J-POWER Group

SUSTAINABILITY REPORT 2011

Harmonizing energy supply with the environment




Harmonizing Energy Supply with the Environment

Following our corporate philosophy "We will meet people's needs for energy without fail, and play our part for the sustainable development of Japan and the rest of the world," J-POWER Group aims to harmonize our energy supply and the environment in our various business activities.

Editorial Policies

- J-POWER Group operates under its corporate philosophy of playing our part for the sustainable development of Japan and the rest of the world. Accordingly, this report is titled Sustainability Report to express our intention of achieving sustainable growth and development of both the Group and society. It summarizes and reports on the Group's corporate activities under the headings of Governance, Social Responsibilities, and Environment.
- This report includes all consolidated subsidiaries and is representative of the entire J-POWER Group.
- The effects of the Great East Japan Earthquake and J-POWER Group's responses are the subjects of this year's Special Feature.
- All environmental load and other data, such as the figures for inputs and outputs given in the "Business Activities and the Environment" section, have been calculated for J-POWER Group as a whole. Joint investments have been accounted for according to the percentage ownership.
- To ensure objective credibility, this report has been independently assured by Ernst & Young Shin-Nihon Sustainability Institute Co., Ltd. (for details, see p. 79).
- Opinions on issues that exist toward the fulfillment of J-POWER's corporate social responsibilities have been drawn from shareholders, investors, and members of the general public with the goal of improving corporate management so that it may contribute to building a sustainable society and of increasing the reliability and transparency of our operations.

Period covered:
April 2010 - March 2011
(January - December 2010 for those companies with a January – December fiscal year. Also, some articles may include content from April 2011 or thereafter.)

Scope:
J-POWER and J-POWER Group companies (consolidated subsidiaries)
Note: If other than above, this is indicated in the appropriate place.

Guidelines referred to:
Ministry of the Environment, Environmental Reporting Guidelines: FY 2007 Version
Global Reporting Initiative (GRI), Sustainability Reporting Guidelines 2006

Report issued since: 1998

Published in: September 2011

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

This report is also available at J-POWER's website as "J-POWER Group Sustainability Report 2011."
Information on business plans and financial data are provided in its Annual Reports.

http://www.jpower.co.jp/english/

Contents

Governance

Social Responsibilities

Environment

External Evaluation and Outside Opinions

Reference Data

J-POWER Group Overview (As of the end of March 2011)

Company name	Electric Power Development Co., Ltd.
Communication name	J-POWER
Date of incorporation	September 16, 1952
Headquarters address	6-15-1, Ginza, Chuo-ku, Tokyo, 104-8165 JAPAN
President	Masayoshi Kitamura
Capital	¥152.449 billion
Employees	J-POWER: 2,299
	J-POWER Group: 6,774
Business category	Electric Utility

Overview of facilities

● Wholesale power supply

Power generation facilities (output)		
Hydropower stations	59	8.56 GW
Thermal power stations (including 1 geothermal)	8	8.43 GW
	Total 67	16.99 GW
Transmission lines		2,408 km
AC power transmission lines		1,973 km
DC power transmission lines		267 km
Substations	3	4.29 million kVA
Frequency converter station	1	0.3 GW
AC/DC converter stations	4	2 GW

● Other electricity businesses (includes equity method affiliates, but percentage ownership is not taken into account.)

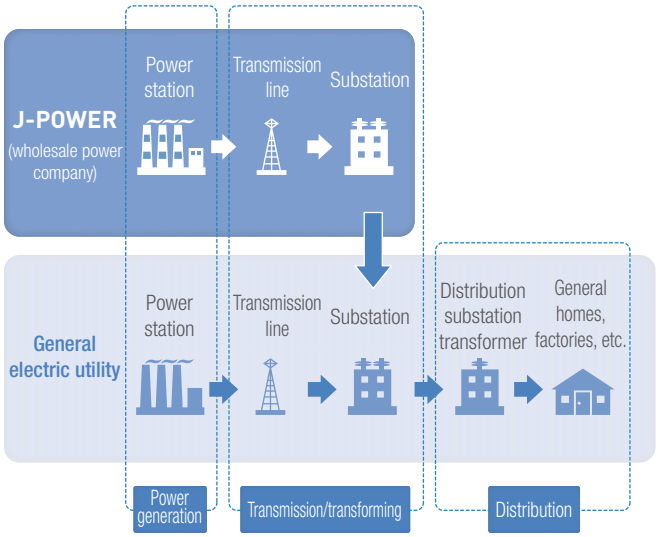
Power generation facilities (output)		
Wind farms	18	0.35 GW
Via independent power producers (IPP)	3	0.52 GW
Power generation for competitive market	3	0.32 GW
	Total 24	1.19 GW

Profile

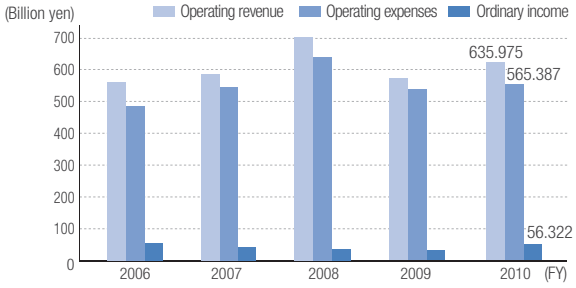
J-POWER was founded as an electricity wholesaler by the Japanese government in 1952 and has a nationwide network of transmission and substation facilities that play a key role in the generation and supply of electricity throughout Japan. Since its establishment, J-POWER has contributed to economic growth and the improvement of everyday life in Japan by providing moderately priced and stable electricity supply to general electric utilities (10 regional power companies).

J-POWER was fully privatized in October 2004, and currently wholesales hydroelectric and thermoelectric power, provides wheeling services through its transmission and substation facilities, and uses its technology and know-how to develop its business in electric power generation overseas and in new energy.

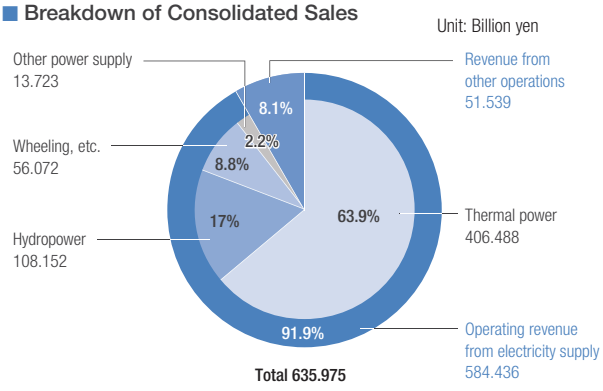
How J-POWER Differs from General Electric Utilities



Consolidated Business Results

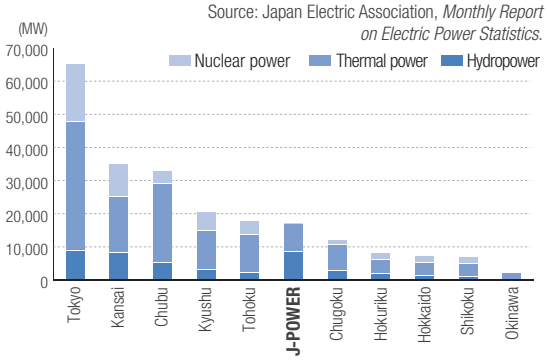


Breakdown of Consolidated Sales

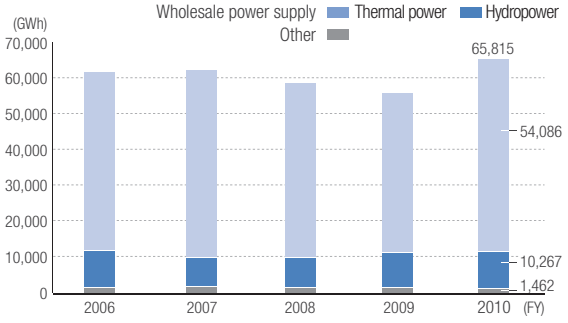


Output of J-POWER and 10 Electric Power Companies

Source: Japan Electric Association, *Monthly Report on Electric Power Statistics.*



Electric Power Sold



Note: Percentage ownership is not taken into account.

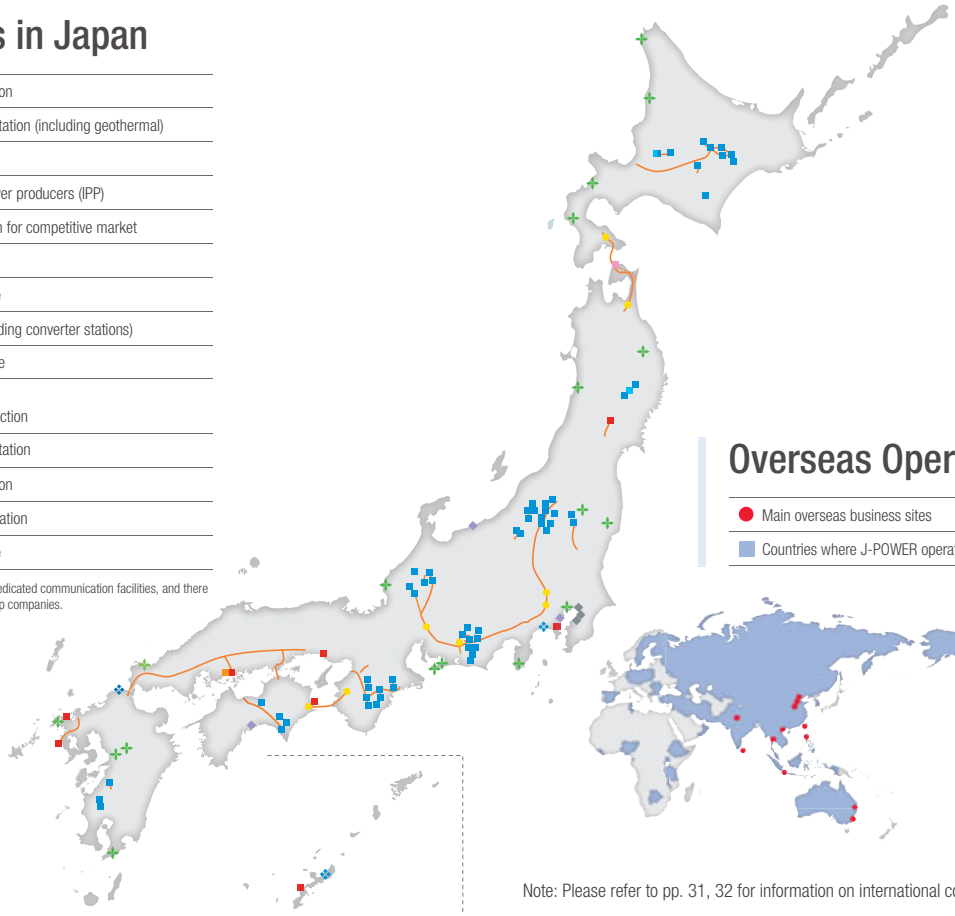
Facilities in Japan

- Hydropower station
- Thermal power station (including geothermal)
- Wind farm
- Independent power producers (IPP)
- Power generation for competitive market
- Transmission line
- Substation (including converter stations)
- Research institute

Planned/Under construction

- Thermal power station
- Hydropower station
- Nuclear power station
- Transmission line

Note: The group also has dedicated communication facilities, and there are facilities owned by group companies.



