, fuel property analysis, and basic testing of co-firing with coal using small experimental apparatuses.

On the basis of the results of these studies, test co-firing was carried out in the No. 2 unit at the Matsuura Thermal Power Station (Nagasaki Prefecture) for about six months beginning in May 2004. It was determined from these tests that the wood chips can be burned without difficulty at a co-firing ratio of 0.5%.



Woody biomass chips

### ◆Utilization of Biosolid (Sewage Sludge) Fuel

Biosolid fuel is produced by mixing sludge from sewage treatment plants with discarded cooking oil and then heating it to remove the water content. It has approximately the same heat value of combustion as coal. Along with woody biomass, J-POWER is exploring the co-firing of this fuel in coal-fired power stations.

Thus far fuel property analyses and basic co-firing tests using small-scale experimental equipment have been carried out to ascertain the basic combustive properties of biosolid fuel during co-firing.

In addition, in the first attempt of this nature in Japan, we conducted test co-firing in actual power-generation equipment using the No. 1 unit at the Matsuura Thermal Power Station for approximately one year beginning in August 2003. As a result it was determined that the fuel can be burned without difficulty at a maximum co-firing ratio of 1%. If biosolid fuel were mixed with coal at a ratio of 1% in the No. 1 unit of the Matsuura power station (1 million kW) for one year, CO<sub>2</sub> emissions could be reduced by about 50,000 t-CO<sub>2</sub>.



Biosolid fuel

\* For information on micro-hydropower and gas-turbine combined-cycle power stations, see p. 12, FY 2004 Environmental Topics.

### ◆Biomass Power Project in Thailand

J-POWER has been working with the Thai private electric utility EGCO on a power generation IPP project using biomass fuel in Thailand, which started commercial operations in May 2003.

This undertaking, which is utilizing about 76,000 tons of rice chaff each year as power-generator fuel, was our first domestic or international biomass power project. The power station has annual output of approximately 64.39 million kWh (calculated), which represents a CO<sub>2</sub> emissions reduction benefit of about 30,000 t-CO<sub>2</sub>.

J-POWER is also involved in a biomass power generation plan (23 MW) in Yala (about 1,000 km south of Bangkok), using waste from rubber-wood sawmills as fuel. This project will supply electricity to the Electricity Generation Authority of Thailand, thereby allowing the latter to cut back on fuel consumption at its thermal power stations and enabling reduction of CO<sub>2</sub> emissions on the order of 60,000 t-CO<sub>2</sub> annually.

#### Biomass Power Stations in Thailand

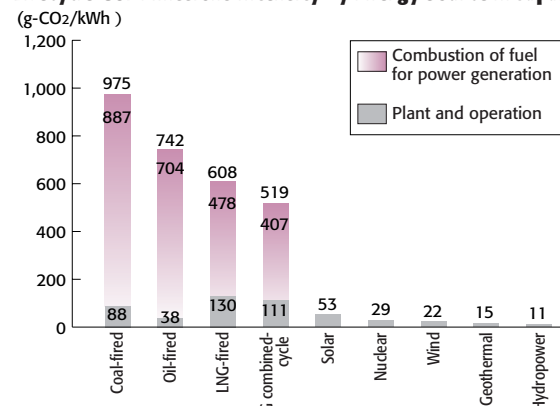
	Roi-Et Biomass Power Station	Yala Biomass Power Station
Location	Roi-Et, Thailand	Yala, Thailand
Fuel	Chaff from rice-milling plants	Rubber-wood residue from local sawmills
Capacity	9,950 kW	23,000 kW
Environmental equipment	Multi-cyclone Electrostatic precipitators Waste-water treatment equipment	Multi-cyclone Electrostatic precipitators Waste-water treatment equipment
Start-up date	May 2003	April 2006 (scheduled)

#### Reference

#### Lifecycle Assessment (LCA) of CO<sub>2</sub> Emissions for Japan's Energy Sources

CO<sub>2</sub> emissions over the entire energy lifecycle are shown below for each electric power source in Japan. An LCA of CO<sub>2</sub> emission includes not only emissions from fuel burned directly for electric power generation but emissions from all energy consumed from raw material mining to the construction of power-generation facilities, transporting and refining of fuel, operation and maintenance, and so on.

#### Lifecycle CO<sub>2</sub> Emissions Intensity by Energy Source in Japan



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

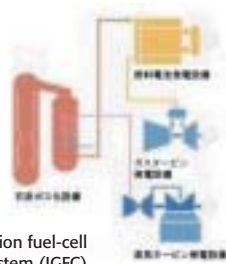
## Developing, Transferring, and Disseminating New Technologies

Aiming for dramatic improvement in the efficiency of coal use, J-POWER is working to develop an integrated coal-gasification fuel-cell combined-cycle power generation system. Such coal gasification technology can be effectively combined with CO<sub>2</sub> capture technology. We are also carrying out CO<sub>2</sub> behavior simulations necessary to begin work on the geological storage of CO<sub>2</sub>. Moreover, we provide consulting services to developing countries regarding cutting-edge technologies.

### Technologies under Research & Development

#### ◆ Production of Coal Gas

J-POWER is currently at work on techniques for gasifying coal and refining gas from coal with the aim of developing an integrated coal-gasification fuel-cell combined-cycle system (IGFC) by combining fuel cells, gas turbines, and steam turbines as a promising technology for the efficient use of coal. In March 2002, we started up a 150 t/d pilot plant to conduct a wide range of performance and reliability testing over a period of five years.



Integrated coal-gasification fuel-cell combined-cycle system (IGFC) (schematic diagram)

#### ◆ Fuel Cells Using Coal Gas (SOFC)

Solid oxide fuel cells (SOFC) are highly efficient and reliable fuel cells that can make use of a variety of fuels and have a wide range of potential uses, including dispersed power generation and alternatives to thermal generation. Combined with coal gasification, the technology could lead to the development of a combined-cycle power generation system with the potential to dramatically reduce CO<sub>2</sub> emissions. At present J-POWER is at work on a normal-pressure (150 kW–200 kW class) SOFC cogeneration system. After a complete redesign of the unit's modular structure, the goal is to test a scaled-up version for long-term reliability and develop the technology to integrate it into a practical power generation system.



Normal-pressure SOFC cogeneration system (schematic diagram)

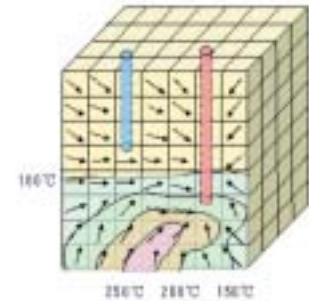
#### ◆ Field Test of Afforestation for CO<sub>2</sub> Sequestration

J-POWER is involved in a Japan-Australia joint project at the site of the closed Ensham coal mine in Queensland, Australia, to field-test technology for short-term cultivation of forests with high CO<sub>2</sub>-sequestration capacity (commissioned by the New Energy and Industrial Technology Development Organization).

#### ◆ Stored CO<sub>2</sub> Behavior Simulation

Under a three-year plan beginning in fiscal 2002, J-POWER carried out research to predict the behavior of geologically stored CO<sub>2</sub> through fluid flow simulation and to optimize monitoring techniques, with a view to eventually achieving geological storage of CO<sub>2</sub>. (Commissioned by the New Energy and Industrial Technology Development Organization)

Monitoring and Predicting the Behavior of Geologically Stored CO<sub>2</sub>



#### ◆ Carbonized Waste as Fuel

As a field test for the use of biomass and other previously untapped energy sources, J-POWER, in cooperation with the New Energy and Industrial Technology Development Organization and the city of Saikai in Nagasaki Prefecture, is involved in a demonstration project to manufacture carbide fuel from general waste and burn it at the Matsushima Thermal Power Station. This is one aspect of our ongoing effort to find ways of using biomass in our coal-fired power stations.

In this demonstration project, carbide fuel is being produced from general waste, a form of biomass that is available domestically in large and stable supplies, and used as fuel in a coal-fired power station.

A test facility was built in fiscal 2004, and test manufacturing of carbide fuel is scheduled to begin in fiscal 2005.

\* About 60% of general waste is garbage and other biomass-derived matter.

#### ◆ Number of Patents and Other Industrial Property Rights (including those secured from research on local environment)

	Power Generation Technology	Recycling Technology	Environmental Technology	Other	Total
Filed individually	5	-	1	9	15
Filed jointly	14	4	14	124	156
<b>Total</b>	<b>19</b>	<b>4</b>	<b>15</b>	<b>133</b>	<b>171</b>

Notes: 1. "Other" includes such categories as electrical transmission, electrical transformation, civil engineering, and new technologies (secondary batteries, superconductivity, etc), which comprise a large number of patents.

2. Includes only patents currently owned. Pending or surrendered patents not included.

## Reducing Emissions of Greenhouse Gases Other than CO<sub>2</sub>

The Kyoto Protocol of the Framework Convention on Climate Change covers six types of greenhouse gases. J-POWER is working to ensure adequate controls not only on CO<sub>2</sub> but also on the other greenhouse gases (SF<sub>6</sub>, HFC, PFC, N<sub>2</sub>O, and CH<sub>4</sub>) and is doing its utmost to reduce emissions. We are also taking appropriate steps to control specified CFCs and halons that deplete the ozone layer.

### ◆Measures for Reducing Emissions of Other Greenhouse Gases

The greenhouse gases covered by the Kyoto Protocol include five types in addition to CO<sub>2</sub>. With respect to emissions by the electric power industry, the contribution of these gases to global warming is about 1/600 that of CO<sub>2</sub>.\*

Sulfur hexafluoride (SF<sub>6</sub>) is used in a confined state and is therefore not released into the atmosphere during use. However, partial release can occur when equipment is inspected or discarded. We are striving to minimize SF<sub>6</sub> emissions by capturing at least 98% through recovery and reuse techniques. In fiscal 2004, our recovery rate for SF<sub>6</sub> was 99%.

\* Federation of Electric Power Companies of Japan, Electric Power Industry Environmental Action Plan (September 2004).

### Measures for Reducing Emissions of Other Greenhouse Gases

Gas	Applications and measures for reducing emissions
Sulfur hexafluoride (SF <sub>6</sub> )	Used for insulation in gas insulation equipment. Emissions reduced by rigorously applying recovery and reuse methods during inspection and disposal.
Hydrofluoro carbons (HFCs)	Used as refrigerant in air-conditioning equipment, etc. CFCs, the specific target of government regulation, are being progressively replaced by alternatives. Meanwhile, emissions are being reduced through cooperative efforts to recover and reuse gas as well as to prevent leaks during installation and repair
Perfluoro carbons (PFCs)	Not used by J-POWER.
Nitrous oxide (N <sub>2</sub> O)	Emissions minimized by improving thermal efficiency of coal-fired power stations
Methane (CH <sub>4</sub> )	As CH <sub>4</sub> concentrations in flue gases from coal-fired power stations are below average atmospheric concentrations, emissions are effectively zero.

### ◆Protection of the Ozone Layer

The ozone layer in the upper stratosphere (about 20 km–40 km above earth) plays an important role in protecting life by absorbing harmful ultraviolet rays. It is believed that specified chlorofluorocarbons (CFCs) and halons destroy the ozone layer, resulting in serious damage to human health and to the ecosystem. For this reason reduction in the production and consumption of these substances has been mandated internationally.

As a user of these substances, J-POWER is not subject to direct regulation. Nevertheless, we periodically monitor our stocks and consumption and are working to control their use.

### Stocks and Consumption of Specified CFCs and Halons

Category		At year-end, 2004 (t)	Application
Specified CFCs	Stock Consumption	2.3 0.1	Refrigerant
Halons	Stock Consumption	3.9 0.0	Fire extinguisher
Other CFCs, etc.	Stock Consumption	9.2 0.2	Refrigerant
Total	Stock Consumption	15.4 0.3	
CFC substitutes (HFCs)	Stock Consumption	1.9 0.0	Refrigerant

#### Reference About Specified CFCs and Halons

Ozone-depleting substances, such as specified CFCs and halons, are chemically stable compounds that contain chlorine or bromine. Like HFCs, PFCs, and SF<sub>6</sub>, they also have a powerful greenhouse effect.

Under the Ozone Layer Protection Law (Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures), the production and consumption of substances designated for regulation under the

Montreal Protocol, referred to as “specified substances,” is being phased out according to a regulatory schedule.

As a result, halon production had completely halted by the end of 1993, and production of specified CFCs had stopped by the end of 1995. The production of other ozone-depleting substances is also being phased out.

## Utilization of Kyoto Mechanisms and Other Approaches

J-POWER is already making proactive use of the Kyoto Mechanisms, particularly the development of CDM projects that can generate emissions credits before the first commitment period (2008–12) under the Kyoto Protocol. J-POWER is also contributing to CO<sub>2</sub> absorption through overseas afforestation projects. In addition, we are actively supporting other companies' utilization of the Kyoto Mechanisms.

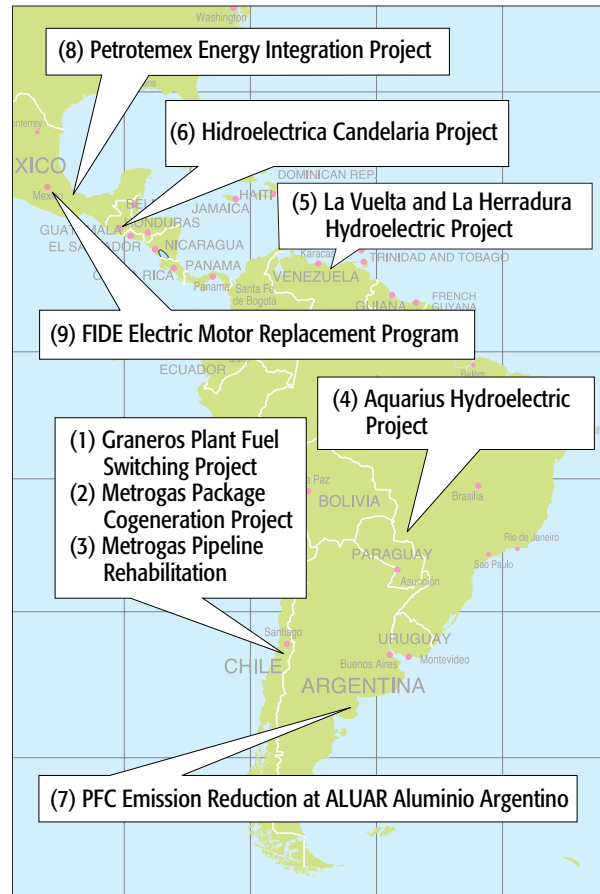
### Overview of CDM Projects

Detailed rules for the application of the Kyoto Mechanisms were adopted at the COP7 meeting in Marrakech in November 2001, and the Japanese government ratified the Kyoto Protocol in June 2002. In response to these developments, J-POWER began moving proactively to take advantage of the Clean Development Mechanism (CDM). The reason for our focus on CDM is that, of the three market-based mechanisms established by the Kyoto Protocol—Joint Implementation (JI), CDM, and Emissions Trading—only CDM generates carbon credits for activities carried out from the year 2000 on, whereas JI and Emissions Trading only go into effect in 2008 after the Kyoto Protocol comes into force.

J-POWER decided to begin by participating in a large number of small projects, primarily in receptive Central and South American countries, and assisting in activities that need to be carried out before a project can be registered as a CDM project, with the aim of accumulating necessary experience in these activities. After the protocol's enforcement had come into view, J-POWER decided to participate in large-scale projects as well.

Currently J-POWER is participating in nine CDM projects in Central and South America. With the tough standards of the United Nations CDM Executive Board now apparent, J-POWER is applying itself diligently to the application process for registration. For six of the nine projects, J-POWER was obliged to submit methodology documents for review, and two of these methodologies have since been approved by the CDM Executive Board. These two projects have also received host country approvals. One, the Graneros Plant Fuel Switching Project at Nestle's plant in Chile, was also approved by the Japanese government and subsequently approved by the CDM Executive Board for project registration in July 2005, making this J-POWER's first registered CDM project.

J-POWER's CDM Projects



### J-POWER Projects Oriented to Utilization of Kyoto Mechanisms

Country	Project Name	Description	Notes
Chile	Nestle Graneros Plant Fuel Switching Project	Switch to natural gas in conjunction with renovation of facilities	1, 2, 3, 4
	Metrogas Package Cogeneration Project	Introduction of cogeneration for improving energy-use efficiency	1, 2
	Metrogas Pipeline Rehabilitation	Rehabilitation of facilities for improving energy-use efficiency	
Brazil	Aquarius Hydroelectric Project	Use of renewable energy source ☺	
Columbia	La Vuelta and La Herradura Hydroelectric Projects	Use of renewable energy source	
Guatemala	Candelaria Hydroelectric Project	Use of renewable energy source	
Argentina	PFC <sup>a</sup> Emission Reduction at ALUAR Aluminio Argentino	PFC emissions reduction through improving aluminum production methods	
Mexico	Petrotemex Energy Integration Project	Improving energy-use efficiency through energy conservation, etc.	
	FIDE <sup>b</sup> Electric Motor Replacement Program	Switch to high-efficiency motor for energy conservation	

a. PFC: Perfluorocarbon, a type of CFC gas  
b. FIDE: Mexico's Trust for Electric Energy Saving

Notes: 1. Methodology approved  
2. Approved by host country

3. Approved by Japanese government  
4. Project registered



## Major Activities in FY 2004

### ◆Development of CDM Projects

In fiscal 2004, J-POWER took part in three new projects: a PFC emissions reduction project at the ALUAR aluminum plant (Argentina: upgrading the electrode control method used in the aluminum production process to reduce PFC emissions), a comprehensive energy efficiency improvement project at Petrotemex Corp. (Mexico: reducing CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions through energy conservation and fuel switching), and a motor upgrade program at FIDE (Mexico: reducing CO<sub>2</sub> emissions by replacing antiquated motors with the newest high-efficiency type). J-POWER drew up and made public the Project Design Documents (PDDs) for these three projects and also drew up and submitted to the CDM Executive Board three new methodologies required for their approval. In addition, J-POWER passed the validation review by the Designated Operational Entity (DOE) for the Nestle Graneros Plant Fuel Switching Project (Chile) and submitted the project to the CDM Executive Board for registration.

### ◆Participation in Carbon Funds

As part of its ongoing effort to secure emissions credits efficiently through CDM and JI, J-POWER made the decision to participate in the newly established Japan Greenhouse Gas Reduction Fund (JGRF) and contribute up to \$3 million to the fund.

In addition, J-POWER conducted background research for potential projects in Eastern Europe by dispatching personnel to assist a fund for energy conservation in that region.

### ◆Feasibility Studies

With a view to identifying new JI and CDM projects, J-POWER carried out feasibility studies for a biomass power project in Czech Republic, a district heating project in Bulgaria, a waste power project in Poland, and a hydroelectric power project in Vietnam.

J-POWER also conducted joint feasibility studies with other companies on a project to save energy at beer-brewing plants in Mexico and a coal mine methane recovery and use project in China.

### ◆Overseas Afforestation Projects

Afforestation is an effective way of furthering the absorption and storage of atmospheric CO<sub>2</sub>. J-POWER has set up joint ventures in Australia and Ecuador, each of which is involved in afforestation of an area of that will ultimately cover about 10,000 ha. Since the trees in the afforested area can supply material for paper manufacture, the project will also serve to protect natural forests that are presently being cut down for this purpose.



Afforestation in Australia



Afforestation in Ecuador

### ◆International Conferences

In fiscal 2004 J-POWER supported several international conferences relating to emissions trading, including the Climate Change & Business Conference & Trade Expo, held in Auckland in November 2004, and Carbon Market Insights, organized by Point Carbon in Amsterdam in March 2005.

In addition, J-POWER took part as an exhibitor in the Carbon Expo held by the International Emissions Trading Association (IETA) in May 2004.

### Activities to Support Utilization of the Kyoto Mechanisms

J-POWER is engaged in various activities to support utilization of the Kyoto Mechanisms by other Japanese businesses. As an exclusive agent in Japan for the Norwegian firm Point Carbon, a world leader in information, analysis, and forecasts concerning the emissions trading market, J-POWER offers information services targeted to specialists. We also operate a web-based service called GHG Solutions, which offers information and solutions targeted to a wide range of Japanese businesses interested in global warming issues.

### Overseas Afforestation Projects

Country	Name of joint venture	Year launched	Area afforested in FY 2004	CO <sub>2</sub> stored in FY 2003	Total afforested area
Australia	BPFL <sup>1</sup>	FY 1998	Approx. 1,000 ha	Approx. 620,000 t-CO <sub>2</sub>	7,100 ha
Ecuador	Eucalyptus Pacifico <sup>2</sup>	FY 2001	Approx. 1,800 ha	Approx. 290,000 t-CO <sub>2</sub>	4,100 ha

1. BPFL (Brisbane Plantation Forest Company of Australia) partners: Oji Paper Co., Ltd., Itochu Corp., Kodansha Ltd., JP Resources Co., Ltd., Seihoku Co., Ltd., and J-POWER.  
2. Eucalyptus Pacifico partners: Walts International S.A., Mitsubishi Paper Mills Ltd., Sumitomo Corp., Jpec Co., Ltd., and J-POWER.

# Efforts Relating to the Local Environment

From conducting power generation activities in various locales, the J-POWER Group has come to the understanding that a basic prerequisite for harmony with the local community is to ensure the safety and preserve the living environment of the people in that community. With this understanding we do our best to coexist harmoniously with the local community, above all by taking measures to minimize the impact of our activities on the environment.

## Reducing the Environmental Load

To minimize the impact of our activities on the air quality, water quality, and other aspects of the local environment, J-POWER implements environmental conservation measures against air and water pollution, noise and vibration, and other environmental problems at its coal-fired power stations and elsewhere, using the latest technology and know-how.

### Reducing Emissions from Thermal Power Stations

#### ◆ Air Pollution Control

Coal-fired thermal power stations generate sulfur oxides (SOx) ☹, nitrogen oxides (NOx) ☹, and soot and dust ☹ as a result of coal combustion. To eliminate these emissions, J-POWER has worked to improve combustion methods and has installed flue gas treatment equipment such as desulfurization and denitrification systems and electrostatic precipitators. Although the performance of this equipment varies according to the era when it was installed, in each case we used the newest technology available to remove pollutants with maximum efficiency.

This equipment operates automatically with the aid of flue gas monitors that continuously measure the content of flue gas. In addition, human operators monitor the equipment 24 hours a day to ensure a swift response in the event of any malfunction.

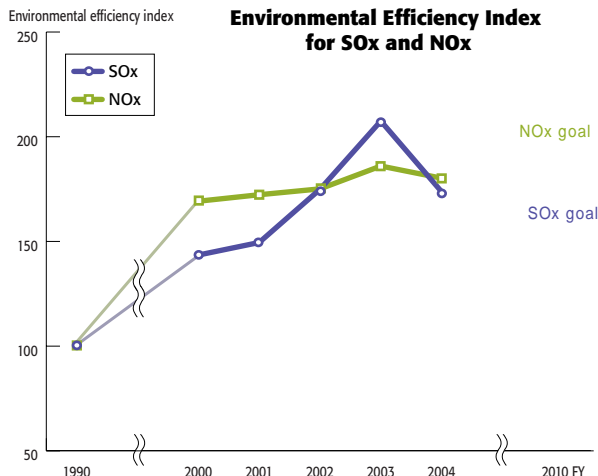
In fiscal 2004, the emissions intensity of NOx and soot and dust remained more or less constant compared with fiscal 2003. However, because the sulfur content of the coal burned in our power stations was higher than in the previous year, SOx intensity increased slightly in fiscal 2004, resulting in a decline in environmental efficiency ☹.

#### FY 2004 Performance

Substance	Equipment efficiency (removal efficiency)	Emissions (tons)	Emissions intensity (g/kWh)
SOx	72%–99%	10,400	0.20
NOx	69%–90%	26,600	0.50
Soot and dust	99% (design value)	1,000	0.02

Notes: 1. Emissions intensity in the text of this report and accompanying charts has been calculated using the electric energy output of J-POWER's coal-fired thermal power stations as the denominator.

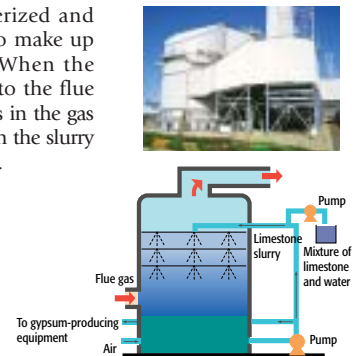
2. Emissions of dust are calculated on the basis of measurements taken monthly.



Note: For the environmental efficiency index, 100 = FY 1990 environmental efficiency (electric power sales volume ÷ SOx, NOx emissions).

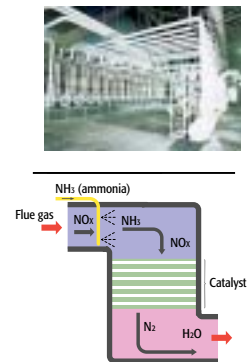
#### Mechanism of Wet-type Flue Gas Desulfurization System

Limestone is pulverized and mixed with water to make up limestone slurry. When the slurry is sprayed into the flue gas, the sulfur oxides in the gas react with the lime in the slurry and become gypsum.



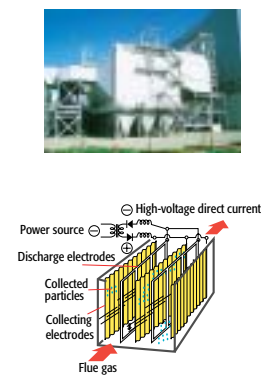
#### Mechanism of Flue Gas Denitrification Systems

Ammonia is added to flue gas containing nitrogen oxides, which is then passed through a metal-based catalyst (a substance that triggers a chemical reaction). The action of the catalyst causes a chemical reaction in which the nitrogen oxides break down into nitrogen and water.



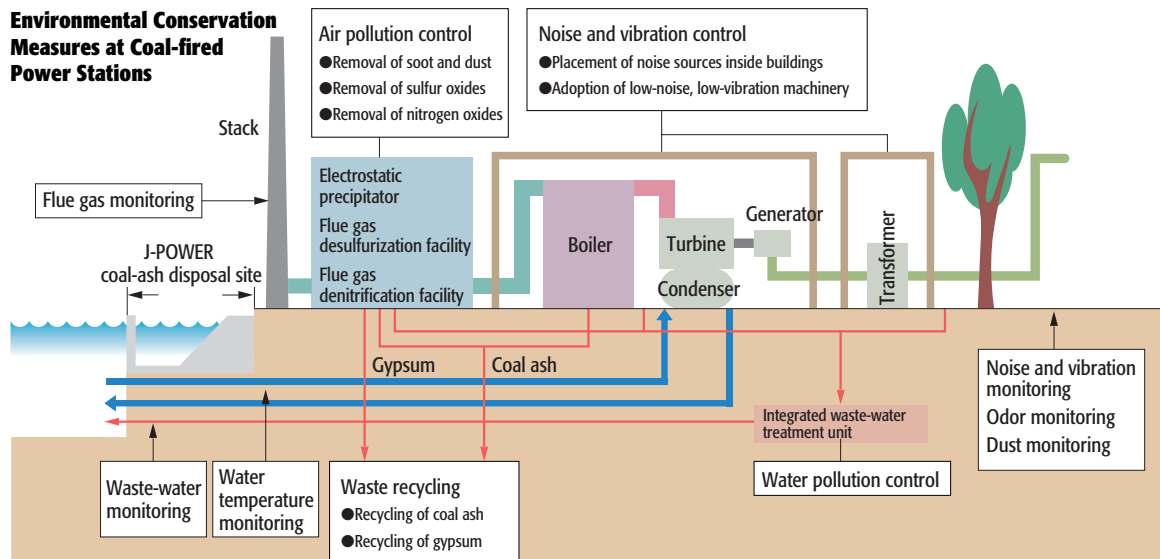
#### Mechanism of Electrostatic Precipitator

Flue gas is passed between high-voltage electrodes to give the dust a negative charge, and the negatively charged particles adhere to the positively charged collecting electrodes. Periodic rapping knocks the electrode and consequently the accumulated particles fall to the bottom of the precipitator and are removed. The underlying mechanism, static electricity, is the same principle that causes small paper or dust particles to adhere to a vinyl sheet that has been rubbed repeatedly.





### Environmental Conservation Measures at Coal-fired Power Stations



#### ◆Water Pollution Control

A waste-water treatment system is installed in all coal-fired power stations to ensure that water discharged from desulfurization units, waste water from offices, and other effluents are adequately treated.

