Tadami Main Transmission Line (Gunma Prefecture)

Reference Data

Compliance Code

I. Basics
(1) Compliance with laws and internal regulations
(2) Acting in accordance with social norms

II. Areas for Compliance

1. Relations with Society
(1) Contribution to society
(2) Compliance with laws and ethical requirements; respect for cultures and customs
(3) Proper information disclosure
(4) Appropriate PR activities
(5) Regulation of donations and contributions to political parties
(6) Terminating relations with anti-social elements
(7) Environmental conservation
(8) Appropriate use of information systems
(9) Protection of intellectual property rights
(10) Compliance with import/export laws and regulations

2. Relations with Customers, Suppliers, and Competitors
(1) Security and reliability of energy supply and products sales
(2) Compliance with the Antimonopoly Law
(3) Dealing fairly with suppliers
(4) Preventing unfair competition
(5) Entertainment/gifts

3. Relations with Shareholders and Investors
(1) Disclosure of business information
(2) Prohibition of insider trading

4. Relations with Government Agencies/ Officials
(1) Adherence to approval and notification procedures
(2) Entertaining/giving gifts to government officials

5. Relations with Employees
(1) Respect for human rights; prohibition of discrimination
(2) Protection of privacy
(3) Workplace safety and hygiene
(4) Compliance with labor laws
(5) Compliance with employment regulations
(6) Proper accounting and tax procedures
(7) Appropriate use of company assets

J-POWER Group Environmental Management Vision (Formulated April 1, 2004)

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 rest of 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 rest of the world as a whole by minimizing the environmental impact of our business activities, reducing environmental risks such as global warming, and improving eco-efficiency by achieving higher productivity with lower environmental load, thus promoting greater environmental responsibility while enhancing 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_2 emissions per unit of electric power sold through an economically rational combination of measures including maintenance and improvement of the efficiency of energy use; development of low CO_2 emission power sources; development, transfer, and dissemination 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_2.

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_2 emissions per unit of electric power sold through an economically rational 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_2 emission power sources; development, transfer, and dissemination of new technologies; and utilization of the Kyoto Mechanisms.

Recognizing that it will be necessary within this century to capture and store CO_2 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_2 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 foster good community relations.

Recognizing that assuring attractive and safe living environments is the key to good community relations, both nationally and internationally, 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 that 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.

Fiscal 2010 J-POWER Group Environmental Action Guidelines

1. Efforts Relating to Global Environmental Issues

(1) Maintenance and Improvement of Energy Use Efficiency
- Maintain highly efficient operations at existing thermal power stations and employ highly efficient technologies in new facilities
- Maintain stable operation of existing hydro and geothermal power stations as well as of wind and recycling power stations
- Improve productivity of existing power stations by improvements in efficiency when replacing equipment
- Promote energy saving

(2) Development of Low CO_2 Emission Power Sources
- Construct nuclear power stations
- Effectively utilize renewable and unutilized energy
- Use natural gas-based fuels

(3) Development, Transfer, and Dissemination of New Technologies
- Carry out large-scale demonstration of oxygen-blown integrated coal gasification combined cycle (IGCC) technology
- Promote high-efficiency coal generation and R&D on CO_2 separation and capture technologies
- Promote small hydropower stations

(4) Utilization of the Kyoto Mechanisms and Other Measures
- Identify, cultivate, and utilize opportunities for Joint Implementation (JI), the Clean Development Mechanisms (CDM), and emissions trading

(5) Reduction of Emissions of Greenhouse Gases Other Than CO_2
- Reduce sulfur hexafluoride (SF_6) emissions from gasinsulated switch gear
- Reduce emissions of hydrofluorocarbons (HFCs) from air conditioners
- Reduce nitrous oxide (N_2O) emissions by appropriately managing thermal efficiency

2. Efforts Relating to Global Environmental Issues

(1) Reduction of Environmental Load
- Continue to reduce emissions
- Strengthen measures to prevent oil spills from equipment, etc. and be prepared so that emergencies can be dealt with in an appropriate and timely manner
- Design and introduce efficient and environmentally friendly plant and equipment when constructing or renovating facilities

(2) Promotion of the 3Rs (Reduce, Reuse, and Recycle waste) and Proper Disposal of Waste
- Recycle and reuse recyclable resources and make efforts toward zero emission* production
- Promote green purchasing efforts in line with the J-POWER Group Green Purchasing Guidelines
- Properly maintain and manage landfill sites and implement closing procedures

(3) Management of Chemicals
- Fully comply with the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR Law)
- Take appropriate measures to deal with dioxins
- Properly manage and dispose PCBs
- Strive to reduce volumes of hazardous chemicals handled
- Respond appropriately to asbestos-related issues

(4) Natural Environment and Biodiversity Conservation Initiatives
- Take the natural environment and biodiversity into account in the various stages of business
- Give consideration to rare animal and plant species on land
- Give consideration to aquatic environments
- Implement forest conservation initiatives

(5) Environmental Conservation Initiatives in Overseas Projects
- Promote overseas transfer of environmental protection technologies
- Incorporate environment-friendly initiatives when formulating development plans and considering investment in projects, and ensure that those initiatives are carried out

(6) Implementation of Accurate Environmental Impact Assessments

3. Ensuring Transparency and Reliability

1) Continual Improvement of Environmental Management (Greater Reliability)

(1) Improvement of Environmental Management Level
- Maintain ISO 14001 certification at all certified J-POWER Group business locations
- Continue to enhance operation of the environmental management system (EMS) at all J-POWER Group companies
- Raise employee awareness of environmental issues
- Utilize environmental accounting and eco-efficiency indicators
- Request cooperation of business partners in environmental activities
- Renew the Eco-Leaf environmental labeling certification, which employs the life cycle assessment method
- Strengthen risk management

(2) Full Compliance with Laws, Regulations, Agreements, and other Rules
- Identify applicable laws, regulations, agreements, and other rules, and work to raise awareness and ensure compliance
- Fully comply with environment-related laws, regulations, agreements, and other rules

2) Communication with Society (Greater Transparency)

(1) Publication of Environmental Information
- Carry out environmental reporting

(2) Increased Engagement in Environmental Communication
- Carry out environmental communication
- Carry out regional environmental conservation activities

* Zero emissions
A concept proposed by the United Nations University for the creation of a system that would enable the transformation of waste materials into resources through cooperation among different industries (and companies) so that waste emissions (final disposal amounts) can be reduced to as close to zero as possible.

Environment-Related Fiscal Year Data

The following data represent annual values or year-end values in each fiscal year.
Unless specifically noted, includes data for Group companies*. However, data for fiscal 1990 is for J-POWER only.

* The sum of the figures in each column may not equal the total due to rounding.
Note: All figures include J-POWER and its consolidated subsidiaries. Except for the chart for power facilities, joint ventures have been accounted for based on the percentage ownership.

