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Compliance Code

I. Basics (1) Compliance with laws and internal regulations (2) Acting in accordance with social norms	(7) Environmental conservation (8) Appropriate use of information systems (9) Protection of intellectual property rights (10) Compliance with import/export laws and regulations	4. Relations with Government Agencies/ Officials (1) Adherence to approval and notification procedures (2) Entertaining/giving gifts to government officials
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	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	5. Relations with Employees (1) Respect for human rights; prohibition of discrimination (2) Sexual harassment (3) Protection of privacy (4) Workplace safety and hygiene (5) Compliance with labor laws (6) Compliance with employment regulations (7) Proper accounting and tax procedures (8) Appropriate use of company assets
	3. Relations with Shareholders and Investors (1) Disclosure of business information (2) Prohibition of insider trading	

J-POWER Group Environmental Management Vision

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 CO₂ 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 CO₂ 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 CO₂.

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 CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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 2009 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 CO₂ Emission Power Sources

- Construct nuclear power stations
- Effectively utilize renewable and unutilized energy
- Promote the use of 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

- Develop integrated coal gasification fuel cell combined cycle (IGFC) and solid oxide fuel cell (SOFC) technologies
- Promote small hydropower stations
- Promote R&D on CO₂ separation and capture technologies

(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 CO₂

- Reduce sulfur hexafluoride (SF₆) emissions from gas-insulated switch gear
- Reduce emissions of hydrofluorocarbons (HFCs) from air conditioners
- Reduce nitrous oxide (N₂O) emissions by appropriately managing thermal efficiency

2. Efforts Relating to Local 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
- 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 specially noted, data for FY 2004 or earlier are for J-POWER only; data for FY 2005 onward include Group companies.

Notes:

1. The sum of the figures in each column may not equal the total due to rounding.
2. 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 2004	FY 2005	FY 2006	FY 2007	FY 2008
Hydroelectric	GW	7.09	8.55	8.55	8.56	8.56	8.56
Thermal	GW	4.65	7.82	8.18	8.18	8.18	8.18
Coal-fired	GW	4.64	7.81	7.95	7.95	7.95	7.95
Natural gas	GW			0.22	0.22	0.22	0.22
Geothermal	GW	0.01	0.01	0.01	0.01	0.01	0.01
Wind power	GW			0.14	0.21	0.21	0.25
Total	GW	11.74	16.38	16.87	16.94	16.94	16.99

■ Electricity Output

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Hydroelectric	GWh	12,451	12,892	10,187	12,212	10,428	9,470
Thermal	GWh	29,551	52,708	58,922	52,429	57,050	53,648
Coal-fired	GWh	29,452	52,616	58,070	51,624	56,260	52,979
Natural gas	GWh			748	701	686	589
Geothermal	GWh	99	92	104	104	104	80
Wind power	GWh			203	254	321	322
Total	GWh	42,002	65,600	69,312	64,870	67,799	63,439

■ Electric Power Sold

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Hydroelectric (excluding pumped storage)	GWh	10,046	11,172	8,583	10,633	8,287	8,384
Thermal	GWh	27,293	49,345	55,205	49,128	53,576	50,122
Coal-fired	GWh	27,206	49,261	54,413	48,381	52,842	49,505
Natural gas	GWh			698	652	640	547
Geothermal	GWh	87	84	94	94	94	70
Wind power	GWh			195	245	307	310
Total	GWh	37,338	60,517	63,983	60,006	62,170	58,816

■ Fuel Consumption

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Coal (dry coal 28MJ/kg equivalent)	million t	9.56	16.69	18.39	16.30	17.91	16.97
Use intensity (coal-fired thermal)	t/GWh	351	339	338	337	339	343
Natural gas	million m ³ N			124	117	115	99
Heavy oil	million kl	0.1	0.06	0.06	0.06	0.05	0.04
Diesel	million kl	0.01	0.03	0.03	0.02	0.03	0.03

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

■ Greenhouse Gas Emissions

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
CO ₂ emissions (domestic and overseas power generation)*	million t-CO ₂	24.67	44.76	49.49	45.36	50.22	49.38
	kg-CO ₂ /kWh	0.66	0.69	0.72	0.68	0.70	0.68
(domestic power generation)	million t-CO ₂	24.67	42.54	47.18	42.14	45.97	43.47
	kg-CO ₂ /kWh	0.66	0.70	0.74	0.70	0.74	0.74
SF ₆ emissions	t	-	0.0	0.1	0.1	0.0	0.1
Handled	t	-	3.4	3.3	6.4	4.4	7.9
Recovery rate	%	-	99	98	99	99	99
HFC emissions	t	-	0.0	0.1	0.0	0.1	0.1

* Figures for CO₂ emissions exclude the Wakamatsu Research Institute. Figures for CO₂ emissions (domestic and overseas power generation) include all consolidated subsidiaries and joint venture companies.