Metals and organic substances contained in waste water are removed through coagulation, precipitation, filtration, and other methods in each facility's on-site integrated waste-water treatment unit.

Treated water is appropriately monitored through routine monitoring by automatic measuring equipment as well as periodic analyses to verify that all substances are well within the regulatory limits established under the Water Pollution Control Law and environmental conservation agreements.

(For information on incidents involving waste water, see p. 48, Environmental Incidents.)

#### ◆Noise and Vibration Control

J-POWER works hard to prevent undue noise and vibration from boilers, turbines, exhaust fans, and other equipment by installing low-noise, low-vibration machinery in its coal-fired power plants and by keeping such equipment inside of plant buildings.

With regard to outdoor equipment in our coal-fired and hydropower plants, in addition to using low-noise low-vibration equipment, we also install soundproof covers and walls as needed.

Noise and vibration levels are periodically measured at the boundaries of power station sites to ensure that they meet regulatory standards.

#### ◆Greening Measures

At its coal-fired power stations, J-POWER plants trees (primarily evergreen), grass, and seasonal flowers to cover 20% or more of the site area with greenery and provide habitats for birds, insects, and other small animals.

#### ◆Odor Control

Rigorous safeguards are in place to ensure that the ammonia used in denitrification units and other systems has no impact on the surrounding area. These include periodic inspection, performance testing, and routine checking of equipment that makes use of ammonia. In addition, care is taken to avoid leakage of ammonia from receiving or storage facilities.

Odor levels are periodically measured at the boundaries of power station sites to confirm that they meet regulatory standards.

#### ◆Measures against Thermal Water Discharge

Coal-fired power stations intake seawater to cool steam used for power generation and release it as thermal water discharge. To prevent any negative impact on marine life in the vicinity, each J-POWER plant controls thermal water discharge through an intake-discharge method adapted to the conditions of the plant site.

The temperature of warm water discharge is monitored around the clock to ensure that it remains within the limits established by environmental agreements.

#### ◆Measures against Coal Dust

J-POWER coal-fired power stations implement various measures to prevent scattering dust during coal unloading, transport, storage, and other operations by such means as the use of closed conveyor belts and indoor coal storage, as well as windshielding and spraying as dictated by topographical and weather conditions.

#### ◆Measures at Coal-Ash Disposal Sites

At the coal-fired power stations that are equipped with landfill disposal sites, soil is spread over the ground in such a way as to avoid dispersion of coal ash. Leachate treatment equipment is used to treat leachate as needed.

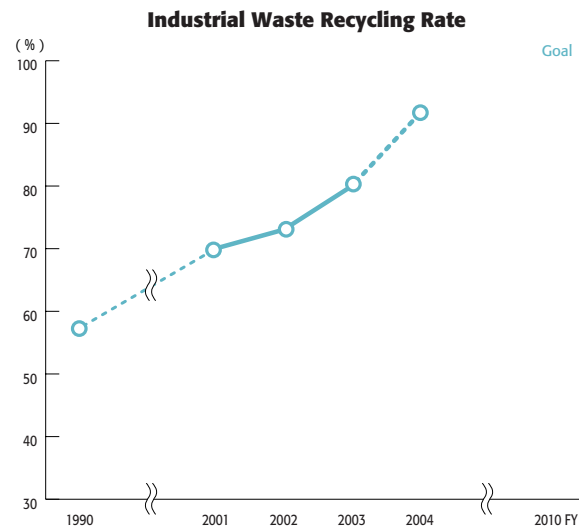
# Recycling and Reuse of Recyclable Resources

To help build a recycling-based society, J-POWER is working hard to reduce the amount of waste it generates and to properly treat and recycle the waste it does produce. We are also involved in a number of environmental recycling programs to promote appropriate waste management, environmental measures, and use of unutilized energy.

## Effective Use and Reduction of Waste

In fiscal 2004, the J-POWER Group as a whole generated 2.06 million tons of industrial waste, of which it was able to recycle or reuse 1.89 tons, or 92%.

Henceforth J-POWER has decided to promote more extensive recycling of coal ash and reduction of total industrial waste generated from the maintenance and operation of power generation stations, to "achieve a recycling rate of 97% within the J-POWER Group as a whole by the end of 2010, with the goal of zero emissions of industrial waste."



Note: The figure for FY 1990 represents the recycling rate for coal ash only; figures for FY 2001–FY 2003 represent the rate for all industrial waste produced by J-POWER; and the FY 2004 and the goal figure represent the recycling rate for all industrial waste generated by all companies of the J-POWER Group.

### ◆ Effective Use of Coal Ash

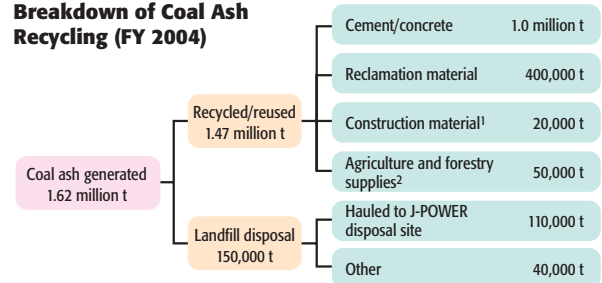
Coal ash, the residue left from the combustion of coal at coal-fired power stations, accounts for the largest volume of waste generated by J-POWER facilities.

In fiscal 2004, J-POWER generated 1.62 million tons of coal ash, of which it recycled or reused 1.47 million tons, or 91% (see graph at right).

Coal ash is used primarily for land reclamation material, construction material, and farming and forestry supplies; the bulk of it is recycled as raw material for cement or concrete admixture. In the area of agriculture and forestry, J-POWER sells potassium silicate fertilizer manufactured from recycled coal ash at fertilizer plants owned by companies of the J-POWER group.

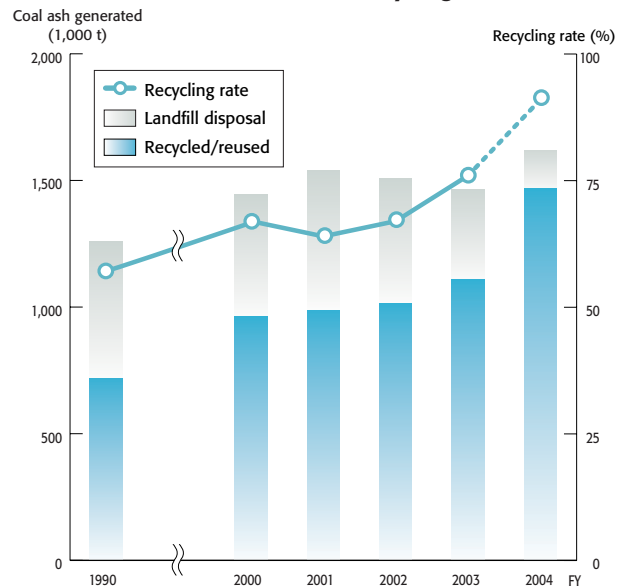
Most of the coal ash that cannot be recycled or reused is disposed of in a landfill at J-POWER's own disposal site (Matsuura-shi, Nagasaki Prefecture).

### Breakdown of Coal Ash Recycling (FY 2004)



1. Primarily facing and filling material  
2. Potassium silicate fertilizer, etc.

### Trends in Coal Ash Recycling



Note: In November 2004, the government issued an opinion regarding the provisions of the Law for Promotion of Effective Utilization of Recyclable Resources, stating that "coal ash provided by businesses belonging to the electric power industry for public water body reclamation projects in harbors and ports designated as important under the Harbor and Port Law or for such projects based on local harbor and port plans shall be regarded as land reclamation material." On the basis of this opinion, in FY 2004 coal ash used for land reclamation in the Port of Kitakyushu (Hibikinada, Kitakyushu-shi, Fukuoka Prefecture) and the Port of Kinwan (Ishikawa, Okinawa Prefecture) has been counted as recycled/reused.

### ◆ Effective Use of Gypsum

All gypsum generated as a by-product of wet-type flue gas desulfurization systems at J-POWER coal-fired power stations is recycled or reused as gypsum board and raw material for cement.

In fiscal 2004, the amount of gypsum recycled or reused was 370,000 tons, or 100% of the volume generated.



### ◆Effective Use of Driftwood

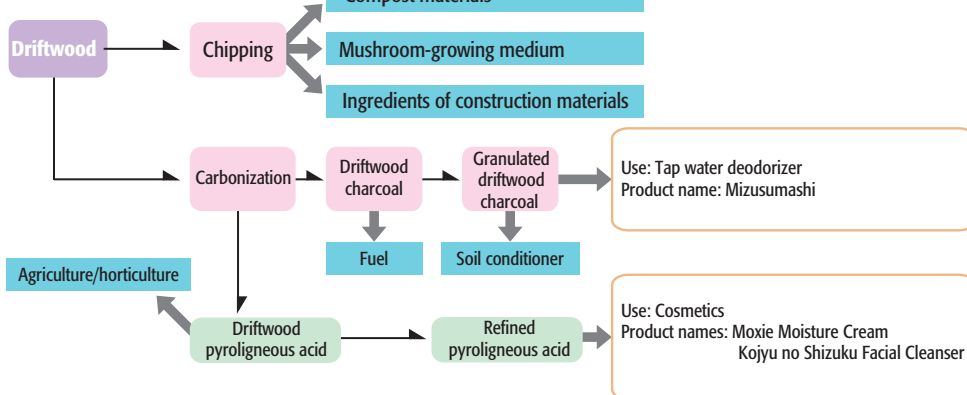
J-POWER voluntarily retrieves driftwood that collects in dam reservoirs at its hydroelectric power stations and recycles it by manufacturing charcoal, extracting pyrolygneous acid, or chipping the wood for use as building materials and mulch.

Because of high demand for road slope spraying materials in fiscal 2004, we were able to process much of the wood that had been collected and stored in fiscal 2003, with the result that 12,500 m<sup>3</sup> of driftwood was recycled.



Driftwood collecting in a dam reservoir (Sakuma Dam, Shizuoka Prefecture)

### Effective Use of Driftwood



### ◆Effective Use of Construction By-products

J-POWER works with contractors to promote effective use of the by-products of new construction, expansion, and renovation of electric power facilities by a variety of means, including the recycling of concrete scrap and cleared trees and the use of loose earth generated during construction within the grounds of the facility.

### ◆Office Recycling Efforts

J-POWER is working to reduce the amount of general waste its offices generate by using both sides of paper; sorting waste paper, bottles, cans, and plastics; reusing envelopes; and so forth.

In fiscal 2004, the head office familiarized itself with and instituted a new waste-sorting policy in keeping with its EMS and educated its employees about the desirable method for sorting. As a result of sorting and recycling different kinds of paper, the amount of general waste including paper generated by the head office in fiscal 2004 was 28 tons, a 6% reduction from the previous year.



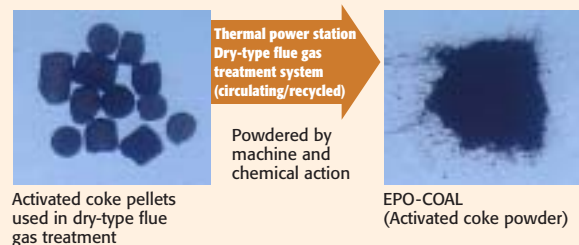
Boxes for sorting waste

### Marketing of "EPO-COAL" (Recycled Granulated Coke Powder) as Dioxin Remover

The powdered dioxin remover EPO-COAL for waste incinerators is made of recycled activated coke powder produced in and shipped from J-POWER's Takehara Thermal Power Station No. 2 unit (Hiroshima Prefecture) and Isogo Thermal Power Station No. 1 unit (Kanagawa Prefecture). Both of these plants are equipped with dry-type flue gas treatment systems, which make use of and recycle granulated activated coke.

Because the activated coke is reused, the CO<sub>2</sub> load of the manufacturing process is close to zero, as compared with that of most commercially available activated charcoal. EPO-COAL has received high marks for dioxin-adsorption performance equal to that of commercial activated charcoal at waste disposal facilities equipped with electrostatic precipitators and bag filters alike.

A waste disposal association in the Kyushu district has adopted EPO-COAL for dioxin removal beginning in fiscal 2005.



### ◆J-POWER's Environmental Recycling Programs

J-POWER is striving to contribute to society by promoting the appropriate treatment of waste, environmental measures, and the use of unutilized energy. Especially noteworthy is our active involvement in the creation and operation of public infrastructure for PFI/PPP\* environmental recycling programs, putting to use our extensive experience investing in, designing, building, maintaining, and managing such infrastructure as electric power generation and transmission facilities.

\* PFIs (private finance initiatives) and PPPs (public-private partnerships) are models for mobilizing private money, management know-how, and technical expertise for the construction, maintenance, management, and operation of public facilities.

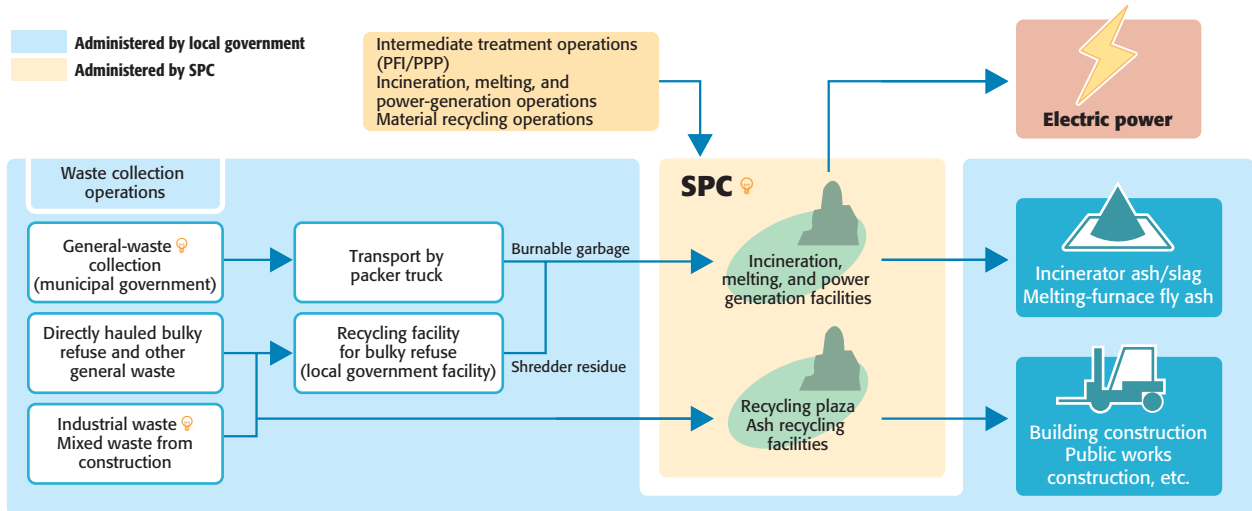
#### Toru Miyamoto

Recycling of sewage sludge as fuel  
Waste Energy Recycling Business Group  
Business Development Department



I am engaged in R&D to make use of dried or carbonized sewage sludge, an unutilized biomass resource, as fuel for co-firing in coal-fired thermal power stations. I am enthusiastic about my work because I know we can make a major contribution to the global environment through the use of unutilized resources if we can make this commercially practical.

### PFI/PPP Environmental Recycling Programs—Schematic Representation



### Examples of Activities

- Waste-fueled power generation/intermediate waste treatment project (participation in Omuta Recycle Power Station, Narumi Waste Disposal Plant in Nagoya, and other PFI operations)
- Building and management of waste water treatment facilities for water purification plants (participation in the Samukawa Water Purification Plant Waste-Water Treatment Facility Specified Project and the Project for the Creation of the Edogawa Water Purification Plant Waste Water Treatment Facility; expanded recycling of soil generated by water purification)
- PFI consulting (PFI consulting on waste heat recovery facilities etc.)
- Test production of carbon fuel from general waste
- Development of technology for making fuel from sewage sludge




Carbon fuel from general waste  
Left: Carbon fuel made from general waste  
Right: Carbon fuel formed into briquettes for easy shipping and storage




## Management of Toxic Chemicals

J-POWER is committed to full legal compliance in its storage and management of toxic chemicals, which can have a major impact on the environment. With regard to PCBs, we carry out detoxification treatment in keeping with Japan's regional waste-management program.

### ◆PRTR (Pollutant Release and Transfer Register) Law

The PRTR  system is a mechanism for reporting and disclosing the level of chemical emissions and the transfer of chemicals to the environment through waste materials. The legislation was enacted in 1999, and monitoring and reporting of the targeted substances began in 2001.

While J-POWER uses chemical substances for painting and coating, treatment of intake water at thermal power stations, and other purposes, it has traditionally managed these substances prudently, as by monitoring and recording the quantities procured and used.


Henceforth we are committed to minimizing the use of such chemicals and to controlling and managing those we use appropriately, complying with all established procedures. With respect to dioxins , we are working hard to reduce emissions through appropriate management and oversight of facilities.

### ◆Measures to Reduce Dioxins

While J-POWER strives for effective use of waste through chipping of driftwood and other means, it also operates three incinerators ("specified facilities" under the Law Concerning Special Measures against Dioxins). At these specified facilities, we implement appropriate maintenance and management, such as sorting prior to treatment and combustion temperature control.

Under this law, incineration facilities must monitor the concentration of dioxin in flue gas at least once a year and report it to the local government. In fiscal 2004, all our incinerators met emissions standards. To reduce dioxin emissions, it is also important to promote the recycling of waste material and to reduce the amount of waste generated.

### ◆Management and Treatment of PCBs

PCBs  have been widely used as insulators in transformers and other electric devices because of their excellent heat-resistance and insulation properties. Because of their toxicity, however, manufacture and import were outlawed in 1974, and all those in possession of the material were required to observe stringent storage and management requirements.

In July 2001, moreover, the Law Concerning Special Measures against PCB Waste came into force, and appropriate treatment of waste containing PCBs became mandatory.

As of June 2004, J-POWER had approximately 139 kl of insulating oil (containing a high level of PCBs), which we store and manage under stringent conditions in 33 warehouses around the country. In February 2005, we began treatment of the substances based on the regional waste-management program.

### ◆Trace PCB Contamination

In July 2002, the Japanese government announced that extremely low levels of PCBs (under 5.0 ppm in about 60% of the cases) were detected in products that had been accidentally contaminated by heavy electrical machinery following the prohibition of PCB use.

J-POWER conducted a survey of machinery using insulating oil and notified the proper authorities of the results in accordance with relevant laws and regulations. We have also subjected machinery contaminating PCBs to strict controls. Meanwhile, a national commission has investigated the causes of the contamination and will be deliberating measures for treating PCB-contaminated material. We will continue to respond to this issue in a conscientious and appropriate manner.

### Total PRTR-Substance Release and Transfer Volumes (FY 2004)

Chemical	Use	Volume handled	Volume released	Volume transferred through waste
40: Ethyl benzene	Coating for machinery and equipment	2.14 t/y	2,100 kg/y	0.0 kg/y
63: Xylene	Coating for machinery and equipment	14.5 t/y	11,000 kg/y	0.0 kg/y
227: Toluene	Coating for machinery and equipment	1.0 t/y	1,000 kg/y	0.0 kg/y
253: Hydrazine	Additive for boiler water	4.0 t/y	0.0 kg/y	0.0 kg/y
179: Dioxins	Waste incinerators	—	0.11 mg-TEQ/y	1.5 mg-TEQ/y

Notes:

1. Figures represent total release and transfer volumes for all business units handling 1 ton or more of the specified substance annually.
2. For dioxins, figures represent total emissions from waste incinerators.
3. As stipulated by law, figures represent the total of the values reported by each business unit.



Machinery containing PCBs being shipped to treatment site (Wakamatsu Operations & General Management Office, Fukuoka Prefecture)



# Steps to Conserve the Natural Environment

When building new power stations, J-POWER works to preserve the natural environment and biodiversity of the area. We carry out environmental impact assessments and incorporate the views of the local residents as we work to minimize the facility's impact on the environment. During construction, we monitor construction activity and implement environmental conservation measures to ensure a harmonious balance with nature.

## Environmental Assessment and Monitoring

J-POWER carries out environmental assessments (environmental impact assessments) when planning for the construction of a new power facility or the expansion of an existing one. We make a survey of the current state of the area's natural environment (air quality, water quality, soil quality, ecology, etc.) and social environment (industry, land use, traffic, etc.) and predict and assess the impact the siting of a power facility will have on that environment. During the process, we listen to the views of local residents and incorporate them in our plan.

After the power plant starts operating, we continue monitoring the environment for a certain period of time to ensure that the impact on the environment falls within the parameters of our predictive assessment.

**Environmental Assessments for J-POWER Projects**  
(date: submission of environmental impact assessment document)

No.	Category	Name of Project	Prefecture	Date
1	Hydro power	Shimogo	Fukushima	Feb. 1974
2		Sakuma No. 2	Shizuoka	Jan. 1978
3		Aburuma River	Niigata	Jun. 1978
4		Hayakido	Nagano	Aug. 1981
5		Tadami	Fukushima	Nov. 1981
6		Tokuyama	Gifu	Dec. 1982
7		Kumaushi	Hokkaido	May 1983
8		Satsunai River	Hokkaido	Aug. 1986
9		Akiba No. 3	Shizuoka	Aug. 1987
10		Seawater Pumped Storage Demonstration Test	Okinawa	Jan. 1989
11		Kurotani	Fukushima	Feb. 1989
12		Isawa No. 1	Iwate	Jun. 1991
13		Okukiyotsu No. 2	Niigata	May 1992
14		Okutadami/Otori Expansion Projects	Fukushima	Sep. 1995
15	Thermal power	Matsushima	Nagasaki	Jan. 1976
16		Takehara No. 3	Hiroshima	Feb. 1980
17		Matsuura	Nagasaki	Apr. 1981
18		Ishikawa	Okinawa	Dec. 1982
19		Takehara No. 2 Fuel Conversion	Hiroshima	Feb. 1991
20		Tachibana-wan	Tokushima	Oct. 1994
21	Shin Isogo	Kanagawa	Aug. 1996	
22	Nuclear power	Oma	Aomori	Sep. 1999
23	Transmission lines	Honshi Interconnection Line	Okayama	May 1983
24		Tadami Main Transmission Line Phase III	Gunma	Apr. 1995
25		Sakuma-Higashi Main Transmission Line	Shizuoka	Nov. 1995
26	Oma Main Transmission Line	Aomori	Jun. 2000	
27	Wind power	Nunobiki Kogen	Fukushima	Jun. 2003

Note: Assessments listed include those carried out under not only the Environmental Impact Assessment Law but also the Public Waters Reclamation Law, the Forest Law, prefectural and municipal ordinances, and other statutes.

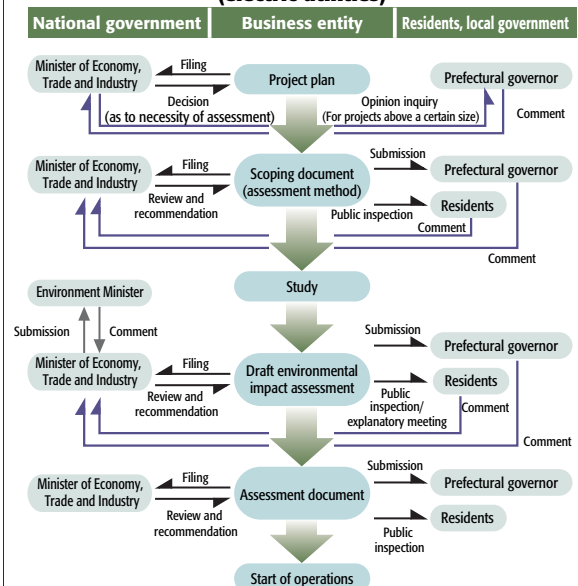
## Outline of the Environmental Impact Assessment Law

The Environmental Impact Assessment Law, which came into effect in June 1999, mandates that businesses planning large-scale projects with the potential to markedly affect the environment conduct studies and make predictive assessments concerning the impact on the environment. It also establishes procedures whereby the prefectural governor, the relevant state minister, the local residents, and others can offer comments on the assessment's methods and conclusions, and it requires businesses to establish a mechanism for incorporating the results of the assessment and the comments into their project.

In respect to electric power plants, for 20 years J-POWER carried out environmental impact assessments in accordance with the environmental assessment system adopted by a resolution of the former Ministry of International Trade and Industry. Currently environmental impact assessments are carried out in accordance with the Environmental Impact Assessment Law and with the Electricity Utilities Industry Law, which was amended to conform to the EIA Law.

In addition to these statutes, we have also carried out environmental assessments under the provisions of such national legislation as the Public Waters Reclamation Law, the Forest Law, and the Waste Management and Public Cleansing Law, as well as various local ordinances.

### Procedures under the Environmental Impact Assessment Law (electric utilities)



## Environmental Conservation Measures during Preparatory Work on the Oma Nuclear Power Station

J-POWER is taking appropriate measures to protect the environment in connection with the planned Oma Nuclear Power Station in accordance with the commitments outlined in the Oma Nuclear Power Station Environmental Impact Assessment. It has



Survey of rare species

### Seiya Yano

Civil & Architectural Engineering Group  
Oma Nuclear Power Project Construction Preparation Office



We monitor the environmental load accompanying preparatory construction and work to minimize it, aiming for a power plant that harmonizes with the rich natural environment along the coast of Tsugaru Strait.

also implemented an environmental management system (adopted October 17, 2000), under which it is engaged in efforts to protect, improve, and enhance the environment.

Type of measure	Content
Protection of terrestrial animals and vegetation	<ul style="list-style-type: none"> <li>● Preserving about 29% of site unaltered to protect rare species, etc.</li> <li>● Protecting small animals' migratory paths by constructing crossing tunnels under roads and gently sloping ditches along roads to allow animals to climb out</li> </ul>
During construction	<b>Noise/vibration measures</b> <ul style="list-style-type: none"> <li>● Installing sheets to prevent spread of pollution in coastal waters; water quality monitoring</li> <li>● Neutralizing seawater when concrete is placed in the sea</li> <li>● Channeling runoff into temporary settling ponds at construction site and releasing supernatant water</li> </ul>
	<b>Protection of terrestrial animals and vegetation</b> <ul style="list-style-type: none"> <li>● Selecting low-noise, low-vibration machinery</li> <li>● Implementing anti-noise/vibration measures as necessary</li> </ul>
	<b>Disposal/handling of loose earth and rock during construction</b> <ul style="list-style-type: none"> <li>● Using loose earth and rock generated by excavation and dredging for reclamation, backfill, and embankment; placing surplus earth in a land-waste disposal site in order to build a mound which will be incrementally greened</li> </ul>
	<b>Measures against dust scattering</b> <ul style="list-style-type: none"> <li>● Installing washing facilities for construction vehicles</li> <li>● Spraying and cleaning construction roads</li> <li>● Installing anti-dust barriers and nets</li> </ul>
	<b>Traffic noise</b> <ul style="list-style-type: none"> <li>● Designating routes for construction vehicles</li> <li>● Reducing road traffic through use of marine transport</li> </ul>
	<b>Industrial waste</b> <ul style="list-style-type: none"> <li>● Undertaking appropriate disposal in compliance with the law</li> <li>● Chipping and recycling cleared timber and roots as mulch, etc. for greening of site</li> </ul>

## Soil Pollution Measures

### ◆ Status Surveys Prior to Power Station Construction

For years J-POWER has carried out environmental assessments in advance of construction of power plants and other facilities, in conformance with the Environmental Impact Assessment Law that came into force in 1999 (and prior to that, in accordance with the environmental assessment system adopted by the former Ministry of International Trade and Industry in 1977), local ordinances, and other statutes. These assessments include status surveys of soil pollution within sites slated for construction to confirm the presence or absence of contamination prior to construction.

### ◆ Prevention of Soil Pollution

Prior to power plant construction, J-POWER designs the construction site in accordance with the Fire Prevention Law and other statutes by building banks around oil and chemical tanks and pipes and separating hazardous substances and treating them with on-site waste treatment units, to ensure that in the unlikely event of a leak, such substances do not pollute the coastal waters or surrounding area.

In the operation of our power stations we prevent

soil and groundwater pollution by following strict handling methods and emergency procedures detailed in our EMS to prevent leakage of chemicals and toxic substances and by providing training programs for plant staff where necessary.

### ◆ Studies to Identify Potential Soil Pollution

Although no J-POWER facilities require a soil contamination survey under the Soil Contamination Countermeasures Law, the company voluntarily drew up plans to check for contamination as part of its Environmental Action Guidelines. In fiscal 2004, studies were conducted at all domestic electric power facilities (218 facilities, including thermal power stations, hydroelectric power stations, and transmission facilities).