■ Power Facilities (maximum output)

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Hydroelectric	GW	7.09	8.55	8.56	8.56	8.56	8.56
Thermal	GW	4.65	8.18	8.18	8.18	8.18	8.79
Coal-fired	GW	4.64	7.95	7.95	7.95	7.95	8.55
Natural gas	GW		0.22	0.22	0.22	0.22	0.22
Geothermal	GW	0.01	0.01	0.01	0.01	0.01	0.02
Wind power	GW		0.14	0.21	0.21	0.25	0.27
Total	GW	11.74	16.87	16.94	16.94	16.99	17.61

■ Electricity Output

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Hydroelectric	GWh	12,451	10,187	12,212	10,428	9,470	10,004
Thermal	GWh	29,551	58,922	52,429	57,050	53,648	50,742
Coal-fired	GWh	29,452	58,070	51,624	56,260	52,979	50,224
Natural gas	GWh		748	701	686	589	415
Geothermal	GWh	99	104	104	104	80	103
Wind power	GWh		203	254	321	322	393
Total	GWh	42,002	69,312	64,870	67,799	63,439	61,140

■ Electric Power Sold

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Hydroelectric (excluding pumped storage)	GWh	10,046	8,583	10,633	8,287	8,384	9,214
Thermal	GWh	27,293	55,205	49,128	53,576	50,122	47,364
Coal-fired	GWh	27,206	54,413	48,381	52,842	49,505	46,887
Natural gas	GWh		698	652	640	547	383
Geothermal	GWh	87	94	94	94	70	94
Wind power	GWh		195	245	307	310	379
Total	GWh	37,338	63,983	60,006	62,170	58,816	56,957

■ Fuel Consumption

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Coal (dry coal 28 MJ/kg equivalent)	million t	9.56	18.39	16.30	17.91	16.97	15.94
Use intensity (coal-fired thermal)	t/GWh	351	338	337	339	343	344
Natural gas	million m^3N		124	117	115	99	71
Heavy oil	million kl	0.1	0.06	0.06	0.05	0.04	0.04
Diesel	million kl	0.01	0.03	0.02	0.03	0.03	0.05

Note: Denominator for use intensity represents electric power sold by coal-fired thermal power stations.

■ Greenhouse Gas Emissions

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
CO_2 emissions (domestic and overseas power generation)*	million t-CO_2	24.67	49.49	44.91	49.86	49.07	46.52
	kg-CO_2/kWh	0.66	0.72	0.68	0.70	0.69	0.66
(domestic power generation)	million t-CO_2	24.67	47.18	42.14	45.96	43.50	40.88
	kg-CO_2/kWh	0.66	0.74	0.70	0.74	0.74	0.72
SF_6 emissions	t	-	0.1	0.1	0.0	0.1	0.0
Handled	t	-	3.3	6.4	4.4	7.9	5.9
Recovery rate	%	-	98	99	99	99	99
HFC emissions	t	-	0.1	0.0	0.1	0.1	0.2

* Figures for CO_2 emissions exclude the Wakamatsu Research Institute. Figures for CO_2 emissions (domestic and overseas power generation) are formulated from figures for J-POWER and aggregates of figures for consolidated subsidiaries and equity method affiliates for their specific fiscal years, in proportion to our investment ratio.

Notes: 1. Denominators for emission intensity represent electric power sold.
2. For the CO_2 calculation method, see p. 45.

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

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Average thermal efficiency (at generation point)	%	39.0	40.5	40.4	40.3	40.1	40.3

■ Usage of Specified CFCs

		Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Specified CFCs	Stocked	t	3.6	1.8	1.8	1.8	1.7	1.0
	Consumed	t	0.7	0.0	0.0	0.0	0.0	0.0
Halons	Stocked	t	4.7	3.9	4.3	4.6	4.6	4.6
	Consumed	t	0.0	0.0	0.0	0.0	0.0	0.0
Other CFCs	Stocked	t	2.8	10.2	9.9	9.5	9.2	12.6
	Consumed	t	0.0	0.3	0.3	0.3	0.3	0.1
HFCs (CFC alternatives)	Stocked	t	–	7.7	8.4	5.9	10.8	11.3
	Consumed	t	–	0.1	0.0	0.1	0.1	0.2

■ SOx, NOx, and Soot and Dust Emissions

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
SOx emissions	1,000 t	9.9	10.2	9.9	11.3	10.6	8.1
Intensity (thermal)	g/kWh	0.34	0.17	0.19	0.20	0.20	0.16
NOx emissions	1,000 t	26.4	28.9	27.9	28.5	26.7	22.3
Intensity (thermal)	g/kWh	0.90	0.49	0.53	0.50	0.50	0.44
Soot and dust emissions	1,000 t	1.0	1.0	0.9	1.0	0.8	0.6
Intensity (thermal)	g/kWh	0.03	0.02	0.02	0.02	0.02	0.01

Notes: 1. Soot and dust emissions are calculated from monthly measurements.
2. Denominators for emissions represent the electricity output of thermal power stations (excluding geothermal stations).

■ Industrial Waste Recycling

	Unit	—	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Volume generated	million t	–	2.23	1.96	2.18	2.14	2.00
Volume recycled	million t	–	2.09	1.86	2.15	2.10	1.96
Recycle rate	%	–	94	95	98	98	98

■ Coal-Ash and Gypsum Recycling

	Unit	FY 1990	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Coal-ash created	1,000 t	1,257	1,806	1,556	1,714	1,747	1,669
Coal-ash recycled	1,000 t	719	1,696	1,512	1,711	1,736	1,660
Coal-ash recycle rate	%	57.2	93.9	97.2	99.8	99.4	99.4
Gypsum created	1,000 t	–	380	334	360	330	263
Gypsum recycle rate	%	100	100	100	100	100	100

Note: For details on coal-ash recycling rate, see p. 63.

■ Office Power Consumption

	Unit	—	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Power consumed by offices (company total)	GWh	–	22.00	22.82	22.23	21.86	21.07
Head office* power consumption	GWh	–	8.89	8.73	8.61	8.61	8.53
Lighting/power sockets	GWh	–	1.76	1.78	1.80	1.72	1.71

* J-POWER head office building
Note: Figures for the base year (FY 2006) and beyond have been adjusted in accordance with the expansion/contraction of the range of data available for compilation.

■ Fuel Consumption in Offices (Gasoline Equivalent)

	Unit	—	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Consumption	kl	–	1,646	1,664	1,339	1,310	1,348

■ Rate of procurement of recycled copy paper

	Unit	—	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Copy paper* purchased	million sheets	–	62.41	69.53	57.84	56.05	57.17
Recycled copy paper* purchased	million sheets	–	57.22	65.87	54.87	55.18	56.79
Recycled copy paper* purchase rate	%	–	92	95	95	98	99

* A4 paper-size equivalent

J-POWER: Main Business Sites (as of March 2010)

In Japan	Name	Location
Head Office		Chuo-ku, Tokyo
Hydropower & Transmission System Department	Hokkaido Regional Headquarters	Sapporo-shi, Hokkaido
	East Regional Headquarters	Kawagoe-shi, Saitama
	Chubu Regional Headquarters	Kasugai-shi, Aichi
	West Regional Headquarters	Osaka-shi, Osaka
	Ohma Main-Transmission Line Project Construction Office	Mutsu-shi, Aomori
	Nishi-Tokyo Main Transmission Line Construction Office	Kawagoe-shi, Saitama
	Kitahon Power Cable Construction Preparation Office	Kameda-gun, Hokkaido
Thermal Power Department	Isogo Thermal Power Station	Yokohama-shi, Kanagawa
	Takasago Thermal Power Station	Takasago-shi, Hyogo
	Takehara Thermal Power Station	Takehara-shi, Hiroshima
	Tachibanawan Thermal Power Station	Anan-shi, Tokushima
	Matsushima Thermal Power Station	Saikai-shi, Nagasaki
	Matsuura Thermal Power Station	Matsuura-shi, Nagasaki
	Ishikawa Coal Thermal Power Station	Uruma-shi, Okinawa
	Onikobe Geothermal Power Station	Osaki-shi, Miyagi