Notes: 1. Denominators for emission intensity represent electric power sold.
2. For the CO₂ calculation method, see p. 55.

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

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Average thermal efficiency (at generation point)	%	39.0	40.4	40.5	40.4	40.3	40.1

■ Usage of Specified CFCs

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Specified CFCs	Stocked	t	3.6	1.4	1.8	1.8	1.8
	Consumed	t	0.7	0.0	0.0	0.0	0.0
Halons	Stocked	t	4.7	3.9	3.9	4.3	4.6
	Consumed	t	0.0	0.0	0.0	0.0	0.0
Other CFCs	Stocked	t	2.8	9.1	10.2	9.9	9.5
	Consumed	t	0.0	0.2	0.3	0.3	0.3
HFCs (CFC alternatives)	Stocked	t	–	1.9	7.7	8.4	5.9
	Consumed	t	–	0.0	0.1	0.0	0.1

■ SO_x, NO_x, and Soot and Dust Emissions

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
SO _x emissions	1,000 t	9.9	10.4	10.2	9.9	11.3	10.6
Intensity (thermal)	g/kWh	0.34	0.20	0.17	0.19	0.20	0.20
NO _x emissions	1,000 t	26.4	26.6	28.9	27.9	28.5	26.7
Intensity (thermal)	g/kWh	0.90	0.50	0.49	0.53	0.50	0.50
Soot and dust emissions	1,000 t	1.0	1.0	1.0	0.9	1.0	0.8
Intensity (thermal)	g/kWh	0.03	0.02	0.02	0.02	0.02	0.02

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 2004	FY 2005	FY 2006	FY 2007	FY 2008
Volume generated	million t	–	2.06	2.23	1.96	2.18	2.14
Volume recycled	million t	–	1.89	2.09	1.86	2.15	2.10
Recycle rate	%	–	92	94	95	98	98

Note: Figures for FY 2004 and later are for the entire J-POWER Group.

■ Coal-Ash and Gypsum Recycling

	Unit	FY 1990	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Coal-ash created	1,000 t	1,257	1,657	1,806	1,556	1,714	1,747
Coal-ash recycled	1,000 t	719	1,507	1,696	1,512	1,711	1,736
Coal-ash recycle rate	%	57.2	91.0	93.9	97.2	99.8	99.4
Gypsum created	1,000 t	–	371	380	334	360	330
Gypsum recycle rate	%	100	100	100	100	100	100

Notes: 1. For details on coal-ash recycling rate, see p. 61.
2. Figures for FY 2004 and later are for the entire J-POWER Group.

■ Office Power Consumption

	Unit	–	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Power consumed by offices (company total)	GWh	–	15.64	22.00	22.82	22.23	21.86
Head office* power consumption	GWh	–	8.99	8.89	8.73	8.61	8.61
Lighting/power sockets	GWh	–	1.79	1.76	1.78	1.80	1.72

* 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 at Business Sites (vehicles, ships, emergency generators, etc.)

	Unit	–	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Gasoline	kl	–	342	1,162	1,191	1,136	1,077
Diesel	kl	–	2,137	2,352	4,342	3,589	3,235

■ Green Purchasing

	Unit	–	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Copy paper* purchased	million sheets	–	25.97	62.41	69.53	57.84	56.05
Recycled copy paper* purchased	million sheets	–	25.11	57.22	65.87	54.87	55.18
Recycled copy paper* purchase rate	%	–	97	92	95	95	98

* A4 paper-size equivalent

J-POWER: Main Business Sites and Significant Consolidated Subsidiaries

Main Business Sites (as of March 2009)

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	
		Sendai Office	Sendai-shi, Miyagi
		Takamatsu Office	Takamatsu-shi, Kagawa
		Fukuoka Office	Fukuoka-shi, Fukuoka
		Hokuriku Office	Toyama-shi, Toyama
Corporate Planning & Administration Department	Chugoku Office	Hiroshima-shi, Hiroshima	
		Chigasaki Research Institute	Chigasaki-shi, Kanagawa
		Wakamatsu Research Institute	Kitakyushu-shi, Fukuoka

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

Significant Consolidated Subsidiaries (As of March 2009)