Overseas Operations (As of the end of July 2011)

- Main overseas business sites
- Countries where J-POWER operates (including completed projects)

Note: Please refer to pp. 31, 32 for information on international consulting and power generation projects.

Major consolidated subsidiaries

Facility design, building and maintenance

JPec Co., Ltd. (Chuo-ku, Tokyo)
JPHYTEC Co., Ltd. (Chiyoda-ku, Tokyo)
KEC Corporation (Bunkyo-ku, Tokyo)
JP Design Co., Ltd. (Chiyoda-ku, Tokyo)
and 10 other companies

Electricity business

Bay Side Energy Co., Ltd. (Chuo-ku, Tokyo)
ITOIGAWA POWER Inc. (Itoigawa-shi, Niigata)
Ichihara Power Co., Ltd. (Ichihara-shi, Chiba)
Green Power Koriyama Nunobiki Co., Ltd. (Koriyama-shi, Fukushima)
and 15 other companies

International business

J-Power Investment Netherlands B.V. (Netherlands)
J-POWER North America Holdings Co.,Ltd. (U.S.A.)
J-POWER Holdings(Thailand)Co.,Ltd. (Thailand)
J-POWER Consultings(China)Co., Ltd. (China)
and 29 other companies

J-POWER Group

80 consolidated subsidiaries

Environment and energy

Omuta Plant Service Co., Ltd. (Omuta-shi, Fukuoka)

Affiliated company control

JPOWER GENEX CAPITAL Co., Ltd. (Chuo-ku, Tokyo)

Supply of power generation fuel and equipment

J-POWER AUSTRALIA PTY.LTD. (Australia)
J-POWER RESOURCES CO., LTD. (Chuo-ku, Tokyo)
and 5 other companies

Telecommunications

Japan Network Engineering Co., Ltd. (Chuo-ku, Tokyo)

Service

JP Business Service Corporation (Koto-ku, Tokyo)
and 1 other company

Other

Kaihatuhiryou Co., Ltd. (Takehara-shi, Hiroshima)
and 1 other company

With the aim of "harmonizing energy supply with the environment," we constantly take up the challenge of developing new technologies and aim for sustained growth as a global electricity utility that underpins a sustainable society.

Let me begin by expressing my deepest sympathy for the families of those who perished in the Great East Japan Earthquake of March 11, 2011, as well as my sincerest wishes for all those in the affected area.

The recent earthquake caused unimaginable harm to certain parts of East Japan and has impacted the entire Japanese economy in many ways. Not least of these impacts is the significant loss of electric power supply capacity in East Japan, which will likely take time to recover. Furthermore, the troubles at the Fukushima Daiichi Nuclear Power Station, which became unable to cool itself down following the earthquake, have deeply shaken the trust of the Japanese people in the industry's nuclear power safety initiatives and caused operations to be suspended at nuclear power stations around Japan.

Thus the outlook for the power supply upon which the Japanese economy depends is now uncertain and fluid. However, the government is likely to step up the pace of its consideration on our present power supply stability measures, as well as how to restructure the nation's medium- to long-term basic energy plan.

Given these circumstances, the first mission of J-POWER Group is to help the nation ensure its vital electric power supply. While East Japan faces power shortages as a direct result of the earthquake, West Japan also has a fragile supply-and-demand balance because of nuclear power stations suspending operations there. In both regions, J-POWER Group is fulfilling its responsibility as an electric utility by enabling our hydropower and coal-fired power stations, backbone transmission lines and so on throughout Japan to function as effectively as possible.

On top of that, we are making steady progress on our Ohma Nuclear Power project and Takehara Thermal Power replacement project as part of a reinforcement of power facilities to ensure Japan's power supply capacity over the medium term.

At the Ohma Nuclear Power Station, now under construction, we have taken the lessons of Fukushima Daiichi Nuclear Power Station to heart. We constantly and appropriately incorporate the necessary safety measures in our plans as based on national policies. As we build our power stations, we seek the understanding of people in the local community and try to build stations that are safe and trusted by the public.

When J-POWER Group was privatized in 2004, we adopted a basic mission "to meet people's needs for energy without fail, and play our part for the sustainable development of Japan and the rest of the world." For us, the recent earthquake highlights the importance of the electric power infrastructure and the seriousness of any

nuclear power accident. This has made us more aware of sustainability and more committed than ever to fulfilling our basic mission.

We in J-POWER Group aim to conduct our business both globally and with a long-term perspective. Therefore we will run our overseas power generation businesses with the high-efficiency coal-fired thermal power and other energy sought by developing countries, and will continue to steadily pursue the development of innovative technologies to reduce carbon emissions in the long term.

By continuing to fulfill our mission of providing a stable supply of electric power with the same high level of trust we have enjoyed heretofore, J-POWER Group will play our part for the sustainable development of Japan and the rest of the world. Therefore we will continue to build a stronger business foundation as measured in technology, human resources and finances.

We hope for the fastest possible recovery of those areas affected by the Great East Japan Earthquake and for the unwavering support of all our stakeholders.

September 2011

President
北村雅良
Masayoshi Kitamura

J-POWER Group's Corporate Social Responsibility

Our corporate philosophy calls for meeting people's needs for energy without fail, and playing our part for the sustainable development of Japan and the rest of the world. This is fundamental to our ongoing efforts to deliver efficient, reliable electricity while conserving the environment. It is this corporate philosophy that forms the basis of our social responsibility. In addition, the J-POWER Corporate Conduct Rules have been laid down as standards for the conduct of business grounded in our corporate philosophy. Individual Group companies also have policies relating to their own responsibilities to society.

We endeavor to fulfill our corporate social responsibility by adhering to our corporate philosophy and Corporate Conduct Rules as we press forward in our operations.

J-POWER Group Corporate Philosophy (Established September 11, 1998)

Our Mission: We will meet people's needs for energy without fail, and play our part for the sustainable development of Japan and the rest of the world.

Our Credo:

We value integrity and pride, which drive everything we do.

We pursue harmony with the environment, and thrive in the trust of communities where we live and work.

We regard profits as the source of our growth, and share the fruits with the society.

We refine our knowledge constantly, to be the pioneering leader in technologies and wisdom.

We unite diverse personalities and passions as one, and dare create a better tomorrow.

J-POWER Group Corporate Conduct Rules (Established January 1, 2001)

Reliable supply of energy
We will put forth every effort to reliably supply energy both in Japan and abroad utilizing our experienced personnel and cutting-edge technology.

Safety assurance
In conducting operations we will constantly work to raise safety awareness and give the highest priority to public and worker safety.

Environmental conservation
Based on an awareness that our business operations are deeply linked with the environment, we will actively engage in environmental conservation activities.

Communication with society
To establish communication with society we will conduct information disclosure and public relations activities in a fair and transparent manner.

Contribution to society
Aiming to be a good corporate citizen we will undertake activities to contribute to society and assist in the development of local communities both in Japan and abroad.

Creation of a rewarding corporate culture
In addition to providing safe and comfortable work environments, we will respect the individuality of our employees and endeavor to establish a rewarding corporate culture that encourages them to take on new challenges.

Compliance with laws, regulations, and corporate ethics
We will conduct business in good faith and in a fair manner with a strong commitment to compliance and ethics. We will stand firm against anti-social forces that undermine the order and security of civil society.

Role of top management
Recognizing their responsibility in putting into practice the spirit of these Corporate Conduct Rules, our top management must set an example for others and work to spread awareness of these Rules.

Should an event occur that violates the spirit of these Rules, top management must take the initiative in dealing with the problem to determine the causes and prevent recurrence. Top management must also identify and take disciplinary action against those responsible, including themselves.

J-POWER Group's Corporate Social Responsibility and Principal Themes of Action Taken

J-POWER Group carries out its responsibilities to society in line with its corporate philosophy, living up to the expectations of the diverse stakeholders who support it. The following is an outline of the principal themes of the action it has been taking.