In Japan	Name	Location
Ohma General Management Department	Ohma Nuclear Power Construction Office	Shimokita-gun, Aomori
	Aomori Branch Office	Aomori-shi, Aomori
Business Planning Department	Wakamatsu Operations & General Management Office	Kitakyushu-shi, Fukuoka
Corporate Planning & Administration Department	Hokuriku Office	Toyama-shi, Toyama
	Chugoku Office	Hiroshima-shi, Hiroshima
	Sendai Office	Sendai-shi, Miyagi
	Takamatsu Office	Takamatsu-shi, Kagawa
	Fukuoka Office	Fukuoka-shi, Fukuoka
Technology Development Center	Chigasaki Research Institute	Chigasaki-shi, Kanagawa
	Wakamatsu Research Institute	Kitakyushu-shi, Fukuoka

Overseas	Name
U.S.A.	Washington Office
China	Beijing Office
Vietnam	Hanoi Office
Sri Lanka	Upper Kotomale Hydropower Project Office
Vietnam	Son La Hydropower Project Office

Business Sites and Companies Receiving ISO 14001 Certification, Etc. (as of March 2010)

In 2002, the J-POWER Group completed the process of putting in place environmental management systems (EMS) at all of our business sites to guide the implementation of environmental initiatives based on our corporate philosophy. By the end of 2005, all of J-POWER's power generation, transmission, substation, and communication facilities had obtained ISO 14001 certification.

The table at the right shows the J-POWER Group business sites and companies that have received ISO 14001 certification as of the end of March 2010.

Facilities managed by J-POWER regional headquarters (Hokkaido, East Japan, Chubu, West Japan): hydroelectric stations, transmission facilities, substations, telecommunication engineering centers, etc. Facilities managed by regional companies of JPHYTEC Co., Ltd., (Hokkaido, East Japan, Chubu, West Japan)
J-POWER thermal power stations (Isogo, Takasago, Takehara, Tachibanawan, Matsushima, Matsuura, Ishikawa Coal) JPec Co., Ltd., companies (Isogo, Takasago, Takehara, Tachibanawan, Matsushima, Matsuura, Ishikawa)
J-POWER Onikobe Geothermal Power Station JPec Co., Ltd., Onikobe Office
J-POWER Civil and Electrical Engineering Dept.
J-POWER Environment & Energy Business Dept. (Water Service Business Group, Subsurface Space Engineering Group)
JPHYTEC Co., Ltd. (Transmission and Compensation Division)
JPec Co., Ltd. (Wakamatsu Environmental Research Center)
JP Design Co., Ltd., main office
KEC Corporation (whole company)
Ichihara Power Co., Ltd.

Electric Utility Industry's Action Guidelines for Biodiversity (April 2010; Federation of Electric Power Companies of Japan)

Guiding principle: As electric power companies, we are grateful for the beneficence of nature, and will endeavor to realize sustainable business practices

I. We will strive to supply electricity with consideration of global warming and other global environmental problems that impact on biodiversity

1) Recognizing the importance of biodiversity and the beneficence of nature, we will give due consideration to our impact on ecosystems and local environments both in Japan and overseas when constructing and operating our facilities.
2) We will attempt to reduce our CO_2 emission intensity by measures including expansion of the use of nuclear power and renewable energies, and improving the thermal efficiency of thermal generation.
3) We will work to limit emissions of greenhouse gases when constructing facilities and in the processes of procurement and transport.

II. At the same time as steadily implementing environmental protection initiatives that contribute to biodiversity, we will endeavor to contribute to society

4) We will carefully analyze and understand the impact of our corporate activities on biodiversity, and we will take measures to protect it.
5) We will strive to contribute to society through activities to protect the environment such as the implementation of greening programs tailored to the characteristics of specific environments.

III. We will strive towards the realization of a material-cycle society that contributes to biodiversity

6) We will work to protect biodiversity and realize sustainable patterns of use by continuing to engage in 3R (reduce, reuse, recycle) activities, for example by attempting to make effective use of resources and reducing the amount of waste sent for final disposal.

IV. We will develop technologies and conduct R&D that contribute to biodiversity

7) We will proceed with R&D and develop technologies that protect biodiversity and contribute to stable patterns of use, and we will work to spread those technologies.

V. We will cooperate with local regions in the area of biodiversity, and we will widely communicate and share information concerning initiatives in relation to biodiversity

8) We will collaborate with local people, local governments, and regional research institutions.
9) We will communicate and share information on our business activities that take biodiversity into consideration in an easily understood form.

VI. We will strive to undertake voluntary activities that increase social awareness of biodiversity

10) We will endeavor to improve the level of environmental education we offer our employees.
11) We will contribute to increasing social awareness of biodiversity.

Eco Business by Group Companies

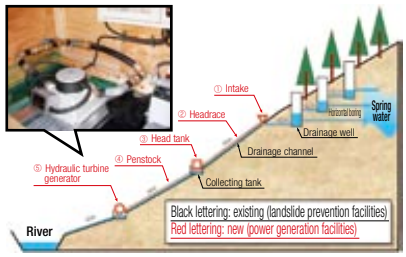
The J-POWER Group has established eco businesses of many kinds, leveraging environmentally-friendly technologies developed over many years of providing energy-related services. A few examples are introduced here.

Contributing to Global Environments through the Development of Small-scale Hydropower Projects
— Progress in the Introduction of Clean Energy —

JP Design Co., Ltd.

http://www.jpde.co.jp/ (Japanese only)

JP Design Co., Ltd. provides engineering services in the fields of civil engineering and construction. Using the hydropower technologies that it has fostered in collaborating with J-POWER, the company is involved in small-scale hydropower projects being developed by national and local governments, and is making a contribution to Japan's regional areas with "energy and the environment" as the axis of its activities. To offer one example, in fiscal 2009 the company was involved in a small-scale hydropower project commissioned by the Ministry of Land, Infrastructure, Transport and Tourism, and planned, designed, and constructed a small 300 W facility that uses spring water, a generally untapped resource. It is expected that the facility will be used to power street lighting, and will function as an emergency power source in the event of a disaster. In the future, JP Design will continue to make a contribution to the fight against global warming via hydropower developments.



Conceptual diagram of micro-hydropower project using spring water

Hydropower generation demonstration trial facility (Iida City, Nagano Prefecture)

Regional contribution through powering street lighting

Dry-Type Flue Gas Desulfurization-Denitrification System
— Regenerative Activated Coke Technology: ReACT —

J-POWER EnTech, Inc.

http://www.jpower.co.jp/entech_e/index.html/

One of J-POWER EnTech's core technologies is dry-type flue gas treatment, which allows users to remove multiple pollutants such as sulfur, nitrogen, dioxin, dust, and soot from flue gas in one operation, using almost no water. This technology is widely used in Japan at coal-fired power stations, steel mills, petrochemical facilities, waste incineration plants and other industrial facilities.

J-POWER EnTech has already delivered the most advanced flue gas treatment system designed for domestic steel mills, and it is displaying the highest performance of any system for the steel industry. The company has also supplied a flue gas treatment system for the J-POWER Isogo Thermal Power Station New No. 2 Unit, a facility operating at the world's highest level of environmental performance. This system is also being provided for use in power stations, steel mills and other facilities in Japan and overseas, where it is helping reduce the environmental burden in a wide range of fields.