The studies determined that pollutants had been present at none of the sites before they came into the possession of J-POWER, that toxic chemicals presently handled at these facilities were being properly managed by means of storage and transfer facilities designed to prevent infiltration into the ground, and that consequently there was no worry of soil or groundwater pollution at these sites. (For information on environmental incidents relating to soil pollution at other sites, see p. 48, Environmental Incidents.)

## Hydroelectric Power and Harmony with the River Environment

### ◆Reservoir Water Quality

Typhoons or torrential rains can send large amounts of muddy water flowing into dam reservoirs, where it builds up. The release of water for power generation purposes can then lead to prolonged river turbidity.

At J-POWER, we monitor the water quality of reservoirs with turbidimeters and water quality analyses. Turbid water is discharged quickly, and at dams where turbidity threatens to become chronic, we install “surface water intake systems” that enable the intake of the relatively clear water at the surface (currently installed at the Ikehara, Kazaya, Yanase, and Sakamoto dams). At sites where the problem is severe, we are cooperating with the national and prefectural governments in forest-management and afforestation programs to reduce runoff.



Sakamoto Dam surface-water intake system under construction (Nara Prefecture)

### ◆Discharge to Preserve River Maintenance Flow

Because river flow falls off between the dam and the generator outlet, in consultation with the Ministry of Land, Infrastructure and Transport and other relevant agencies, J-POWER carries out river maintenance flow discharge to preserve a normal flow of water in rivers.

As of the end of fiscal 2004, such measures were being implemented at 30 power plants over 527 km of river.



Maintenance flow discharge (circled area) at Nanairo Dam (Wakayama Prefecture/Mie Prefecture)

### ◆Efforts to Preserve Our Forests

Recognizing the manifold value of our forests, J-POWER has decided to designate and preserve a portion of its own wooded land as riverhead forest. It has been working to conserve these forests in accordance with a set of “provisional guidelines for the conservation of riverhead forests” adopted in December 2002.

Since fiscal 2004, we have been at work on plans involving the designation of a tract of wooded company land situated on the border between Kawasaki-shi, Kanagawa Prefecture, and Machida-shi, Tokyo—the site of J-POWER Nishi Tokyo Power Administration Office—as a “forest shared with the community.” The purpose of this effort is to help in the restoration of the *satoyama* (village commons; communal forests) and to preserve the scenery for local residents and hikers on the historic Fudamichi road.

### ◆Control of Sediment in Reservoirs

Each year large quantities of earth flow into dams from upstream and are deposited there as sediment. To avoid resulting flood damage, J-POWER controls sediment by dredging to remove it or move it around the reservoir. In fiscal 2004, we moved or removed approximately 1.18 million m<sup>3</sup> of sediment at 13 dams. Of the roughly 650,000 m<sup>3</sup> of sediment removed from reservoirs, approximately 90% is recycled in the form of aggregate or cover soil.



Sediment dredging at Senbiri Dam (Hokkaido Prefecture)

#### Takahiro Nakagawa, in charge of sediment control measures at Horoka Dam

Kamishihoro Administration Office  
Hokkaido Regional Headquarters



Horoka Dam is in the Tokachi region of Hokkaido, an area rich in natural beauty, but even here we are plagued by the yearly buildup of sediment. We are working hard to control it with due attention to the environment, especially given our location in Daisetsusan National Park.



## Supporting Biodiversity

J-POWER is aware of the need to protect the diversity of wildlife, and we are striving toward coexistence with rare species through scrupulous study, planning, construction, and operation.

### ◆Japanese Golden Eagle

The Japanese golden eagle, listed as “endangered IB” in the Environment Ministry's Red Data Book, inhabits the area around Okutadami Dam and Otori Dam.

In the maintenance and operation of these dams, J-POWER does its utmost to avoid outdoor work during the Japanese golden eagle's nesting season.

In addition, if eagle nesting activity is confirmed in the nesting sites around the dam, any work that needs to be carried out in the vicinity of the nesting site is conducted in consultation with local ornithologists, with a minimum of vehicles and noise, to minimize the impact on the eagle's nesting activity.



A young Japanese golden eagle, 30 days after leaving the nest (July 16, 2003).

### ◆Blakiston's Fish Owl

Among the inhabitants of the Tokachi district of Hokkaido is Blakiston's fish owl, categorized as “endangered IA” (critically endangered in Hokkaido).

J-POWER is careful to plan and carry out its work in the area during times other than the nesting season to minimize the impact on the owl population.



Blakiston's fish owl  
(Photo: Kushiro Zoo)

### ◆Japanese Macaques (Shimokita-gun)

In Shimokita-gun, Aomori Prefecture, plans are underway to build a new transmission line extending a total of 60 km, from J-POWER's planned Oma Nuclear Power Station (Oma-machi) to the grounds of the Higashidori Nuclear Power Station (Higashidori-mura) planned by Tokyo Electric Power Company and Tohoku Electric Power Company (Oma Main Transmission Line Project).

The planned route for the line, for which survey construction is now underway, runs through a rich natural environment populated by various rare species of wildlife, including the northern Japanese macaque, which inhabits the northernmost region in Japan and has been designated as a protected species. Since 1997, we have been soliciting the opinion of experts, conducting a variety of studies and deliberations, and incorporating the results in our selection of the route and in other measures for protecting the macaques. In this way we are keeping the impact of power-line construction on the northern Japanese macaques to an absolute minimum.

In addition to Japanese macaques, the area around the planned route is known to be home to a number of endangered birds, including the northern goshawk and the mountain hawk-eagle. As with the Japanese macaque, we are taking precautions to minimize the impact on these rare species.



Northern Japanese macaque (April 18, 1999)

### ◆Re-creating an Environment Area as Biotope

From fiscal 1987 to fiscal 2003, J-POWER was commissioned by METI to conduct a demonstration test of pumped seawater storage generation at Kunigami-mura in Okinawa Prefecture. Because many rare animal species unique to the prefecture populate the area, we established a surplus soil disposal area of 45,000 m<sup>3</sup>, and worked to restore it to its natural state as a biotope 🌱 by building it up to resemble the topography of the surrounding area and planting it with approximately 30,000 trees of the same species found in the surrounding area. Since then we have been monitoring the area and have confirmed that the natural ecology is steadily returning to the site.



The created biotope



### Shokawa Cherries, Symbols of Harmony with the Environment

The two great cherry trees growing on the Nakano observation platform on the shores of Lake Miboro in Gifu Prefecture are Azuma-higan cherries said to be more than 450 years old. Beloved by the villagers for years, they were originally located on the grounds of the temples Shorenji and Korinji in the Nakano district of Shokawa-mura (currently Takayama-shi), now at the bottom of the lake.

Late in the autumn of 1959, the first president of our company visited the site during construction of the dam and was so saddened by the prospect of seeing these great trees submerged that he hired a leading authority on cherry trees, the late Shintaro Sasabe (affectionately known as Professor Cherry), to supervise their transplanting.

Although many experts insisted that it couldn't be done, the massive undertaking—the first of its kind in the world—was successfully completed in December 1960. Even today, the Shokawa cherry trees, under the care of J-POWER employees, bloom spectacularly every spring.

These trees embody J-POWER's corporate mission of developing energy sources in harmony with the environment. Recently, as one of the activities commemorating J-POWER's 50th anniversary, the company decided to present cuttings from the Shokawa cherry trees to elementary and middle schools in prefectures with close connections to the company. During fiscal 2003 and 2004, it gave away 177 of these second-generation Shokawa cherries.

J-POWER is also cooperating in the compilation of integrated-study materials built around the theme of the Shokawa cherry trees and designed to help elementary- and middle-school students learn simultaneously about the environment, energy, history and society, daily life, and human psychology.



**Top left:** Transplanting the cherry trees  
**Top right:** Donation of second-generation Shokawa cherries  
**Middle:** Integrated-study materials for elementary and middle school  
**Below:** The Shokawa cherry trees today (Gifu Prefecture)



### J-POWER Awarded 2004 Society of Engineers Environmental Award for Re-creation of Wetland in Power Station Expansion Project

J-POWER, JPec, and Taisei Corporation were joint recipients of the Japan Society of Civil Engineers environmental award for the wetland restoration carried out in conjunction with the Okutadami-Otori Hydro Project (Fukushima and Niigata prefectures; operation begun June 2003). The award is given for groundbreaking projects that contribute to conservation and creation of natural environments.

As part of the Okutadami-Otori Hydro Project, plans called for the rock generated from drilling during construction of an underground generator and aqueduct tunnel to be used to fill in a basin on the left bank downstream of the Okutadami Dam. However, because the ecosystem of the basin area provides habitat for rare wildlife species that inhabit wetland areas within a mountain environment, the project faced the challenge of filling in the basin while preserving the wetland ecology. The solution arrived at was to create another wetland to substitute for the area to be filled in. The aim was to re-create an environment equivalent to that lost and, by allowing both to exist side by side for an extended period, to conserve the wetland ecology.



Site of wetland re-creation, Okutadami-Otori Hydro Project

## Pursuing Technological Research and Development

In the course of the research and development activities fostered by J-POWER, ranging from such energy-focused efforts as the development of high-efficiency coal-use technology to research in the area of biotechnology, J-POWER researchers have uncovered yet other technologies that promise to open up new possibilities for the future, and we are actively promoting R&D in these new areas.

### Technologies under Development Reservoirs

#### ◆Technology for Flushing Reservoirs

Earth and sand flowing into a dam reservoir from upstream build up sediment that reduces the reservoir's capacity. At the same time, the lack of earth and sand reaching the river below the dam results in a deepening of the river bed. What is needed to solve these problems is an efficient, effective, and environmentally-friendly way to release the sediment to downstream rivers. J-POWER is currently working to develop a flushing technology through hydraulic experiments, numerical analysis, and field studies.

Collaborating institutions: Delft Hydraulics (Netherlands),  
HR Wallingford (UK)



Hydraulic model flushing experiment

#### ◆Production of Hydrogen from Organic Waste

With hydrogen at the center of attention as a clean energy source for the future, J-POWER is currently conducting R&D to develop a process for producing hydrogen from organic waste by extracting microorganisms that efficiently generate hydrogen from such waste material.

#### ◆Technology for Cleansing Aquatic Environments

J-POWER is working hard to develop technology for conserving the environment around hydroelectric power stations. It is currently at work on a technology and proposals for cleansing aquatic environments using a new concept combining the community environment website<sup>1</sup> and a bottom-mud cleansing technology using natural materials.<sup>2</sup>

1. Use of IT to create a website that permits local residents to exchange and share information on the environment.
2. A technology for purifying bottom mud by putting such porous materials like driftwood charcoal and volcanic pumice in the mud at the bottom of a lake or pond to promote the beneficial action of aerobic bacteria.



Demonstration test of technology to cleanse bottom mud.

#### Yasuhiko Nishimura

Biotechnology Laboratory Wakamatsu Research Institute



In my biotechnology research, I search for microorganisms that produce useful, high-value-added substances and work to develop commercial technologies from them.

#### A Gene's-eye View of the Environment

##### Developing and Commercializing DNA Microarray Technology for Assessing the Effect of Chemicals on Organisms

In July 2003, J-POWER teamed with Transgenics Corp. (headquartered in Kumamoto Prefecture) to set up Ecogenomics Corp. (headquartered in Fukuoka Prefecture). Ecogenomics is working to develop and commercialize DNA microarray technology to assess the effect of endocrine disruptors and other chemicals on living organisms and the ecosystem by analyzing genetic changes in killifish and mice.

The first product of this research was a killifish microarray that US research facilities have already purchased and are currently using. We are now moving ahead with preparations to market it to Japanese universities and public research institutions as well. We are hoping that this gene's-eye view assessment technique will eventually be adopted as the standard method for screening substances under the Law Concerning the Examination and Regulation of the Manufacture etc. of Chemical Substances and be used as well in assessing the water quality of rivers and other bodies of water.

For more information, see the Ecogenomics website at <http://www.ecogenomics.co.jp/english/index.htm>



# Transferring Environmental Technology Overseas

J-POWER is applying the technology it has nurtured in its domestic programs and transferring that technology overseas as it expands its operations internationally. In our international consulting program we put our technological know-how to use for environmental impact assessments, transfer of desulfurization and denitrification technology, and so forth. In our IPP investment projects as well, we provide technological consulting to the biomass plants and other facilities in which we have invested and in other ways spread our accumulated environmental know-how.

## Electric Power Services Worldwide

J-POWER's overseas electric-power services, centered on international consulting, have received high marks since they were launched more than 40 years ago, at the beginning of the 1960s. We apply the technology and experience accumulated here in Japan, send government experts to agencies in the host country, and invite engineers from developing countries to train with us.

As of the end of fiscal 2004, we had been involved in a total of 248 international consulting projects in 60 countries.

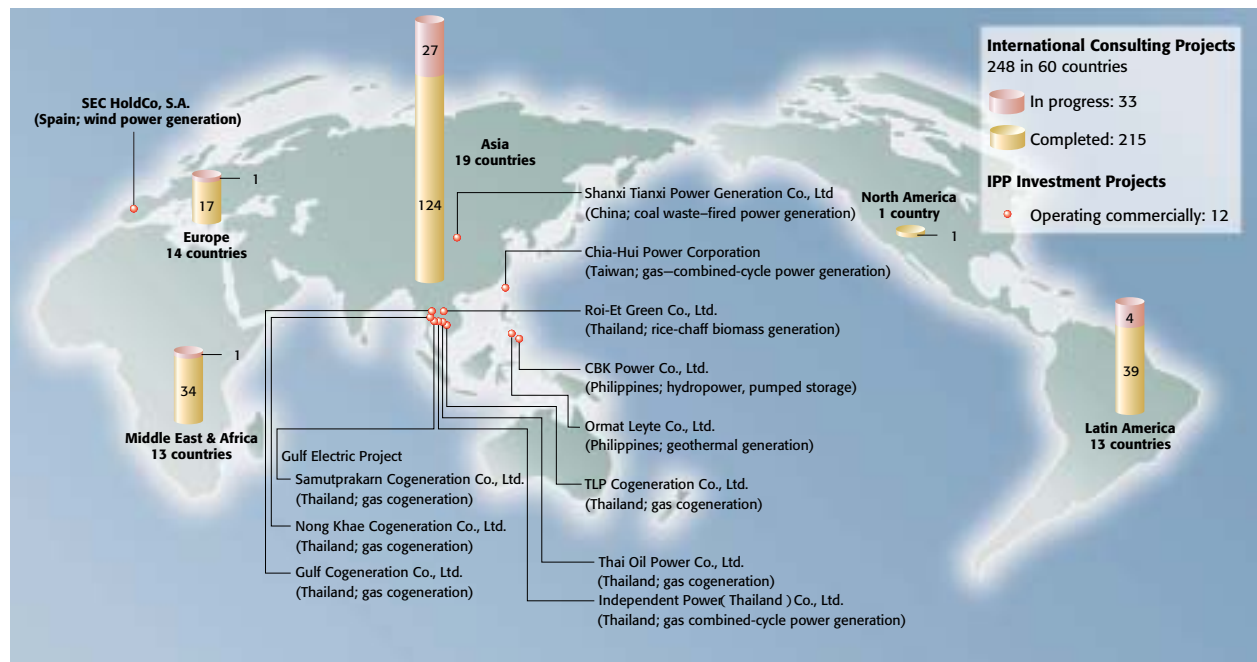
## ◆ International Consulting

Examples of J-POWER's environmental technology consulting in the area of coal-fired thermal power are the transfer of SOx and NOx emissions reduction technology to countries of the European Union, technological advice to East European countries plagued by acid rain on measures to reduce SOx emissions, and in China, a demonstration test of technology to desulfurize coal with high sulfur content (commissioned by METI).



Rehabilitation project, 4th Thermal Power Plant, Ulaanbaatar (Mongolia)

## J-POWER's International Consulting and IPP Investment Projects



(As of the end of March 2005)



## Major Recent Overseas Consulting Projects

Project type	Name	Country	Duration	Description
Thermal power	Rehabilitation Project of the 4th Thermal Power Plant in Ulaanbaatar	Mongolia	Nov. 2001 – Oct. 2006	Supervision of construction in high-efficiency rehabilitation of thermal power plant
Thermal power	Bakreshwar Coal-Fired Thermal Power 4 & 5 Units Extension Project	India	Aug. 2003 – Dec. 2007	Bidding support and supervision of construction of power plant
Thermal power	Tashkent Thermal Power Plant Modernization Project	Uzbekistan	Jan. 2005 – Dec. 2009	Support in bidding process and supervision of construction and O&M of high-efficiency gas cogeneration thermal power plant
Environmental management (thermal power)	Pilot Study for Project Formation for Installing Flue-Gas Measurement System at Ninh Binh Thermal Power Plant	Vietnam	Apr. 2005 – Oct. 2005	Study to determine feasibility of installing flue-gas measurement system in existing thermal power plant
Hydropower	Purulia Pumped-Storage Hydropower Project	India	Oct. 1995 – Feb. 2008	Detailed design, bidding support, and construction supervision
Hydropower	Yuncan Hydroelectric Power Project	Peru	May 1998 – Dec. 2005	Bidding support and construction supervision
Hydropower	Upper Kotmale Hydropower Project	Sri Lanka	Nov. 2003 – Nov. 2009	Bidding support and construction supervision
Hydropower	Dai Ninh Hydropower Project	Vietnam	May 2005 – Jul. 2007	Detailed design review, bidding support, and construction supervision
Micro-hydropower	Study for Detailed Design of Mondol Kiri Micro-hydropower Project	Cambodia	Oct. 2005 – Feb. 2006	Detailed design for independent micro-hydropower station
Power transmission	Transmission and Distribution Development Project in Paraguay's Metropolitan Area	Paraguay	Aug. 1996 – Jan. 2005	Detailed plan and supervision of construction of metropolitan power grid
Power transmission	Plan for Cebu-Negros-Panay Linked Transmission	Philippines	Jul. 2004 – Mar. 2006	Detailed plan and supervision of construction for project linking small islands with underwater cable
Water works	Plan for Improvement of Water Use in Zletovica	Macedonia	Mar. 2005 – Aug. 2010	Detailed plan and supervision of construction of multipurpose system to improve water supply
Solar power	Demonstration Research on Dispersed Power Generation System Technologies: Photovoltaic, Wind Power, and Advanced Storage Batteries	China	Oct. 2003 – Mar. 2006	Demonstration test of wind power, new storage battery, and minigrd

### ◆ International IPP Investment Program

In response to the worldwide trend toward privatization and deregulation of the electric power industry, J-POWER is taking part in a wide range of business undertakings overseas. In conjunction with these, it is applying the technologies for high-efficiency thermal power generation and environmental conservation developed domestically with the goal of reconciling economic growth with environmental conservation. As of the end of 2004, J-POWER was involved in 14 international IPP projects in five countries and territories.

We are working with local staff at the Bangkok office, which was established in September 2002, to ensure the smooth and stable operation of projects in which J-POWER has invested.



Roi-Et Rice-chaff-fired Thermal Power Generation Plant (Thailand)



Chia-Hui Gas Combined-Cycle Power Generation Plant (Taiwan)

### ◆ New Business Areas and Our Contribution to Sustainable Development

J-POWER's international consulting program, while focused on electric power projects using ODA, is also spreading out into new areas where we can apply our technological know-how, such as that involving water supply and irrigation. We are also aiming to expand our business operations to non-ODA areas, such as private development projects. With regard to our IPP investment program, we are striving to balance and diversify our overseas investment portfolio.

We believe that by continuing to promote overseas technology transfers through our consulting and investment programs, we can contribute to global sustainable development in the years ahead.



Calayan Pumped-water Power Generation Plant (Philippines)

#### Hiroya Naramoto

Business Development Office No. 2  
International Power Business Department



Of the new energy sources that contribute to the reduction of CO<sub>2</sub> emissions, biomass is one of the easiest for developing countries to put into commercial use. We are actively promoting this project using the knowledge and expertise that our company has accumulated through its past thermal and waste-power generation projects.



# Ensuring Transparency and Reliability

The J-POWER Group works to improve environmental management and ensure legal compliance in all its business activities. It also discloses a wide range of environmental information. Through good communications with stakeholders, we strive to earn society's trust.

## Environmental Management

With the aim of conducting environmental conservation activities throughout the company based on our Corporate Philosophy, in March 2000 we established Environmental Management Rules governing environmental management efforts.

### ◆ Company-wide Environmental Management Organization

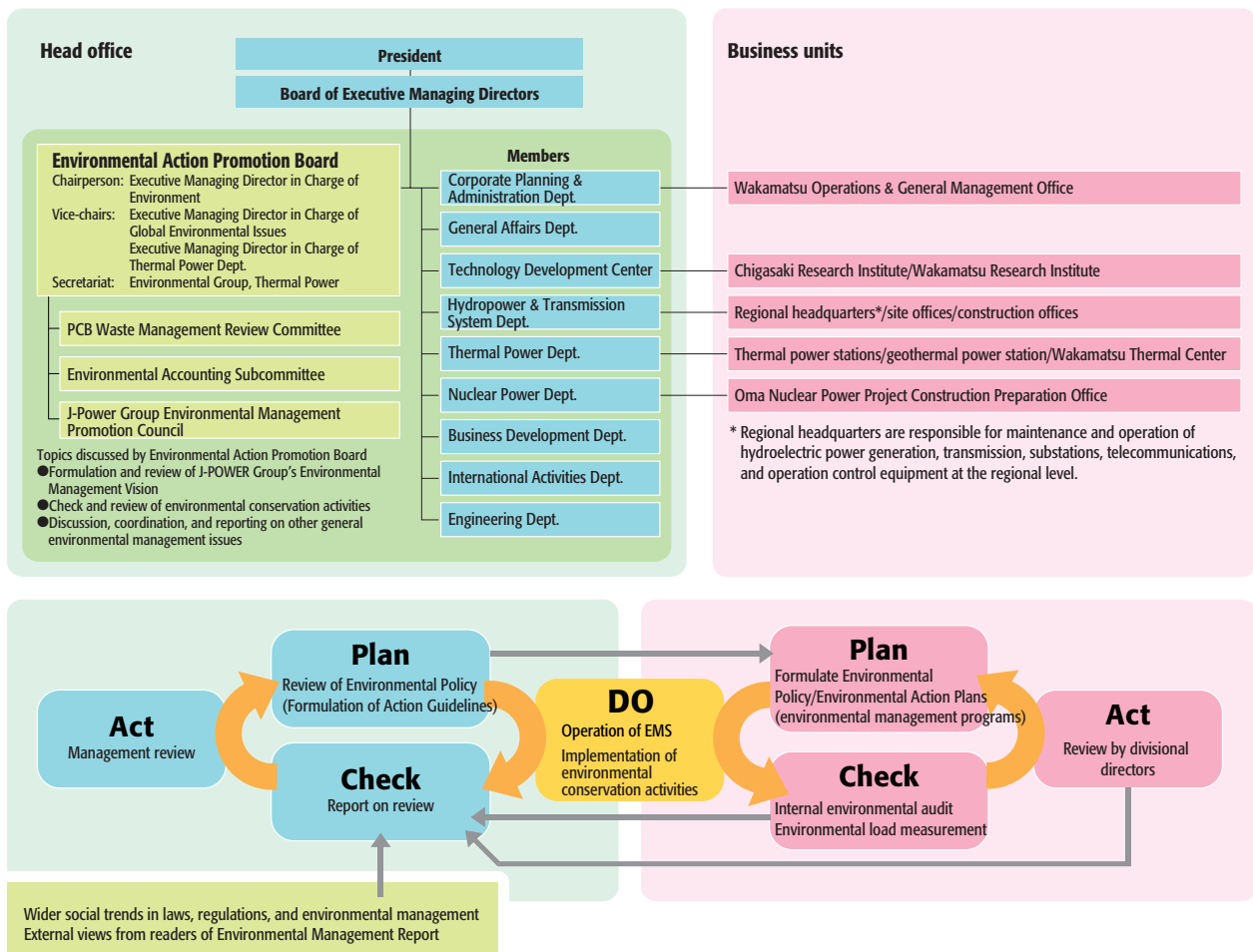
The Environmental Action Promotion Board, led by an executive managing director, was established to discuss, coordinate, and report on overall environmental management. The board is comprised of the heads of divisions responsible for planning, constructing, and operating electric power facilities along with those of other sections, departments, and institutes whose work is closely related to the environment. The Environmental Group of the Thermal Power Dept. acts as secretariat to the board, which oversees environmental activities at the company-wide level.

Furthermore, environmental management systems (EMS) complying with the ISO 14001 international standard for environmental management have been introduced in all business units\*, and environmental conservation activities are being continuously improved.

Based on the J-POWER Group Environmental Action Guidelines (see pp. 9-10), each operational unit draws up an Environmental Action Plan and operates EMS on the basis of the PDCA cycle outlined below.

\* Except some small organizations

**J-POWER Environmental Management Organization Chart**



### ◆Main Agenda Items Discussed at Environmental Action Promotion Board

The board discussed the J-POWER Group Environmental Management Vision, Action Program, and various other issues. Important matters were brought to the attention of the board of executive managing directors.

Meeting date	Agenda items	Main items of discussion
1st meeting May 27, 2004	6	<ul style="list-style-type: none"> <li>● Formulation of plan for J-POWER Group Environmental Management Vision and Action Program</li> <li>● Results of fiscal 2003 environmental management and Environmental Action Plans for fiscal 2004</li> </ul>
2nd meeting July 28, 2004	2	<ul style="list-style-type: none"> <li>● Details of Environmental and Social Activities Report</li> <li>● CSR initiatives</li> </ul>
3rd meeting December 22, 2004	5	<ul style="list-style-type: none"> <li>● Formulation of J-POWER Group Environmental Management Vision and Action Program</li> <li>● Interim report on continual improvement of EMS</li> </ul>
4th meeting March 29, 2005	6	<ul style="list-style-type: none"> <li>● Formulation of 2005 Environmental Management Report</li> <li>● Results of Sustainable Management Review conducted by Sustainable Management Rating</li> </ul>

(total: 19)

### ◆An Outline of EMS and the Operational Units Implementing It

Each business unit establishes and operates EMS for planning/design, construction, and maintenance/operation, while continually striving to make improvements. Group companies engaged in maintenance and management of power plants operate EMS in conjunction with J-POWER maintenance/operating business units (thermal and geothermal power stations, regional headquarters).

\* ISO 14001 certification gained

Category	Business Unit Name	Outline
Planning/ design	Engineering Dept.*	Introduced and operates EMS for construction of generation facilities as well as to ensure new business projects are environmentally responsible right from the planning and design stage. Obtained ISO 14001 certification in February 2001.
Construction	Oma Nuclear Power Project Construction Preparation Office Oma Main-Transmission Line Construction Office and Chushi Main-Transmission Line Construction Office Sakuma-Higashi Main-Transmission Line Construction Office	Introduced and operate EMS to ensure implementation of measures arising out of environmental impact assessment, such as prevention of water pollution, noise, and vibration, and the reuse of byproducts.
Maintenance/ operation	Thermal power stations* (Isogo, Takasago, Takehara, Tachibanawan, Matsushima, Matsuura, Ishikawa Coal), Onikobe Geothermal Power Station*, regional headquarters (Hokkaido, East Japan, Chubu, West Japan)	Introduced and operate EMS in accordance with environmental laws, regulations, and agreements in order to take measures aimed at reducing environmental load. Introduction began in 1998 with Matsuura Thermal Power Station, which completed introduction at the end of fiscal 2001. The station obtained ISO 14001 certification in June 1999. In fiscal 2004 all other coal-fired and geothermal power stations obtained ISO 14001 certification. The scope of certification includes all offices of J-POWER subsidiary JPec, which is involved in power station operation and maintenance. Furthermore, ISO 14001 certification is scheduled to be gained for each regional headquarters (Hokkaido, East Japan, Chubu, West Japan), including hydropower and transmission facilities, by the end of fiscal 2005.
Other	Technical research centers (including Chigasaki Research Institute) Wakamatsu Operations & General Management Office (including the Wakamatsu Research Institute and Wakamatsu Thermal Center)	
	Head Office	Introduced EMS for head office building.
	Total: 20 business units (as of March 2005)	

### ◆Environmental Information for Employees

In order to enhance environmental management and raise employees' environmental awareness, information is made available for all employees to view at any time through electronic bulletin boards, an environmental information network, and the J-POWERs group magazine.