Corporate Philosophy	Theme	Principal Action Taken	Ref.
We value integrity and pride, which drive everything we do.	Stable supply of electric power	Ensuring availability by proper facilities maintenance	Social Responsibilities
	Enhancement of internal controls	Enhancing the corporate governance structure Thorough regulatory compliance	Governance
	Gaining of the trust of society	Conducting appropriate information disclosure Giving attention to safety in all business activities	Governance Social Responsibilities
We pursue harmony with the environment, and thrive in the trust of communities where we live and work.	Efforts relating to global environmental issues	Reducing CO_2 emissions from power generation Maintaining and improving thermal efficiency of thermal power generation	Environment
	Efforts relating to local environmental issues	Reducing emissions of SOx, NOx, etc. Promoting waste recycling Initiatives to protect biodiversity	
We regard profits as the source of our growth, and share the fruits with the society.	Return of value to shareholders	Maintaining stable dividends and raising them in line with growth performance	Social Responsibilities
	Contribution to society as a whole	J-POWER Group social contribution activities	
We refine our knowledge constantly, to be the pioneering leader in technologies and wisdom.	Nurturing of human resources	Enhancing ability to conduct business by improving basic knowledge and professional capabilities	
	Promotion of innovation	Human-resource development and organizational generation to foster creation of new concepts	
We unite diverse personalities and passions as one, and dare create a better tomorrow.	Enhancement of workplace environments	Promoting work-life balance	
	Active participation by diverse human resources	Creating workplace environments and systems that facilitate active participation by senior citizens and women	

Notes:
1. See the Company website for Direction of Management and Near-Term Managerial Policy of the J-POWER Group.
   (Japanese) http://www.jpower.co.jp/annual_rep/ann20000.html
   (English) http://www.jpower.co.jp/english/ir/ir22000.html
2. J-POWER Group's environmental management targets are set out on p. 46 of this report.

Special Feature

The Effects of the Great East Japan Earthquake and J-POWER Group's Responses

Areas of east Japan suffered massive damage as a result of the Tohoku-Pacific Ocean Earthquake and the subsequent tsunami, which struck on March 11, 2011.

The disaster-hit areas have received a great deal of support both from within Japan and overseas, and progress has been made in reconstruction and recovery measures, but there has been a significant loss of electricity supply capacity, and areas across east Japan have experienced scheduled blackouts or have been subject to measures to save energy.

At present, with the extension of the period for shutdown of nuclear power stations undergoing periodic inspections in west Japan, in addition to the decline in power supply capacity in east Japan due to the earthquake and tsunami disaster, power supply capacity has declined across the entire country. Against this background, J-POWER Group is implementing the initiatives discussed below.

Effect on J-POWER Group and Power Supply Capacity in Japan as a Whole

The Tohoku-Pacific Ocean Earthquake, which struck on March 11, and the tsunami that followed in its wake caused significant damage to power stations and other facilities within the area of operation of Tohoku Electric Power Co., Inc. and Tokyo Electric Power Company. Due to measures such as emergency shutdown and the rapid implementation of inspections and recovery work, J-POWER Group power facilities in the same region, with the exception of the Numappara Power Station (a pumped-storage hydroelectric power station located in Tochigi Prefecture), did not suffer any damage that affected generation capacity. (Parts of the Numappara Power Station facilities were damaged, but the station was able to recommence operation on July 17, following the completion of repair work.)

Against the background of a significant decline in power supply capacity on the part of Tohoku Electric Power Co., Inc. and Tokyo Electric Power Company, J-POWER Group is working as an electric power wholesaler to make up the shortfall by maintaining stable operation of power stations with an output of approximately 7 GW in the region of operation of both power companies. The Group is also seeking to ensure supply capacity by revising the details of its periodic inspections at the Isogo Thermal Power Station (Kanagawa Prefecture) in order to respond to the emergency situation, attempting to reduce the length of time required for procedures. We also contributed to electricity interchange by supplying 300 MW of power from west Japan to east Japan via the Sakuma Frequency Converter Station (Shizuoka Prefecture), and 600 MW of power from Hokkaido to Honshu via the Kitahon DC trunk line.

Preparing for the increase in electricity demand over the summer period, the government has placed restrictions on power use in the areas of operation of Tohoku Electric Power Co., Inc. and Tokyo Electric Power Company. Supply has been further restricted by a decline in supply capacity across the entire country due to the extension of the periods of shutdown of nuclear power stations undergoing periodic inspections.

In response to an unprecedented energy crisis, as an electric power wholesaler operating throughout the country J-POWER Group remains firm in its mission of supporting the stable supply of power. Extending from Hokkaido to Okinawa, J-POWER Group's hydroelectric facilities generate a total output of approximately 8.6 GW, its thermal facilities a total of approximately 8.4 GW, and its wind power facilities a total of approximately 350 MW. The Group also maintains approximately 2,400 km of transmission lines linking it to the power network across the entire country, in addition to frequency converter stations and other facilities. All of these facilities play a significant role in wide-area power interchange in Japan.

J-POWER Group takes meticulous care in maintaining these country-wide facilities, working to further increase the stability of power supply.

Support for Recovery and Responses to the Disaster

The provision of support to the disaster-hit regions by fulfilling our essential mission - doing our utmost to ensure a stable supply of power - is a fundamental goal for J-POWER Group. We are also contributing relief funds to support recovery, and our employees are donating to the Japanese Red Cross Society.

Even before the March earthquake and tsunami, the Group already had a volunteering leave system in place. This system enables us to support employees wishing to assist in volunteer activities for the recovery of the regions struck by the disaster. In addition, we also provide information to our employees, for example concerning calls for participation in volunteer activities by businesspeople.

A great deal of time and effort will be required to achieve recovery and reconstruction in the areas affected by the disaster, and J-POWER Group's efforts to support the people of these regions will not be set aside as temporary measures, but will be ongoing as we seek to make a genuine contribution.

J-POWER Group has made preparations for unforeseen contingencies such as fire, earthquakes and other natural disasters, formulating regulations and providing training to enable response to emergencies, and maintaining a disaster prevention system under which we stockpile emergency supplies and make other preparations. Since the Niigata Chuetsu Earthquake of 2004, we have focused particular efforts on measures to safeguard our facilities, and we continue to work to enhance our disaster prevention system.

In order to respond in an appropriate manner to any unforeseen events that may occur in future, we will treat the recent earthquake and tsunami disaster as a lesson, working to further bolster our disaster prevention system, all the while maintaining close attention to our contribution to local communities. (See p. 17)

Performing volunteer activities

Generation and transmission facilities that support the stable supply of power across Japan

Generation facilities supplying power across a wide area

Acting as an electric power wholesaler supplying power across a wide area, we operate hydroelectric, thermal and wind power facilities throughout Japan

- Hydroelectric power facilities
  59 facilities throughout Japan, with a total output of 8.6 GW. This represents approximately 20% of all hydroelectric facilities in Japan
- Thermal power facilities
  Seven facilities throughout Japan, with a total output of 8.41 GW. This gives us the number one share of Japan's thermal power facilities
- Wind power facilities
  18 facilities in Japan, with a total output of approximately 350 MW, giving us the number two share of Japan's wind power facilities
- Other
  We have been operating the Onikobe Geothermal Power Station (output: 15 MW), which uses geothermal energy, since 1975

Immediately following the Great East Japan Earthquake, we supplied 600 MW through the Kitahon DC trunk line as a backup power interchange (See p. 26)

Introduced as a new technology – Japan's first ultra-high-voltage DC transmission line – the Kitahon HVDC Link commenced operation in 1979 as Japan's only power interconnection system (transmission capacity: 600 MW) connecting the power networks of Hokkaido and Honshu. Power is converted from AC to DC at a converter station, and sent via the Kitahon DC trunk line to a converter station on the opposite side, where it is converted back to AC. By this means, the line enables mutual power interchange between Hokkaido and Honshu, contributing to effective wide-area power management.

Main facilities

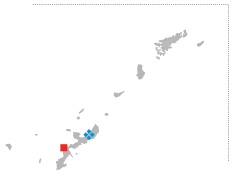
- Hydroelectric power stations
- Thermal power stations (including geothermal)
- Wind farms
- Independent power producers (IPP)
- Power generation for competitive market
- Transmission lines
- Substations (including converter stations)
- Research institutes, etc.
- Planned, under construction
- Thermal power stations
- Hydroelectric power stations
- Nuclear power stations
- Transmission lines

● In addition, dedicated Group communications facilities and facilities owned by affiliated companies.

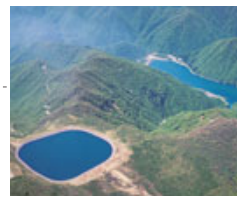
Okutadami Power Station

Matsuura Thermal Power Station

Tachibanawan Thermal Power Station



Nikaho Kogen Wind Farm



Numappara Power Station

Isogo Thermal Power Station

Immediately following the Great East Japan Earthquake, we supplied 300 MW through the Sakuma Frequency Converter Station as a backup power interchange (See p. 26)

Because of differences in power generation technologies introduced in the Meiji Period, Japan's power system uses two frequencies: 50 Hz to the east of the Fuji River in Shizuoka Prefecture, and 60 Hz to the west of the river. The Sakuma Frequency Converter Station was constructed in 1965 to enable efficient management of backup power by converting power between these two frequencies. Power is converted to DC and then converted back to AC at its destination in order to link the 50 and 60 Hz systems.

Transmission lines and frequency conversion facilities enabling power supply across a wide area

Acting as an electric power wholesaler supplying power across a wide area, we operate transmission and conversion facilities throughout Japan

- Connecting regions to enable comprehensive management of Japan's entire power network
- Wide-area power interconnection facilities linking Honshu with Hokkaido, Shikoku and Kyushu (Kitahon HVDC Link, Honshi Interconnecting Line, Anan Kihoku DC Trunk Line, Kanmon Interconnecting Line) and the Sakuma Frequency Converter Station, which enables power interchange between 50 Hz east Japan and 60 Hz west Japan, contribute to power interchange across a wide area
- 2,400 km of transmission lines and eight substations and other facilities

Status of Ohma Nuclear Power Station (Report)

Introduction

During the Tohoku-Pacific Ocean Earthquake, tremors measuring four on the Japanese scale were recorded in Ohma-machi (Shimokita-gun, Aomori Prefecture), where J-POWER is proceeding with the construction of its Ohma Nuclear Power Station, and a tsunami reaching a maximum height of 0.9 m occurred in Ohma Bay. The earthquake and tsunami did not cause any damage at the construction site, but due to the effect of power outages caused by the earthquake and restrictions on fuel for power sources, heavy machinery and other vehicles, on the transportation of equipment, and on other construction-related necessities, in addition to the prioritization of relief for the disaster-hit regions, work on the facility other than work essential for environmental protection and the maintenance of equipment was suspended from March 11.