Dry-type desulfurization system at Isogo Thermal Power Station New No. 2 Unit (Yokohama)

Utilizing Coal Ash to Contribute to Agriculture:
— Potassium Silicate Fertilizer —

KAIHATSU HIRYOU CO., Ltd.

http://www.jpsik.com/ (Japanese only)

KAIHATSU HIRYOU Co., Ltd., a J-POWER Group company, developed the world's first slow-release potassium silicate fertilizer made using coal ash from coal-fired power stations. Seeking to make more effective use of coal ash, the company began manufacturing the product in 1980. The potassium silicate fertilizer manufactured by the company is sold to farmer and growers in all 47 prefectures nationwide through ZEN-NOH (JA-Group). In the future, the company aims to make improvements in quality and the stability of supply, and to go on supporting agricultural production through the supply of this superior, environmentally friendly, and safe-to-use fertilizer.

The world's first potassium silicate fertilizer soluble in citric acid*, made from recycled coal ash generated at thermal power stations

* The fertilizer is soluble in a 2 percent solution of citric acid, but does not dissolve in weaker acids such as that exuded from roots. Since it dissolves gradually, its effectiveness is long-lasting.

Viewing the Environment through the Eyes of Biotechnology
— Analyzing Gene Expression using EG Microarrays —

Ecogenomics, Inc.

http://www.ecogenomics.co.jp/english/index.htm/

Based on the concept of "a fusion between the environment and biotechnology," Ecogenomics, Inc. uses tools termed "microarrays," formed by mounting a sample of the genetic material of an organism under study on glass or a semiconductor substrate, to test, analyze, and evaluate the effect of various chemical substances, wastewater, environmental water, and other factors on organisms and ecosystems at the genetic level.

The company is collaborating with the U.S. biotechnology venture company CombiMatrix, enabling it to apply the technique to every type of organism for which the genome is already known.

Environmental management at present chiefly focuses on managing concentrations of individual chemical substances such as heavy metals. However, the U.S. and other countries have already introduced and applied regulations to methods of environmental management using organisms, and studies are underway towards their introduction in Japan.

The latest biotechnology is continuing the challenge of attempting to realize environmental protection seen through the eyes of living organisms themselves.

EG Microarray Medaka 6000 and an example of a gene expression pattern*

* Red: Increased genes; Green: Reduced genes; Yellow: No change.
Effects on organisms can be analyzed and evaluated using patterns in which genes increase.

Environmental Accounting Data

Environmental Conservation Costs

(billion yen)

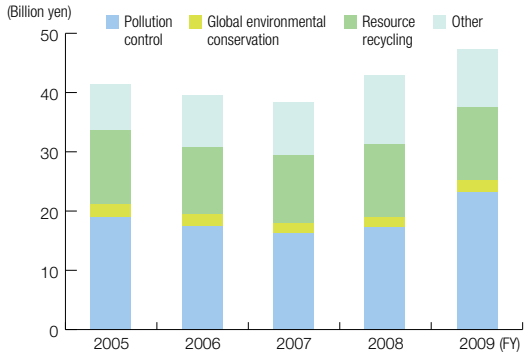
Category	Main measures and efforts	Cost
Pollution control	Air pollution control (desulfurization/ denitrification, soot and dust treatment), water pollution control (waste-water treatment), etc.	23.4
Global environmental conservation	Measures to reduce greenhouse gas emissions (maintaining high-efficiency operation of coalfired power stations, developing renewable and unutilized energy sources, maintenance costs for energy-saving equipment, emission control of greenhouse gases other than CO_2)	2.0
Resource recycling	Waste reduction through reuse and recycling; treatment and disposal of waste	12.5
Management activities	Monitoring and measurement of environmental load, labor costs for environmental conservation organizations, costs for environmental education, etc.	1.8
Research and development	High-efficiency generation, use of fuel cells, CO_2 capture and fixation, recycling of coal ash and gypsum, etc.	2.3
Social activities	Tree-planting, environmental advertising, environmental beautification, membership in environmental groups, preparation of sustainability report, etc.	2.2
International projects	Overseas cooperation projects for environmental conservation technologies	1.0
Other	Pollution load levy	2.0
Total		47.2

Environmental Conservation Benefits

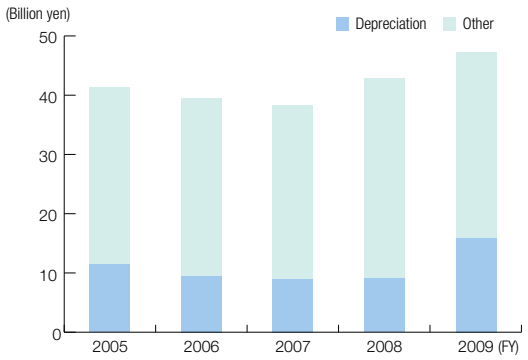
Environmental conservation benefit	FY 2005	FY 2009
SOx emissions intensity (g/kWh)	0.20	0.16
NOx emissions intensity (g/kWh)	0.50	0.44
Soot and dust emissions intensity (g/kWh)	0.02	0.01
CO_2 emissions intensity (kg-CO_2/kWh)	0.68	0.66
Average thermal efficiency of thermal power generation (%)	40.1	40.3
Coal ash recycling rate (%)	99.4	99.4
Industrial waste recycling rate (%)	98	98
Gypsum recycling rate (%)	100	100
Volume of driftwood recycled (1,000 m^3)	12	13
Employees completing internal environmental auditor training	76	
Sustainability report (copies published)	16,000	
Environmental pamphlet (copies published)	12,000	
Overseas consulting projects (cumulative total)	312	

Note: For detailed data on each category, see pp. 77–78, Environment-Related Fiscal Year Data, in the Reference Data section.

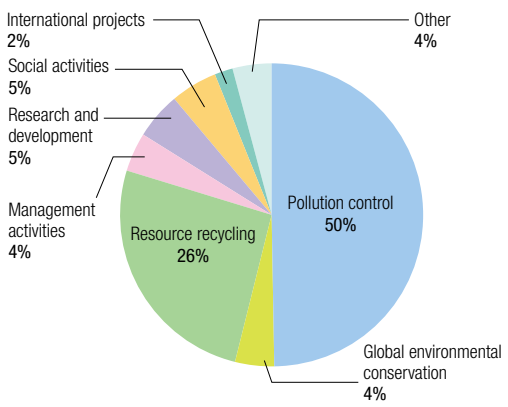
Environmental Conservation Costs: Comparison by Fiscal Year



Proportion of Depreciation and Other Costs



Environmental Conservation Costs: Breakdown by Category



Calculation Guidelines for Environmental Conservation Costs

- Period: April 1, 2009, to March 31, 2010
- Format: In accordance with Environmental Accounting Guidelines 2005 issued by the Ministry of the Environment
- Scope: Costs (including depreciation costs) for thermal power generation companies, which have the highest environmental load among J-POWER and Group company operations

Note: Costs were calculated focusing on expenses for the following: 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.

Treaties and Laws Relating to Global Warming

Overview of the United Nations 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 192 countries and regions.

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

Note: 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.

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 in 2000 and after.

Targeted greenhouse gases (GHGs)	6 categories of gases: CO_2 (carbon dioxide), methane, N_2O (nitrous oxide), HFCs (hydrofluorocarbons), PFCs (perfluorocarbons), and SF_6 (sulfur hexafluoride)
Commitment period	2008~2012 (first commitment period)
Goal	To reduce average yearly emissions of greenhouse gases by the Annex I countries by at least 5 percent below 1990 levels. In Annex B of the Kyoto Protocol, the Annex I countries commit themselves to specific reduction targets; Japan's reduction target is 6 percent.
Use of sinks (absorption forests)	Countries may include in their calculation of emissions reduction the removal of CO_2 by "sinks" resulting from land use change and forestry activities, limited to afforestation, reforestation, and deforestation since 1990.
Kyoto Mechanisms	Emissions trading,[1] Joint Implementation (JI),[2] and the Clean Development Mechanism (CDM)[3] have been adopted as economically rational means to achieve reduction targets on a global scale.