Medium	Title	Content
Electronic bulletin board	Environmental laws, regulations, and data	<ul style="list-style-type: none"> <li>● Implementation and revision of laws and regulations</li> </ul>
	Information on environmental management and events	<ul style="list-style-type: none"> <li>● Social trends</li> <li>● In-house environmental events</li> <li>● EMS</li> </ul>
	Forum on nature, the environment, and animals, and plants	<ul style="list-style-type: none"> <li>● Forum for free exchange of opinions among employees</li> </ul>
Intranet	Environment information network	<ul style="list-style-type: none"> <li>● Overview of laws and regulations</li> <li>● Overview of EMS</li> <li>● Environmental education and training</li> </ul>



### ◆ Education and Training

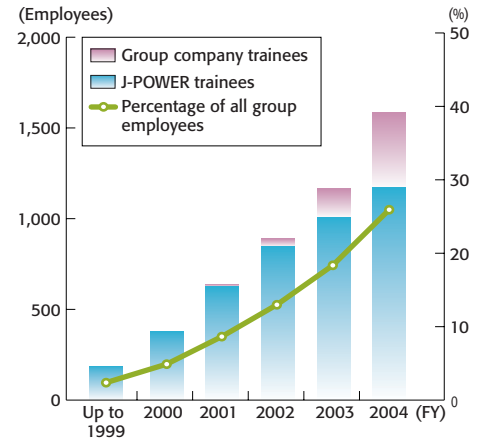
The head office and other workplaces conduct a range of internal and external environmental training programs to raise employee awareness and cultivate a sense of personal responsibility regarding environmental issues. An e-learning-based environmental education program has been available to group employees since the end of fiscal 2003. Including group employees, a total of 1,567 staff members have taken the course for EMS ☺ internal environment auditors.

#### Environmental Training in Fiscal 2004

Category	Topics	Trainees	Main content
Overall environmental management	Environmental report study groups	Approx. 500	J-POWER Group's efforts
	Environmental report study groups for group companies	Approx. 190	J-POWER Group's efforts
Basic training for EMS operation	Internal environmental auditor training	387	Requirements of ISO 14001 ☺, internal environmental audit method
	Follow-up training for internal environmental auditors	22	Practice in identifying nonconformance, simulated inspection
	Introductory training for new staff	34	The basics of environmental issues, J-POWER Group's efforts
E-learning	Basic knowledge of environmental issues	2,956	Global and regional environmental issues
Total		Approx. 4,089	

Note: Most training was aimed at all group employees

#### Cumulative Number/Percentage of Employees Who Have Received Internal Environmental Auditor Training



### ◆ Environment-related Official Qualifications

At power stations and other facilities, staff members with formal qualifications, such as Manager in Charge of Pollution Control Certificates, are assigned to positions where they can facilitate day-to-day environmental conservation activities. We will continue to provide employees with guidance and support to acquire various qualifications, with a view to improving their knowledge and skills.

As of the end of March 2005

Qualification	No. of holders	Qualification	No. of holders	Qualification	No. of holders
Professional Engineer, Construction Division (Construction Environment)	9	Manager of Specially Controlled Industrial Waste ☺	277	Hazardous Materials Officer, Class A	55
Professional Engineer, Environment Division (Environmental Conservation Planning)	2	Technical Manager in Charge of Industrial Waste Final Disposal Site	40	Boiler Technician (Special Grade, Grades 1 & 2)	999
Professional Engineer, Environment Division (Conservation of the Natural Environment)	1	Technical Manager in Charge of Waste Disposal Facilities	18	Boiler Mechanic	3
Manager in Charge of Pollution Control, Senior Level	5	Biotope ☺ Design Supervisor (Grades 1 & 2)	2	Works Supervisor for Specific Chemicals	752
Manager in Charge of Pollution Control, Air (Types 1-4)	163	Biotope Construction Supervisor (Grades 1 & 2)	3	Manager in Charge of Poisonous and Deleterious Substances (General and Specific)	6
Manager in Charge of Pollution Control, Water Quality (Types 1-4)	120	Technical Supervisor for Landscape Construction, Grades 1 & 2	30	Works Supervisor for Organic Solvents	358
Manager in Charge of Pollution Control, Noise	82	Chief Electrical Engineer, Classes 1-3	701	Sanitation Manager, Classes 1 & 2	302
Manager in Charge of Pollution Control, Vibration	38	Radiation Protection Supervisor, Classes 1 & 2	83	Certified Measurer, Environment	7
Manager in Charge of Pollution Control, General Dust	2	Energy Supervisor, Electricity	159	Work Environment Measurement Expert (Classes 1 & 2)	9
Manager in Charge of Pollution Control, Specific Dust	1	Energy Supervisor, Thermal	224	EMS Auditor (Prov. Auditor)	24
Manager in Charge of Pollution Control, Dioxins ☺	11	Manager in Charge of High-pressure Gas Production and Storage (Classes A, B, & C)	454		

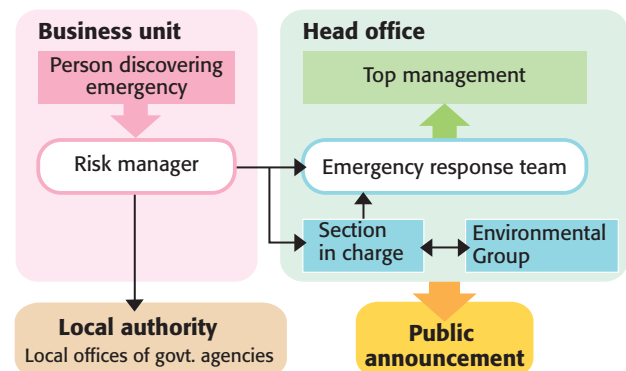
Note: Chart shows total number of qualifications held by J-POWER group employees. Employees with multiple qualifications (in terms of level or category) are counted under each relevant item.

### ◆ Response and Information Disclosure in the Event of an Environmental Emergency

In the event of an environmental emergency:

- (1) The risk manager at each business unit will take the necessary steps to prevent damage from spreading, as well as contact the relevant local bodies, the head office emergency response team, and the head office section in charge of the business unit.
- (2) The head office emergency response team will promptly report to top management and provide information on the emergency to the media and other interested parties.

### Response and Information Disclosure in the Event of an Environmental Emergency



### ◆Environmental Incidents

Eight environmental incidents occurred between May 2004 and April 2005. The incidents were not serious enough to incur an administrative penalty for violation of environmental laws or bylaws, but press releases were issued and improvements were made to facilities and procedures to prevent a recurrence.

Location	Situation/Response
Matsuura Thermal Power Station (Matsuura-shi, Nagasaki Prefecture)	On September 2, 2004, approximately 35 m <sup>3</sup> of recycled acidic wastewater discharged from a condensate demineralizer leaked from a storage tank and flowed into the sea nearby. The incident was caused by an oversight in operation of the control valve on the storage tank intake pipe. Improvements were made to operating procedures and the equipment involved to prevent a recurrence.
Isogo Thermal Power Station (Yokohama-shi, Kanagawa Prefecture)	On October 9, 2004, moderately alkaline rainwater flowed from the power station site into the sea nearby. The incident was caused by heavy typhoon rains gaining a moderate level of alkalinity after coming into contact with concrete blocks used on the site as backfill material and flowing into the sea without being treated in a neutralizer. Measures taken to prevent a recurrence included installation of a larger neutralizer.
Matsushima Thermal Power Station (Saikai-shi, Nagasaki Prefecture)	On December 11, 2004, approximately 3 m <sup>3</sup> of wastewater containing coal powder that was washed off a coal conveyor belt during cleaning flowed into the sea nearby. The incident was caused by negligence in the operation of the catch-basin water level monitor, resulting in overflow from the catch-basin. Procedures for checking the water level monitor were tightened to prevent a recurrence.
Ishikawa Coal-fired Power Station (Uruma-shi, Okinawa Prefecture)	On February 24, 2005, a sudden downpour of rain washed approximately 30 liters of emulsifying agent (adhesive) being used in laying asphalt on an on-site road into the sea nearby. The incident occurred while the asphalt was being laid, and emulsifying agent that had not hardened was washed away. Operating procedures were improved to prevent a recurrence.
Matsushima Thermal Power Station (Saikai-shi, Nagasaki Prefecture)	Following confirmation that selenium levels were rising in a wastewater monitoring well near our industrial waste ♻️ processing plant that treats sludge from a wastewater processing unit for landfill disposal, intake of sludge to the plant was suspended from April 2005 while necessary countermeasures were considered in consultation with local authorities and other interested parties.
Bay Side Energy Co., Ltd. Ichihara Power Station (Ichihara-shi, Chiba Prefecture, electric supply company 100% owned by J-POWER)	On April 5, 2005, a volume of untreated wastewater (estimated to be 6 m <sup>3</sup> ) leaked from a wastewater pit and flowed into the sea in front of the site. The incident was caused by a blockage in a wastewater pipe. Checking procedures were tightened to prevent a recurrence.
Okutadami Power Station (Uonuma-shi, Niigata Prefecture)	On April 18, 2005, it was confirmed that heavy oil (Class A) had leaked underground from a tank installed in a disused employee residence. The volume of the leakage was estimated to be approximately 25 kiloliters. The incident was caused by a hole in an underground pipe. With the help of guidance from relevant organizations, we are currently conducting digging and boring surveys for groundwater to confirm and monitor the extent of pollution and working to remove contaminated soil and prevent the spread of contamination.
Isogo Thermal Power Station (Yokohama-shi, Kanagawa Prefecture)	On April 29, 2005, we failed to recover 860 sponge balls used in the cleaning of a condenser. A pipe in the device for retrieving the sponge balls was blocked by algae and shells, resulting in incomplete retrieval, and most of the balls flowed into the sea. Operating procedures were improved to prevent a recurrence.



## Legal Compliance

J-POWER was not reprimanded for any violation of environmental laws, regulations, or ordinances in fiscal 2004 and did not exceed any limits set out in environmental conservation agreements.

### ◆ Main Environmental Laws

Name	Main business subject to the law
Environmental Impact Assessment Law Electric Utilities Industry Law	Forecasting and assessment of environmental impact of power plant construction on surrounding areas
Air Pollution Control Law	Control of SO <sub>x</sub> ☹️, NO <sub>x</sub> ☹️, and soot and dust ☹️ emissions resulting from power plant operation
Water Pollution Control Law	Control of wastewater discharge from power stations to public waterways
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 odors from operation of power stations and substations
Factory location law	Greening of sites for power stations and other facilities
Industrial Water Law	Pumping of underground water used for power generation
Natural Parks Law	Construction of power stations, substations, transmission facilities, and communication equipment in national, quasi-national, and prefectural 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	Appointment of manager in charge of pollution control in power plants

### ◆ Environmental Agreements

When constructing a thermal power plant, J-POWER concludes an environmental agreement with the local authorities and strives to fully comply with the relevant terms.

While the content of such agreements varies according to the particular characteristics of the site or region, the agreements generally cover the following points and include quantitative commitments on air and water quality.

- Air pollution control measures
- Water pollution control measures
- Noise and vibration control measures
- Offensive odor control measures
- Waste treatment measures
- Measures for the protection of the natural environment
- Accident response measures

Environmental agreements concluded regarding our thermal power stations are set out in the chart below.

Name	Power station	Local authority
Memorandum of Environmental Conservation Agreement	Isogo Thermal Power Station	Yokohama-shi, Kanagawa Prefecture
Memorandum of Pollution Control Agreement	Takasago Thermal Power Station	Takasago-shi, Hyogo Prefecture
Memorandum of Agreement concerning Environmental Conservation	Takehara Thermal Power Station	Takehara-shi, Hiroshima Prefecture
Environmental Conservation Agreement	Matsushima Thermal Power Station	Saikai-shi, Nagasaki Prefecture
Memorandum of Environmental Conservation Agreement	Matsuura Thermal Power Station	Matsuura-shi, Nagasaki Prefecture Imari-shi, Saga Prefecture
Memorandum of Environmental Conservation Agreement	Ishikawa Coal-fired Power Station	Uruma-shi, Okinawa Prefecture
Memorandum of Environmental Conservation Agreement	Tachibanawan Thermal Power Station	Anan-shi, Tokushima Prefecture

### ◆ Allowable Level Set by Prefectural Ordinance Exceeded in Fiscal 2002

In September 2002 the manganese concentration in discharge from the coal ash final disposal site for Isogo Thermal Power Station exceeded the allowable level specified in Kanagawa prefectural ordinances\*. We promptly installed wastewater treatment equipment at the site and ensured that wastewater was only discharged after confirming that manganese levels were below the allowable level. This system continues to operate effectively.

In fiscal 2004 we conducted reinforcing works to maintain seepage control capabilities at the disposal site and we continue to consult with the relevant local authorities and take the necessary steps to prevent a recurrence.

\* Exceeding of allowable level: On September 19, 2002, manganese concentrations in wastewater discharged into a river from the final disposal site in Chigasaki-shi, Kanagawa Prefecture reached 1.1 mg/l, exceeding the allowable level of 1 mg/l or less specified by Kanagawa prefectural ordinance on conservation of the living environment.

## Green Purchasing

J-POWER has long made efforts to purchase “green” products including recycled paper for toilet paper and copy paper and energy-saving office equipment such as PCs and photocopiers. In February 2004 we stepped up our efforts to help build a recycling-based society with the adoption of the J-POWER Group Green Purchasing Guidelines.

### Promoting Green Purchasing

The chart below outlines the results of our green purchasing efforts in fiscal 2004.

#### FY 2004 Green Purchasing (J-POWER)

		Green purchasing volume	Green purchasing percentage
Copy paper	A4	19.02 million sheets	97%
	A3	2.88 million sheets	96%
	B5	100 thousand sheets	83%
	B4	170 thousand sheets	91%
Toilet paper		56,000 rolls	99%
Office equipment		2,598 units	99%
Uniforms/work clothes		11,085 units	99%
Vehicles		30 units	68%
Desks, etc. (Head office only)		6,194 units	100%

#### ◆Office Equipment

Compliance with the Green Purchasing Law, the PC Green Label system, and the International Energy Star Program was a prerequisite for replacement PCs purchased in fiscal 2004. Compliance with specified purchasing standards based on the Green Purchasing Law will continue to be a requirement for new and replacement purchases.

#### ◆Uniforms & Work Clothes

As part of our efforts to reduce environmental load, in fiscal 2004 material made from recycled PET bottles was adopted as standard for all J-POWER Group uniforms and work clothes. In the public interest and to promote reuse, all discarded uniforms and work clothes are donated to organizations collecting used clothing.



Work clothes featuring material made from recycled PET bottles.

#### ◆Vehicles

To help reduce environmental load we make efforts to purchase smaller vehicles when replacing or adding to our fleet. Wherever possible we are steadily switching to vehicles that comply with the Green Purchasing Law.



Hybrid vehicles (Tachibanawan Thermal Power Station, Tokushima Prefecture)

#### ◆Office Desks

All replacement desks and related furniture purchased for the head office in fiscal 2004 complied with the Green Purchasing Law. Similar efforts are being made at local sites.



Office desk (Head Office, Tokyo)

#### ◆Other Equipment and Materials

Our green purchasing efforts extend to stationery, electrical appliances, and air conditioners, as well as all other equipment and materials purchased by the company.

## Environmental Communication

In order to become a more trusted and familiar member of society and to promote good relations with local communities, we publicize our environmental conservation efforts and communicate various types of environmental information through our public relations initiatives. Our workplaces value communication with the public and actively take part in local environmental activities.

### Publication of Environmental Report

Each year since 1998 we have issued an environmental report, and this is our eighth such publication. This year the report has been issued under the title *2005 Environmental Management Report*.

We will continue to publish these reports in an effort to provide stakeholders with clear and specific information on our environmental management.

The *2005 Environmental Management Report* is also available on our website: <http://www.jpowers.co.jp>



Reports published to date

### Public Relations Activities

#### ◆Advertising

J-POWER corporate advertising appears in newspapers, business magazines, and weeklies as well as on public transportation.

"The Re View Series" of advertisement issued since February 2004 has shown how we are actively working to address global environmental issues such as global warming. This series of advertisements won the Environment Minister's environmental advertising prize in the 53rd Nikkei Advertising Awards as well as the Nikkei ecology advertising prize in the 11th Nikkei BP Advertising Awards.

We issued a further series showing our efforts to address the issue of global warming to coincide with the coming into force of the Kyoto Protocol in February 2005.

A commercial showing how our business activities aim to achieve the harmonious coexistence of energy and the environment is broadcast during the J-POWER-sponsored television show "Sound Sonority," screened in the Kanto region.

#### "Sound Sonority"—brought to you by J-POWER

In the music world, "sonority" is used to describe full and resonant tones. This program is based on the concept of presenting sounds from Japan's natural environment that can only be heard in certain places, bringing viewers a sense of both comfort and the power of nature.

#### ●The Re View Series of Advertisements (ads issued during fiscal 2004)





● **Advertisement Issued to Coincide with the Coming into Force of the Kyoto Protocol**



Seeing beyond Kyoto

● **Television Commercial**



International project to recycle chaff

◆ **Main Brochures**

Each year we publish a corporate brochure and an annual report for distribution to the public to explain our activities. These publications also outline our environmental conservation efforts.

Two further brochures explaining our business, which is not always well known to the public, are produced for distribution at power stations and various events: *Oshiete J-POWER* (Tell Me about J-POWER) and *J-POWER wa chikara mochi* (Powerful J-POWER), which is aimed at children.



Annual report



Corporate brochure



*Oshiete J-POWER*  
(Tell Me about J-POWER)



*J-POWER wa chikara mochi*  
(Powerful J-POWER)

◆ **Public Relations Magazines: *Global Edge* and *J-POWER News***

Each issue of the quarterly *Global Edge* focuses on a particular aspect of our corporate vision, the coexistence of energy and nature. As well as interviews and articles featuring opinion leaders from various fields, the publication highlights J-POWER technologies and businesses that exemplify the theme selected for the issue.

*J-POWER News* tells the public at large about our latest business developments.



*Global Edge*



*J-POWER NEWS*

◆ **Group-wide In-house Magazine: *J-POWERs***

This in-house magazine, which is circulated to all group employees, aims to communicate top management insights, share information, and stimulate communication among staff members.

Special issues of *J-POWERs* featuring environmental efforts are published to coincide with Environment Month and the appearance of the Environmental Management Report.



*J-POWERs*



## Environmental Conservation Activities

### ◆Events during Environment Month

The Japanese government designates June of each year as Environment Month, providing the public and companies with an opportunity to reconsider their relationship with the environment and think about what actions they can take in their communities and workplaces to contribute to environmental conservation.

In fiscal 2004 J-POWER conducted a range of events during Environment Month, including lectures at the head office and other business units, clean-ups of local beaches and roads, and participation in planting projects undertaken by local governments.

Type of event	Content and offices participating
Lectures, instructional/educational meetings, etc.	Lectures organized: 7; Instructional/educational meetings: 13; Study groups: 6; Attendance at lectures: 9
Panel exhibitions	Environmental panel displays: 2
Photo exhibitions	Photo exhibitions: 2
Video screenings	Environmental education video screenings: 11
Poster exhibitions, provision of information, etc.	Exhibition featuring the President's message and Environment Month posters; Distribution of pamphlets to organizations nationwide: 3; Exhibition on theme of Environment Month: 1
Forestry volunteers, nature walks	Forestry volunteer programs: 7; Nature walks: 3
Beautification activities	Beach clean-ups: 7; Local community clean-ups: 34; Improvement of workplace environment: 46; Tree and flower planting, distribution of seedlings: 19
Recycling activities	Activities to promote recycling: 13
Activities against global warming	Activities promoting energy-saving: 11; Campaigns to encourage drivers not to leave their car engines running unnecessarily: 13; Campaigns to encourage drivers to leave their cars at home: 11
Surveys	Environmental surveys: 11
Site visits	Visits to environment-related sites: 7
Other	No-smoking hours: 3; Open days: 1



Donation of flowering plants to Shinjuku Elementary School (East Japan Regional Office, Saitama Prefecture)



Participation in flower-planting event at the Okawachi Dam Park (Numappara Power Station, Tochigi Prefecture)

### ◆Exhibition Featuring President's Message and Ministry of Environment Posters

In conjunction with Environment Month, the J-POWER President's message and Ministry of Environment posters were exhibited in all workplaces nationwide with the aim of raising employees' environmental awareness.



### ◆Environmental Lectures

University of Tokyo Professor Izumi Washitani was invited to the J-POWER Head Office in Tokyo on June 2, 2004, to deliver an environmental lecture which was attended by approximately 100 people including group company staff.

The topic of the lecture was "reviving the ecosystem." Professor Washitani spoke about the dwindling of biodiversity and the importance of preserving the diversity of living things. She went on to outline a variety of methods and case studies of environmental activities taking place in Japan and around the world.

Professor Washitani also touched upon corporate activities aimed at preserving biodiversity and raised a number of issues to be addressed such as what stance companies should take toward biodiversity and what factors they should consider.



Professor Izumi Washitani

◆Green Fair

Every year during 3Rs\* Month, we hold a Green Fair to display and sell environmentally conscious products made of byproducts from our electricity generation business. The 2004 fair was held in October in front of the head office entrance.

By giving the public a chance to see for themselves environmentally conscious products made and sold by J-POWER group companies, we aim to strengthen their understanding of our environmental conservation activities.

\* 3Rs: "Reduce, Reuse, Recycle"

**Green Fair**

Date	No. of visitors	Donations	Funds donated to:
Oct. 2004	477	¥ 22,000	Green Fund (National Land Afforestation Promotion Organization)



Green Fair (Head Office, Tokyo)

◆J-POWER Forest Club

The J-POWER Forest Club is made up of around 30 volunteers from J-POWER group companies who support the activities of the Nature Conservation Committee "Takao no morizukuri no kai," part of the Japanese Alpine Club.

In fiscal 2004 club members met on the second Saturday of each month to take part in conservation programs such as tree-planting projects undertaken by "Takao no morizukuri no kai," helping to conserve the environment while keeping fit.



J-POWER Forest Club members participate in the tree-planting program of "Takao no morizukuri no kai."

◆Other Activities

Various other activities were undertaken to build relationships of trust in local communities (see "Interacting with Local Residents" on p. 61)

**Giving a Presentation on Environmental Conservation**

**Takaomi Tobase**

Subsurface Space Group, Engineering Department

Environmental conservation efforts made as part of construction projects involve not only the relationship between human beings and nature, but also relationships among people. When it comes to conserving ecosystems, as well as taking appropriate technical measures we need to effectively communicate them to society.

To do that, energy companies need to take the initiative in disclosing information and setting up a dialogue with society. With that in mind, in January 2005 I accepted an invitation from the Nature Conservation Society of Japan to make a presentation titled "Constructing a Hydroelectric Power Station to Coexist with the Golden Eagle," based on our experiences in building the Okutadami-Otori Power Station.



# Group Companies' Efforts

In accordance with the Basic Policy for achieving the J-POWER Group's Environmental Management Vision, all group companies contribute to the development of a sustainable society by carrying out environmental conservation activities, in addition to ensuring safe and secure operation and maintenance of power plants.

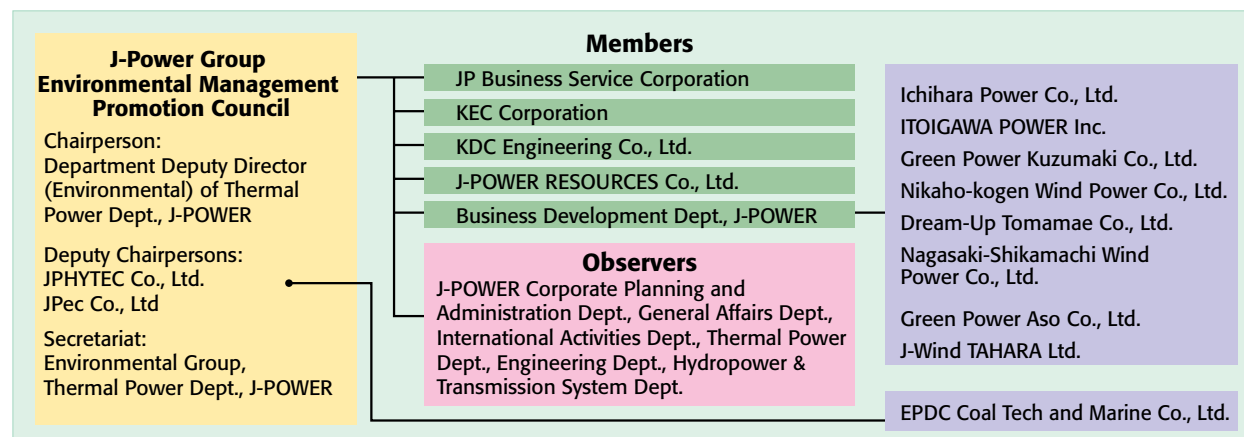
## Group Companies' Business Activities

### ◆ Major Consolidated Subsidiaries

As of the end of March 2005

Company Name	Main Activities
JP Business Service Corporation	General services within and outside the J-POWER group
JPHYTEC Co., Ltd.	Overall maintenance of J-POWER's hydropower stations, transmission facilities, and substations
JPec Co., Ltd.	Overall maintenance of J-POWER's thermal power generation facilities
EPDC Coal Tech and Marine Co., Ltd.	Coastal shipping and collection and transport of industrial waste
KEC Corporation	Construction and maintenance of electronic and communications facilities
KDC Engineering Co., Ltd.	Engineering and construction, survey, and design and construction management of electric power facilities
J-POWER RESOURCES Co., Ltd.	Survey, exploration, and development of coal mines, and investment in these activities
Ichihara Power Co., Ltd.	Electric power supply (gas-fired thermal)
ITOIGAWA POWER Inc.	Electric power supply (coal-fired thermal)
Green Power Kuzumaki Co., Ltd.	Electric power supply (wind power)
Nikaho-kogen Wind Power Co., Ltd.	Electric power supply (wind power)
Dream-Up Tomamae Co., Ltd.	Electric power supply (wind power)
Nagasaki-Shikamachi Wind Power Co., Ltd.	Electric power supply (wind power)
Green Power Aso Co., Ltd.	Electric power supply (wind power)
J-Wind TAHARA Ltd.	Electric power supply (wind power)

### ◆ J-Power Group Environmental Management Promotion Council: Organization Chart (FY 2004)





## Efforts Relating to Environmental Management

### ◆J-Power Group Environmental Management Promotion Council

This council, set up in fiscal 2002 with environmental personnel from each group company, meets quarterly to discuss topics such as promotion of environmental management for the entire group and the J-POWER Group's environmental management vision.

### Main Topics Discussed by the J-POWER Group Environmental Management Promotion Council

Meeting Date	Main Topics
1st meeting June 16, 2004	<ul style="list-style-type: none"> <li>● Promotion of environmental management for the J-POWER Group</li> <li>● Policy for production of environmental report and request for cooperation</li> </ul>
2nd Meeting September 29, 2004	<ul style="list-style-type: none"> <li>● Request for each company to produce an Action Program</li> <li>● Draft of J-POWER Group Green Purchasing</li> </ul>
3rd Meeting December 24, 2004	<ul style="list-style-type: none"> <li>● Progress report on production of J-POWER Group Environmental Management Vision/Action Program</li> <li>● Basic policy for environmental information processing in the J-POWER Group</li> </ul>
4th Meeting March 17, 2005	<ul style="list-style-type: none"> <li>● J-POWER Group Environmental Management Vision/Action Program</li> <li>● J-POWER Group environmental education/structure</li> </ul>

### ◆Action Programs for Group Companies

Each consolidated subsidiary formulated goals related to its own business activities. Targets are set in areas such as maintaining and enhancing thermal efficiency 💡 in electricity supply companies, reducing CO<sub>2</sub> emissions and volumes of waste material in offices, conducting overseas afforestation projects, obtaining ISO 14001 💡 certification, introducing EMS 💡, promoting green purchasing 💡, and enhancing environmental communications.

### ◆Environmental Management at Group Companies

- JPHYTEC, JPec, JP Business Service Corporation, and two other subsidiaries have introduced and are continually improving EMS, while other subsidiaries are working toward introduction. Some facilities and departments have also obtained ISO 14001 certification.
- Group company facilities located within J-POWER plants operate EMS in conjunction with J-POWER. JPec, which is involved in operation and maintenance of thermal power stations, obtained ISO 14001 certification for all its facilities at the same time as the parent company.
- The IT maintenance business division at KEC Corporation obtained ISO 14001 certification in March 2005. Preparations are now underway to extend the scope of that certification to all group companies by the end of fiscal 2006.