In the future we intend to work together as one, with the understanding of the local community, towards the construction of a safe facility that is trusted by all, while continuing in our examination of enhanced safety measures in response to the accident at the Fukushima Daiichi Nuclear Power Station, as shown below, in addition to appropriately incorporating the necessary measures based on government guidelines and other instructions and recommendations.

The Accident at the Fukushima Daiichi Nuclear Power Station

Overview of the Accident

The Fukushima Daiichi Nuclear Power Station lost three functions as a result of the tsunami that occurred in the wake of the Tohoku-Pacific Ocean Earthquake – the functioning of all equipment for the supply of AC power, the function of cooling the reactors using seawater, and the function of cooling the spent fuel storage pools.

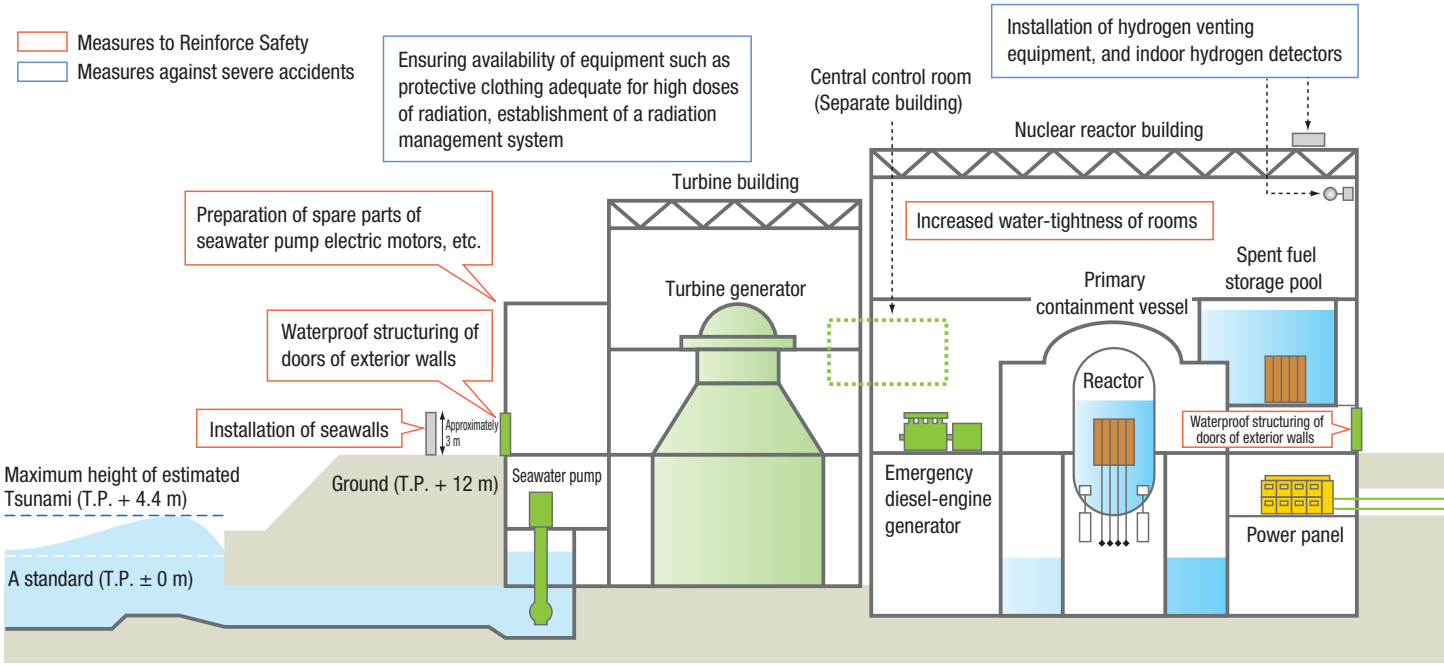
Instructions, etc. from the Nuclear and Industrial Safety Agency

On March 30, the Nuclear and Industrial Safety Agency (NISA) issued instructions to power utilities and other companies operating nuclear power stations to put in place emergency safety measures to prevent damage to reactor cores and spent fuels and to restore reactor cooling functions while controlling the release of radioactive substances, even in the event of the above three functions being lost, and to establish safety-related rules based on the revisions to the ministerial ordinance.

On June 7, NISA issued instructions to power utilities and other companies operating nuclear power stations concerning measures to enable rapid response in case a severe accident (serious damage to the reactor core, etc.) should occur, based on the lessons learned through the intense efforts undertaken to restore the situation at the Fukushima Daiichi facility.

In addition, on July 22, NISA instructed power utilities and other companies operating nuclear power stations to conduct assessments (stress tests) of the safety margins (ultimate limitations of strength) of nuclear reactor facilities by evaluating the scale of events that on NPS can withstand without significant damage to the fuel, assuming the occurrence of events beyond the design basis.

Image of measures to reinforce safety, etc. at Ohma Nuclear Power Station



T.P.: An altitude from sea level of Tokyo Bay

Measures to Reinforce Safety, etc. for Ohma Nuclear Power Station

1. Measures against tsunami

J-POWER is evaluating the tsunami safety of the Ohma Nuclear Power Station by means of numerical simulations of past tsunami believed to have affected the site of the station and projected future tsunami. Specifically, we have projected earthquakes in the eastern margin of the Japan Sea, along the Japan Trench, and offshore from Chile. Of these, the earthquake at the eastern margin of the Japan Sea (magnitude 7.85) gave the highest water level. Synodic mean high tide (0.6 m) was added to the maximum increase in water level due to this earthquake (approximately 3.8 m) to give T.P. + 4.4 m as the maximum height of a tsunami at the Ohma site. (T.P. is an altitude from sea level of Tokyo Bay.)

Given that the elevation of the site for the main buildings including the nuclear reactor buildings is T.P. + 12 m, a sufficient safety margin exists. However, the tsunami that followed the Tohoku-Pacific Ocean Earthquake left traces on the Fukushima Daiichi Nuclear Power Station at a height of 14 – 15 m. Taking into consideration the potential occurrence of a tsunami of around 15 m in height at the Ohma Nuclear Power Station, we plan to add flood prevention barriers of a further 3 m in height to the T.P. + 12 m site.

In addition, as measures to prevent the infiltration of seawater into the main buildings, we are using waterproof structures for the doors of the main buildings, and increasing the water-tightness of buildings housing equipment that is particularly important to safety.

2. Ensuring power sources

We have established 500 kV and 66 kV transmission lines as external power sources. In addition, we are planning to install three emergency diesel generators in the nuclear reactor buildings (ground floor), which are located at T.P. + 12 m.

We are also installing emergency generators at an elevation of T.P. + 20 m or more, where they will be safe from the effects of a tsunami, to ensure power sources for the operation of pumps and other equipment for the cooling of the reactors and the spent fuel storage pools, even if these other power sources are not functioning.

We will also set up generator trucks to ensure that a flexible response can be mounted, even if the permanent power panels or cables are damaged by a tsunami or other contingency.

3. Ensuring ultimate heat removal functions

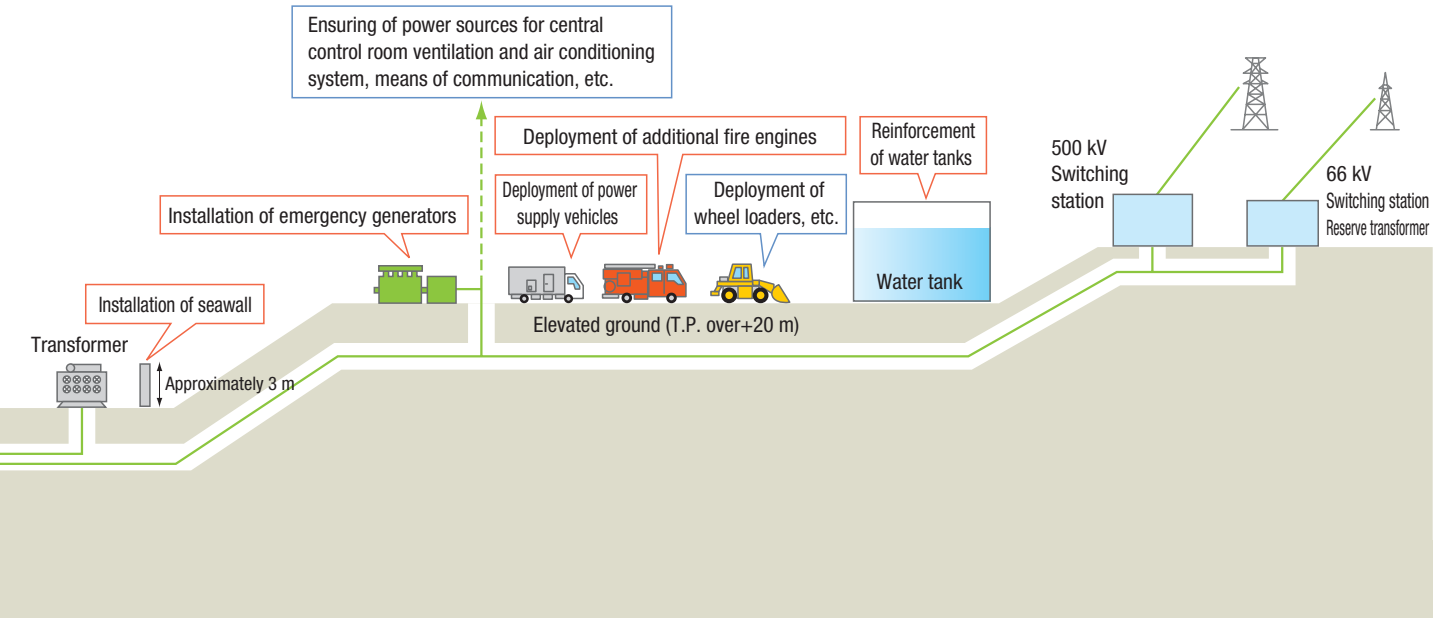
To ensure that functions necessary for the cooling of the reactors and the spent fuel storage pools are maintained even if the ordinary seawater pumps cannot be used, in addition to deploying portable power pumps and additional fire engines as alternative measures for pumping water where it is needed, we will also reinforce water tanks to increase the reliability of water sources for these measures.