Company name	Equity stake (%)	Main businesses	Head office
Bay Side Energy Co., Ltd.	100	Electric power supply	Chuo-ku, Tokyo
Green Power Kuzumaki Co., Ltd.	100	Construction and operation of wind power stations	Iwate-gun, Iwate
Green Power Setana Co., Ltd.	100	Construction and operation of wind power stations	Kudo-gun, Hokkaido
Green Power Koriyama Nunobiki Co., Ltd.	100	Construction and operation of wind power stations	Koriyama-shi, Fukushima
Dream-Up Tomamae Co., Ltd.	100	Construction and operation of wind power stations	Tomamae-gun, Hokkaido
Green Power Aso Co., Ltd.	81	Construction and operation of wind power stations	Aso-gun, Kumamoto
ITOIGAWA POWER Inc.	80	Electric power supply	Itoigawa-shi, Niigata
Nagasaki-Shikamachi Wind Power Co., Ltd.	70	Construction and operation of wind power stations	Kitamatsuura-gun, Nagasaki
Nikaho-Kogen Wind Power Co., Ltd.	67	Construction and operation of wind power stations	Nikaho-shi, Akita
J-Wind TAHARA Co., Ltd.	66	Construction and operation of wind power stations	Tahara-shi, Aichi
Ichihara Power Co., Ltd.	60	Electric power supply	Ichihara-shi, Chiba
JPOWER GENEX CAPITAL Co., Ltd.	100	Management of joint venture IPP projects	Chuo-ku, Tokyo
JPec Co., Ltd.	100	Construction, technical development, design, consulting, maintenance, and surveys for thermal and nuclear power generation facilities; unloading and transport of coal for thermal power stations; sale of fly ash; marine transport of coal for power generation; research and planning related to environmental conservation	Chuo-ku, Tokyo
JPHYTEC Co., Ltd.	100	Construction, technical development, design, consulting, maintenance, and surveys for hydropower and wind power stations, substations, and transmission facilities; land surveys and land compensation work related to construction sites; civil engineering, general construction, and construction management	Chiyoda-ku, Tokyo
KEC Corporation	100	Installation and maintenance of electronic and communications facilities	Bunkyo-ku, Tokyo
EPDC Coal Tech and Marine Co., Ltd.	100	Marine transportation of ash and fly ash from thermal power stations	Chuo-ku, Tokyo
JP Design Co., Ltd.	100	Construction consulting business; design and construction management of electric power facilities and other buildings; geological and other various surveys	Chiyoda-ku, Tokyo
J-POWER RESOURCES CO., LTD.	100	Import, sale, and transport of coal	Chuo-ku, Tokyo
J-POWER EnTech, Inc.	100	Engineering of equipment for removal of atmospheric and water pollutants	Minato-ku, Tokyo
Omuta Plant Service Co., Ltd.	100	Operation and maintenance of waste-fueled power stations	Omuta-shi, Fukuoka
Japan Network Engineering Co., Ltd.	100	Telecommunications business; operation and maintenance of telecommunications facilities	Chuo-ku, Tokyo
KAIHATSU HIRYOU Co., Ltd.	100	Production and sale of fertilizer using ash	Takehara-shi, Hiroshima
JP Business Service Corporation	100	Operation of welfare facilities; building maintenance; administrative, labor, and accounting contract services; computer software development	Koto-ku, Tokyo
FWM Investment Co., Ltd.	51	Investment management for implementing water service business	Omuta-shi, Fukuoka
Fresh Water Miike Co., Ltd.	51	Water service business and ancillary businesses	Omuta-shi, Fukuoka
J-POWER AUSTRALIA PTY.LTD.	100	Investment in development of coal mines in Australia	Australia
J-Power Investment Netherlands B.V.	100	Investment in overseas power generation projects	Netherlands
J-POWER North America Holdings Co.,Ltd.	100	Holding of power generation assets in the U.S.	U.S.A.
J-POWER Holdings(Thailand)Co.,Ltd.	100	Holding of power generation assets in Thailand	Thailand
J-POWER Generation(Thailand)Co.,Ltd.	100	Operation and management power generation assets in Thailand	Thailand
J-POWER USA Investment Co.,Ltd.	100	Operation and management of power generation projects in the U.S.	U.S.A.
J-POWER USA Development Co.,Ltd.	100	Development of new power generation projects in the U.S.	U.S.A.

Business Sites and Companies Receiving ISO 14001 Certification, Etc.

>>> The following sites have received ISO 14001 certification as of March 2009.

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 Treatment Engineering 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.

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.