Overview of the Revised Kyoto Protocol Target Achievement Plan

In accordance with the Act on Promotion of Global Warming Countermeasures (Act No. 117, 1998), on April 28, 2005, the Japanese government formulated the 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 percent from the 1990 level. The plan was later revisited and updated following a review of the targets and measures it laid down. On March 28, 2008, a fully revised plan was adopted by cabinet resolution.

Countermeasures and Policies to Achieve the Targets

1. Countermeasures and Policies Concerning Reduction, Removal, etc. of Greenhouse Gas Emissions

(1) Countermeasures and Policies Concerning Reduction of Greenhouse Gas Emissions

Key measures added

•Promotion of voluntary action plans •Improvement of the energy efficiency of homes and other buildings •Measures involving toprunner products, etc. •Thoroughgoing measures to save energy in factories and other places of business •Improvement of vehicle fuel efficiency •Promotion of measures to reduce emissions by small- and medium- sized enterprises •Measures for improvements in areas including agriculture, forestry, and fisheries; water and sewage systems; and traffic flow •Urban greening and efforts concerning wastes, the three fluorinated gases, etc. •Promotion of the use of new forms of energy

(2) Greenhouse Gas Sink Measures and Policies

•Forest management through thinning, etc., and promotion of the campaign to create well-managed forests

2. Cross-Sectoral Policies

•Systems for calculation, reporting, and public disclosure of greenhouse gas emissions
•Development of national campaign

■ Quantitative Targets for Emissions Reduction and Absorption of Greenhouse Gases

		Emissions target range for FY 2010*	
		million t-CO_2	Ratio to base year total emissions
Energy-related CO_2		1,076~1,089	+1.3%~+2.3%
	Industrial sector	424~428	–4.6%~–4.3%
	Commercial and other sectors	208~210	+3.4%~+3.6%
	Residential sector	138~141	+0.9%~+1.1%
	Transport sector	240~243	+1.8%~+2.0%
	Energy conversion sector	66	–0.1%
Non-energy-related CO_2, CH_4, N_2O		132	–1.5%
Three fluorinated gases		31	–1.6%
Greenhouse gas emissions		1,239~1,252	–1.8%~–0.8%

* Japan will ensure achievement of its 6 percent reduction target under the Kyoto Protocol by combining the reduction of greenhouse gas emissions with such means as the use of carbon sinks and the Kyoto Mechanisms.

Environmental Action Plan by the Japanese Electric Utility Industry

(Summarized from the Environmental Action Plan by the Japanese Electric Utility Industry, The Federation of Electric Power Companies of Japan, September 2009)

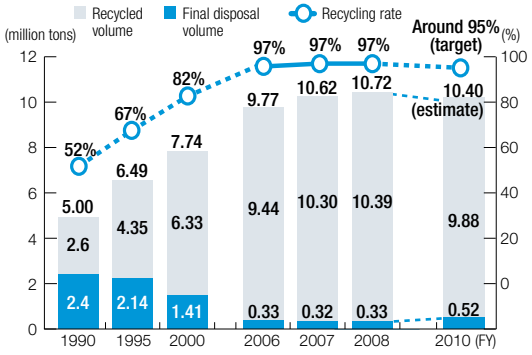
The Environmental Action Plan by the Japanese Electric Utility Industry lays out the electric industry's policy and plan for dealing with global warming and other environmental issues. Each year the plan is reviewed in relation to the industry's progress toward its goals and domestic and international trends. This plan is incorporated in the Keidanren Voluntary Action Plan on the Environment, adopted by Nippon Keidanren in June 1997. Progress toward the Keidanren plan as a whole and the various voluntary industry plans that make it up is regularly monitored by national councils and similar organs.

Measures for Waste Reduction and Recycling

Waste Recycling Rate Targets

Through fiscal 2010, we aim to maintain our waste recycling rate at around 95 percent.

■ **Waste Recycling Rate Target for the Electric Utility Industry**



Note: After landfills for final disposal are closed, the land is utilized for the expansion of power generation facilities or for other industrial purposes. A portion of the coal ash used at such sites has been included in "volume recycled" from fiscal 2004 as land reclamation material in accordance with the position taken by the national government.

■ **Trends in Recycling of Major Wastes and By-products**

(Unit: million tons)

Type			FY 1990	FY 2006	FY 2007	FY 2008
Waste	Combustion residue, dust and soot (coal ash)	Volume generated	3.47	7.05	7.68	7.80
		Recycled volume (Recycling rate)	1.37 (39%)	6.83 (97%)	7.46 (97%)	7.58 (97%)
	Construction waste material	Volume generated	0.40	0.42	0.41	0.38
		Recycled volume (Recycling rate)	0.21 (53%)	0.41 (97%)	0.40 (98%)	0.37 (97%)
	Scrap metal	Volume generated	0.14	0.20	0.22	0.34
		Recycled volume (Recycling rate)	0.13 (93%)	0.19 (98%)	0.22 (99%)	0.34 (100%)
Byproducts	Gypsum from desulfurization process	Volume generated	0.85	1.87	1.97	1.85
		Recycled volume (Recycling rate)	0.85 (100%)	1.87 (100%)	1.97 (100%)	1.85 (100%)

Measures to Mitigate Climate Change

CO_2 Emissions Suppression Targets

From fiscal 2008 to fiscal 2012, we aim to further reduce CO_2 emissions intensity (emissions per unit of user-end electricity) by an average of approximately 20 percent to about 0.34 kg-CO_2/kWh from the fiscal 1990 level.

■ **Goal of 12 FEPC-Affiliated Companies**

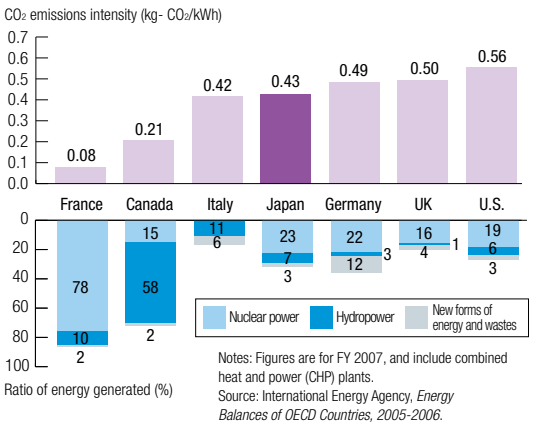
CO_2 emissions (kg-CO_2) = Electric power consumption (electric energy) (kWh) × CO_2 emissions intensity (CO_2 emissions per unit of electric power consumed) (kg-CO_2/kWh)

■ **Electric Utility Industry's CO_2 Emissions**

Item \ Fiscal year	1990 (results)	2006 (results)	2007 (results)	2008 (results)	2008 to 2012 (five-year average)
Electric power consumption (billion kWh)	659	889	920	889	(est.) 931
CO_2 emissions (million t- CO_2)	275	365	417	332	(est.) —
CO_2 emissions intensity of user-end electricity (kg- CO_2/kWh)	0.417	0.410	0.453	0.373	(est.) —

Reference Information

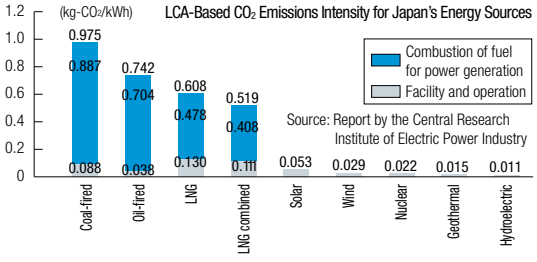
■ **Country-by-Country Comparison of CO_2 Emissions Intensity**
(per unit of energy generated; preliminary calculation by FEPC)



Notes: Figures are for FY 2007, and include combined heat and power (CHP) plants.
Source: International Energy Agency, *Energy Balances of OECD Countries, 2005-2006.*

■ **Life Cycle Assessment-Based CO_2 Emissions Intensity for Japan's Energy Sources**

The chart below represents the CO_2 emissions for various power sources when the entire life cycle is taken into account (LCA CO_2). This method calculates CO_2 emissions not only from the combustion of fuel for power generation but also from all energy consumed from such activities as mining and drilling, building power generation facilities, transporting fuel, refining fuel, operating and maintaining facilities, and so forth.