While we believe that the seawater pumps will not be affected by a tsunami because of their location in the turbine buildings, in order to respond rapidly should any flooding of the facilities or similar problems occur, we will maintain reserve motors and other equipment for seawater pumps.

4. Measures for response to severe accidents

We are adopting the following measures to enable a rapid response in the event of a severe accident.

- We will establish the necessary power supply system from the emergency power sources to ensure the maintenance of an adequate working environment in the central control room.
- We will establish fixed-line telephones, transceivers and satellite-based mobile phones to ensure means of communication within the facility in an emergency.
- We will prepare equipment such as protective clothing for high doses of radiation and establish a radiation management system to enable work to proceed smoothly following an accident.
- We will install equipment to release hydrogen and hydrogen detectors in the nuclear reactor buildings as measures to prevent the occurrence of hydrogen explosions.
- We will deploy to heavy machinery such as wheel loaders to enable rapid removal of flotsam and rubble strewn around the facility following a tsunami.



5. Assessment of safety margins (ultimate limitations of strength): Stress tests

We will conduct assessment of the safety margins of the Ohma Nuclear Power Station prior to commencement of operation of the reactor.

The latest information concerning these safety enhancement measures and other measures will be published on the nuclear power page of the J-POWER website.

• Measures to Reinforce Safety, etc.
http://www.jpower.co.jp/bs/field/gensiryoku/index.html (Japanese only)

Plan and Background of the Ohma Nuclear Power Station

J-POWER Group has been carrying out surveys and studies concerning nuclear power development since 1954, and since 1976 it has been pursuing plans to build the Ohma Nuclear Power Station in Ohma-machi, Shimokita-gun, Aomori Prefecture. The Ministry of Economy, Trade and Industry (METI) granted permission to build this nuclear reactor in April 2008. Construction began in May of that year, and is proceeding with a view towards the commencement of commercial operation in November 2014.

We believe that nuclear power is an important energy source that is indispensable from the perspective of combating global warming and securing resources, and one that, with appropriate management, can be exploited as an effective energy supply. It is therefore essential that nuclear power should continue to represent a specific ratio of the energy sources in Japan's energy portfolio.

We further believe that the Ohma Nuclear Power Station is an essential facility for Japan in terms of the provision of a stable supply of power mainly in east Japan and measures to reduce carbon emissions.

Overview of the Ohma Nuclear Power Station

Location		Ohma-machi, Shimokita-gun, Aomori Prefecture
Construction begins		May 2008
Commercial operation begins		November 2014 (scheduled)
Electricity Output		1,383 MW
Reactor	Type	Advanced Boiling Water Reactor (ABWR)
	Fuel: Type	Enriched uranium and uranium-plutonium mixed oxide
	Fuel assembly	872 elements

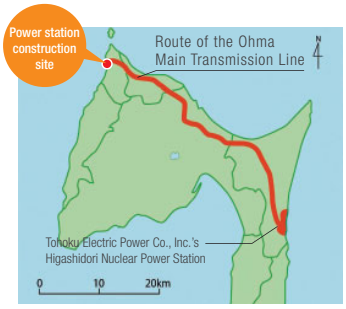


Diagram of Ohma Nuclear Power Station position (Aomori Prefecture)


Artist's rendering of completed Ohma Nuclear Power Station


Status of construction of Ohma Nuclear Power Station (March 2011)

Aso Nishihara Wind Farm (Kumamoto Prefecture)

Governance

Initiatives for Enhancing Corporate Value

Initiatives for Enhancing Corporate Value

J-POWER Group is committed to addressing changes in society and being worthy of the trust held in it by its diverse stakeholders. To that end, we are taking steady steps to build and operate a structure needed to ensure enhanced corporate governance.

Corporate Governance

Based on our corporate philosophy of aiming "to meet people's needs for energy without fail, and play our part for the sustainable development of Japan and the rest of the world," J-POWER Group recognizes that the enhancement of corporate governance and thorough implementation of regulatory compliance are highly important management issues for achieving long-term corporate growth and enhanced corporate value and winning the trust of our stakeholders.

Corporate Governance Framework

In accordance with the J-POWER Group corporate philosophy, J-POWER directors and corporate auditors take the initiative in giving guidance on honest and fair activity based on an unswervingly law-abiding spirit and ethical attitude in accordance with the J-POWER Corporate Conduct Rules. At the same time, they promote efforts to instill this attitude in all J-POWER employees. We firmly confront any anti-social forces that threaten the safety and order of civil society and make sure that our employees take the same attitude.

At J-POWER, directors who are thoroughly familiar with our operations are put in charge of executing those operations, while non-executive outside directors who take part in Company management decisions from an independent point of view also attend the meetings of the Board of Directors and other meetings as directors. Under this system, directors supervise each other. We also believe that our corporate governance functions extremely well, as our corporate auditors, including outside auditors with a wealth of experience managing some of Japan's leading public companies and working in fiscal policy, attend meetings of the Board of Directors and other meetings and therefore constantly monitor the execution of duties by the directors.

Going further, in response to the Tokyo Stock Exchange's securities listing rules, we designate one external director and all three external auditors as independent officers. The high level of independence of these officers keeps them from having any conflict of interest with ordinary shareholders.

Framework for Execution of Business

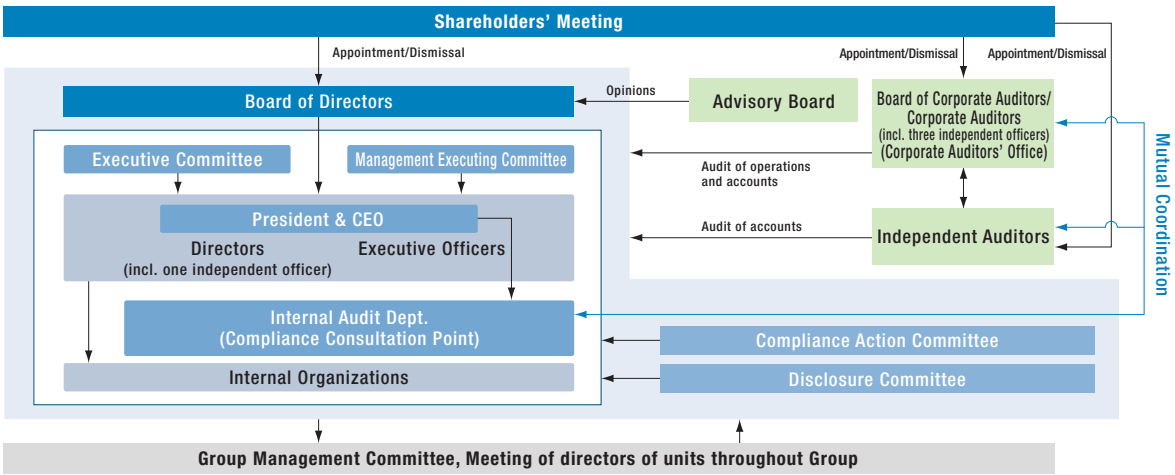
To ensure that directors' duties are carried out efficiently, functions have been allocated to bodies other than the Board of Directors. Specifically, the Executive Committee has been established to deliberate on specific matters, in particular matters of key importance to the Company as a whole from among those being handled by the president in accordance with policies decided on by the board, and the Management Executing Committee deliberates on important matters relating to specific aspects of business execution. In addition, the system of executive officers has enabled us to build a framework in which executive officers and directors in executive capacity divide executive duties among themselves. This has clarified responsibilities and authority, enabling precise and prompt decision-making and efficient corporate management.

System of Audits and Supervision

J-POWER's Board of Corporate Auditors comprises five auditors. Three of these are outside auditors, one of whom has the status of a standing auditor, in order to enhance the oversight functions of the Board of Corporate Auditors. To ensure that the corporate auditors' auditing is carried out effectively, the directors have created an environment in which corporate auditors attend and state their opinions at meetings of the Board of Directors, the Executive Committee, and the Management Executing Committee, hear descriptions from directors and others concerning the state of business execution, inspect internal Company organizations and major subsidiaries, and engage in smooth mutual coordination with accounting auditors and others.

In addition to these supervisory and oversight functions, J-POWER's Internal Audit Department conducts internal auditing independent of other Company units. On top of this, each Company unit conducts periodic voluntary audits of its own operations.

J-POWER Group's Corporate Governance Framework



Other Structures

With regard to disclosure, to improve the accountability and transparency of its corporate activities the Company has established the Disclosure Committee, chaired by the president, which ensures that the disclosure of the Company's information is vigorous, fair, transparent, and timely.

The J-POWER Advisory Board was established in September 2008 as part of the Company's measures to enhance corporate governance. The Advisory Board allows outside experts to provide diverse and objective opinions and uses them to enhance corporate value.

With regard to the administration of subsidiaries and affiliates, J-POWER's basic policy calls for Group-wide development in accordance with the Group's management plan. In addition to the administration of subsidiaries based on company regulations, we have set up a Group Management Meeting to enhance the fairness of business activity within the corporate group.

We additionally set up the J-POWER Summit, a meeting of directors of units throughout the Group for the sharing of information. This meeting, which takes place several times a year, brings together the President, Directors and executive officers, the standing auditor, heads of units in Japan and abroad, representatives of major subsidiaries and others to give information on common concerns and items to be performed, call for action and share input.

J-POWER Summit, meeting of directors of units throughout Group

Response to Internal Control Reporting System on Financial Reporting

In J-POWER Group, our Accounting & Finance Department and Internal Audit Department head up our "Internal Control Reporting System on Financial Reporting" as required under the Financial Instruments and Exchange Law, preparing, operating and evaluating the internal control system.