●Dry-Type Flue Gas Desulfurization-Denitrification System (Regenerative Activated Coke Technology: ReACT)

J-POWER EnTech, Inc.

http://www.jpowers.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 trace 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 latest flue gas treatment system designed for Japanese steel mills, with the highest performance of any system for the steel industry, as well as supplying a flue gas treatment system for the J-POWER Isogo Thermal Power Station No. 2 unit, which started operation in 2009. 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 potassium silicate fertilizer as a slow-release potassium fertilizer made using coal ash from thermal power stations, and has been manufacturing and selling it since 1980. In fiscal 2007 the company built a new factory in Takehara, Hiroshima Prefecture, in order to increase production of potassium silicate fertilizer and also in an attempt to promote more effective use of coal ash. The manufactured potassium silicate fertilizer is sold to farmers and growers in 47 prefectures nationwide through ZEN-NOH (JA Group) as an agricultural cooperative exclusive fertilizer. By continuing to supply this outstanding fertilizer, which is friendly to people and nature and can be used with assurance, we intend to offer powerful support for future agriculture.



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.

Environmental Accounting Data

Environmental Conservation Costs

(billion yen)

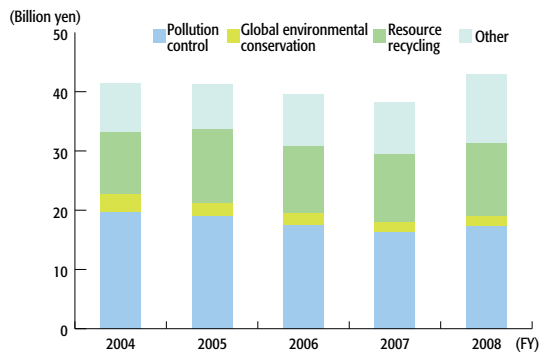
Category	Main measures and efforts	Cost
Pollution control	Air pollution control (desulfurization/denitrification, soot and dust treatment), water pollution control (waste-water treatment), etc.	17.3
Global environmental conservation	Measures to reduce greenhouse gas emissions (maintaining high-efficiency operation of coal-fired power stations, developing renewable and unutilized energy sources, maintenance costs for energy-saving equipment, emission control of greenhouse gases other than CO ₂)	1.7
Resource recycling	Waste reduction through reuse and recycling; treatment and disposal of waste	12.3
Management activities	Monitoring and measurement of environmental load, labor costs for environmental conservation organizations, costs for environmental education, etc.	1.5
Research and development	High-efficiency generation, use of fuel cells, CO ₂ capture and fixation, recycling of coal ash and gypsum, etc.	4.4
Social activities	Tree-planting, environmental advertising, environmental beautification, membership in environmental groups, preparation of environmental report, etc.	2.9
International projects	Overseas cooperation projects for environmental conservation technologies	0.9
Other	Pollution load levy	2.0
Total		43.0

Environmental Conservation Benefits

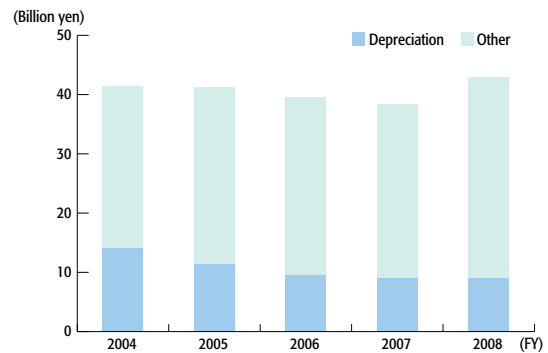
Environmental conservation benefit	FY 2004	FY 2008
SOx emissions intensity (g/kWh)	0.20	0.20
NOx emissions intensity (g/kWh)	0.50	0.50
Soot and dust emissions intensity (g/kWh)	0.02	0.02
CO ₂ emissions intensity (kg-CO ₂ /kWh)	0.69	0.68
Average thermal efficiency of thermal power generation (%)	40.4	40.1
Coal ash recycling rate (%)	91.0	99.4
Industrial waste recycling rate (%)	92	98
Gypsum recycling rate (%)	100	100
Volume of driftwood recycled (1,000 m ³)	–	39
Employees completing internal environmental auditor training	126	
Environmental report (copies published)	15,000	
Environmental pamphlet (copies published)	15,000	
Overseas consulting projects (cumulative total)	300	

Note: For detailed data on each category, see pp. 75–76, Environment-Related Fiscal Year Data, in the Reference Data section.