The J-POWER Group's Contribution for Japan to Achieve the Kyoto Target

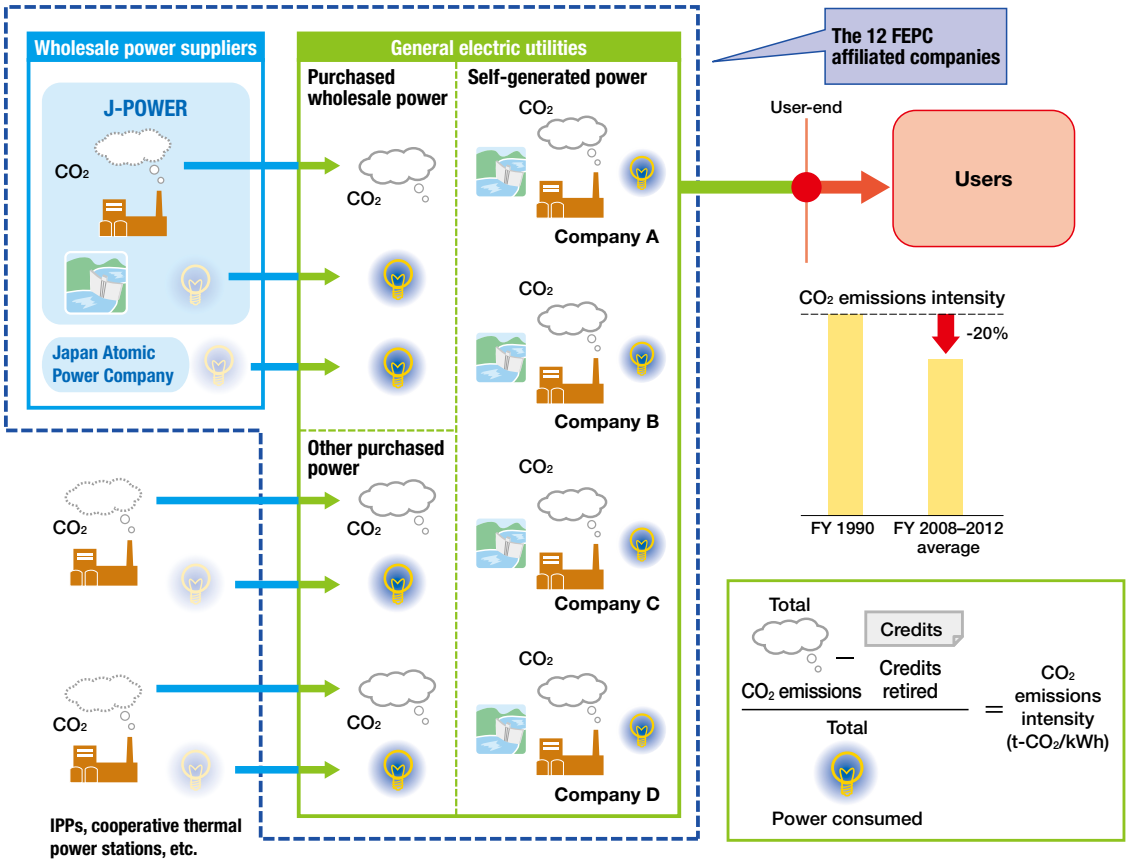
J-POWER, one of the 12* members of the Federation of Electric Power Companies of Japan (FEPC), is supporting the federation's program—the Environmental Action Plan by the Japanese Electric Utility Industry—to contribute to Japan's achievement of its Kyoto target.

Based on the Act on Promotion of Global Warming Countermeasures (Act No. 117, 1998) the Japanese government adopted the Kyoto Protocol Target Achievement Plan, a program to provide a series of necessary measures for surely achieving the Kyoto target of the 6 percent reduction in greenhouse gas emissions from 1990 levels, in a Cabinet resolution on April 28, 2005 (revised on March 28, 2008). As part of the industrial sector's efforts, the Keidanren Voluntary Action Plan on the Environment of the Nippon Keidanren has been incorporated into the governmental program, and the FEPC's program, composing a part of Nippon Keidanren's program, has in turn been included in the governmental program. The FEPC's program has also been incorporated into the governmental program as part of the energy supply sector's efforts to reduce CO_2 emissions.

The FEPC's program, the Environmental Action Plan by the Japanese Electric Utility Industry, has set the following target: From fiscal 2008 to fiscal 2012, we aim to further reduce CO_2 emissions intensity (emissions per unit of user-end electricity) by an average of approximately 20 percent from the fiscal 1990 level. One means to achieve this target is the retirement of emission credits gained by electric utility companies through the Kyoto Mechanisms to offset CO_2 emissions.

Because J-POWER is a wholesale power supplier without consumption points, the electric power and emissions it generates is directly reflected in the emissions of general electric utilities. J-POWER is therefore working in cooperation with general electric utilities to reduce CO_2 emissions. Specific efforts include the maintenance and improvement of the generation efficiency of coal-fired power stations, the development of energy sources with low CO_2 emissions such as nuclear power, the development of innovative technologies including those relating to coal gasification and CO_2 capture, and the utilization of CDM and JI credits. In these ways, J-POWER continues to press forward toward joint achievement of the targets set forth in the Environmental Action Plan by the Japanese Electric Utility Industry.

* The 12 companies affiliated with the Federation of Electric Power Companies of Japan are the 10 FEPC member companies (Hokkaido Electric Power Co., Inc., Tohoku Electric Power Co., Inc., Tokyo Electric Power Co., Inc., Chubu Electric Power Co., Inc., Hokuriku Electric Power Co., Inc., Kansai Electric Power Co., Inc., Chugoku Electric Power Co., Inc., Shikoku Electric Power Co., Inc., Kyushu Electric Power Co., Inc., and Okinawa Electric Power Co., Inc.) plus J-POWER and the Japan Atomic Power Company.



Glossary

(Page numbers indicate major citations.)

A

Advanced boiling water reactor (ABWR)
p. 21

A nuclear reactor that incorporates all the latest BWR (boiling-water reactor) technologies, including use of steel reinforced concrete for the containment vessel and a self-contained reactor recirculation pump, resulting in significant improvements in terms of safety, reliability, and cost.

Annex I countries
pp. 55, 82

Countries designated in Annex I of the United Nations Framework Convention on Climate Change, which have committed themselves to reducing emissions of greenhouse gases. Includes countries generally referred to as developed countries as well as those transitioning to market economies, such as former republics of the Soviet Union and Eastern European countries.