In FY 2010, as in the year before, executives evaluated the state of preparation and operation of the items "company-level internal control," "business process internal control" and "IT-based internal control" as based on the implementation standards set by the Financial Service Agency. The results indicated that our internal control on financial reporting was effective. The evaluation results were summarized into an internal control report, examined by an auditing firm and submitted to the Kanto Local Finance Bureau Director-General at the end of June 2011.

The whole Group is committed to ongoing enhancement of its internal control systems and to ensuring the reliability of its financial reporting.

Emergency Management Structure

The risks inherent in J-POWER Group's business environment are becoming increasingly diverse and complex.

To accurately forecast and prevent various emergencies and to manage and respond to them appropriately in the event they occur, we have put the following structure in place.

1 Emergency Response Team

(1) To deal with emergency management during periods of normality, the Emergency Response Team made up mainly of the General Affairs Dept. and Secretarial Affairs & Public Relations Dept. and other related departments is established permanently at the head office to predict emergencies, conduct rapid first response when they do occur, and take overall charge of emergency management.

(2) The Emergency Response Team manages the following matters.

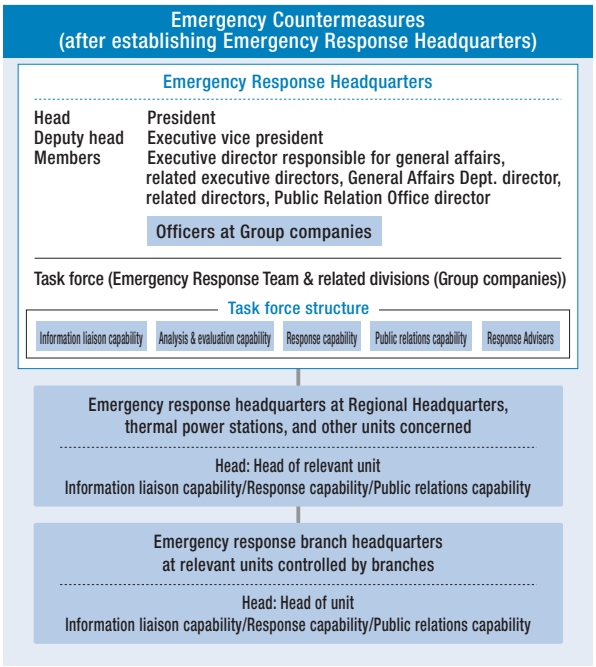
- Prediction of emergencies and rapid first response when they do occur
- Emergency identification, gathering and management of emergency information
- Emergency management education and training

2 Emergency managers and emergency duty personnel

Emergency managers and duty personnel are appointed in each head office division, local unit and Group company, and these undertake rapid first response and transmission of information.

3 Emergency Response Headquarters and branches

When emergencies are predicted and occur, and their seriousness warrants emergency countermeasures, the Emergency Response Headquarters (and branches) are established promptly (see chart below).



4 Overseas emergency response task force

The overseas emergency response task force has been established under the Emergency Response Team in line with the expansion of the scale of J-POWER's business outside Japan. Its activities also include the gathering of information relating to emergencies overseas.

What Emergencies Mean for J-POWER Group

For J-POWER Group, a variety of events are considered emergencies, but as a wholesale power company the greatest emergency for us would be the malfunctioning of equipment that produces and distributes electric power and prevents us from supplying it.

Causes of such situations include natural disasters, man-made causes, and physical causes. We take the following steps to prevent each of these emergencies from happening.

1 Malfunctions caused by natural disasters

Natural disasters such as earthquakes, typhoons, lightning strikes, tsunami, and volcanic eruptions are not able to be prevented by artificial means, though it is possible to minimize the damage they cause through the use of appropriate equipment and systems for disaster recovery. J-POWER takes precautions to prevent equipment malfunction, etc. as a result of natural disasters by such means as having systems in place to restore equipment functions as rapidly as possible when such natural disasters affect the maintenance and operation of facilities such as those for power generation and transmission, substations, and control centers (for remote operation of power stations), and conducting reinforcement engineering works that incorporate state-of-the-art earthquake-resistant design concepts. In addition, the Company fosters emergency-management awareness among its employees by conducting regular disaster-prevention drills.

2 Malfunctions from man-made causes

With the exclusion of crises that it is impossible for a single company to address alone, the Company addresses warfare, terrorism involving acts of destruction, malicious acts, and other forms of crisis caused by human activity to avoid them as much as possible by such means as making every effort to gather relevant information, liaising with relevant authorities, and building a liaison structure for times of crisis. In addition, power transmission pylons close to public thoroughfares are fenced off and inspected and examined regularly.

3 Malfunctions from physical causes

J-POWER's electricity generation, transmission, substation, and communications equipment was in some cases installed more than 50 years ago, and thus a significant proportion of it is aging. Equipment whose functioning deteriorates and suffers damage is repaired or renewed as necessary, and daily inspections and examinations are conducted to ensure that they do not give rise to significant obstacles to power supplies. In addition, we perform regular overhauls and meticulous inspections to check the performance of key equipment and conduct preventative maintenance to avoid equipment malfunctions.

4 Other

Anticipating the possibility of new strains of influenza or other infectious diseases arriving in the workplace and threatening to impede operations, J-POWER adopted a "New Strains of Influenza Action Plan" in April 2007 and has a framework in place to ensure business continuity.

Disaster Prevention Measures

J-POWER is an electric power supplier with responsibility for the nation's vital lifelines, and has the status of a designated public institution under the Disaster Countermeasures Basic Act, but the Company has long been developing disaster prevention measures and has formulated and disclosed disaster prevention operational plans and civil protection plans. In this way, J-POWER has aimed to be a company that is resilient to disasters.

In-house manuals for responding to disasters, including a set of rules on disaster countermeasures and protection measures for the people, have been prepared, and the Company has built a disaster prevention structure that systematically encompasses head office and all Group units in each region. In addition to the creation of this structure, disaster drills are held regularly in every unit to improve its practical ability to deal with actual disasters so that emergency situations can be handled appropriately.

Also, given the frequent occurrence and growing severity of natural disasters since the Chuetsu Earthquake in Niigata Prefecture, the Disaster Prevention Task Force, a cross-sectional organization within J-POWER, was established in 2005. It brings together the Company's knowledge in a broad range of spheres such as civil engineering and construction, studying and implementing measures to protect Company power generation, transmission, substation and communications equipment from such disasters.

The Great East Japan Earthquake, which struck off the Pacific coast of the Tohoku area of Japan on March 11, 2011, caused unprecedented damage with its scale and interlocked character and the subsequent tsunami. Additionally, during the Niigata and Fukushima rainstorm of July 28–30, 2011, record precipitation damaged J-POWER hydroelectric power facilities, but we have endeavored to keep up a stable supply of electric power through concentrated restoration work.

J-POWER has already been engaged in studies of how our facilities would be affected by a seismic event such as a Tokai-Tonankai-Nankai triple-interlocked earthquake or a major earthquake directly beneath the Tokyo area, as well as ongoing efforts to strengthen our disaster prevention system (seismic reinforcement, anti-tsunami construction, periodic education and training, etc.). However, we are stepping up these anti-disaster initiatives in light of this year's Great East Japan Earthquake and Niigata/Fukushima flooding.

* See p. 9 for information on the Great East Japan Earthquake.

Disaster response training (J-POWER head office)

Compliance

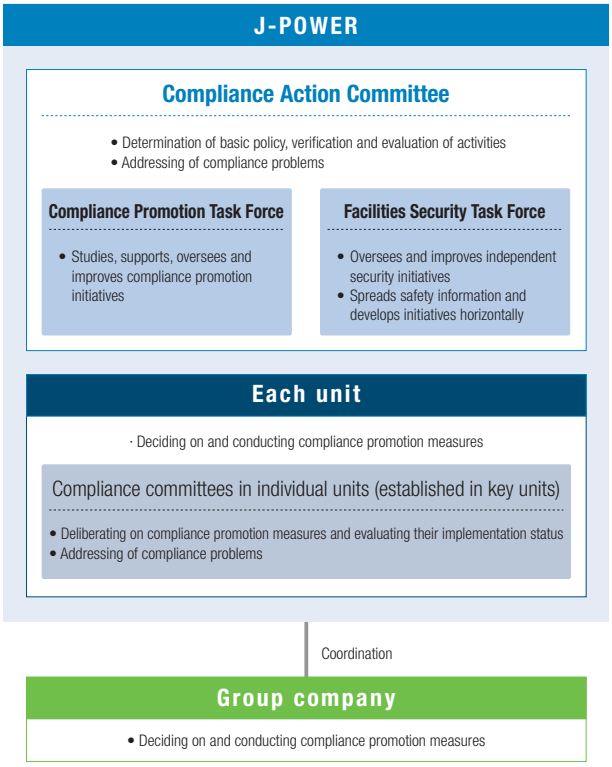
Compliance Promotion Structure

In accordance with its corporate philosophy, J-POWER has instituted its Corporate Conduct Rules, serving as the model for action in the conduct of business that accords with corporate ethics and reflects a law-abiding spirit, while our Compliance Code (see p. 82) provides specific decision-making standards in daily business activities. The Company has also established the Compliance Action Committee, headed up by the J-POWER Chairman, to determine policy for Group-wide compliance activities and to evaluate how they are being applied. Beneath the Compliance Action Committee are the Compliance Promotion Task Force (which works on compliance at the Group-wide level) and the Facilities Security Task Force (overseeing independent security initiatives as based on safety regulations). In addition, compliance committees have been established in individual branches, thermal power stations and other key units. These organizations and units coordinate with each other to ensure that compliance becomes firmly rooted in our corporate culture. Compliance is practiced at the whole-Group level as Group companies also participate in these compliance committees.

Compliance Consultation Points

J-POWER has established "Compliance Consultation Points" within our Internal Audit Department and at an outside law office for employees to seek advice when they are facing or have noticed a compliance problem. These consultation centers are careful to protect privacy and ensure that persons seeking advice do not suffer consequences for doing so.