### ◆Main Group Company Activities

#### ●JPHYTEC Co., Ltd.

Twenty-four staff members from the head office took part in community street-cleaning activities in Chiyoda Ward, focusing on the area around JR Ichigaya Station. The garbage collected was sorted and sent for disposal and recycling.

#### ●JPec Co., Ltd.

Former Japan Broadcasting Corporation newscaster Ryoju Katsube was invited to speak at a symposium on the theme of "The Global Environment and Energy."

#### ●JP Business Service Corporation

A "Green Fair," featuring distribution of foliage plants and displays of environmental products, was held for people residing near the head office to publicize the company's environmental initiatives.

#### ●J-POWER RESOURCES Co., Ltd.

Ongoing afforestation projects in Australia and elsewhere.

#### ●Others

Group companies and workplaces around Japan carried out a variety of activities, including tree-planting and cultivation, screening of environmental education videos, group cleaning efforts around plants, environmental beautification patrols, community and beach clean-ups near facilities, and promotional campaigns to encourage drivers not to leave their car engines running unnecessarily.



JPec Co., Ltd.: Iwaya Beach clean-up, Wakamatsu (Fukuoka Prefecture)



JP Business Service Corporation: Green Fair (Tokyo)



## Environmental Load Data

Inputs and outputs during fiscal 2004 are as follows.

### Inputs

#### ◆Power Stations

##### Fuel

Coal (wet base)	233 thousand tons
Heavy oil	800 kl
Natural gas	45.4 million m <sup>3</sup> N

##### Water

Water for industrial use	1.5 million m <sup>3</sup>
--------------------------	----------------------------

##### Main resources

Limestone	2.9 thousand tons
-----------	-------------------

#### ◆Offices/Other Facilities

##### Electricity consumption

6.65 million kWh

##### Water

30 thousand m<sup>3</sup>

##### Fuel

Gasoline/kerosene/diesel/Class A heavy oil	2 thousand kl
City gas	3 thousand m <sup>3</sup> N
LPG	7.3 tons

##### Copy paper

27 million sheets

##### Sanitary paper

62 thousand rolls

### Business Activities

◆Primarily maintenance and services for J-POWER electricity generation business

◆Electricity supply business

Electric power sales volume: 1 billion kWh

### Outputs

#### ◆Power Stations

##### Atmospheric emissions

CO <sub>2</sub>	672 thousand t-CO <sub>2</sub>
SO <sub>x</sub> ☹	166 tons
NO <sub>x</sub> ☹	198 tons
Soot and dust ☹	3 tons

Note: All coal ash is recycled in cement

#### ◆Industrial Waste

##### Coal ash

33.9 thousand tons

##### Other

17.4 thousand tons

(43.3 thousand tons [84%] of industrial waste was recycled)

##### General waste ☹

280 tons

(80 tons [27%] of general waste was recycled)

##### CO<sub>2</sub> emissions from electricity/gas/fuel use in offices

##### and other facilities

7.9 thousand t-CO<sub>2</sub>



Itoigawa Power Station (Niigata Prefecture)



Nagasaki Shikamachi Wind Farm (Nagasaki Prefecture)

## Environmental Business

J-POWER group companies conduct a range of environmental business activities, including sale of environmentally friendly products made with recycled coal ash and driftwood as well as energy- and resource-saving products, and consulting services aimed at harmonizing development with the environment.

### JP Business Service Corporation

#### ◆“Savestar” Water-saving Valve

The eco-friendly “Savestar” water-saving valve sold by JP Business Service Corp. reduces both water consumption and costs.



Savestar

**Inquiries:**  
Market Development Business Dept.  
JP Business Service Corp.  
Tel. +81-3-3642-9817  
<http://www.jpbs.co.jp/>

### JPHYTEC Co., Ltd.

JPHYTEC carries out energy-saving checks on facilities and installs various energy-saving products as part of its environmental business.

Energy-saving devices:  
EcoSylphi and NeoLux

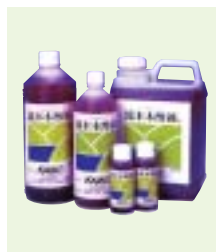


Energy-saving devices: EcoSylphi and NeoLux

**Inquiries:**  
Energy-saving and Engineering Group  
Electricity Business Dept., JPHYTEC Co., Ltd.  
Tel. +81-3-3234-0468  
<http://www.jphytec.co.jp/>

### Epure Co., Ltd.

Large amounts of driftwood are swept into dam reservoirs in mountainous areas. This driftwood is usually collected and disposed of, but after researching the possibility of effectively utilizing such driftwood, Epure discovered it could be used for high-quality charcoal. The company produces and sells skincare products made from driftwood charcoal and pyroligneous acid that are gentle on both the natural environment and human skin.



Pyroligneous acid



Koju no Shizuku

**Inquiries:**  
Customer Services, Epure Co., Ltd.  
Tel. +81-3-3642-0481  
<http://www.epure.co.jp/>

### JPec Co., Ltd.

#### ◆Environmental Engineering Service

JPec provides a range of customized environmental solutions. Building on its many years of experience with environmental surveys and gardening services, in recent years the company has begun to offer survey, planning, design, construction, and management services for the conservation and creation of natural environments such as biotopes. It also manufactures cleaning agents that combine environmental responsibility with good business sense and offers consulting services to support the J-POWER Group's environmental management efforts.



Alkaline detergent



Wetland restoration following completion of Okutadami-Otori hydro project construction

**Inquiries:**  
Environmental Engineering Dept., JPec Co., Ltd.  
Tel. +81-3-5203-0361 <http://www.jp-ec.co.jp/>

#### ◆Thermal Power Recycling Business

Waste and byproducts from thermal power stations are effectively recycled through sales of coal and gypsum. Coal ash is also the main ingredient of the world's first citrate soluble potassium silicate fertilizer, developed and sold throughout Japan by J-POWER.



For vegetables



For flowers

**Inquiries:**  
Fertilizer Business Group  
Thermal Power Recycling Business Dept.  
JPec Co., Ltd.  
Tel. +81-3-5203-0371  
<http://www.jp-ec.co.jp/>

Superblend is a hybrid fertilizer with the optimum balance of nitrogen, phosphate, and potassium, which are needed by all plants.

### KDC Engineering Co., Ltd.

KDC Engineering offers a wide range of services aimed at ensuring a balance between development and the environment, including surveys, analysis, forecasting, and solutions. The company uses technical know-how built up over many years of experience with geological and groundwater surveys to carry out high-precision survey and analysis and propose optimum water purification solutions.

(A designated survey organization under the Soil Contamination Countermeasures Law: Environment 2003-1-815)

**Inquiries:**  
KDC Engineering Co., Ltd.  
Tel. +81-3-5371-9588 <http://www.kdc.co.jp/>



## Society

J-POWER's social initiatives are closely connected to its Corporate Philosophy. In particular, the following four components of our Corporate Philosophy constitute the foundation on which we conduct social activities.

- Sincerity and pride underlie all our corporate activities.
- We build community trust by harmonizing our operations with the environment.
- 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.

### Sincerity and Pride Underlie All Our Corporate Activities

#### Earning Trust through Sincere Corporate Operations

- J-POWER is a multinational energy company that engages in corporate activities not only in Japan but in many countries around the world. We are supported by a diverse range of stakeholders, including shareholders, customers, suppliers, and local communities. Accordingly, we operate the company premised on sincerity in order to earn the trust of our stakeholders.
- Since our establishment we have given particular priority to transparency and fairness in corporate activities as an energy company that serves the public interest. We intend to continue to value this conscientious corporate culture in the future and plan to lend further strength to it.
- To this end J-POWER has actively worked to clarify and disseminate our Corporate Philosophy, formulate Corporate Conduct Rules, establish structures to promote compliance, disclose information on management and the company, engage in dialogue with external organizations, and establish an appropriate relationship with the government.
- J-POWER recognizes that it has a social responsibility to properly understand the importance of individual rights and interests, protect the personal information of customers, suppliers, and others, and maintain their trust. We act in accordance with this recognition.

### Compliance and Governance

J-POWER promotes healthy corporate activities through each and every executive and employee acting both in accordance with laws and ordinances and with social norms.

#### ◆ Promoting Compliance

For the promotion of compliance management, J-POWER has organized its compliance-related regulations, including the Compliance Code, which was drawn up to serve as a more concrete basis for evaluating actions. We have also established committees which promote compliance and quickly respond to compliance-related issues when they occur.

Regulations	Committees
<ul style="list-style-type: none"> <li>● J-POWER Corporate Conduct Rules</li> <li>● Compliance Code</li> <li>● Compliance Promotion Regulations</li> </ul>	<ul style="list-style-type: none"> <li>● Compliance Committee</li> <li>● Compliance Consultation Desk</li> </ul>

We have established a Compliance Consultation Desk to provide a place for employees to go for consultation when they are directly faced with a compliance-related issue. The privacy of employees using this service is protected and they are not disadvantaged in any way.

#### ◆ Corporate Governance

J-POWER uses a system of corporate auditors for the sake of transparency and fairness. The auditors attend meetings of the Board of Directors and the Board of Managing Executive Committee Directors and work to enhance the effectiveness of auditing functions.

In addition, the Internal Audit & Legal Office endeavors to ensure proper management of company operations by conducting internal audits.

### Respect for Human Rights, Prohibition on Discrimination

J-POWER's Compliance Code mandates that the company constantly work to maintain a healthy work environment, to respect the rights of each individual, and to entirely refrain from actions that lead to discrimination.

#### ◆ Employee Training on Human Rights Issues

J-POWER endeavors to raise the awareness of employees by conducting human rights training as a part of its management training program.

## Information Disclosure

J-POWER widely discloses company information in order to improve the transparency of corporate activities and raise accountability. Our specific initiatives in this area are as follows.

### ◆ Disclosure Committee

The president chairs the Disclosure Committee, which we established to fairly, transparently, and proactively disclose information on the company.

### ◆ Information Transmission in Emergencies

In emergencies such as natural disasters and accidents, we quickly assess the situation and disseminate information about it.

## Dialogue with the General Public

J-POWER endeavors to have a presence in society that is broadly open to the outside through actively engaging in dialogue with external organizations and establishing an appropriate relationship with the government. Specific activities follow below.

### ◆ Communication with the Public

We strive to keep interactive communication open with the public through our website, [www.jpowers.co.jp/english/index.html](http://www.jpowers.co.jp/english/index.html), which features information on contacting us via email or telephone.



Contact Us page on J-POWER's website

### ◆ Exchange of Opinions on Business Activities

For construction projects in areas inhabited by rare animals and plants, we adopt policies that reflect the recommendations of experts and actively hold discussions with environmental protection organizations where opinions are exchanged.



Flight status of helicopter flying to a raptor nesting area  
Right: Normal flight  
Left: High altitude flight (450 m)  
(Hokkaido Transmission Line Maintenance Center, Hokkaido)

## Respect for Privacy

As a company that works to promote compliance activities based on our Corporate Philosophy, we comply with regulations related to protecting personal information, and management and all employees recognize the importance of managing such information. We have established a basic policy to ensure its proper handling.

### ◆ Policy for the Protection of Personal Information Privacy (Basic Policy)

J-POWER recognizes that it has a social responsibility to properly understand the importance of individual rights and interests, protect the personal information of customers, suppliers, and others, and maintain their trust. We strive to act as follows in accordance with this recognition.

■ Because leakage, alteration, loss, improper use, disclosure without permission, and other such acts with respect to personal information possessed by

the company damage the trust put in the company by society and exert a substantial impact on the promotion of our business activities, executives and all employees recognize the importance of managing personal information and their responsibilities with respect thereto and take sincere actions in this regard.

■ Executives and all employees uphold laws and ordinances related to protecting personal information and relevant internal regulations, and they properly handle personal information possessed by the company.



## We Build Community Trust by Harmonizing Our Operations with the Environment

### Harmonious Relations with Local Communities

- J-POWER involves itself in a variety of corporate activities that seek harmony with local communities. We believe it is important to increase opportunities for employees to directly interact with residents in order to continue to deepen the relationships of trust we share with local communities.
- Safety and peace of mind are major preconditions for maintaining corporate activities that enjoy the trust of local communities both domestically and overseas. To this end we also comply with local laws and ordinances, show respect for different cultures and customs, conduct corporate activities in accordance with international standards, and publicize and open our facilities to local residents. Employees also participate in a variety of activities that benefit local communities.
- As a part of our business activities, we have long sent specialists to developing countries and accepted trainees from them. Such initiatives both contribute to the development of electric power technology in those countries and help deepen understanding on all sides.

## Interacting with Local Residents

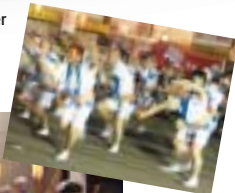
In order for local residents to gain an even greater understanding of J-POWER and to deepen the relationship of trust we share with them, we create many opportunities for employees of the J-POWER Group to interact directly with residents. Specific activities in this regard follow below.

### Participation in Local Events and Traditional Performing Arts

We participate in events and festivals in communities near our dams and power stations, and support the holding of such events as a sponsor. We also participate in events featuring traditional performing arts to protect and show respect for local culture.



Participating in the Tokachi River Raft Excursion (Kamishihoro Power Administration Office, Hokkaido)



Participating in the Tokushima Awa Dance (Tachibanawan Thermal Power Station, Tokushima Prefecture)



Cleanup at Kumano Ancient Road, a World Heritage site (Totsukawa Power Administration Office, Nara Prefecture)



Participating in dragon boat races (Matsushima Thermal Power Station, Nagasaki Prefecture)

## Opening Facilities and Establishing PR Houses

### ◆ Opening Facilities to the Public

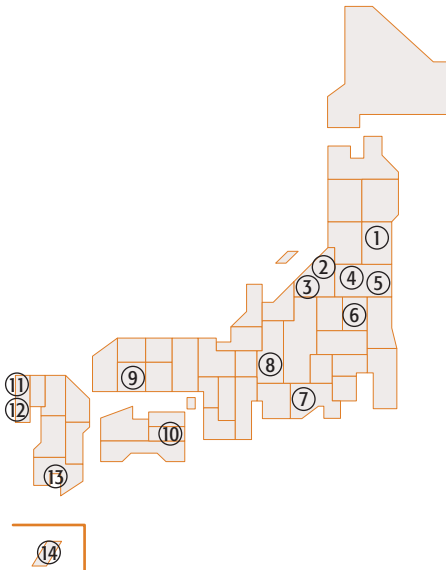
We open our power stations, research labs, and other facilities on certain days to provide the opportunity to the general public to see and learn about them.

**Power Stations and Other Facilities Opened to the Public (FY 2004)**

Facility	Details	Visitors
Isogo Thermal Power Station	Power station opened to the public for a day	2,400
Takasago Thermal Power Station	Power station opened to the public for a day Movie shown on the premises for senior citizens club	2,500
Takehara Thermal Power Station	Power station opened to the public for a day	2,800
Matsushima Thermal Power Station	Fishing tournament on the power station premises	150
Ishikawa Coal-Fired Power Station	Power station opened to the public for a day	2,400

### ◆ Establishment of PR Houses

We have worked to facilitate greater knowledge of electric power and J-POWER among the general public by holding tours and establishing exhibition pavilions throughout the country.



**J-POWER's PR Facilities**

Name	Address
1. Onikobe Exhibition House	2-5 Onikobe-aza-Arao-dake, Naruko-cho, Tamatsukuri-gun, Miyagi Prefecture 989-6941
2. Okutadami Electric Power PR House	1317-3 Imokawa-aza-Otori, Yunotani, Uonuma-shi, Niigata Prefecture 946-0082
3. Okukiyotsu Exhibition Facility "OKKY"	502 Oaza-Mikuni-aza-Tsuchibayama, Yuzawa-machi, Minami-Uonuma-gun, Niigata Prefecture 949-6212
4. Tadami Exhibition House	2476-230 Oaza-Tadami-aza-Atoyama, Tadami-machi, Minami-Aizu-gun, Fukushima Prefecture 968-0421
5. Shimogo Exhibition House	847-1 Oaza-Konumazaki-aza-Hanjo-otsu, Shimogo-machi, Minami-Aizu-gun, Fukushima Prefecture 969-5208
6. Numappara Exhibition House	897-6 Itamuro-aza-Takinosawa, Nasu-Shiobara-shi, Tochigi Prefecture 352-0111
7. Sakuma Electric Power PR House	2252 Sakuma, Sakuma-cho, Hamamatsu-shi, Shizuoka Prefecture 431-3901
8. Dam Site Park MIBORO	140-1 Oaza-Maki, Shirakawa-mura, Ono-gun, Gifu Prefecture 501-5505
9. Takehara Thermal Power Exhibition House	2-1-1 Tadanouminagahama, Takehara-shi, Hiroshima Prefecture 729-2311
10. J-POWER Yonden Wonderland	1 Funabata, Fukui-cho, Anan-shi, Tokushima Prefecture 779-1620
11. MATSUURA Energy Plaza	458-1 Aza-Sezaki, Shirahama-men, Shisa-cho, Matsuura-shi, Nagasaki Prefecture 859-4506
12. Matsushima Thermal Power PR Room	2573-3 Matsushima-Uchigo, Oseto-cho, Saikai-shi, Nagasaki Prefecture 857-2531
13. J-POWER Fureai House	3985-9 Aza-Uchikomi, Koshi, Satsuma-cho, Satsuma-gun, Kagoshima Prefecture 859-2101
14. Teida Hall	3-4-1 Ishikawa-Akasaki, Uruma-shi, Okinawa Prefecture 904-1103

## Community Volunteer Activities

Employees volunteer to visit local kindergartens and schools to perform plays.



Putting on a play at a kindergarten (Takasago Thermal Power Station, Hyogo Prefecture)

# Safety and Peace of Mind

J-POWER constructs and operates large-scale power generation and transmission facilities. We believe that ensuring safety is a major precondition for engaging in corporate activities that are trusted by local communities. To this end we conduct the following initiatives to deliver peace of mind to community members.

## ◆ Management Regulations for Safety and Health

Based on the Management Regulations for Safety and Health drawn up in January 1993, we have formulated detailed regulations regarding a safety and health management system, safety and health educational programs, and a management system for occupational safety and health. We also strive to prevent public disasters and industrial accidents.

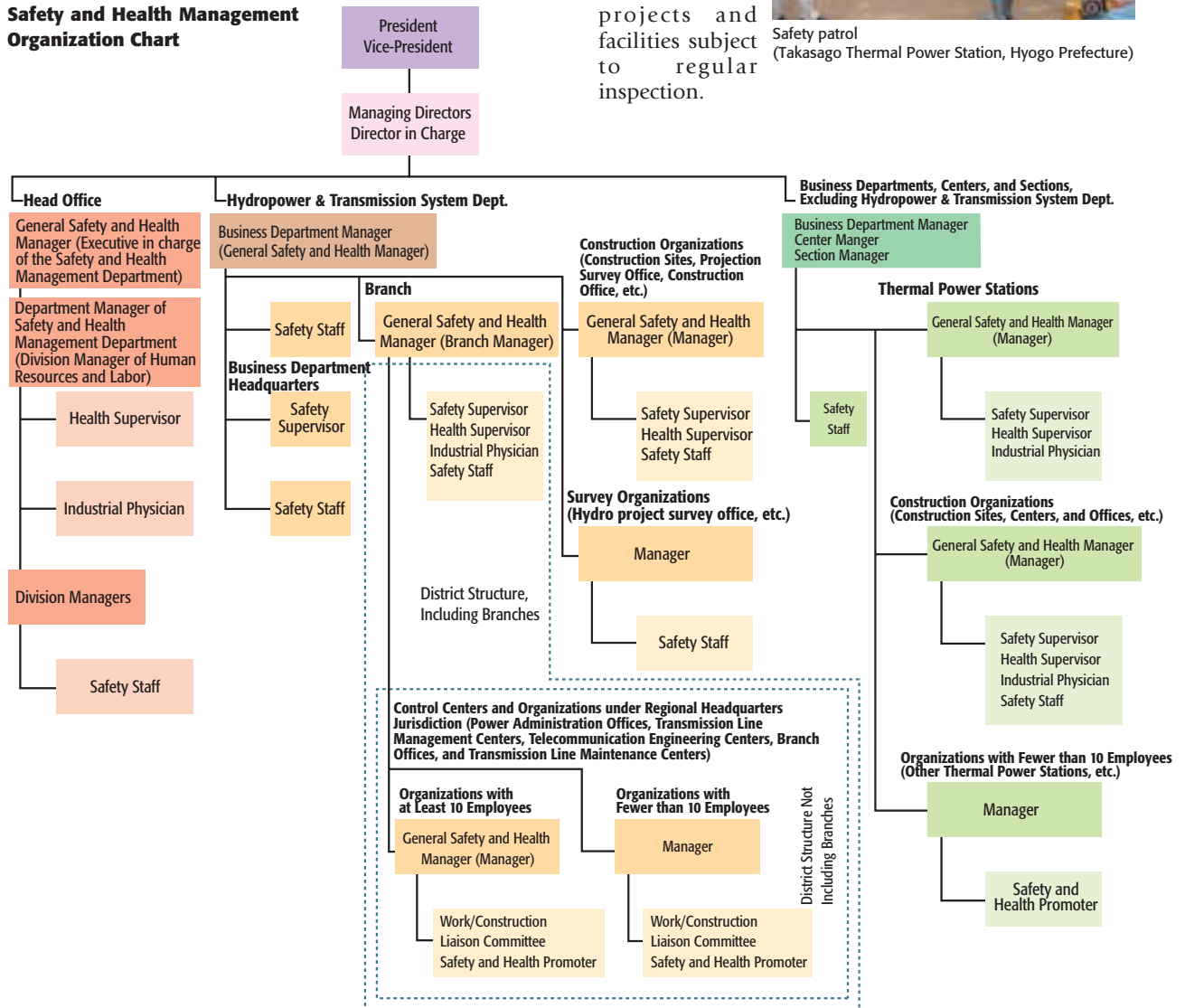
## ◆ Safety and Health Activities

Along with a safety and health educational program involving level-specific training for company employees, we have established organizational structures for safety and health management, including the Safety and Health Promotion Committee, which is formed jointly with construction contractors. We further work to prevent industrial accidents and promote health management by conducting safety patrols, which target large-scale construction projects and facilities subject to regular inspection.



Safety patrol (Takasago Thermal Power Station, Hyogo Prefecture)

### Safety and Health Management Organization Chart





## Safety and Health Training

Level	Training Plan
Beginning and Mid-level Engineering Staff	Two days per year
Upper Level Engineering Staff	Two days per year
Administrative Staff	Two days per year
Administrative Management	Two days per year
General Safety and Health Managers, Safety Officers, Safety Staff, Safety and Health Promoters	Two days per year
Foremen & Health and Safety Controllers	Two days per year
Occupational Safety and Health Management System Auditors	Two days three times per year

## Number of Industrial Accidents during J-POWER-related Projects

	Deaths	Serious Injury	Slight Injury
FY 2002	0	8 people (8 incidents)	9 people (8 incidents)
FY 2003	0	7 people (5 incidents)	4 people (4 incidents)
FY 2004	0	2 people (2 incidents)	8 people (8 incidents)

## Frequency and Severity

	Frequency Rate	Severity Rate
FY 2003	0.64	0.02

**Notes** 1. The frequency rate is the number of deaths and injuries caused by industrial accidents that lead to at least one day of missed work per one million hours worked. It expresses the frequency with which accidents occur.  
2. The severity rate is the number of days of work missed due to an industrial accident per 1,000 hours worked. It expresses the severity of the accidents.

## Community Activities

J-POWER considers the fulfillment of its responsibilities as a member of society to be indispensable to ensuring its ongoing growth as a company and therefore actively engages in activities that benefit the community. Specific initiatives follow below.

### Culture and Welfare

#### ◆ Cultural Activities

We hold community concerts in various locations that serve as an expression of gratitude and provide local residents with the opportunity to enjoy classical music.

Through the concerts we deepen our relationship with the communities.



Community concert

#### ◆ Welfare Activities

We contribute to the welfare of local regions by holding small concerts at nursing homes and other sites.



Concert at a nursing home

### Energy Education

#### ◆ Participation in Energy Education

We broadly participate in school educational programs by explaining the structure of power plants and the properties of electricity to local elementary school, junior high school, and senior high school students. We also accept students with an interest in the power industry to work as interns.

Region	FY 2004 Course Details & Number
Eastern Japan	<ul style="list-style-type: none"> <li>Science classroom (elementary school and junior high school students): Total of 5 times for 98 students</li> <li>Aomori Prefecture Oma Senior High School General Course: Total of 2 times for 160 students</li> <li>Miyagi University of Education Affiliated Junior High School and 3 others (41 students)</li> </ul>
Central Japan	<ul style="list-style-type: none"> <li>Fukui Prefecture Izumimura Junior High School (10 students)</li> </ul>
Western Japan	<ul style="list-style-type: none"> <li>Science classroom</li> </ul>



Science classroom (Fukui Prefecture, Kuzuryu Power Administration Office)

#### ◆ Teacher Training Program

J-POWER accepts educators from Tokyo and provides an onsite training program for them.

#### ◆ Development of Foreign Engineers

By providing grants to exchange student assistance associations and loaning facilities, we contribute to the development of engineers from a global perspective.



## International Exchange

### ◆Support for Non-profit Organizations

We actively provide support for activities in the public interest performed by non-profit organizations like environmental NGOs, UNESCO (Note 1), and OISCA (Note 2). In so doing we contribute with a global reach to education, culture, and industry development.

Notes:1. United Nations Educational, Scientific and Cultural Organization  
2. Organization for Industrial, Spiritual and Cultural Advancement International

### ◆Accepting Trainees

J-POWER conducts training programs for engineers involved in electric power around the world. We accepted the following numbers of trainees in fiscal 2004.

Region	Country	Number
Asia	Cambodia	1
	China	1
	India	2
	Laos	8
	Mongolia	2
	Sri Lanka	6
	Vietnam	3
	Indonesia	1
	Thailand	2
	Malaysia	2
	Philippines	4
	Total	32
Middle and Near East, and Africa	Ghana	1
	Malawi	1
	Total	2
Total		34

Cumulative Total: 2,039



Trainees from Vietnam  
(Honshi Interconnection Line, Okayama Prefecture)

## Support for Volunteer Activities

J-POWER supports volunteer activities and participation in local events by providing special leave for this purpose.

### Indian Ocean Tsunami

The Indian Ocean tsunami in December 2004 affected many people and resulted in substantial loss of life. Among those affected were Sri Lankans involved in the Upper Kotmale Hydro Power project, on which J-POWER provides consulting. Condolence money given voluntarily by people involved in the project was used to buy 500 sets of paper and writing implements, which were donated to all the elementary students in Matara, Sri Lanka.

### Disaster Recovery Support Initiatives (Niigata-Chuetsu Earthquake)

J-POWER has four hydro power plants and other facilities in Uonuma, Niigata Prefecture, which was hit by the Niigata-Chuetsu earthquake. We also operate a ski area through a group company and otherwise share a close relationship with the local community. Given these connections, immediately after the earthquake struck we offered support in the form of relief provisions to help in the city recover.

In April 2005 we provided a portion of the head office in Higashi-Ginza, Tokyo, and assisted in managing an exhibition of local products.



Niigata on the Road to Recovery!  
Uonuma Giving Its All!  
Exhibition for Okutadami spring skiing and  
Uonuma sightseeing and local products

## We Continuously Refine Our Knowledge and Technologies to Be a Leader in These Areas

### Improving Employee Skills and the Spirit of Leadership

- Ever since its establishment, J-POWER has constantly worked to solve difficult problems, which have included implementation of the latest technology, in order to contribute to the stable supply of electric power and energy. We have had many successes in such time.
- Through such initiatives, J-POWER's employees have cultivated a pioneering spirit oriented toward leading the way in the pursuit of new knowledge and solutions. It is this pioneering spirit that supports the company over the long-term and serves as the driving force behind its development. The company in turn provides active support for the pioneering spirit of employees.

## Support for Employee Self-development

J-POWER provides active support for employees to become pioneers through refining their skills in their respective fields and to help them acquire new knowledge.

### ◆ Employee Support System

We have instituted a training system that supports employee initiatives. It consists of support for formulating career plans, assistance in learning business skills, and incentives and support for acquiring official certifications.

In order to help employees refine their skills and

knowledge, we have instituted a program to lighten the expense burden of employees by allowing them to allocate their cafeteria plan, a fringe benefit, to skill development activities, and a program whereby they can use their accumulated paid vacation days for the same purpose.

## Proposal Schemes

J-POWER established an in-house suggestion system consisting of performance improvement suggestions and idea awards in order to promote greater efficiency and improvements in operations, stimulate creative thinking, and foster the desire to participate in management by utilizing the creative ideas of employees in business processes.