B

Biomass
pp. 11, 28, 45, 46, 49, 51, 65, 70, 72

Renewable organic resources of plant and animal origin other than fossil fuels.

C

Carbon dioxide capture and storage (CCS)
pp. 46, 53, 54, 69, 72

A system for capturing CO_2 from factory and power station emissions and transferring and storing the captured CO_2 to sequester it from the atmosphere over the long term. The two storage options are storage in geological formations and storage in the ocean.

Chemical oxygen demand (COD)
p. 43

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.

Chlorofluorocarbon (CFC) alternatives
pp. 57, 78, 82

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 CO_2, they were included among the gases targeted for reduction at COP3 held in Kyoto in December 1997.

Cool Earth 50
p. 53

A long-term target for combating global warming proposed in May 2007 by then-Prime Minister Shinzo Abe. It set the goal of halving global CO_2 emissions by 2050.

D

Designated public institution
p. 17

A public institution designated by the prime minister based on the Basic Act on Disaster Control Measures and the Act on the Peace and Independence of Japan and Maintenance of the Nation and the People's Security in Armed Attack Situations etc. Included are institutions of a public nature such as Japan Broadcasting Corporation and the Bank of Japan, as well as companies providing basic public services such as the supply of electricity and gas, transportation, and communications. Designated public institutions are obliged to cooperate with local governments and among themselves to help prevent disasters and carry out measures to protect the people of Japan. J-POWER is a designated public institution under both of the Acts mentioned above, and it intends to undertake disaster prevention and the protection of the public through the supply of electricity.

Dioxin(s)
pp. 63, 66, 76

Generic name for polychlorinated dibenzo-p-dioxin (PCDD), polychlorinated dibenzofuran (PCDF), and coplanar polychlorinated biphenyl (coplanar-PCB). Toxic substances generally present in the environment in trace amounts and suspected of posing grave danger to human life and health. Under the Act on Special Measures against Dioxins, which came into force in January 2000, dioxin emissions from waste incinerators and other sources are strictly regulated.

E

Eco-efficiency
pp. 44, 75, 76

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.

Environmental accounting
pp. 44, 76, 81

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 of environmental reports, etc., which can be used as yardsticks for measuring and comparing the environmental efforts of different companies.

Environmental Action Plan by the Japanese Electric Utility Industry
pp. 57, 83, 84

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 management system (EMS)
pp. 41, 67, 76, 79

A system by which organizations employ the PDCA management cycle to continuously improve the environment in an effort to comply with laws and regulations and take initiative in protecting the environment.

F

Fuel cell
pp. 54, 81

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_2 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 they are relatively quiet.

G

Gas-turbine combined-cycle generation
pp. 11, 49

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.

Green purchasing
pp. 41, 64, 76, 81

Placing priority on minimizing the environmental load in the purchase of goods and services by emphasizing the effect on the environment, as opposed to price, quality, convenience, or design.

H

Hydrofluorocarbons (HFCs)
pp. 57, 76–78, 82

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_2.

I

Independent power producer (IPP)
pp. 3, 4, 9, 11, 84

A business, other than a wholesale power supplier, that supplies electricity to general electric utilities.

Industrial waste
pp. 41–44, 63, 78, 81

Wastes such as ash, sludge, waste oil, waste acid, waste alkali, and waste plastics generated in the course of business operations. The Waste Management and Public Cleansing Act calls for proper disposal and incineration of industrial waste.

Integrated coal gasification fuel cell combined cycle system (IGFC)
pp. 46, 54

A triple combined power generation system achieved by combining the fuel cell, gas turbine, and steam turbine; the ultimate coal-fired thermal power generation system.

Integrated coal gasification combined cycle system (IGCC)
pp. 46, 53, 54, 76

A combined power generation system consisting of gas turbines that generate electricity by firing gas produced from coal and steam turbines that use the exhaust heat from the gas turbines.

Internal Control Reporting System
p. 16

From the perspective of investor protection, this system is aimed at ensuring the reliability of financial reporting. The term refers to the stipulations of the Financial Instruments and Exchange Act's Article 24-4-4 and Article 193-2, which set forth matters relating to internal control. Specifically, the system requires that applicable corporations and corporate groups issue internal control reports evaluating the internal structures essential to ensuring validity of financial statements and other information and that the statements be accompanied by an audit certificate issued by a certified public accountant or audit firm.

K

Kyoto Mechanisms
pp. 41, 45, 55, 56, 75, 76, 82, 84

Please refer to p. 55, 82.

Kyoto Protocol
pp. 45, 55–57, 75, 82, 84

Please refer to p. 82.

L

Lower heating value (LHV)
pp. 42, 46

Heating value refers to the amount of heat released when completely combusting a specified amount (1 kg, 1 m^3, 1 l) of fuel at a specified state (for example, 1 atm and 25°C) with a sufficient amount of dry air, then cooling the combustion product gas to the original temperature (in this case, 25°C). Higher heating value includes the latent heat of condensation of any vapor contained in the combustion product gas, whereas lower heating value assumes that vapor remains in that state and therefore does not include the latent heat of condensation. Lower heating value is determined by subtracting the latent heat of vapor condensation from the higher heating value measured by a calorimeter, and is calculated using the following equation:
Lower heating value = Higher heating value – latent heat of vapor condensation x amount of vapor

M

Methane (CH_4)
pp. 55, 57, 82

A main component of natural gas. Also produced through the decay or fermentation of organic matter. The second most common greenhouse gas, after CO_2, with a greenhouse effect 21 times that of CO_2.

Mixed-oxide fuel (MOX fuel)
pp. 21–22

Mixed oxide fuel consisting of uranium mixed with plutonium recovered by reprocessing spent nuclear fuel. In Japan, the use of MOX fuel in light-water and other reactors to generate electricity is referred to as "pluthermal." While Japan's pluthermal plan originally called for use of a one-third MOX core for fuel, the "full MOX" plan calls for a 100% MOX core.

N

Nitrogen oxides (NOx)
pp. 8, 41, 43, 44, 47, 58, 62, 78, 81

General term for compounds made up of nitrogen and oxygen. NOx 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 stations or in automobile engines yields nitrogen monoxide, and this NO is further oxidized to form the stable compound nitrogen dioxide (NO_2), 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.

Nitrous oxide (N_2O)
pp. 51, 57, 76, 82

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_2. Said to be generated by combustion and application of nitrogen fertilizer.

Non-industrial waste
pp. 42, 43, 51, 64, 65

Defined as waste other than industrial waste under the Waste Management and Public Cleansing Act. Further divided into household waste and business waste (waste from offices, eating and drinking establishments, etc.).

P

Perfluorocarbons (PFCs)
pp. 57, 82

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_2.

Polychlorinated biphenyl (PCB)
pp. 66, 68, 76

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 Act on Special Measures concerning Promotion of Proper Treatment of PCB Wastes, which came into force in July 2001, calls for detoxification treatment of PCB waste currently in storage by 2016.

Polychlorinated biphenyl (PCB) regional waste treatment program
p. 66

In 2001, the government enacted the Act on Special Measures concerning Promotion of Proper Treatment of PCB Wastes and revised the Japan Environment Corporation Law to establish a framework for the treatment by 2016 of the PCB waste in storage since production and use was banned in 1874. As part of this framework, the Japan Environment Corporation (name changed to Japan Environmental Safety Corporation in 2004) set up five regional treatment facilities in Hokkaido, Tokyo, Toyota, Osaka, and Kitakyushu, where PCB waste is now being treated.