J-POWER Group Compliance Promotion Structure



Enhancing Employee Compliance Awareness

J-POWER distributes its Compliance Pledge to employees and encourages them to carry it at all times to stimulate their awareness of compliance. We also provide compliance training and lectures as needed. In addition, October each year is set aside as a special month for raising compliance awareness, with compliance slogan contests and events to collect and publicize examples of initiatives.

The Compliance Consultation Points also conduct a compliance questionnaire survey in January to learn the state of compliance awareness among J-POWER Group employees and use the results for subsequent compliance activities.

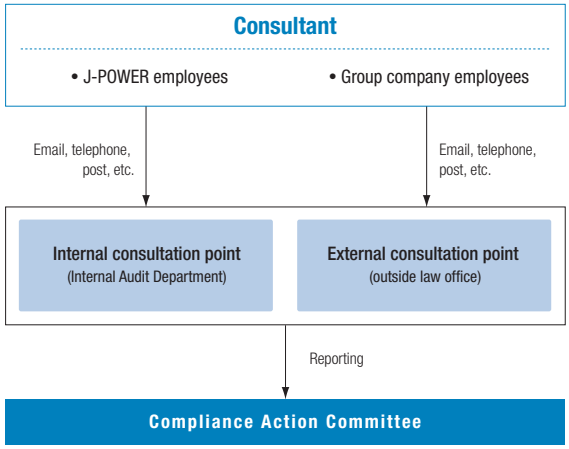
Training on the subject of compliance

Measures to prevent out-of-compliance issues

J-POWER has established a Group-wide compliance promotion program, which together with each unit's day-to-day initiatives works to prevent compliance problems.

In the event of compliance problems, we study the facts and investigate the causes, and based upon the results we draft and carry out measures to prevent recurrence. We also make other departments of J-POWER aware of the situation and work to prevent similar incidents from happening there. Additionally, we notify company personnel of any amendment or abolishment of relevant laws when these occur. We regularly monitor implementation of these measures to verify their effectiveness and reflect the results to improve subsequent compliance promotion.

J-POWER Group Compliance Consultation Points



Information Security Activities

As companies have become increasingly informationoriented and are making ever-greater use of IT, the significance of information security is growing. J-POWER has the duty to build vital national infrastructure in the form of nuclear power stations and to provide stable supplies of electricity. Given this important duty, it seeks to enhance information security and maintain it at a higher level and is implementing a variety of measures to achieve that.

Basic Policy on Information Security

J-POWER has formulated its Group-wide "Basic policy on information security", and publicizes it on its website. The information security measures outlined below are implemented throughout the Group in accordance with this basic policy.

In addition to existing operations, J-POWER Group's business activities are expanding continuously, including the development of nuclear power at Ohma and of power generation business overseas. In tandem with this it is becoming increasingly important to conduct proper information management that earns the trust of society while ensuring the stability of business operations. In view of this, the assurance and enhancement of information security is regarded as an important theme of management, and steps to upgrade the level of security still further are being taken throughout J-POWER Group.

• Basic Policy on Information Security
http://www.jpower.co.jp/english/privacy/privacy_003_e.html

Collaboration in Core Electric Power Systems

J-POWER is also making efforts in the field of IT to help ensure the stability of electric power systems. To position ourselves to deal rapidly and properly with IT problems in core systems for electric power operations, we are strengthening the structure of collaboration with the government and electric power industry as a whole.

Specific Measures

1 Organization and structure

- Establishment of Information Security Committee as a lateral organization whose membership comprises the heads of all J-POWER head-office divisions
- Designation of the J-POWER IT & Telecommunications Office of the Corporate Planning & Administration Department as the unit in overall charge of information security to promote the development of rules and the implementation of concrete countermeasures
- Quick response by risk management system at any time an information security incident arises
- Joint assessment by all J-POWER Group companies of information security status at individual companies, and implementation of improvements

2 Personal measures

- Instruction and education for all Group employees, including e-learning and seminars
- Gives training using scenario of an information security incident

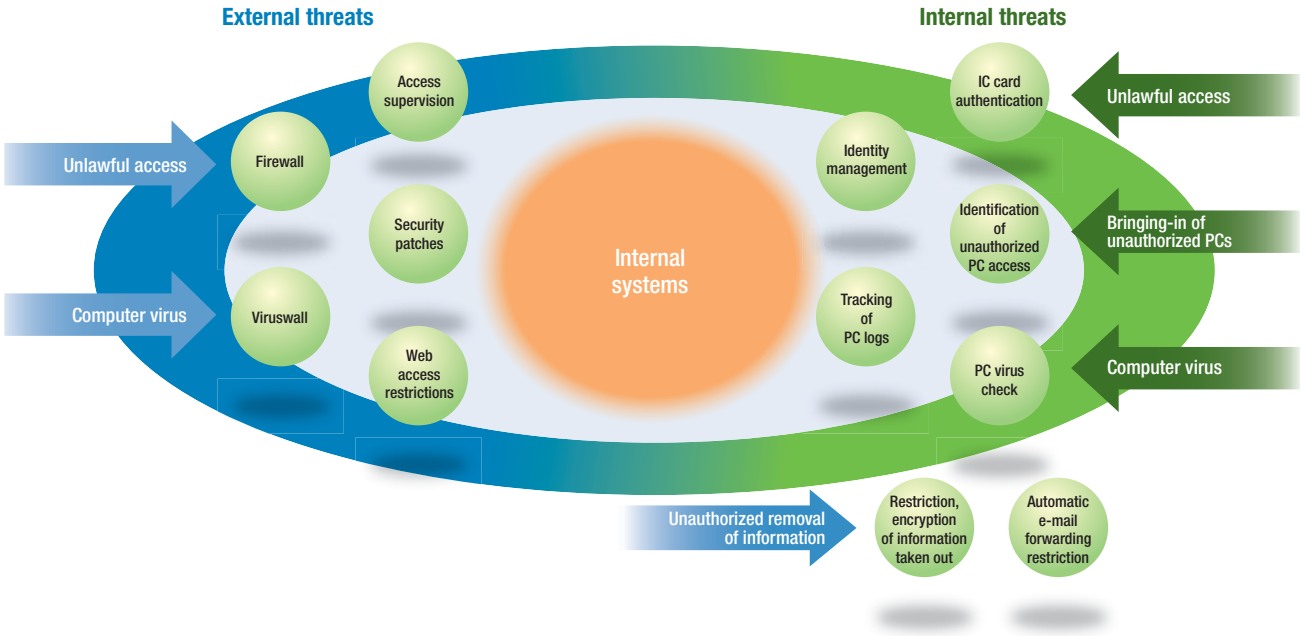
3 Physical measures

- Locking control (J-POWER head office) when people enter or leave the premises, by means of IC cards (for employee identification)
- Separation of business areas from meeting and reception space

4 Technical measures

- Prevention of unlawful intrusion through the Internet
- Access management (user authentication) for all business systems by means of IC cards (for employee identification)
- Approval by senior staff for removal of electronic information, and encryption of files
- Encryption of e-mail attached files
- Creating password to PCs for business trip
- Collects and analyzes various operating logs and creates reports of results

J-POWER Group Information Security Countermeasures



Ishikawa Coal Thermal Power Station (Okinawa Prefecture)

Social Responsibilities

Social Responsibilities

Part 1

Measures for a Stable Supply of Electricity

J-POWER Group produces electricity at hydroelectric, coal-fired and wind power stations throughout Japan and transmits it through its power transmission and substation facilities, supporting people in their daily lives. Backed by a highly trustworthy technical capability, it will continue to supply electric power in a stable and efficient manner, bringing peace of mind to people's daily lives.

TOPICS Maintenance and Operation of Power Facilities

J-POWER Group has hydroelectric power facilities at 59 locations and thermal power facilities at eight locations (including one geothermal) throughout Japan. We also own and operate transmission facilities that include a total of some 2,400 km of lines and eight substations. The following will introduce the kind of efforts we make in maintenance and operations at J-POWER Group to carry out the mission of stable operation of these power facilities.