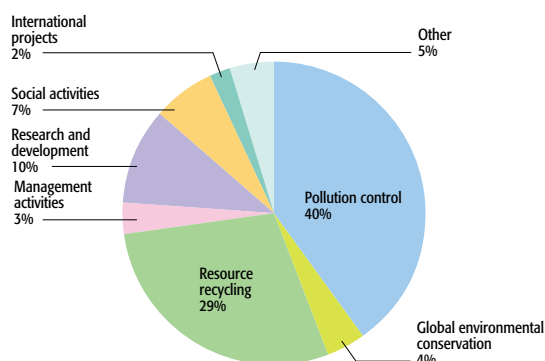
Environmental Conservation Costs: Comparison by Fiscal Year



Proportion of Depreciation and Other Costs



Environmental Conservation Costs: Breakdown by Category



Calculation Guidelines for Environmental Conservation Costs

- Period: April 1, 2008, to March 31, 2009
- 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 ₂ O (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.

- 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

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 top-runner 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

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 ₂ O	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 2008)

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.

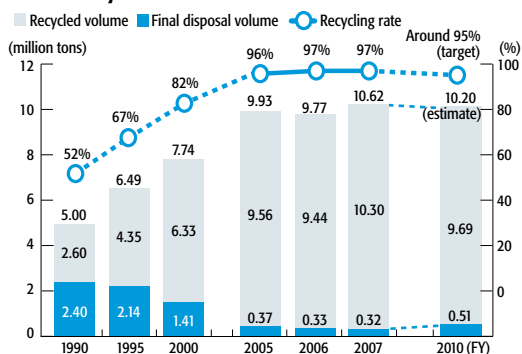
This plan is incorporated in the Keidanren Voluntary Action Plan on the Environment, adopted by Nippon Keidanren in June 1997. Progress toward the Keidanren plan as a whole and the various voluntary industry plans that make it up is regularly monitored by national councils and similar organs.

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)

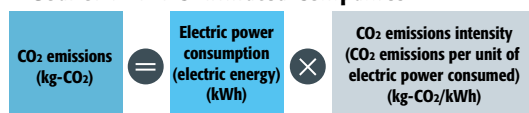
Type		FY 1990	FY 2005	FY 2006	FY 2007	
Waste	Combustion residue, dust and soot (coal ash)	Volume generated	3.47	7.24	7.05	7.68
		Recycled volume (Recycling rate)	1.37 (39%)	6.97 (96%)	6.83 (97%)	7.46 (97%)
	Construction waste material	Volume generated	0.40	0.36	0.42	0.41
		Recycled volume (Recycling rate)	0.21 (53%)	0.35 (97%)	0.41 (97%)	0.40 (98%)
	Scrap metal	Volume generated	0.14	0.19	0.20	0.22
		Recycled volume (Recycling rate)	0.13 (93%)	0.18 (99%)	0.19 (98%)	0.22 (99%)
By-products	Gypsum from desulfurization process	Volume generated	0.85	1.90	1.87	1.97
		Recycled volume (Recycling rate)	0.85 (100%)	1.90 (100%)	1.87 (100%)	1.97 (100%)

Measures to Mitigate Climate Change

CO₂ Emissions Suppression Targets

From fiscal 2008 to fiscal 2012, we aim to further reduce CO₂ emissions intensity (emissions per unit of user-end electricity) by an average of approximately 20 percent to about 0.34 kg-CO₂/kWh from the fiscal 1990 level.

Goal of 12 FEPC-Affiliated Companies



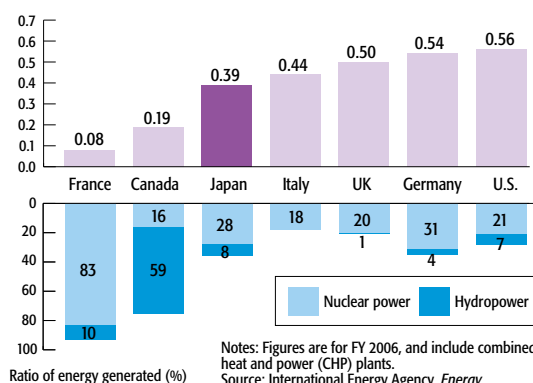
Electric Utility Industry's CO₂ Emissions

Item	Fiscal year	1990 (results)	2005 (results)	2006 (results)	2007 (results)	2008 to 2012 (five-year average)
Electric power consumption (billion kWh)		659	883	889	920	(est.) 931
CO ₂ emissions (million t-CO ₂)		275 [2]	373 [26]	365 [28]	417 [30]	(est.) -
CO ₂ emissions intensity of user-end electricity (kg-CO ₂ /kWh)		0.417	0.423	0.410	0.453	(est.) -