Power producer and supplier (PPS)
pp. 3–4

A business that provides electricity to meet a certain level of demand (in general, contract demand of at least 2,000 kW in a single service area served by extra-high voltage lines maintained by general electric utilities, excluding Okinawa Electric Power Co.; in the case of Okinawa Electric Power Co., contract demand of at least 20,000 kW in a single service area served by power lines carrying at least 60,000 volts), excluding the general electric utilities that maintain the transmission lines. A new category of business established under the revised Electricity Business Act of 1999.

Pulverized coal-fired (PCF) power
pp. 47, 54

Method of power generation whereby pulverized coal and air are placed in a boiler for combustion.

Renewable energy
pp. 12, 13, 44–46, 49–52, 55, 70, 79, 84

Energy derived from such natural phenomena as sunlight, 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. 49, 60

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.

S

Soot and dust
pp. 43, 44, 62, 78, 81, 83

The Air Pollution Control Act 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 motor vehicles.

Specially controlled industrial waste
p. 43

Explosive, toxic, or infectious industrial waste requiring strict controls under the Waste Management and Public Cleansing Act. Includes waste oil with a low flash point, medical waste, PCBs, asbestos, and sludge containing high concentrations of heavy metals.

Sulfur hexafluoride (SF_6)
pp. 41, 57, 77

A compound of sulfur and fluorine produced industrially; SF_6 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_2.

Sulfur oxides (SOx)
pp. 8, 41, 43, 44, 47, 58, 62, 78, 81

General term for compounds made up of sulfur and oxygen, including sulfur dioxide (SO_2), sulfur trioxide (SO_3), and sulfuric acid mist (H_2SO_4). Sulfur oxides are generated from the sulfur content in coal and heavy oil when they are fired as fuel in factories and thermal power stations and are released into the atmosphere in exhaust gases. As a substance responsible for acid rain, they are a source of atmospheric pollution.

Sustainability Reporting Guidelines
p. 1

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. 1, 5–7, 10–13, 15, 29, 30, 34, 41, 72, 75, 82

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."

T

Thermal efficiency
pp. 8, 10, 41, 44, 46–48, 57, 76, 77, 79, 81

For an electric power generating facility, the ratio of electric power generated (converted to thermal units) to heat energy input.

Thermal water discharge
p. 61

In thermal and nuclear power generation, 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 stations, seawater is used for cooling in 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 thermal water discharge.

U

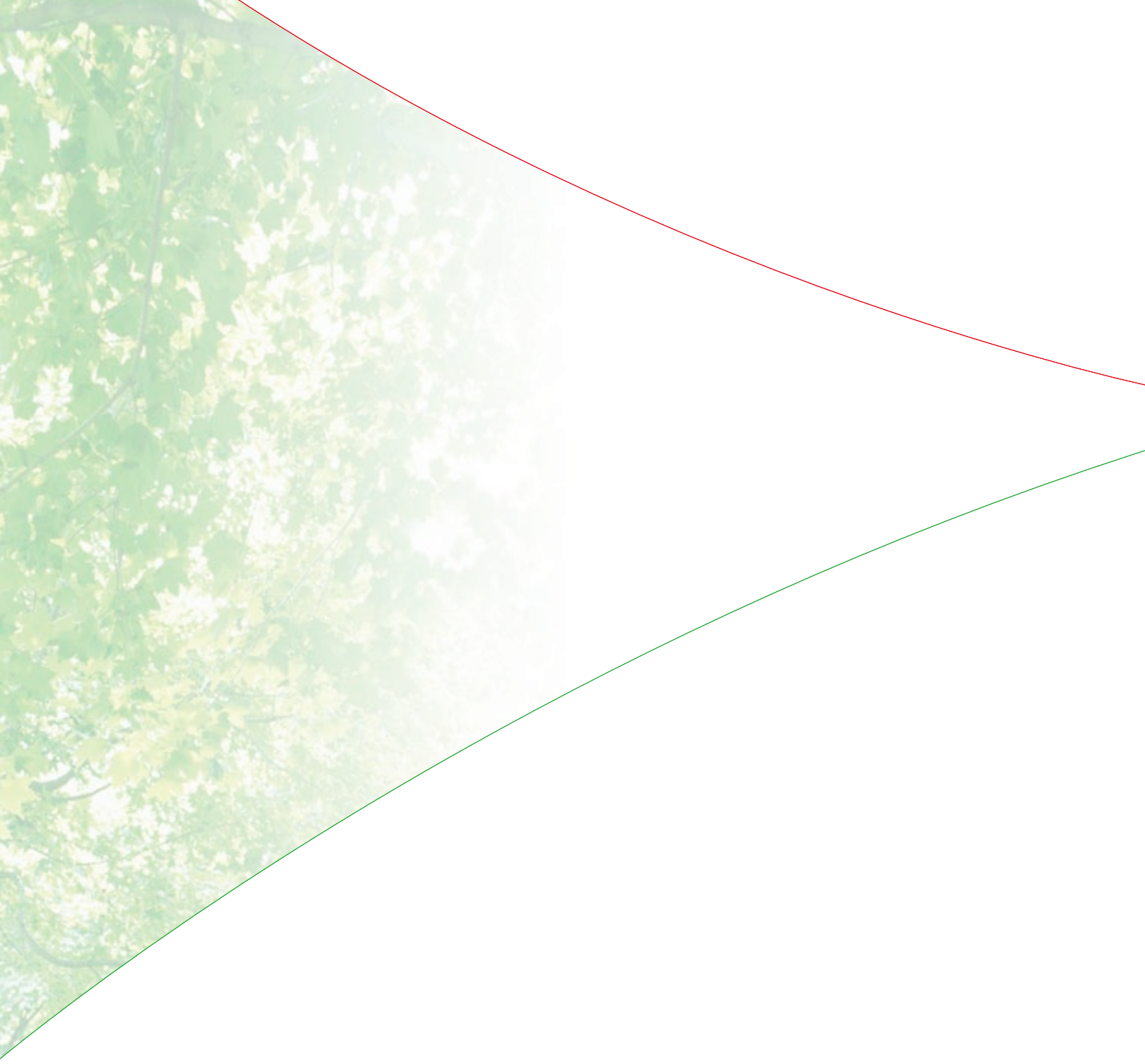
Ultra super critical (USC)
pp. 12, 45–47, 53

A steam turbine technology that makes use of advanced steam conditions, beyond those used in conventional super critical turbines (pressure 22.1 MPa temperature 566ºC), to improve the efficiency of thermal power stations.

W

Wheeling
p. 3

The delivery by a power producer and supplier of power received from a third party to users via its own transmission lines and other equipment.



Electric Power Development Co., Ltd.

Environmental Management Promotion Board Office:
Environmental Management Group, Corporate Planning and Administration Department

15-1, Ginza 6-chome, Chuo-ku, Tokyo 104-8165, JAPAN
Tel: +81-3-3546-2211 Fax: +81-3-3546-9531
http://www.jpower.co.jp/english/

Reliability Assurance

Inspection/Registration Mark
Indicates that the report has been inspected by a third party organization and satisfies "Sustainability Report Inspection and Registration Mark Conferment Standards."

Paper Considerations

FSC-Certified Paper
The paper used in this report is made of wood from forests properly managed according to strict standards.

Printing Considerations

Non-VOC Ink
This report was printed with 100% eco-friendly plant-based ink with no volatile organic compounds.

Soy Ink
This report was printed with soy ink for excellent biodegradability, deinking and printed matter recycling.

Waterless Printing
This report was printed with a waterless printing process creating little waste liquid containing organic matter.

Published October 2010
Printed in Japan