### ◆ Performance Improvement Suggestions

This system has been in place since 1965. It involves soliciting suggestions for improvements from employees in order to streamline and rationalize operations.

### ◆ Idea Awards

Established in 2000, this system solicits creative ideas for the sake of improving and streamlining overall operations. Employees can present ideas for areas outside their realms of responsibility.

**Proposal Schemes (FY 2004)**

Scheme	Number of Suggestions (FY 2003)	Outstanding Proposals
Performance Improvement Suggestions	241 (195)	<b>Excellence Award – 1</b> Countermeasure for coal heat generation and ignition in coal storage silos
Idea Awards	258 (234)	<b>Gold Prize – 1</b> Proposal for electricity bill plan at dormitories for single employees

# We Meet the Challenges of Tomorrow by Harnessing Our Unique Skills and Enthusiasm

## Creating an Environment to Motivate and Bring Out the Individuality in Employees

- People form the backbone of any company, so for a company to experience sustained growth, dedicated employees brimming with individuality and the motivation to constantly pursue growth are essential. J-POWER strives to implement a variety of measures for hiring and fostering such talented personnel, to ensure workplace environments are pleasant, and to develop a corporate culture that makes work meaningful while respecting the personalities and individuality of employees.

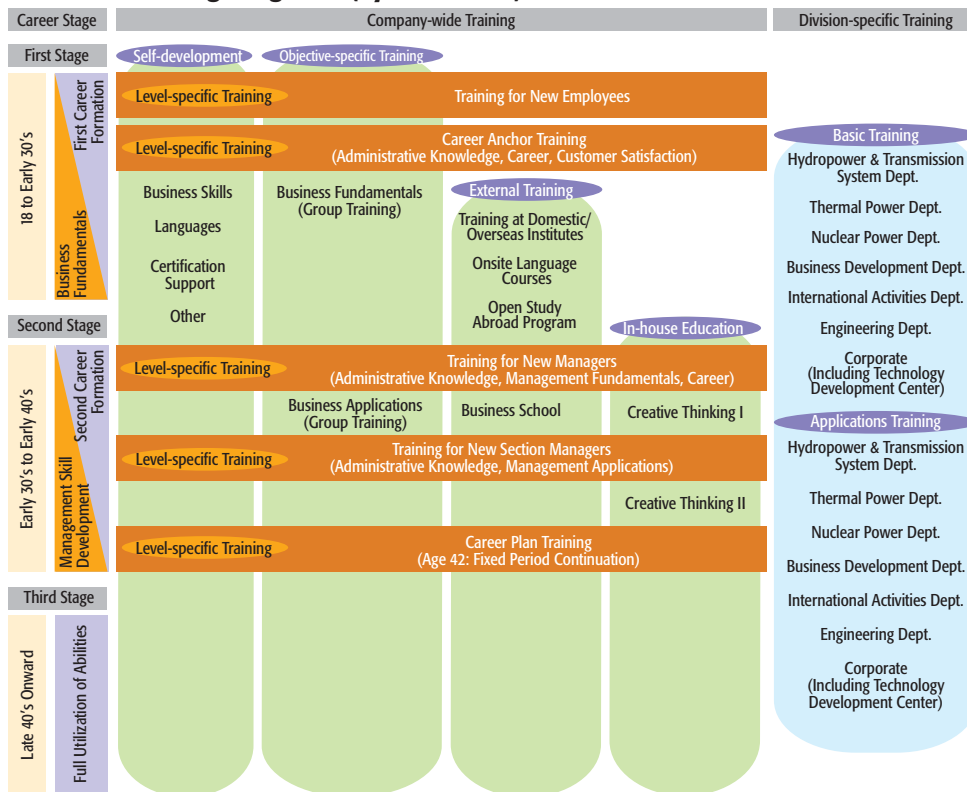
## Comprehensive Policy on Developing Talent

J-POWER has established a Career Development Program for effectively promoting the development of talent in employees, which serves as the source of the company's competitiveness. Along with clearly conveying the direction of the company, we promote, from a medium- to long-term perspective, interactive personnel development that aims at striking a balance with employees' future aspirations.

### ◆Mechanisms for Developing Talent

We have systems for career development and hiring that respect the autonomy of employees. Specifically, we conduct objective-specific and level-specific training throughout the company, run career development programs for each division, administer a self-assessment program, openly recruit talented personnel within the company, and actively encourage employees to participate in training overseas.

J-POWER Training Programs (System Chart)



## Human Resources Policy

Our specific measures in the area of human resources are as follows.

### ◆Creating Fulfillment and Challenges

In order to motivate and bring out the individuality of employees, J-POWER conducts measures in the area of human resources that organically combine management of individual goals, performance reviews, and employee benefits.

### ◆Hiring the Elderly and People with Disabilities

As measures to utilize human resources, we have a system to register personnel for the sake of utilizing in business operations the experience and willingness to work of elderly group employees. We are also striving to expand the hiring of people with disabilities.

## Maintaining the Mental and Physical Health of Employees

J-POWER implements measures for the sake of maintaining the mental and physical health of employees. Our specific initiatives are outlined below.

### ◆Health Management System

The General Health Center has been set up at the Head Office in Tokyo in order to help employees in the area manage their health. The center includes a medical clinic, a health counseling room, and a dental clinic.

The center is staffed with doctors, nurses, licensed nutritionists, dental hygienists, and clinical psychologists who offer general check-ups, health exams, health advice, dental treatment, mental health counseling, and other healthcare services.

In addition, the health counseling room helps employees manage the results of their health exams in an integrated manner. The results are analyzed statistically and incorporated into our health management policy.

### ◆Encouragement for Health Exams

Along with conducting regular health exams in accordance with the Industrial Safety and Health Law, we encourage employees to get full medical check-ups, dental exams, and eye exams on their own initiative.

	FY 2003	FY 2004
Percentage of employees receiving regular spring health exam (J-POWER)	94%	97%

### ◆Total Health Promotion Plan

The Total Health Promotion Plan is a program to build physical vitality and prevent the occurrence of lifestyle-related diseases. The program provides guidance on exercise, maintaining health, and nutrition based on employees' health test results.

## Promoting a Comfortable Workplace

J-POWER has policies designed to develop workplace environments that are pleasant places to work for employees. Our specific initiatives in this area follow below.

### ◆Proper Management of Working Hours

We use an IC-card-based system to manage in and out times in order to ensure proper working hours. We also designate certain days on which overtime work is not allowed.



In and out time management system (Head Office, Tokyo)

### ◆Preventing Sexual Harassment

In order to ensure a pleasant work environment, we have established consultation desks for the prevention of sexual harassment and work to raise awareness by distributing guidelines to employees.

### ◆Separate Smoking Areas

We have banned smoking in principle at administrative offices and inside company-owned vehicles, establishing separate rooms where smoking is allowed in an effort to prevent exposure to second-hand smoke at the workplace.

### ◆Barrier-free Measures

J-POWER has adopted a number of barrier-free measures (implementation of universal design), such as installing elevators and bathrooms that can be used by people with physical disabilities and creating slopes on curbs and steps.



Elevator that can be used by people with physical disabilities (Head Office, Tokyo)





# External Evaluation and Outside Opinions

J-POWER strives to incorporate independent evaluations and recommendations in various forms, including environmental ratings, reviews, environmental management report questionnaires, and the opinions of experts. By means of these evaluations and opinions, we can determine the kind of business development and environmental activities that others expect of J-POWER and work to improve our environmental management. By making such comments public, we can also improve our transparency and credibility.

## Environmental Management Rating

In fiscal 2004, as in 2003, J-POWER underwent a sustainable management rating review by the Sustainable Management Rating Institute (SMRI).

This rating is a comprehensive assessment of a company's efforts with regard to corporate responsibility and sustainable development, including its environmental policies. It consists of 69 indicators regarding "strategy," "organization," and "results" in three broad categories: management (with five subcategories), environment (nine subcategories), and society (nine subcategories).

The rating is based on written responses to 530 essential survey questions on 207 points, evidence inspection for verification purposes, and an interview with an officer in charge of environmental affairs regarding corporate management's attitude towards the environment and

policy for environmental efforts.

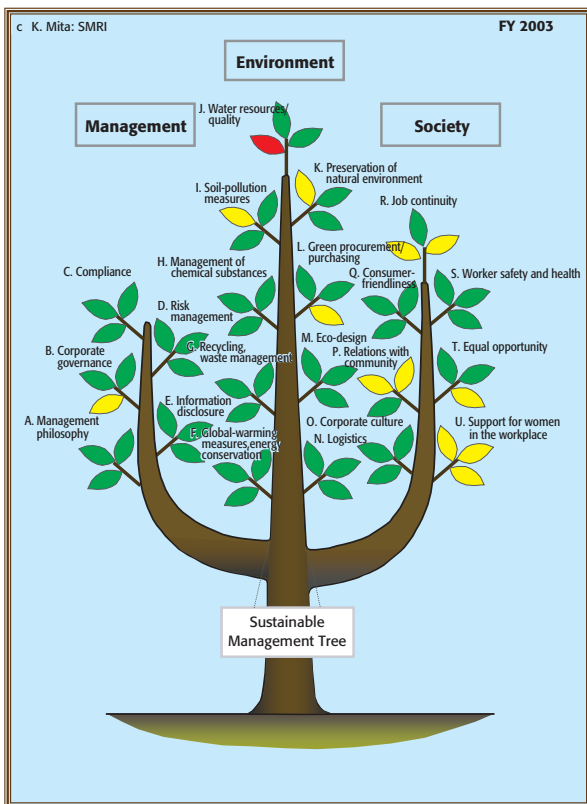
The results of the evaluation are expressed in the form of a large tree with three large limbs, 23 smaller branches, and 69 leaves. The rating for each item is indicated by the hue (out of four colors) of a leaf on the tree or, in the worst case, on the ground. In its fiscal 2004 rating, J-POWER received a rating of "outstanding" (dark green) on 46 indicators, "excellent" (yellowish green) in 17, and "good" (yellow) on 6 indicators. The report noted J-POWER's improvement in the environmental category.

Assessing J-POWER's overall performance, SMRI commented that "its most urgent task is to put more effort into the social aspects of CSR." At J-POWER we take such evaluations and opinions seriously, and we will continue to promote sound environmental management.

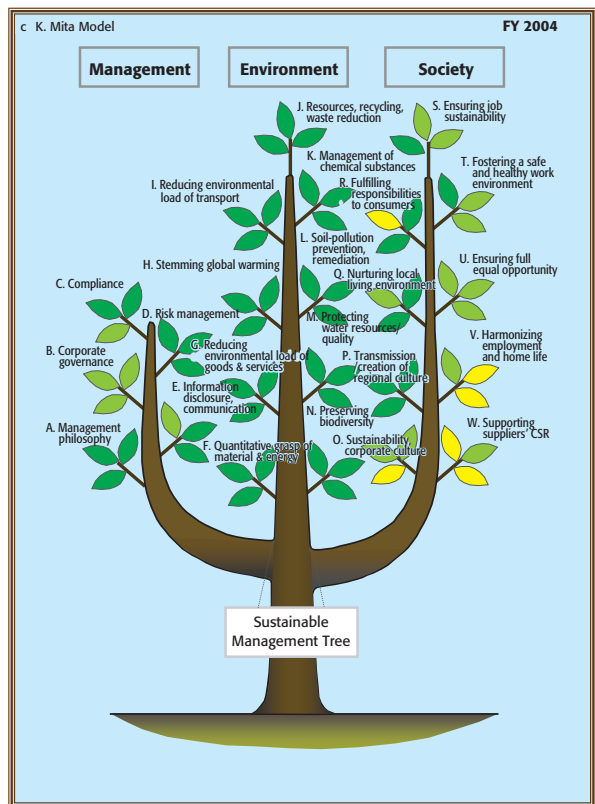
External Evaluation and Outside Opinions

Environmental Management Rating

Fiscal Year 2003



Fiscal Year 2004

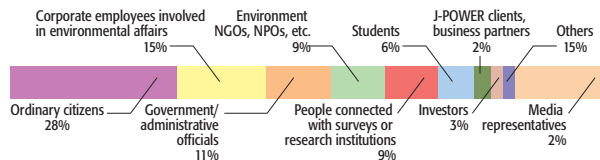


# Readers' Opinions

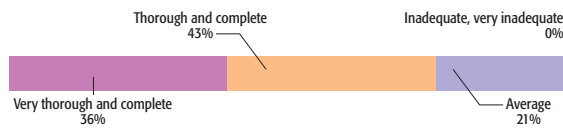
At J-POWER we received many comments from readers in response to our 2004 Environmental and Social Activities Report (published August 2004). We regard these valuable comments as important reference material for our compilation of subsequent reports and our future conduct of environmental management, and we intend to put their lessons to use in our corporate activities henceforth.

## Aggregate Questionnaire Results (as of the end of June 2005; 53 respondents)

### ◆ Breakdown of Readership



### ◆ Quantity and Quality of Information in the Report



### ◆ Areas That Should Be Augmented or Improved

#### Reader comments

- (1) The Society section is difficult to understand. (Educator)
- (2) At times the same topics are mentioned repeatedly. (Corporate employees involved in environmental affairs)
- (3) Uses language that is a bit hard for a student to understand. (Student)
- (4) I would like to see some pages that a middle school student could understand. (Government/administrative official)

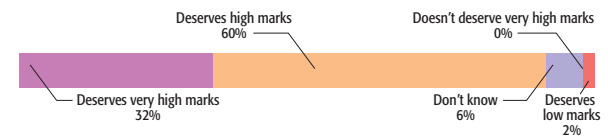
#### J-POWER's response

- (1) Streamlined the Corporate Philosophy section and made it easier to understand
- (2) Reorganized the content of the report
- (3) Notated specialized vocabulary and provided a glossary for reference
- (4) Compiled a separate, simplified environmental pamphlet

### ◆ Environmental/Social Activities Expected of J-POWER

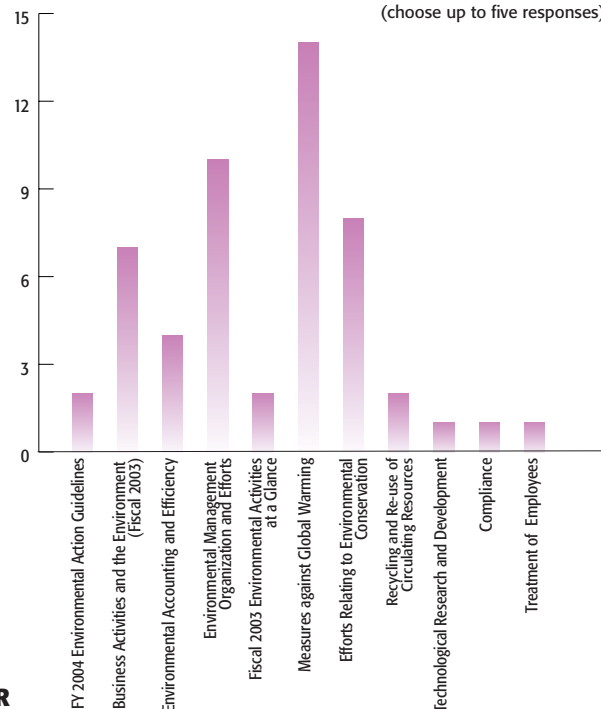
Typical Comments	J-POWER's Efforts
I expect a multi-pronged approach to stemming global warming. (Educator)	J-POWER Group as a whole has embraced the goal of reducing CO <sub>2</sub> emissions intensity (CO <sub>2</sub> emissions per unit of electricity sold). It is pursuing a number of approaches combined in an economically rational manner: maintaining and improving efficiency of energy use; developing low-CO <sub>2</sub> -emissions power sources; developing, transferring, and disseminating new technologies; and utilizing the Kyoto Mechanisms.
More development of wind power and other natural energy sources. (Person connected with survey or research institution)	In FY 2004, J-POWER launched operations at three wind power stations. It is committed to actively promoting the use and development of biomass and other renewable, unutilized energy ☀ sources henceforth as well.
I think efforts for international cooperation are important. (Citizen)	J-POWER intends to continue contributing to sustainable development ☀ around the world through its overseas transfer of technology for clean, high-efficiency coal-fired power generation.
Making existing coal-fired power generation safer and more environmentally friendly. (Citizen)	J-POWER has received ISO 14001 ☀ certification for all its thermal power stations (coal-fired and geothermal). It is committed to continued improvements in operation henceforth.
Efforts toward forest conservation. (Government/administrative official)	J-POWER is working actively to protect and develop forested company land, including that surrounding dam reservoirs. It is also involved in afforestation projects overseas and supports volunteer activity related to forest conservation.
Active disclosure of information when incidents occur. (Person connected with survey or research institution)	J-POWER is working hard to inform the public promptly when an environmental accident occurs at a power plant, and it has also published information on such incidents in this report. J-POWER is striving to improve corporate transparency and earn the public's trust.
It would be good to conduct some form of PR [regarding environmental efforts] oriented to the schools. (Government/administrative official)	J-POWER will continue working to publicize its environmental efforts widely not only through environmental pamphlets and this report but also through such projects as jointly sponsored energy classes in schools and elsewhere.

### ◆ J-POWER's Efforts and Activities Relating to the Environment and Society



### ◆ Areas That J-POWER Should Address More Aggressively

(choose up to five responses)



## Independent Recommendations

We asked Yuko Sakita, a knowledgeable journalist and environmental counselor who speaks for the ordinary citizen, for her comments on the 2005 Environmental Management Report.

### ◆ Comments on the 2005 Environmental Management Report

#### Looking Forward to Real Progress

Since the Kyoto Protocol came into force, measures to fight global warming, focused on building a sustainable society, have become a topic of everyday conversation.

In these times, the public is looking for management policies that guarantee the stable energy and power supply essential to our daily lives and work, using a variety of energy sources, including coal-fired, hydropower, nuclear power (under construction), geothermal power, wind power, and biomass. Such policies are indispensable for supporting Japan's social infrastructure. At the same time, it wants to see serious efforts to minimize the impact of these and other business activities on the environment.

This year J-POWER, responding to society's demands and working in accordance with a basic environmental management policy for "coexistence of energy and the environment" adopted last year, has formulated an "action plan" for achieving medium-term goals and forged a comprehensive vision and roadmap toward the ultimate goal of "zero CO<sub>2</sub> emissions." For this reason I think we can hope to see steady progress in environmental management.

#### A Greater Role in Supporting the Global and Regional Environment

Specifically, J-POWER has embraced the goal of a 10% reduction in CO<sub>2</sub> emissions per unit of electricity sold, compared with the fiscal 2002 level, by fiscal 2010. Given J-POWER's influence as a member of the wholesale power and energy industry, which currently accounts for 3% of Japan's CO<sub>2</sub> emissions, I think the company's willingness to honestly disclose the current emissions situation and continue its reduction efforts are to be commended.

Primarily because of greater demand for electricity from coal-fired power stations, CO<sub>2</sub> emissions rose in 2004. J-POWER is working diligently on CDM projects and technologies to reduce, capture, and store emissions, and I am hopeful that their efforts will bear fruit.

In addition to emissions reduction from coal-fired power plants, society has a very positive attitude toward renewable energy sources, including wind power, geothermal power, biomass, and micro-hydropower, as well as conventional hydropower. I am eager to see J-POWER get down to work on new-energy development initiatives including those based on a long-term

perspective, such as development of a vision for a hydrogen-powered society.

J-POWER is currently in the process of building a nuclear power station, nuclear power being one example of a low-emissions energy source, and I am counting on the company to make even more strenuous efforts to ensure safety and peace of mind, disclose information, and communicate with the local community.

With regard to local and regional environmental issues, J-POWER has its sights set on the creation of a recycling-based society and to that end is aiming for zero emissions of industrial waste. This is a particularly relevant topic given the shortage of final disposal sites throughout the country. My hope is that J-POWER will not limit its efforts to activities inside the company but will consider teaming up with local industry in the pursuit of zero emissions, with a view to becoming an active participant in the creation of regional recycling-based societies.

#### Transparency, Credibility, and Contribution to Society

One year has passed since J-POWER became a private corporation, and the company's stakeholders are growing increasingly diverse. Against this backdrop, J-POWER's efforts to make public the information on eight environmental incidents to improve transparency and credibility are to be applauded.

Another important way of building a relationship of trust with society and the local community is to deepen citizens' understanding of energy and the power industry. I would like to see J-POWER broaden its range of communication by promoting programs like hands-on learning at electric power facilities, energy education, and environmental conservation activities in partnership with local communities. In the past few years, the emphasis on corporate social responsibility has continued to increase. In order to maintain its trustworthy image, not only in the community and society as a whole but also among investors and the people who work there, J-POWER needs to establish CSR as a high priority within the company and work over the long term for the creation of a sustainable Asia and a sustainable world.

Journalist, environmental counselor  
**Yuko Sakita**



### ◆ Response:

We who have made it our own mission to answer the present era's call for coexistence between energy and the environment are grateful for your encouraging words. Drawing on its own unique ideas and continuous innovation, the J-POWER Group will work tirelessly to achieve the targets spelled out in this report.

In addition, now that the organization has become a private corporation listed on the Tokyo Stock Exchange, we are more keenly aware than ever of the importance of earning the trust of our stakeholders in every aspect of our

business, as a matter of corporate social responsibility. We intend to redouble our efforts to improve performance in the critical areas of public disclosure and communication.

Chairperson, Environmental Activities  
Promotion Board  
Executive Managing Director  
**Masayoshi Kitamura**





## Independent Review

Since 2004, J-POWER has submitted its Environmental Management Report for review by an independent organization, Shin Nihon Environmental Management and Quality Research Institute, with a view to improving its credibility vis-à-vis the environmental performance indicators presented in the report.

### Review of 2005 Environmental Management Report by an Independent Organization

In 2005, the review included the following:

- (1) Verification of supporting documents to confirm correspondence between information in report and actual situation
- (2) Verification of facts by interview
- (3) Accuracy check of information in report (Evaluation of internal controls in compilation of numerical data; data check by sampling)

The 2005 review was conducted at J-POWER's main headquarters, Isogo Thermal Power Station, and Kamishihoro Power Administration Office.

In addressing the issues raised in the review, we feel that we have been able to enhance our credibility with regard to numerical data, while at the same time making structural improvements in the gathering of statistics and other procedures that will serve us well henceforth.



On-site review (Nukabira Power Station, Kamishihoro Power Administration Office)



On-site review (Isogo Thermal Power Station, Kanagawa Prefecture)



Document review (Isogo Thermal Power Station, Kanagawa Prefecture)



Report on the independent review of the 2005 Environmental Management Report



## Fiscal Year Data

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

### Power Facilities (maximum output)

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Hydroelectric	10 MW	709	826	826	855	855
Thermal	10 MW	465	782	782	782	782
Coal-fired	10 MW	464	781	781	781	781
Geothermal	10 MW	1	1	1	1	1
Total	10 MW	1,174	1,609	1,609	1,637	1,637

### Electricity Output

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Hydroelectric	GWh	12,451	11,333	10,624	12,103	12,892
Thermal	GWh	29,551	44,544	48,679	51,237	52,708
Coal-fired	GWh	29,452	44,439	48,599	51,133	52,616
Geothermal	GWh	99	105	80	104	92
Total	GWh	42,002	55,877	59,303	63,340	65,600

### Electric Power Sales Volume

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Hydroelectric (excluding pumped storage)	GWh	10,046	8,873	8,902	10,850	11,172
Thermal	GWh	27,293	41,529	45,527	47,937	49,345
Coal-fired	GWh	27,206	41,434	45,453	47,841	49,261
Geothermal	GWh	87	96	74	96	84
Total	GWh	37,338	50,403	54,429	58,787	60,517

### Fuel Consumption

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Coal (dry coal 28 MJ/kg conversion)	10,000 tons	956	1,412	1,543	1,621	1,669
Use intensity (coal-fired thermal)	t/GWh	351	341	340	339	339
Heavy oil	10,000 kl	10	5	5	7	6
Diesel	10,000 kl	1	3	3	3	3

Note: Denominator for use intensity represents power sales from coal-fired thermal power stations.

### Greenhouse Gas Emissions

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
CO <sub>2</sub> emissions	10,000 tons-CO <sub>2</sub>	2,418	3,574	3,915	4,107	4,222
Intensity (all types)	-CO <sub>2</sub> /kWh	0.65	0.71	0.72	0.70	0.70
Intensity (coal-fired)	-CO <sub>2</sub> /kWh	0.89	0.86	0.86	0.86	0.86
SF <sub>6</sub> emissions	t	—	0.1	0.0	0.1	0.0
Handled	t	—	5.1	4.2	6.2	3.4
Recovery rate	%	—	98	99	98	99
HFC emissions	t	—	0.0	0.0	0.0	0.0

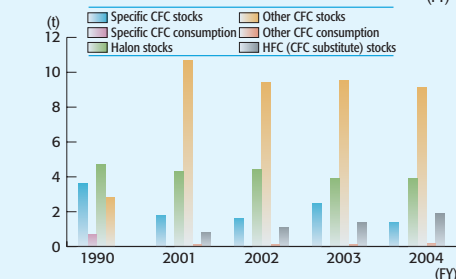
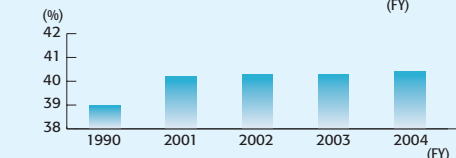
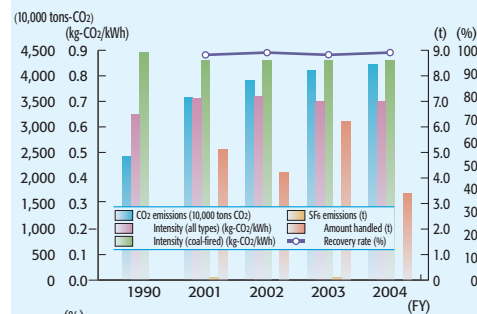
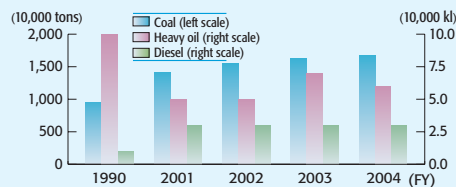
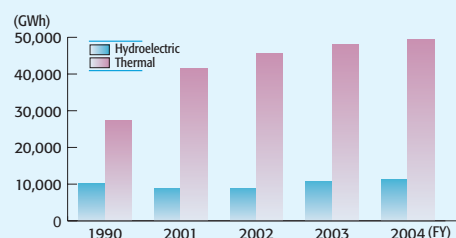
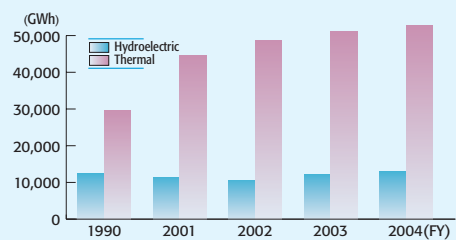
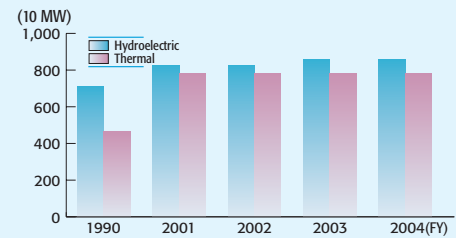
Notes: 1. Denominators for emission intensity represent power sales  
2. Excluding Wakamatsu Research Institute

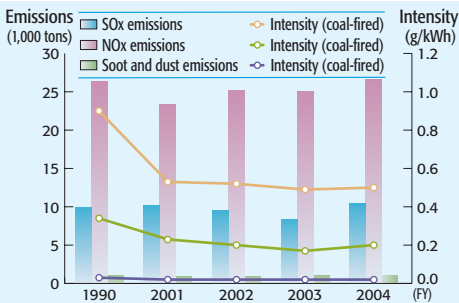
### Average Thermal Efficiency of Coal-fired Power Stations (at generation point)

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Average thermal efficiency (at generation point)	%	39.0	40.2	40.3	40.3	40.4

### Usage of Specific CFCs

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004	
Specific CFCs	Stocked	t	3.6	1.8	1.6	2.5	1.4
	Consumed	t	0.7	0.0	0.0	0.0	0.0
Halons	Stocked	t	4.7	4.3	4.4	3.9	3.9
	Consumed	t	0.0	0.0	0.0	0.0	0.0
Other CFCs	Stocked	t	2.8	10.7	9.4	9.5	9.1
	Consumed	t	0.0	0.1	0.1	0.1	0.2
HFCs (CFC substitutes)	Stocked	t	—	0.8	1.1	1.4	1.9
	Consumed	t	—	0.0	0.0	0.0	0.0





### SOx, NOx, and Soot and Dust Emissions

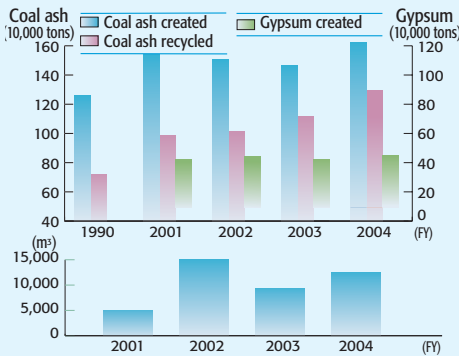
	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
SOx emissions	1,000 tons	9.9	10.2	9.5	8.4	10.4
Intensity (coal-fired)	g/kWh	0.34	0.23	0.20	0.17	0.20
NOx emissions	1,000 tons	26.4	23.4	25.2	25.0	26.6
Intensity (coal-fired)	g/kWh	0.90	0.53	0.52	0.49	0.50
Soot and dust emissions	1,000 tons	1.0	0.9	0.9	1.0	1.0
Intensity (coal-fired)	g/kWh	0.03	0.02	0.02	0.02	0.02

Notes: 1. Soot and dust emissions calculated from monthly measurements  
2. Denominators for emissions represent power generation in coal-fired thermal power stations

### Coal Ash and Gypsum Recycling

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Coal ash created	10,000 tons	125.7	153.9	150.7	146.5	162.3
Coal ash recycled	10,000 tons	71.9	98.8	101.4	111.9	147.5
Coal-ash recycle rate	%	57	64	67	76	91
Gypsum created	10,000 tons	-	35.4	33.0	32.0	37.1
Gypsum recycle rate	%	100	100	100	100	100

Note: Refer to p. 33 for details on coal-ash recycling rate



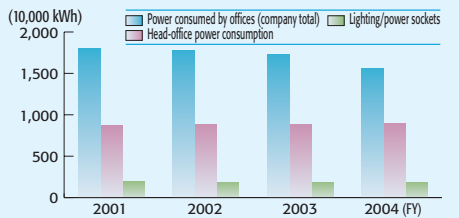
### Effective Use of Driftwood

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Volume effectively used	m <sup>3</sup>	-	5,000	15,000	9,400	12,500

### Office Power Consumption

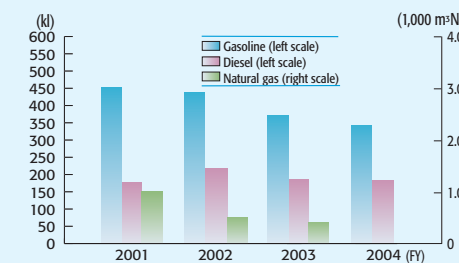
	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Power consumed by offices (company total)	10,000 kWh	-	1,797	1,781	1,728	1,564
Head office power consumption	10,000 kWh	-	866	884	881	899
Lighting/power sockets	10,000 kWh	-	190	185	179	179

Note: Figures for FY 2001 to FY 2003 include some power for non-office projects



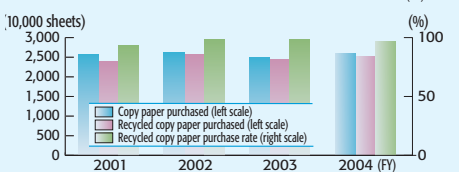
### Fuel Consumption (vehicles, ships, emergency generators, etc.)