Reference Information

Country-by-Country Comparison of CO₂ Emissions Intensity (per unit of energy generated; preliminary calculation by FEPC)

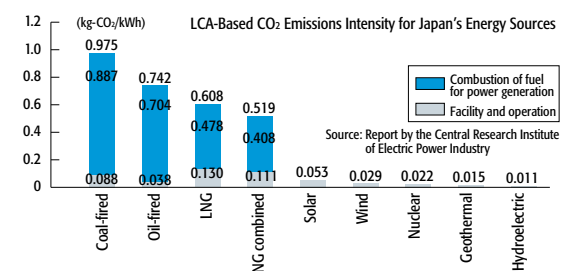
CO₂ emissions intensity (kg-CO₂/kWh)



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

Life Cycle Assessment-Based CO₂ Emissions Intensity for Japan's Energy Sources

The chart below represents the CO₂ emissions for various power sources when the entire life cycle is taken into account (LCA CO₂). This method calculates CO₂ 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.



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

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.

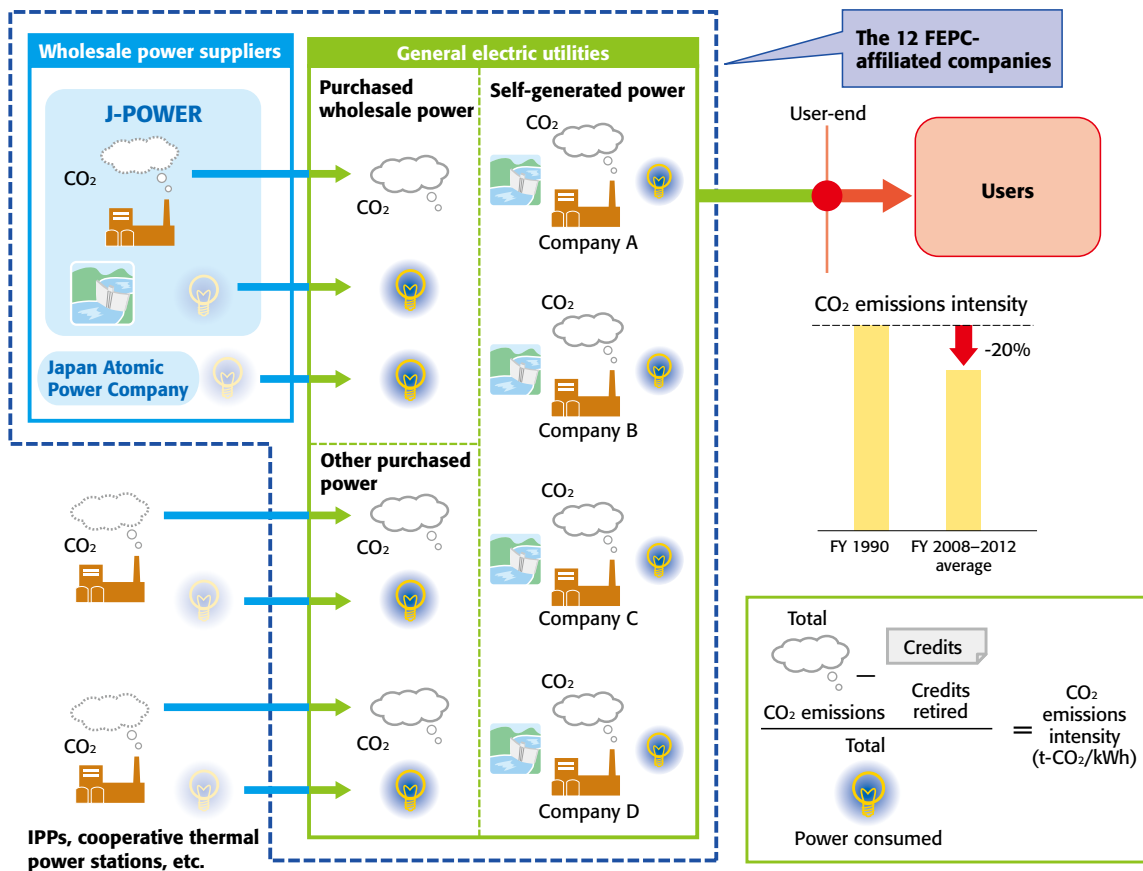
Based on the Act on Promotion of Global Warming Countermeasures (Act No. 117, 1998) the Japanese government adopted the Kyoto Protocol Target Achievement Plan, a program to provide a series of necessary measures for surely achieving the Kyoto target of the 6 percent reduction in greenhouse gas emissions 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 CO₂ 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 CO₂ 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 CO₂ emissions (see figure below).