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Gasoline	kl	-	452	438	372	342
Diesel	kl	-	176	217	185	182
Natural gas	1,000 m <sup>3</sup> N	-	1	0.5	0.4	0.0



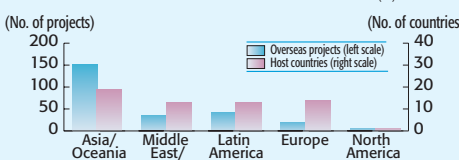
### Green Purchasing

	Unit	FY 1990	FY 2001	FY 2002	FY 2003	FY 2004
Copy paper purchased	10,000 sheets	-	2,560	2,617	2,492	2,597
Recycled copy paper purchased	10,000 sheets	-	2,380	2,560	2,453	2,511
Recycled copy paper purchase rate	%	-	93	98	98	97



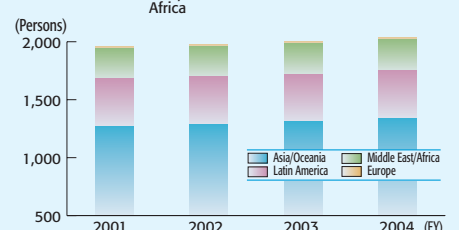
### Overseas Technology Cooperation Projects

	Unit	Asia/Oceania	Middle East/Africa	Latin America	Europe	North America	Total
Projects	Projects	151	35	43	18	1	248
Host countries	Countries	19	13	13	14	1	60



### Foreign Trainees Accepted

	Unit	-	FY 2001	FY 2002	FY 2003	FY 2004
Total foreign trainees accepted	Persons (cumulative total)	-	53(1,961)	19(1,980)	25(2,005)	34(2,039)
Asia/Oceania	Persons (cumulative total)	-	48(1,271)	17(1,288)	20(1,308)	32(1,340)
Middle East/Africa	Persons (cumulative total)	-	2 (409)	1 (410)	3 (413)	2 (415)
Latin America	Persons (cumulative total)	-	2 (262)	1 (263)	2 (265)	0 (265)
Europe	Persons (cumulative total)	-	1 (19)	0 (19)	0 (19)	0 (19)



# Treaties and Laws Relating to Global Warming

## Plan to Meet the Targets of the Kyoto Protocol

In accordance with the Law Concerning the Promotion of the Measures to Cope with Global Warming (Law no. 117, 1998), the Japanese government has formulated a Kyoto Protocol Target Achievement Plan establishing the measures and mechanisms needed for Japan to be certain of meeting its Kyoto Protocol commitment to reduce emissions by 6% from the 1990 level. On April 28, 2005, the plan was adopted by cabinet resolution.

### Basic Directions for the Promotion of Measures to Stem Global Warming


#### Goals for Fighting Global Warming

- Achieve the 6% reduction target under the Kyoto Protocol without fail
- Aim for long-term, continuing reductions
- Take a global leadership role as an "advanced environmental nation."

#### Basic Approach to Fighting Global Warming

- Reconcile environmental and economic imperatives
- Promote technological innovation, encourage participation by and partnership among all entities in all sectors of society
- Make use of a variety of policy tools
- Forge international partnerships

## Quantitative Targets for Emissions Reduction and Absorption of Greenhouse Gases

Energy-related CO <sub>2</sub>	+0.6%
Non-energy-related CO <sub>2</sub>	-0.3%
Methane	-0.4%
Nitrous oxide (N <sub>2</sub> O)	-0.5%
Three HFCs 	+0.1%
Sinks (forest absorption)	-3.9%
Kyoto Mechanisms	-1.6%
<b>Total</b>	<b>-6.0%</b>

Reduction and increase figures represent change from total emissions in FY 1990.

### Measures to control energy-related CO<sub>2</sub>

**FY 1990**  
1,048 million tons CO<sub>2</sub>

**FY 2010**  
1,115 million tons CO<sub>2</sub>  
(under current policies)

**FY 2010**  
1,056 million tons CO<sub>2</sub>  
(under additional policies)  
-59 million tons

FY 2010 Emissions by Sector			
Industrial Sector	Residential and Commercial Sector	Transport Sector	Energy Conversion Sector
435 million tons CO <sub>2</sub> (-8.6% from 1990)	302 million tons CO <sub>2</sub> (+10.7% from 1990)	250 million tons CO <sub>2</sub> (+15.1% from 1990)	69 million tons CO <sub>2</sub> (-16.1% from 1990)
Breakdown by Sector			
(-15 million tons)	(-31 million tons)	(-9 million tons)	(-4 million tons)

## Overview of the Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change is a treaty that establishes an international framework for stemming global warming. It was adopted in June 1992 at the first World Summit on Sustainable Development in Rio de Janeiro (commonly known as the Earth Summit), and came into force on March 21, 1994. Thus far it has been ratified by 188 countries and 1 territory.

The ultimate aim of the convention is to stabilize the concentration of greenhouse gases in the atmosphere at levels that will not cause dangerous human disruption of the earth's climate system.

### Principles

- (1) Protection of the climate on the basis of common but differentiated responsibility
- (2) Consideration of special circumstances
- (3) Implementation of precautionary measures\*
- (4) Right and duty to promote sustainable development
- (5) Cooperation to promote a supportive and open international economic system

#### \*Complete 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.

## Overview of the Kyoto Protocol

The Kyoto Protocol is a resolution establishing the greenhouse gas emissions reduction targets for the Annex I countries.\* It was adopted in December 1997 at the Third Session of the Conference of the Parties to the UN Framework Convention on Climate Change (COP3) and came into force on February 16, 2005.

\* 35 developed countries (including 11 economies in transition) and the European Community.

Targeted greenhouse gases (GHGs)	6 categories of gases: CO <sub>2</sub> (carbon dioxide), methane, N <sub>2</sub> O (nitrous oxide), HFCs (hydrofluorocarbons), PFCs (perfluorocarbons), and SF <sub>6</sub> (sulfur hexafluoride)
Commitment period	2008–2012 (first commitment period)
Goal	To reduce average yearly emissions of greenhouse gases by the Annex I countries by 5% from 1990. In Annex B of the Kyoto Protocol, the Annex I countries commit themselves to specific reduction targets; Japan's reduction target is 6%.
Use of sinks (absorption forests)	Countries may include in their calculation of emissions reduction the removal of CO <sub>2</sub> by "sinks" resulting from land-use change and forestry activities, limited to afforestation, reforestation, and deforestation since 1990.
Kyoto Mechanisms	Emissions trading, <sup>1</sup> joint implementation (JI), <sup>2</sup> and the clean development mechanism (CDM) <sup>3</sup> have been adopted as means to achieve reduction targets on a global scale in an economically rational manner.


#### Notes:

1. Emissions trading: International trading of emissions allowances (or emissions reduction units earned through CDM or JI). Annex I countries may add allowances acquired from other countries to their own allowances.
2. Joint implementation (JI): Mechanism whereby Annex I countries can jointly carry out GHG emissions reduction projects and distribute the resultant reduction volume among the countries concerned. Applicable to reductions between 2008 and 2012.
3. Clean development mechanism (CDM): Mechanism whereby Annex I countries can carry out GHG emissions reduction projects in developing countries and distribute the resultant reduction volume among the countries concerned. Applicable to reductions carried out in 2000 and after.



## Environmental Action Plan of the Electric Power Industry

(Summarized from the Environmental Action Plan of the Electric Power Industry, Federation of Electric Power Companies of Japan, September 2004)

The Environmental Action Plan by the Japanese Electric Power Industry  lays out the electric industry's policy and plan for dealing with global warming and other environmental issues. Each year the plan is reviewed in relation to the industry's progress toward its goals and domestic and international trends.

This plan is incorporated in the Keidanren Voluntary Action Plan on the Environment, adopted by Keidanren (now Nippon Keidanren) in June 1997. Progress toward the Keidanren plan as a whole and the various voluntary industry plans that make it up is checked regularly by national councils and similar organs.

### Measures for Stemming Global Warming

#### ◆ CO<sub>2</sub> Emissions Reduction Target

By fiscal 2010, the electric power industry aims to further reduce CO<sub>2</sub> emissions intensity (emissions per unit of user-end electricity) by approximately 20% from the fiscal 1990 level, to about 0.34 kg of CO<sub>2</sub>/kWh.

While total electricity consumption is expected to increase 37% over the fiscal 1990 level by fiscal 2010, the industry calculates that growth in total CO<sub>2</sub> emissions will be held to around 10%.

#### ◆ Summary of Measures to Reduce CO<sub>2</sub> Emissions

Measures by the electric utility industry to suppress CO<sub>2</sub> emissions can be broadly classified into "supply side" and "demand side" measures. Following is a summary of each.

##### ● Supply-side measures

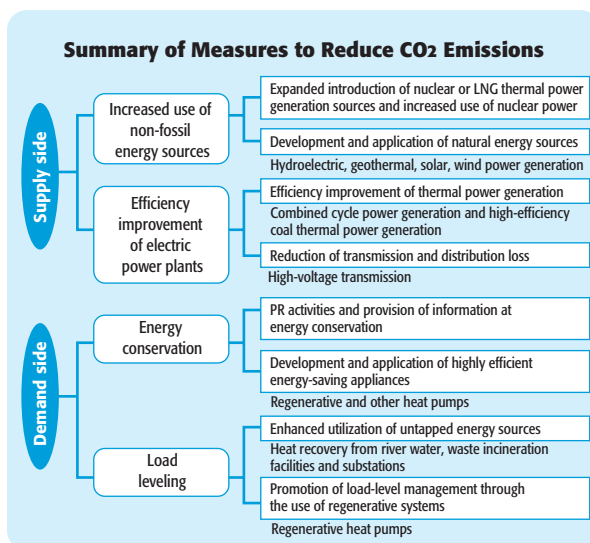
- Expanded introduction of nuclear power generation, which emits no CO<sub>2</sub> to generate power, and liquefied

natural gas (LNG), which emits comparatively little CO<sub>2</sub>; increased use of nuclear power generation

- Development 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 and provision of information on energy conservation measures for customers, development and application of highly efficient, energy-conserving appliances like heat pumps, and using untapped energy sources
- Promotion of load leveling by the use of regenerative heat systems, etc.



### Japan's CO<sub>2</sub> Emissions

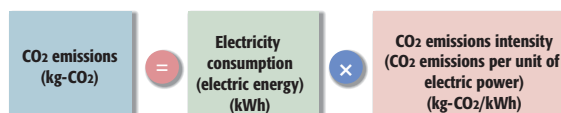
Item	Fiscal Year	1990 (results)	2001 (results)	2002 (results)	2003 (results)	2005 (results)	2010
Electric power consumption (billion kWh)		659	824	841	834	846	(Est.) 905
CO <sub>2</sub> emissions (million t-CO <sub>2</sub> )		277 [2]	312 [13]	342 [17]	363 [20]	310	(Est.) 320
CO <sub>2</sub> emissions intensity (user-end electricity) (kg-CO <sub>2</sub> /kWh)		0.421	0.379	0.407	0.436	0.37	(Est.) 0.36 → (Target) 20% reduction vs. FY 1990 (about 0.34)

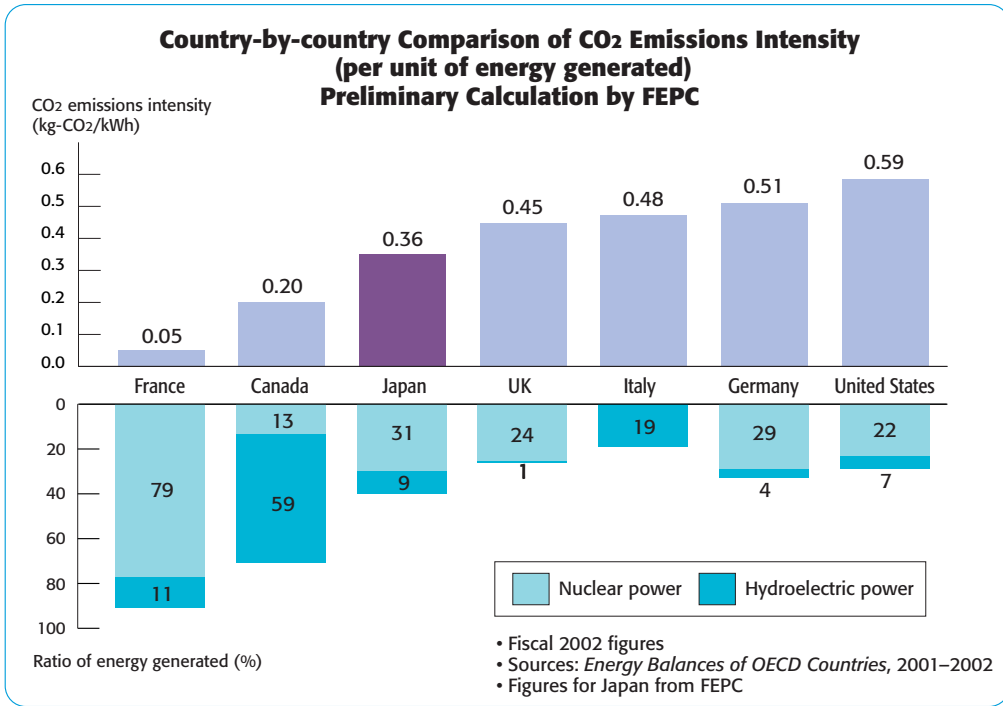
- CO<sub>2</sub> emissions intensity (user-end electricity) = CO<sub>2</sub> emissions ÷ energy consumption
- CO<sub>2</sub> emissions represent the total of CO<sub>2</sub> emissions for each type of fuel. They are calculated as follows:  
CO<sub>2</sub> emissions = Calorific value attending fossil fuel combustion × CO<sub>2</sub> emissions coefficient
- Calorific value uses figures stated in the Agency for Natural Resources and Energy's Fiscal 2004 Fuel Plan for Steam Power Generation, etc. Fuel-specific CO<sub>2</sub> emissions coefficient uses the figures stated in the Ministry of the Environment's Report on Comprehensive Total Greenhouse Gas Emission Estimate Investigation (August 2002).
- Estimates for fiscal 2005 and 2010 are based on fiscal 2004 energy supply plans, which consider GDP indicators, demand trends, and other factors.
- Electric power consumption and CO<sub>2</sub> emissions include power purchased from cooperative thermal power plants, IPPs (independent power producers), and household generators, power sold, and CO<sub>2</sub> given off when the purchased power was generated.

- Figures in parentheses represent total CO<sub>2</sub> emissions from the power purchased from IPPs and household generators, and CO<sub>2</sub> reduction efforts are expected from each source. For the purposes of calculation, calorific value is estimated from the amount of power purchased.

#### Goal of 12 FEPC-affiliated Companies

Reduce CO<sub>2</sub> emissions intensity at point of consumption by about 20% from FY 1990 level by FY 2010

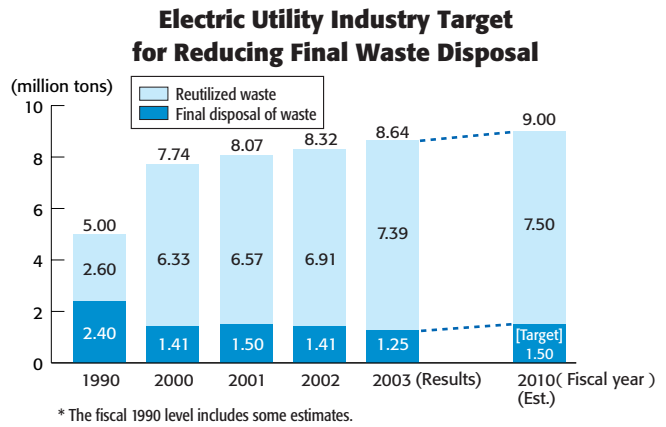




## Measures to Reduce and Recycle Waste

### ◆ Reductions Target for Waste Disposal

By fiscal 2010, we aim to reduce the amount of final waste disposal to 1.5 million tons, less than the 2.4 million tons of fiscal 1990. (Viewed in terms of reutilization of resources, the reutilization rate in fiscal 2010 will be 83%, compared with an actual 52% in fiscal 1990.)



### Trends in Reutilizing Major Types of Waste and Byproducts

Type			Fiscal 1990	Fiscal 2001	Fiscal 2002	Fiscal 2003
Waste	Combustion residue Soot and dust ☹️ Coal ash	Volume generated	3,470	5,820	6,050	6,400
		Reutilized volume (Reutilization rate)	1,370 (39%)	4,460 (77%)	4,740 (78%)	5,260 (82%)
	Construction waste material	Volume generated	400	390	330	300
		Reutilized volume (Reutilization rate)	210 (53%)	340 (87%)	310 (94%)	290 (96%)
	Scrap metal	Volume generated	140	150	170	160
		Reutilized volume (Reutilization rate)	130 (93%)	140 (94%)	160 (96%)	150 (97%)
By-products	Gypsum from desulfurization process	Volume generated	850	1,530	1,600	1,610
		Reutilized volume (Reutilization rate)	850 (100%)	1,530 (100%)	1,600 (100%)	1,610 (100%)

(1,000 tons)

\* Waste includes products of value.

\* Figures for construction waste materials 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 1,000 tons.)

# Environmental Chronology

World	J-POWER	Japan
	1952 Establishment of our company	
	1960 Shokawa cherry Crees transplanted at Miboro Power Station 1964 Pollution Control Agreement concerning Isogo Thermal Power Station concluded with Yohohama City (Yokohama method)	1967 Basic Law for Environmental Pollution Control promulgated 1968 Air Pollution Control Law promulgated 1968 Noise Pollution Regulation Law promulgated
1972 United Nations Conference on the Human Environment (UNCHE) held in Stockholm 1975 Washington Convention (Convention on International Trade in Endangered Species, CITES) came into force	1973 Numappara Power Station started operation (wetland conservation) 1975 Flue-gas desulfurization system completed at Takasago Thermal Power Station No.1 (Japan's first complete flue-gas desulfurization system) 1976 Totsukawa Power Station No. 1 improved water intake by introducing surface intake facilities 1977 Funagira Dam started operation (fish ladder installed)	1970 Water Pollution Control Law promulgated 1970 Waste Management (Disposal) and Public Cleansing Law promulgated 1971 Offensive Odor Control Law promulgated 1974 Air Pollution Control Law amended and promulgated (regulation of total emissions introduced)
1985 Vienna Convention for the Protection of the Ozone Layer adopted 1988 Intergovernmental Panel on Climate Change (IPCC) established	1980 Yanase Power Station improved water intake by introducing selective intake facilities 1982 Takehara Thermal Power Station No. 1 installed flue-gas denitrification system 1986 Isogo Thermal Power Station received Pollution Prevention Award from Kanagawa Prefecture 1987 Ishikawa Coal-fired Thermal Power Station selected as one of Public Color Prize Ten Environmental Winners 1988 Takasago Thermal Power Station received Director General's Award (Energy Saving) from the Agency for Natural Resources and Energy	1975 Vibration Regulation Law promulgated 1977 Notification of Ministry of International Trade and Industry (currently Ministry of Economy, Trade and Industry) regarding the Ministerial Meeting on Assessment issued
1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro 1994 Framework Convention on Climate Change came into force 1995 1st Conference of Parties to the UN Framework Convention on Climate Change (COP1) held in Berlin 1996 2nd Conference of Parties to the UN Framework Convention on Climate Change (COP2) held in Geneva 1996 ISO 14001 Environmental Management System formulated 1997 3rd Conference of Parties to the UN Framework Convention on Climate Change (COP3) held in Kyoto 1998 4th Conference of Parties to the UN Framework Convention on Climate Change (COP4) held in Buenos Aires 1999 5th Conference of Parties to the UN Framework Convention on Climate Change (COP5) held in Bonn	1990 Committee for Coping with Global Environment Problems established 1990 Nishi-Yoshino Power Station No. 1 started discharging for river flow maintenance (first hydraulic power station of J-POWER) 1990 Tagokura Power Station started producing driftwood charcoal 1990 Takehara Thermal Power Station received Director General's Award (Energy Saving) from the Agency for Natural Resources and Energy 1993 Environmental Activities Promotion Board established 1993 Denpatsu Environmental Action Guidelines established 1993 Driftwood charcoal received Minister's Prize (Recycling Concept) from Ministry of International Trade and Industry 1994 Kumaushi Power Station received Good Design Prize from Ministry of International Trade and Industry 1994 Huang Dao Power Station in China started high-sulfur coal desulfurization demonstration test 1997 Okukiyotsu Power Station No. 2 received Technology Award (Cohabitation with Local Community/Open Type Power Station) from the Japan Society of Civil Engineers 1998 New J-Power Environmental Action Guideline established 1998 Afforestation operation in Australia began 1998 Matsuura Thermal Power Station No. 2 received Director-General's Prize from the Agency of Industry Science and Technology (Prevention of Air Pollution) for its microfiltration-type flue-gas desulfurization wastewater treatment system 1999 Matsuura Thermal Power Station acquired ISO 14001 certification 1999 Okutadami-Otori Hydro Project Construction Office acquired ISO 14001 certification (first construction organization in Japan to receive ISO 14001 certification) 1999 Matsuura Thermal Power Station No. 2 Generator Turbine received an award (improvement of combustion efficiency, etc.) from the Japan Society of Mechanical Engineers	1984 Implementation Outline of Environmental Impact Assessment approved by the Cabinet  1990 Global Warming Prevention Action Plan approved 1993 Law for Promotion of Utilization of Recyclable Resources promulgated 1993 Basic Environment Law promulgated 1994 Basic Environment Plan approved by the Cabinet 1995 Law for Promotion of Sorted Collection and Recycling of Containers and Packaging promulgated 1997 Environment Impact Assessment Law promulgated 1997 River Law amended (for not only irrigation and water use but also improvement and conservation of river environment) 1998 Law concerning the Rational Use of Energy (Energy Saving Law) amended 1998 Law Concerning the Promotion of the Measures to Cope with Global Warming promulgated 1999 Law concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management promulgated 1999 Law concerning Special Measures against Dioxins promulgated
2000 6th Conference of Parties to the UN Framework Convention on Climate Change (COP6) held in The Hague 2001 Resumed Session of 6th Conference of Parties to the UN Framework Convention on Climate Change (COP6 Resumed Session) held in Bonn 2001 7th Conference of Parties to the UN Framework Convention on Climate Change (COP7) held in Marrakesh 2001 Operational Rules for the Kyoto Protocol adopted 2002 World Summit on Sustainable Development held in Johannesburg 2002 8th Conference of Parties to the UN Framework Convention on Climate Change (COP8) held in New Delhi 2003 9th Conference of Parties to the UN Framework Convention on Climate Change (COP9) held in Milan 2003 3rd Water Forum held 2004 10th Conference of Parties to the UN Framework Convention on Climate Change (COP10) held in Buenos Aires 2004 2004 version of ISO 14001 released 2005 Kyoto Protocol came into force	2000 Environmental Management Regulations and J-POWER Environmental Policy formulated 2000 Okinawa Seawater Pumped-Storage Project Demonstration Test Office received the Technology Award (Restored Environment Area) from the Japan Society of Civil Engineers and got recognition for Energy PR Facility/PR Activities, receiving the Steering Committee Chairman's Prize (for activities promoting understanding of environmental problems) 2000 Tomamae Winvilla Wind Farm started operation 2000 Received Technical Development Award of the Japanese Geotechnical Society (Cyclic Use of Resources) for deep-chemical mixing method for utilizing coal ash 2000 Tachibana-Wan Thermal Power Station received award from the Japan Society of Civil Engineers (measures for peripheral environmental conservation and harmonizing, reuse of sea-floor dredging earth, recycling of coal ash in large quantities, etc.) 2000 Construction Division acquired ISO 14001 certification 2001 Nikaho Kogen Wind Farm started operation 2001 Isago Thermal Power Station received Public Color Award and Top Ten Environmental Color Award from the Study Group for Color in Public Places 2001 Introduction of EMS based on ISO 14001 throughout the company completed 2002 Received Japan Institute of Energy Award for development of ash-circulating-type PFBC technology (improvement of desulfurization efficiency and combustion efficiency, reduction of coal ash, etc.) 2002 Omuta Recycling Power Station started operation 2002 Tokyo Bayside Wind Power Plant started operation 2003 Omuta Power Recycling Station received New Energy Award and Chairman's Prize from the New Energy Foundation 2003 Okutadami-Otori Hydro Project Construction Office received Technology Award from the Japan Society of Civil Engineers (for natural environmental conservation and overcoming of obstacles to technological development) 2003 Green Power Kuzumaki Wind Farm put into commercial operation 2004 Report prepared by Okutadami-Otori Hydro Project Construction Office received an encouragement prize at 7th Environmental Report Awards ceremony 2004 Concrete action plan for the J-POWER Group Environmental Management Vision formulated 2004 J-POWER certified and registered for EcoLeaf Environmental Labeling Program 2005 Three J-POWER-owned wind power stations (Tahara Wind Farm, Aso Wind Farm, and Shikamachi Wind Farm) put into commercial operation 2005 All of J-POWER's coal-fired thermal power stations and a geothermal power station acquired ISO 14001 certification	2000 Fundamental Law for Establishing a Sound Material-Cycle Society promulgated 2001 Inauguration of Ministry of the Environment following the reorganization of ministerial offices 2001 Law concerning Special Measures against PCB Waste enforced 2001 Law concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing) enforced 2002 Law concerning the Rational Use of Energy amended 2002 Law concerning the Promotion of the Measures to Cope with Global Warming amended 2002 Law for the Promotion of Nature Restoration promulgated 2003 Law concerning the Measures against Soil Pollution enforced 2003 Law on Special Measures Concerning New Energy Use for Electric Utilities (RPS Law) enforced 2003 Law for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education enforced 2004 Waste Disposal and Public Cleansing Law amended 2004 Air Pollution Control Law amended 2004 Law Concerning the Promotion of Business Activities with Environmental Consideration by Specified Corporations, etc., by Facilitating Access to Environmental Information, and Other Measures promulgated 2004 Scenery Law enforced

# Glossary

(Page numbers indicate major citations.)