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 CO₂ emissions. Specific efforts include the maintenance and improvement of the generation efficiency of coal-fired power stations, the development of energy sources with low CO₂ emissions such as nuclear power, the development of innovative technologies including those relating to coal gasification and CO₂ 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.

Note:
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.)

Advanced boiling water reactor (ABWR)

pp. 9–11

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

p. 80

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.

Biomass

pp. 13, 14, 29, 30, 45, 47, 49, 53, 63, 67

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

Carbon dioxide capture and storage (CCS)

pp. 14, 16, 17, 36, 67, 69, 82

A system for capturing CO₂ from factory and power station emissions and transferring and storing the captured CO₂ 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. 45

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. 76, 80

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 CO₂, they were included among the gases targeted for reduction at COP3 held in Kyoto in December 1997.

Cool Earth 50

p. 16

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 CO₂ emissions by 2050.

Designated public institution

p. 21

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. 61, 63, 64, 74

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.

Eco-efficiency

pp. 46, 73, 74

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. 46, 74, 79

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. 55, 81, 82

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. 43, 65, 66, 74

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.

Fuel cell

pp. 14, 28, 74, 79

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 CO₂ 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.

Gas-turbine combined-cycle generation

pp. 29, 47, 50

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. 43, 44, 62, 74, 76, 79

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.

Hydrofluorocarbons (HFCs)

pp. 55, 74, 80

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 CO₂.

Independent power producer (IPP)

pp. 1, 3, 77, 82

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

Industrial waste

pp. 43–46, 61, 74, 76, 79

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. 14, 17, 74

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. 6, 14–16, 17, 74

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.

Intergovernmental Panel on Climate Change (IPCC)

p. 14

The IPCC was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 as a forum for international deliberation on the issue of global warming. Participants include Japan, the United States, China, Russia, and numerous other developed and developing countries. The IPCC collects and assesses a wide range of research involving scientific knowledge on global warming, its impacts, and the measures to be taken, and publishes the results in assessment reports. As part of the IPCC Fourth Assessment Report (AR4), Working Group I, studying the physical science basis of climate change, released a report in February 2007. This report concluded that warming of the climate system is unequivocal and also stated with very high confidence that the increase in anthropogenic greenhouse gas emissions is the cause.

Internal Control Reporting System

p. 20

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.

Kyoto Mechanisms

pp. 13, 14, 43, 53–55, 73, 74, 80, 82

Please refer to pp. 53, 80.

Kyoto Protocol

pp. 53–55, 73, 80, 82

Please refer to p. 80.

Lower heating value (LHV)

pp. 14, 15, 43, 44

Heating value refers to the amount of heat released when completely combusting a specified amount (1 kg, 1 m³, 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

Methane (CH₄)

pp. 53, 55, 80

A main component of natural gas. Also produced through the decay or fermentation of organic matter. The second most common greenhouse gas, after CO₂, with a greenhouse effect 21 times that of CO₂.

Mixed-oxide fuel (MOX fuel)

pp. 10, 11

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.

Nitrogen oxides (NOx)

pp. 8, 30, 43–46, 51, 56, 60, 76, 79

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 (NO₂), 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 (N₂O)

pp. 49, 55, 74, 80

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 CO₂. Said to be generated by combustion and application of nitrogen fertilizer.

Non-industrial waste

pp. 44, 45, 49, 62, 63

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.).

Perfluorocarbons (PFCs)

pp. 55, 80

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 CO₂.

Polychlorinated biphenyl (PCB)

pp. 64, 74

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. 64

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 1974. 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. 1, 3

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. 17, 28

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

Renewable energy

pp. 13, 14, 27, 30, 46–48, 50, 53, 67

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

p. 58

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.

Soot and dust

pp. 45, 46, 60, 76, 79, 81

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.

Specialty controlled industrial waste

p. 45

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 (SF₆)

pp. 43, 44, 55, 74, 75, 80

A compound of sulfur and fluorine produced industrially; SF₆ 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 CO₂.