**ABWR (Advanced Boiling Water Reactor)**  
pp. 15, 25

**Annex I countries**  
p. 76

Countries, designated in Annex I of the Framework Convention on Climate Change, that have committed themselves to reducing emissions of greenhouse gases (also referred to as “developed countries” in this report).

**Biotope**  
pp. 40, 47, 58

The habitat of a community of organisms. From the Greek bio, meaning life, and topos, meaning place. Originally used broadly to mean an ecosystem, it now often refers to an artificially created habitat for plants, fish, insects, etc.

**CDM (Clean Development Mechanism)**  
pp. 7, 9, 23, 29, 76

**COD (chemical oxygen demand)**  
p. 18

The amount of oxygen required to oxidize the pollutants (primarily organic) in water. Used as an indicator to measure pollution of coastal waters and lakes.

**Compliance**  
pp. 2, 6, 45, 59, 60

Observance of legal statutes.

**Dioxins**  
pp. 9, 34, 36, 47, 79

Collective name for Polychlorinated dibenzo-p-dioxin (PCDD), polychlorinated dibenzofuran (PCDF), and coplaner polychlorinated biphenyl (coplaner-PCB). Toxic substances generally present in the environment in trace amounts and suspected of posing grave danger to human life and health. Under the Law Concerning Special Measures against Dioxins, which came into force in January 2000, dioxin emissions from waste incinerators and other sources are strictly regulated.

**DNA microarray**  
p. 42

A wafer or microscopic slide on which DNA spots are densely fixed in a predetermined arrangement; used as a tool for genetic analysis. When the microarray is exposed to the sample DNA, which has been marked with fluorescent pigment, it is possible to identify the DNA in the sample by taking advantage of the structure of the DNA molecule, which consists of two complementary chains. DNA microarrays allow a large amount of

genetic information to be analyzed in a short time and are expected to have wide application, including genomic drug discovery, tailor-made medical treatment, and inspection of genetically modified food.

**DOE (designated operational entity)**  
p. 30

Organization designated by a trustee of the CDM Executive Board and the United Nations Secretariat to validate a CDM (Clean Development Mechanism) project and verify and certify the amount of emissions reduction.

**EMS (Environmental Management Systems)**  
pp. 7, 11, 23, 34, 38, 45, 47, 56, 79

**Environmental accounting**  
pp. 10, 19

A mechanism for accurately determining and disclosing what a company invests and spends on environmental conservation and the effect of such spending—something not reflected in traditional financial analysis. Environmental accounting benefits companies by providing a quantitative assessment of their efforts to protect the environment so that they can improve the cost-effectiveness of their business activities with respect to environmental costs. It benefits stakeholders by making available corporate environmental accounting data in the form environmental reports, etc., which can be used as yardsticks for measuring and comparing the environmental efforts of different companies.

**Environmental Action Plan of the Electric Power Industry**  
p. 77

Plan for positive, voluntary environmental action by electric utilities, compiled by 12 organizations affiliated with the Federation of Electric Power Companies of Japan. Establishes concrete goals and outlines active efforts to address global warming, build a recycling-based society, etc. To ensure transparency, progress under the plan is reviewed each year and the results are made available to the public.

**Environmental efficiency**  
pp. 10, 20, 22, 31

A method for quantifying, comparing, and evaluating activities to reduce the amount of water, electricity, and raw materials used and to reduce the volume of waste, effluent, and exhaust gas generated in business operations, as well as efforts at legal compliance and control of environmental pollution.

**Fuel cell**  
pp. 12, 27

A device that converts externally supplied hydrogen and oxygen into electricity through a chemical reaction. Because fuel cells can achieve high generating efficiency and the heat generated can also be utilized, they have a high net energy efficiency and offer an effective means of saving energy and reducing CO<sub>2</sub> emissions. Fuel cells are particularly friendly to the environment because they dispense with combustion, thus giving off few air pollutants, and because they generate electricity without using rotating parts, and thus are relatively quiet.

**Full MOX-ABWR (Advanced Boiling Water Reactor)**  
pp. 15, 25

Special type of ABWR using MOX fuel for the whole reactor core, whereas the ratio of the MOX fuel is up to about 1/3 in another light water reactors under the national MOX fuel utilization plan in light water reactors.

**Gas cogeneration system**  
pp. 7, 9

An energy system that burns natural gas to produce electricity with turbines or engines and uses the heat generated for air conditioning, hot water, etc. It achieves high thermal efficiency by generating two forms of energy at once.

**Gas turbine combined cycled generation**  
pp. 8, 12, 26

A power generation method combining gas turbines and steam turbines. The pressure of the exhaust gas created when the fuel is burned within compressed air drives the gas turbine, and the residual heat is used to run the steam turbine. Combining these two processes results in high generating efficiency.

**General waste**  
pp. 9, 19, 26, 34, 35, 57

Defined as waste other than industrial waste under the Waste Management and Public Cleansing Law. Further divided into “household general waste” and “business general waste” (waste from offices, eating and drinking establishments, etc.).

**Generating efficiency, thermal efficiency**  
pp. 12, 13, 17, 22, 56, 70

For an electric power generating facility, the ratio of electric power generated (converted to thermal units) to heat energy input.

**Green purchasing**  
pp. 8, 10, 50, 56, 74

Placing priority on minimizing the



environmental burden in the purchase of goods and services by emphasizing environmental impact, as opposed to price, quality, convenience, or design.

**HCFCs (hydrochlorofluorocarbons)**  
pp. 28, 75

Chemicals used in refrigerators and in the manufacture of semiconductors in place of chlorofluorocarbons, which destroy the ozone layer. Because their greenhouse effect is several thousands or even tens of thousands times that of carbon dioxide, they were included among the gases targeted for reduction at COP3, held in Kyoto in December 1997.

**HFCs (hydrofluorocarbons)**  
pp. 9, 28, 73, 76

Chemicals used in refrigerators, car air conditioners, etc., beginning around 1991, after CFCs and HCFCs were subject to controls out of concerns that they destroy the ozone layer. HFCs are artificial greenhouse gases with a greenhouse effect ranging from 140 to 11,700 times that of CO<sub>2</sub>.

**Industrial waste**  
pp. 7, 18, 33, 35, 38, 47, 48

Wastes such as cinders, sludge, waste acid, waste oil, waste alkali, and waste plastics generated in the course of business operations. The Waste Management and Public Cleansing Law calls for proper disposal and incineration of industrial waste.

**Industrial waste subject to special control**  
pp. 18, 47

Explosive, toxic, or infectious industrial waste requiring strict controls under the Waste Management and Public Cleansing Law. Includes waste oil with a low flash point, medical waste, PCBs, asbestos, and sludge containing high concentrations of heavy metals.

**Integrated coal gasification fuel cell combined cycle (IGFC)**  
pp. 7, 9, 27

A triple complex power generation system combining the fuel cell, gas turbine, and steam turbine; the ultimate coal-fired thermal power generation system.

**IPP (independent power producer)**  
pp. 1, 26, 44

A business, other than a wholesale power supplier, that supplies electricity to general electric utilities.

**ISO 14001**  
pp. 7, 10, 11, 45, 47, 56, 70, 79

An international standard specifying the requirements for an environmental management system; one of the ISO 14000 series of international standards for

environmental management adopted by the International Standards Organization (ISO).

**Japan Electric Power Exchange**  
p. 3

Market where electricity is sold by utilities and non-utility generators and bought by electric power retailers to sell to users on the retail market. Established in November 2003 by 21 major power utilities and others.

**JEPIX (Environmental Priorities Index for Japan)**  
p. 20

A method for assessing the overall environmental impact of a company and expressing it by means of a single figure by assigning weights to 300 environmental pollutants in terms of their impact on water and air quality using a single index model called ecopoint.

**Jl (Joint Implementation)**  
pp. 7, 9, 23, 29, 76

**LCA (life-cycle assessment)**  
pp. 19, 12, 26

A method for quantitatively and objectively assessing the resources and energy used and the total environmental emissions produced by a product in all its phases—including manufacture, transport, use, and disposal—and the impact of this consumption and burden on the earth and its ecosystems.

**LIME (life cycle impact assessment method based on endpoint modeling)**  
p. 20

A method for scientifically analyzing the contribution of substances such as CO<sub>2</sub> to various environmental problems, such as global warming and destruction of the ozone layer, and calculating the potential damage caused to various objects of protection, such as human health and ecosystems; weighting the relative importance of these objects; and integrating the information into an overall impact assessment.

**Methane (CH<sub>4</sub>)**  
pp. 28, 30, 76

A main component of natural gas. Also produced through the decay or fermentation of organic matter. The second most common greenhouse gas, after carbon dioxide, with a greenhouse effect 21 times that of CO<sub>2</sub>.

**Microhydropower**  
pp. 12, 26

Hydroelectric power produced in smaller plants (usually generating 100 kW or less, although there is no precise definition).

**MOX fuel**  
p. 15

Mixed oxide fuel consisting of uranium mixed with plutonium recovered by

reprocessing spent fuel.

**N<sub>2</sub>O (nitrous oxide)**  
pp. 28, 30, 76

Also known as dinitrogen monoxide. A major greenhouse gas (along with carbon dioxide, methane, tropospheric ozone, and chlorofluorocarbons) with a greenhouse effect 310 times that of CO<sub>2</sub>. Said to be generated by combustion and application of nitrogen fertilizer.

**NO<sub>x</sub> (Nitrogen oxides)**  
pp. 8, 9, 13, 17, 19, 24, 31, 43, 49, 57, 74

Collective term for compounds made up of nitrogen and oxygen. NO<sub>x</sub> is invariably produced during combustion as oxygen binds with nitrogen in the air and/or in the substance being burned. High-temperature combustion in the boilers of electric power plants and factories or in automobile engines yields nitrogen monoxide, and this NO is further oxidized to form the stable compound nitrogen dioxide (NO<sub>2</sub>), which is emitted into the atmosphere. Ultraviolet light from the sun reacts with nitrogen oxides in the atmosphere to create ozone and other photochemical oxidants.

**ODA (Official Development Assistance)**  
p. 44

Financial and technological aid offered by government and governmental agencies to developing countries with the purpose of promoting economic development and human welfare. In Japan, ODA is carried out by the Ministry of Foreign Affairs and such entities as the Japan International Cooperation Agency (JICA) and the Japan Bank for International Cooperation (JBIC).

**PCB (polychlorinated biphenyl)**  
pp. 9, 36, 79

An organic chlorinated compound first produced industrially in 1929 and thereafter used for a wide range of applications because of its stability, heat resistance, and performance as an insulator. In time it became clear that PCB, which takes a long time to break down, tends to accumulate in living tissue and cause long-term toxicity, and its manufacture, import, and use in new products was banned in 1974 under the Law Concerning the Examination and Regulation of Manufacture, etc., of Chemical Substances. In addition, the Law Concerning Special Measures Against PCB Waste, which came into force in July 2001, calls for detoxification treatment of PCB waste currently in storage by 2016.

**PDCA management cycle**  
p. 45

Management cycle, consisting of plan, do, check, and action, whose repetition provides the basis for continuous improvement in environmental management systems.

**PFCs (Perfluorocarbons)****pp. 28, 30, 76**

Chemicals used for semiconductor manufacturing beginning in the 1980s. PFCs are artificial greenhouse gases with a greenhouse effect 6,500 to 9,200 times that of CO<sub>2</sub>.

**PRTR (Pollutant Release and Transfer Register)****pp. 36, 49, 79****Renewable energy****pp. 7, 15, 16, 17, 19, 22, 25, 29, 70**

Energy derived from such natural phenomena as sunshine, water, wind, waves, and biomass, as opposed to such fossil fuels as coal and oil that exist in the earth in limited quantities.

**River maintenance flow****pp. 12, 15, 39, 79**

A minimum river flow determined for each river by considering all the conditions needed to restore or create a sound river environment, as by restoring habitat for fish, improving the scenery, etc. Established with the goal of minimizing problems caused by low water around hydroelectric power stations, as a tool for improving the river environment and restoring clean water flow.

**RPS Law (effective April 2003)****p. 12**

Law requiring general electric utilities to use renewable energy sources (wind, solar, geothermal, hydropower [generators using waterways and producing less than 1,000 kW], and biomass) for a certain portion of their electricity, with the aim of helping to protect the environment and ensure stable energy supply.

**SF<sub>6</sub> (sulfur hexafluoride)****pp. 9, 17, 19, 28, 73, 76**

A compound of sulfur and fluorine produced industrially; SF<sub>6</sub> does not exist in nature. Because it is chemically stable and an excellent insulator, it is widely used in the electric industry as a gas insulator in circuit breakers and other devices. Its greenhouse effect is 23,900 times that of CO<sub>2</sub>.

**SOFC (Solid Oxide Fuel Cells)****pp. 9, 27****Soil pollution****pp. 38, 79**

Contamination of soil or groundwater by hazard substances, or the state of being so contaminated. May occur directly, as when raw materials leak from containers or pollutants enter the soil from dumped waste matter or landfills, or indirectly, via air or water pollution. Soil pollution is not easily visible and is difficult to mitigate.

**Soot and dust****pp. 9, 13, 18, 19, 31, 49, 57, 74, 78**

The Air Pollution Control Law classifies particles that remain suspended in the atmosphere according to source. Soot and dust is that generated when matter is burned, general dust is that generated or dispersed when matter is broken up by mechanical treatment or from deposition of resultant particles, and particulate matter is that generated by the operation of diesel motor vehicles.

**SO<sub>x</sub> (sulfur oxides)****pp. 8, 9, 13, 17, 19, 24, 31, 43, 49, 57, 74**

Collective term for compounds made up of sulfur and oxygen, including sulfur dioxide (SO<sub>2</sub>), sulfur trioxide (SO<sub>3</sub>), and sulfuric acid mist (H<sub>2</sub>SO<sub>4</sub>). Sulfur oxides are generated from the sulfur content in coal and heavy oil when they are burned as fuel in factories and thermal power plants and are released into the atmosphere in exhaust gases. As a substance responsible for acid rain, they are a source of atmospheric pollution.

**SPC (Special Purpose Company)****p. 35****Sustainability Reporting Guidelines****pp. 2, 84**

Set of guidelines adopted by the Global Reporting Initiative (GRI; an international nongovernmental organization involving the UN Environmental Programme, environmental groups, institutional investors, accountants' associations, and corporations from various countries) to standardize sustainability reports, i.e., company reports that cover not only environmental but also social and economic aspects of business activity from the standpoint of sustainable development.

**Sustainable development****pp. 3, 4, 5, 6, 13, 20, 44, 69, 70, 76**

The 1987 report of the World Commission on Environment and Development, *Our Common Future*, defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The 1991 report *Caring for the Earth*, jointly compiled by the International Union for Conservation of Nature, the United Nations Environmental Programme, and the World Wide Fund for Nature, defines it as "improving the quality of people's lives while living within the carrying capacity of supporting ecosystems."

**Thermal water discharge****p. 32**

In thermal and nuclear power generations, the steam that powers the turbine is cooled and turned to water in a condenser so that

it can be used again. In almost all Japanese power plants, seawater is used to cool the condensers. As the seawater passes through the condenser, its temperature rises. It is then returned to the ocean through the discharge outlet, at which point it is referred to as warm water discharge.

**USC (Ultra Super Critical)****pp. 19, 22****Zero emission****pp. 7, 13**

A concept developed by United Nations University in 1994 in response to the idea of sustainable development put forth at the 1992 Earth Summit. It aims to build a system of recycling-based industries in which one industry uses the waste of another to create a situation in which no net waste is generated. It involves a process of continuous improvement in the quest for that ideal. In Japan different entities are now approaching the goal of "no garbage" (as the concept is popularly known) in a variety of different ways.

# List of Organizations and Offices

## In Japan

(As of April 1, 2005)

Name	Address	Phone Number
<b>Head Office</b>	104-8165 6-15-1, Ginza, Chuo-ku, Tokyo	+81-3-3546-2211
<b>Hydropower &amp; Transmission System Department</b>		
Hokkaido Regional Headquarters	060-0003 Daido Seimei Building, Kitasanjo, Nishi 3-chome, Chuo-ku, Sapporo-shi, Hokkaido	+81-11-221-8445
East Regional Headquarters	350-1162 151, Oaza Minami Otsuka, Kawagoe-shi, Saitama	+81-49-246-9711
Chubu Regional Headquarters	486-0815 3030-68-1, Jusanzuka, Jusanzuka-cho, Kasugai-shi, Aichi	+81-568-81-2300
West Regional Headquarters	530-6691 Nakanoshima Center Building, 6-2-27, Nakanoshima, Kita-ku, Osaka-shi, Osaka	+81-6-6448-5921
Oma Main-Transmission Line	035-0035 1-10, Hon-machi, Mutsu-shi, Aomori	+81-175-22-8177
Chushi Main-Transmission Line Project Survey Office	793-0010 2810, Iioka, Saijo-shi, Ehime	+81-897-53-4871
Sakuma-Higashi Main-Transmission Office	412-0042 Dream Palace, 518-1, Hagiwara, Gotemba-shi, Shizuoka	+81-550-84-6464
Ibigawa Hydro Project Survey Office	501-0603 675, Kamiminamigata, Ibigawa-cho, Ibi-gun, Gifu	+81-585-22-0722
Kumagawa Hydro Project Survey Office	868-0022 860-13, Ganjoji-machi, Hitoyoshi-shi, Kumamoto	+81-966-24-3100
<b>Thermal Power Department</b>		
Isago Thermal Power Station	235-8510 37-2, Shin-Isogo-cho, Isogo-ku, Yokohama-shi, Kanagawa	+81-45-761-0281
Takasago Thermal Power Station	676-0074 6-4-1, Umei, Takasago-shi, Hyogo	+81-794-47-1301
Takehara Thermal Power Station	729-2394 2-1-1, Tadanouminagahama, Takehara-shi, Hiroshima	+81-846-27-0211
Tachibanawan Thermal Power Station	779-1631 3, Kokatsu, Tachibana-cho, Anan-shi, Tokushima	+81-884-34-3221
Matsushima Thermal Power Station	857-2531 2573-3, Matsushima-cho, Oseto-cho, Saikai-shi, Nagasaki	+81-959-22-2111
Matsuura Thermal Power Station	859-4595 458-1, Aza Sezaki, Shirahamamen, Shisa-cho, Matsuura-shi, Nagasaki	+81-956-72-1201
Ishikawa Coal-fired Power Station	904-1103 3-4-1, Ishikawaakasaki, Uruma-shi, Okinawa	+81-98-964-3711
Onikobe Geothermal Power Station	989-6802 16-10, Aza Suezawa Nishi, Naruko-cho, Tamatsukuri-gun, Miyagi	+81-229-82-2141
Wakamatsu Thermal Center	808-0111 1, Yanagasaki-machi, Wakamatsu-ku, Kitakyushu-shi, Fukuoka	+81-93-741-0931
<b>Nuclear Power Department</b>		
Oma Nuclear Power Project Construction Preparation Office	039-4601 20, Aza Omataira, Oaza Oma, Oma-machi, Shimokita-gun, Aomori	+81-175-37-2125
Aomori Branch Office	030-0802 Sumitomo Seimei Aomori Yanagimachi Building, 1-2-20, Hon-cho, Aomori-shi, Aomori	+81-17-722-4772
<b>Corporate Planning &amp; Administration Department</b>		
Wakamatsu Operators & General Management Office	808-0111 1, Yanagasaki-machi, Wakamatsu-ku, Kitakyushu-shi, Fukuoka	+81-93-741-0931
Sendai Office	980-0811 Sendai Daiichi Seimei Tower Building, 4-6-1, Ichiban-cho, Aoba-ku, Sendai-shi, Miyagi	+81-22-267-2551
Takamatsu Office	760-0023 Takamatsu-Chuodori Building, 1-4-3 Kotobuki-cho, Takamatsu-shi, Kagawa	+81-87-822-0821
Fukuoka Office	812-0011 Nihon Seimei Hakata-ekimae Building, 3-2-1, Hakata-ekimae, Hakata-ku, Fukuoka-shi, Fukuoka	+81-92-472-3736
Hokuriku Office	930-0004 Toyama Kogin Building, 5-13, Sakurabashi-dori, Toyama-shi, Toyama	+81-76-442-1151
Chugoku Office	730-0013 Central Building, 15-10, Hacchobori, Naka-ku, Hiroshima-shi, Hiroshima	+81-82-221-0423
<b>Technology Development Center</b>		
Chigasaki Research Institute	253-0041 1-9-88, Chigasaki, Chigasaki-shi, Kanagawa	+81-467-87-1211
Wakamatsu Research Institute	253-0041 1-9-88, Chigasaki, Chigasaki-shi, Kanagawa	+81-467-87-1211
	808-0111 1, Yanagasaki-machi, Wakamatsu-ku, Kitakyushu-shi, Fukuoka	+81-93-741-0931

## Overseas

Offices	Address
<b>Washington Office (USA)</b>	1101 17th street, N.W., Suite 802, Washington D.C., 20036, U.S.A.
<b>EPDC Beijing Office (China)</b>	Chang Fu Gong Office Building, Jia- 26, Jian Guo Men Wai Da Jie, Beijing 100022, PRC
<b>EPDC Bangkok Office (Thailand)</b>	Nantawan Building, 161 Rajdamri Road, Lumpinee Pathumwan, Bangkok 10330, Thailand
<b>Kuala Lumpur Office (Malaysia)</b>	32, 1st Floor, Jalan 28/70 A Desa Sri Hartamas 50480 Kuala Lumpur, Malaysia
<b>Yuncan Hydropower Project Office (Peru)</b>	Calle Morelli No. 109, 3ro. Piso, San Borja, Lima 41, Peru
<b>Purulia Pumped Storage Project Office (India)</b>	WESEB PPSP Administrative Building, Patherdhi Village, P.O. Baghmundi, Purulia District, West Bengal State 723152, India
<b>Upper Kotomale Hydropower Construction Supervision Office (Sri Lanka)</b>	304-1, Union Place, P.O. Box 2014, Colombo 2, Sri Lanka
<b>Dai Ninh Hydropower Construction Supervision Office (Vietnam)</b>	Dai Ninh Ninh Gia-Duc Trong-Ram Dong, Vietnam

## Table of Correspondences to GRI's 2002 Sustainability Reporting Guidelines

Section in the Guidelines	Relevant Page(s) in This Report
<b>1 Vision and Strategy</b>	
1.1	pp. 4, 5, 6
1.2	p. 3
<b>2 Profile</b>	
<b>Organisational Profile</b>	
2.1	p. 1
2.2	pp. 1, 55, 58
2.3	p. 1
2.4	pp. 1, 55
2.5	pp. 1, 83
2.6	pp. 1, 3
2.7	p. 1
2.8	p. 1
2.9	pp. 3, 59
<b>Report Scope</b>	
2.10	Back cover
2.11	p. 2
2.12	p. 2
2.13	p. 2
2.16	p. 21
<b>Report Profile</b>	
2.18	pp. 19-20
2.20	pp. 69-72
2.22	pp. 51-52
<b>3 Governance Structure and Management Systems</b>	
<b>Structure and Governance</b>	
3.1	pp. 45, 59
3.4	p. 47
3.6	pp. 45-46, 55-56, 59, 63
3.7	pp. 4-10, 59
<b>Stakeholder Engagement</b>	
3.9	pp. 3, 59
3.10	pp. 60, 66
3.11	pp. 60, 66
3.12	pp. 60, 66
<b>Overarching Policies and Management Systems</b>	
3.13	pp. 37-38
3.14	pp. 21, 77
3.15	pp. 21, 77
3.19	pp. 7, 8, 45-46
3.20	p. 46
<b>4 GRI Content Index</b>	
4.1	p. 84
<b>5 Performance Indicators</b>	
<b>Integrated Indicators</b>	
Systemic indicators	pp. 13-16, 21
Cross-cutting indicators	pp. 19-20
<b>Economic Performance Indicators</b>	
Item in the Guidelines	Relevant Page(s) in This Report
<b>Direct Impacts</b>	
<b>Customers</b>	
EC1	p. 1
EC2	p. 1
EC3	p. 1

The Table of Correspondences represents our understanding of how the specific information contained in this report corresponds to the sections of the GRI Guidelines.

\*GRI (Global Reporting Initiative): A global network of NGOs, corporations, and international organizations a goal of which is to encourage reporting of the economic, environmental, and social aspects of corporate activities. A copy of the GRI Guidelines is available at the following web address: [http://www.globalreporting.org/guidelines/2002/gri\\_2002\\_guidelines.pdf](http://www.globalreporting.org/guidelines/2002/gri_2002_guidelines.pdf)

<b>Environmental Performance Indicators</b>	
Item in the Guidelines	Relevant Page(s) in This Report
<b>Materials</b>	
EN1	pp. 17-18, 57
EN2	pp. 17-18, 57
<b>Energy</b>	
EN3	pp. 17-18, 57
<b>Water</b>	
EN5	pp. 17-18, 57
<b>Biodiversity</b>	
EN7	pp. 40-41
<b>Emissions, Effluents, and Waste</b>	
EN8	pp. 18, 21, 28, 57
EN9	p. 28
EN10	pp. 18, 31, 57
EN11	pp. 33-35
EN12	pp. 18, 57
EN13	p. 48
<b>Products and Services</b>	
EN14	pp. 13-16
EN15	pp. 18, 33-34
<b>Compliance</b>	
EN16	p. 49
<b>Energy</b>	
EN17	pp. 22-27
<b>Water</b>	
EN20	p. 39
<b>Biodiversity</b>	
EN25	pp. 38, 40-41
EN26	pp. 38, 40-41
EN27	pp. 37, 40
EN29	pp. 38, 40
<b>Emissions, Effluents, and Waste</b>	
EN32	p. 39
<b>Transport</b>	
EN34	p. 24
<b>Overall</b>	
EN35	pp. 19-20
<b>Social Performance Indicators</b>	
Item in the Guidelines	Relevant Page(s) in This Report
<b>Labour Practices and Decent Work</b>	
<b>Health and Safety</b>	
LA5	pp. 63-64
LA6	pp. 63-64
<b>Diversity and Opportunity</b>	
LA10	pp. 59, 67
<b>Employment</b>	
LA12	pp. 66, 68
<b>Training and Education</b>	
LA16	pp. 66-67
LA17	pp. 66-67
<b>Human Rights</b>	
<b>Strategy and Management</b>	
HR1	pp. 59, 60
<b>Strategy and Management</b>	
HR8	p. 59
<b>Disciplinary Practices</b>	
HR9	pp. 59, 68
HR10	p. 59
<b>Society</b>	
<b>Community</b>	
SO1	pp. 37, 61
SO4	pp. 41, 51, 79
<b>Product Responsibility</b>	
<b>Respect for Privacy</b>	
PR3	p. 60
<b>Customer Health and Safety</b>	
PR6	p. 12





Electric Power Development Co., Ltd.

6-15-1 Ginza, Chuo-ku, Tokyo 104-8165 Japan

Environmental Activities Promotion Board Office:  
Environment Group, Thermal Power Department

TEL: +81-3-3546-2211 (switchboard)

FAX: +81-3-3546-9357

Web site: <http://www.jpowers.co.jp>

E-mail: [kankyo@jpowers.co.jp](mailto:kankyo@jpowers.co.jp)

For further information on this report, please contact the  
Environmental Group, Thermal Power Department, J-POWER.



古紙パルプ配合率100%再生紙を使用



Non Volatile Organic Compounds



This report is printed on 100% post-consumer recycled paper, with vegetable inks employing no air-polluting volatile organic compounds, and a waterless printing process that generates no harmful effluents.

Published November 2005  
Printed in Japan