Sulfur oxides (SOx)

pp. 8, 30, 43–46, 51, 56, 60, 76, 79

General term for compounds made up of sulfur and

oxygen, including sulfur dioxide (SO₂), sulfur trioxide (SO₃), and sulfuric acid mist (H₂SO₄). 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, 3–7, 19, 25, 27, 29–31, 34, 36, 43, 69, 70, 73, 80

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 efficiency

pp. 8, 14, 15, 17, 43, 44, 46, 51, 52, 55, 74, 75, 79

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

Thermal water discharge

p. 59

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.

Ultra super critical (USC)

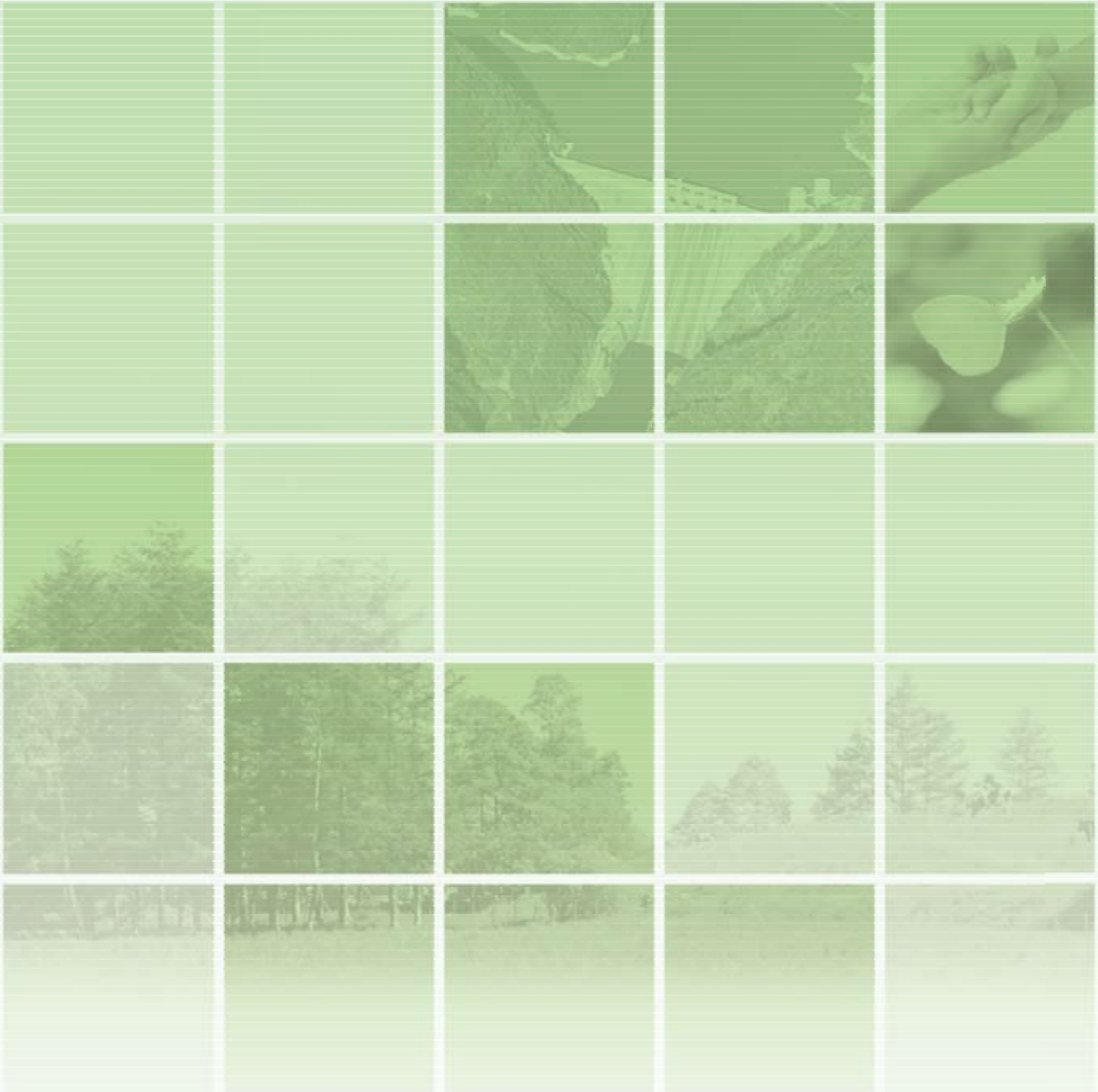
pp. 13, 14, 15, 31, 51

A steam turbine technology that makes use of advanced steam conditions, beyond those used in conventional super critical turbines (pressure 246 kg/cm²; temperature 566°C), to improve the efficiency of thermal power stations.

Wheeling

p. 1

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.



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