Hydroelectric Power Facilities

Sakuma Power Station

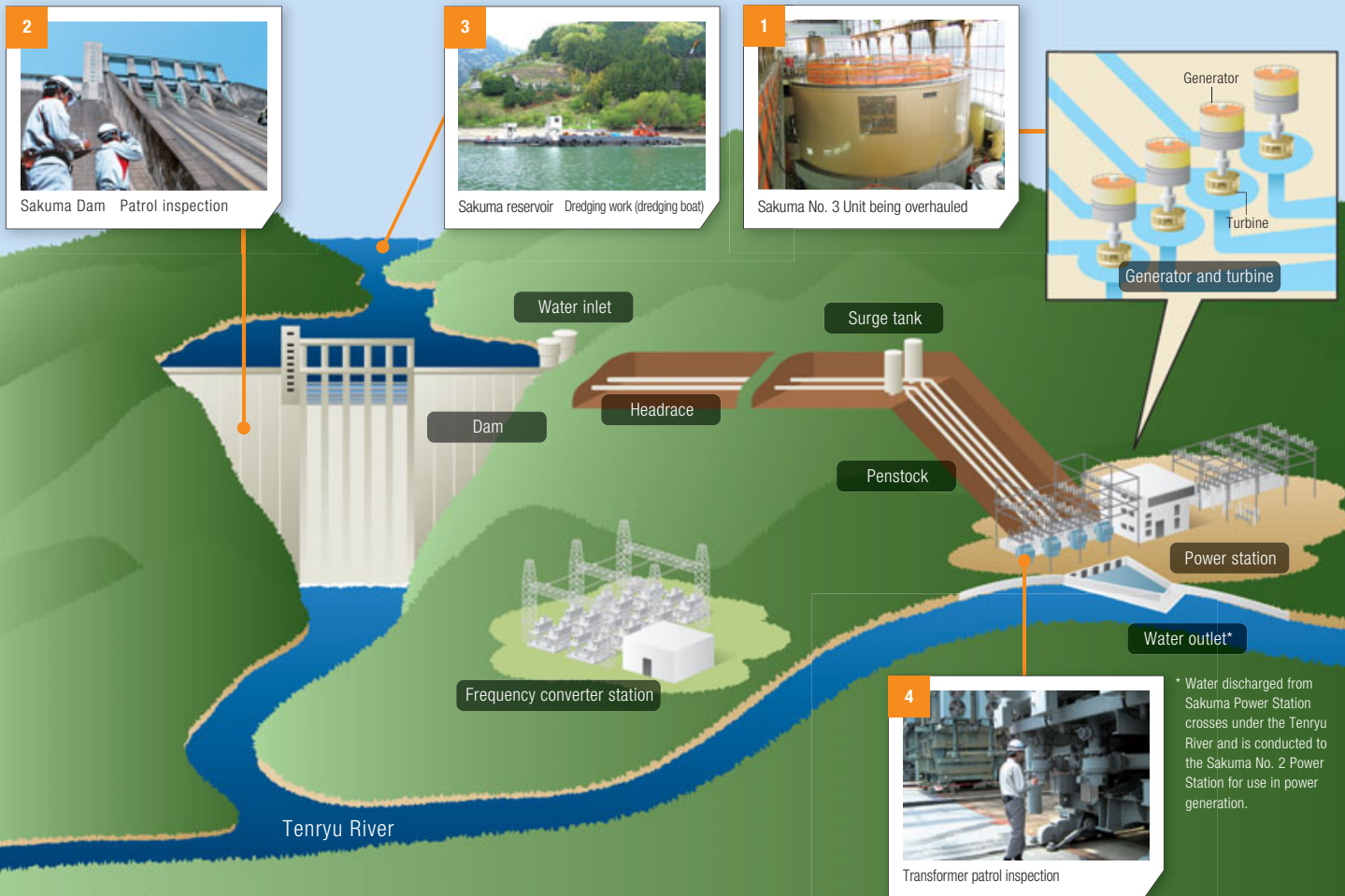
Sakuma Power Station, a premier J-POWER facility, is a large-scale hydroelectric power station that has been in commercial operation since 1956.

It once provided the electric power to support Japan's postwar industrial reconstruction, and now, even 55 years after coming on line, this facility's average annual power output amounts to approximately 1,400 GWh. This makes it the hydroelectric power station with the highest annual power output in Japan.

Sakuma Power Station was the first in Japan to introduce large construction machinery from the United States, and it was built in the short period of three years. Over the subsequent 55 years, it has contributed to the stable supply of electric power in Japan. Going forward, we intend to contribute to society with hydroelectric power stations providing precious, purely domestic and renewable energy.

Overview of Facilities

Location	Tenryu-ku, Hamamatsu-shi, Shizuoka Prefecture
Maximum Capacity	350 MW
Number of power generators	4 units
Maximum water usage	306 m^3/s
Effective head	133.49 m
Started operation	April 1956



* Water discharged from Sakuma Power Station crosses under the Tenryu River and is conducted to the Sakuma No. 2 Power Station for use in power generation.

1 Maintenance and Operation of Power Stations and Electrical Equipment

The Sakuma Power Administration Office, which controls the Sakuma Power Station, maintains and operates the frequency converter station and nine power stations on the Tenryu River water system. A major characteristic of the Sakuma Power Administration Office's jurisdiction is that it serves as an interconnection point between the system on 60 Hz power and the system on 50 Hz power. There are two power stations capable of switching between generation of either 50 Hz or 60 Hz electricity, as well as the frequency converter station that enables interchange between systems with different frequencies.

In order to operate stably over the long term, generators are given an overhaul every 10 or so years in which they are completely dismantled and inspected. Sakuma Power Station has four generators, and Unit No. 3 went through an overhaul from December 2010 to June 2011. This work generally takes a half-year, and other, related equipment that has deteriorated is renewed at the same time. The work is carried out with an emphasis on safety first, and a thorough preliminary survey is made first to ensure that there is no impact on adjoining units that are in commercial operation as well as to ensure that the work can be completed within the limited shutdown time. The equipment is definitely locked down and the work area marked off when work is being done, and the people involved in the work hold daily meetings during the work period to enable the work to proceed safely and surely.

Yoshiyuki Nakamura
Deputy Director, Sakuma Power Administration Office
Chubu Regional Headquarters
Hydropower and Transmission System Department, J-POWER

2 Appropriate Maintenance of Civil Engineering Structures for Dams and Other Facilities

We conduct maintenance of the civil engineering structures at hydroelectric power facilities so as not to allow any interference with the operation of generators. Our work includes inspection, measurement, repair, and other maintenance of dams, reservoirs, waterways, and other structures, renewal of deteriorated facilities, measures to deal with sediment and driftwood, monitoring water quality, and other duties covering a wide range of operations. We also operate the dam gates appropriately when flooding occurs due to typhoon or other heavy rains, and perform tasks that include safe downstream discharge of water that enters the dam.

Our maintenance duties include keeping track of the condition of facilities by inspection, measurement, and other such actions, finding deformations and abnormalities and investigating the necessity for repair, determining countermeasures, and taking other such actions to maintain the functionality of facilities. When we inspect and measure facilities, we take care not to overlook deformations or abnormalities, and when we do detect deformations, we make every effort to identify the risk correctly and deal with it promptly. For the future, I intend to continue pursuing maintenance in a further appropriate and rational manner.

Yukio Ibe
Civil Engineering Group, Sakuma Office
Chubu regional company, JPHYTEC Co., Ltd.

3 Dam Reservoir Sedimentation Control Measures

Each year large quantities of earth flow into dam reservoirs from upstream, and a portion of the earth builds up as sediment in the reservoir. This makes it necessary to institute sedimentation control measures to reduce the accumulation of earth. We are presently implementing three sedimentation control measures for the Sakuma Dam reservoir.

The first measure is transporting within the reservoir using a dredging boat and a sediment transporter to move sediment in the upstream and middle parts of the reservoir to downstream parts. The second measure is removal from the reservoir. This work is done by sand and gravel extraction contractors, and the removed sediment is used effectively for concrete and asphalt aggregate and other such purposes. The third measure is sediment flushing. This involves lowering the water level in the dam during the dry season so that the center and upstream portions of the dam reservoir form natural river channels. By this measure, sediment in the center and upstream portions of the dam reservoir is led to the place which exist below active storage capacity.

All of these methods involve work within the large field of the dam reservoir, and we put the greatest care into supervising and coordinating with the people involved to make certain there are no oversights. In addition to sediment, there is also driftwood and trash that flows into the dam, and we also dispose of that material with consideration for the environment and attention to possible reuse.

Kenichiro Takatsuka
Sakuma Power Administration Office,
Chubu Regional Headquarters
Hydropower and Transmission System Department, J-POWER

Comments from Younger Employees

4 Everyday Inspection and Maintenance of Electric Power Facilities

Sakuma is interesting as the location of power generators that output at frequencies of both 50 Hz and 60 Hz as well as of a frequency converter station, and there are water turbine generators of a variety of types. My work is to deal with these electric power facilities, conducting everyday inspections, repairing and renewing equipment and facilities, and so on.

This service area has power stations like the Sakuma Power Station, which has seen a half-century go by since starting operation, and we engage in renewing and repairing its aging equipment in order to maintain its functionality. Doing this work requires that the equipment be shut down. As the presence of the frequency converter station indicates, however, Sakuma is an important location because it serves to interconnect power grids with different frequencies, and this means that facilities cannot be shut down for very long. In order to do our work safely, quickly, and with high quality, we put great care into preparations, such as studying technical information materials in the archives, seeking the advice of senior colleagues, and investigating construction methods. Then when we do the work, and the equipment returns to good working order without incident, I feel a great sense of accomplishment. I intend to go on doing my very best to help provide a stable supply of electric power, putting safety first.

Kentaro Tsuchida
Sakuma Office, Electric Power Group,
Chubu regional company (now the Control Group,
Generation and Transformation Department,
Generation and Transformation Division)
JPHYTEC Co., Ltd.

Thermal Power Facilities

Takasago Thermal Power Station

The Takasago Thermal Power Station is a coal-fired power station built to secure the demand for domestic coal, with the No. 1 Unit starting commercial operation in July 1968 and the No. 2 Unit in January 1969. As of FY 2011, this station has seen 43 years of service. The past decade has also been a period of transition to thermal power that burns overseas coal because of the shrinking of domestic coal mining, but this power station has been striving to provide a stable supply of electric power for over 40 years since it started operating. For the future, we will continue the effort to meet your expectations while taking care to harmonize with the local community and with the environment.

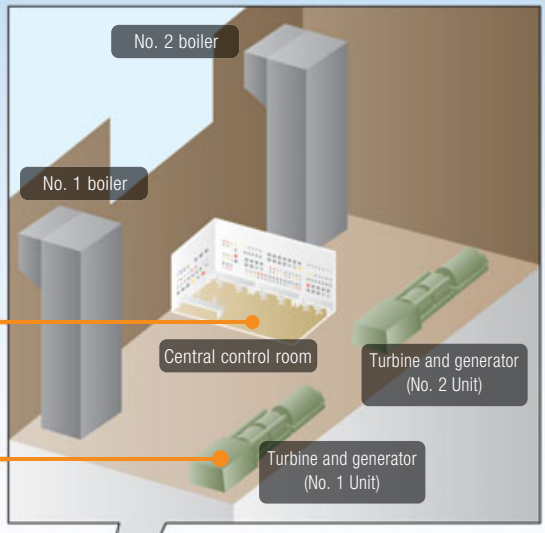
Overview of Facilities

Location	Takasago-shi, Hyogo Prefecture
Output	500 MW (250 MW × 2 units)
Fuel	Coal
Start of Operation	July 1968 No. 1 Unit starts commercial operation January 1969 No. 2 Unit starts commercial operation

4

Monitoring underway in the central control room

Indoor facility layout diagram



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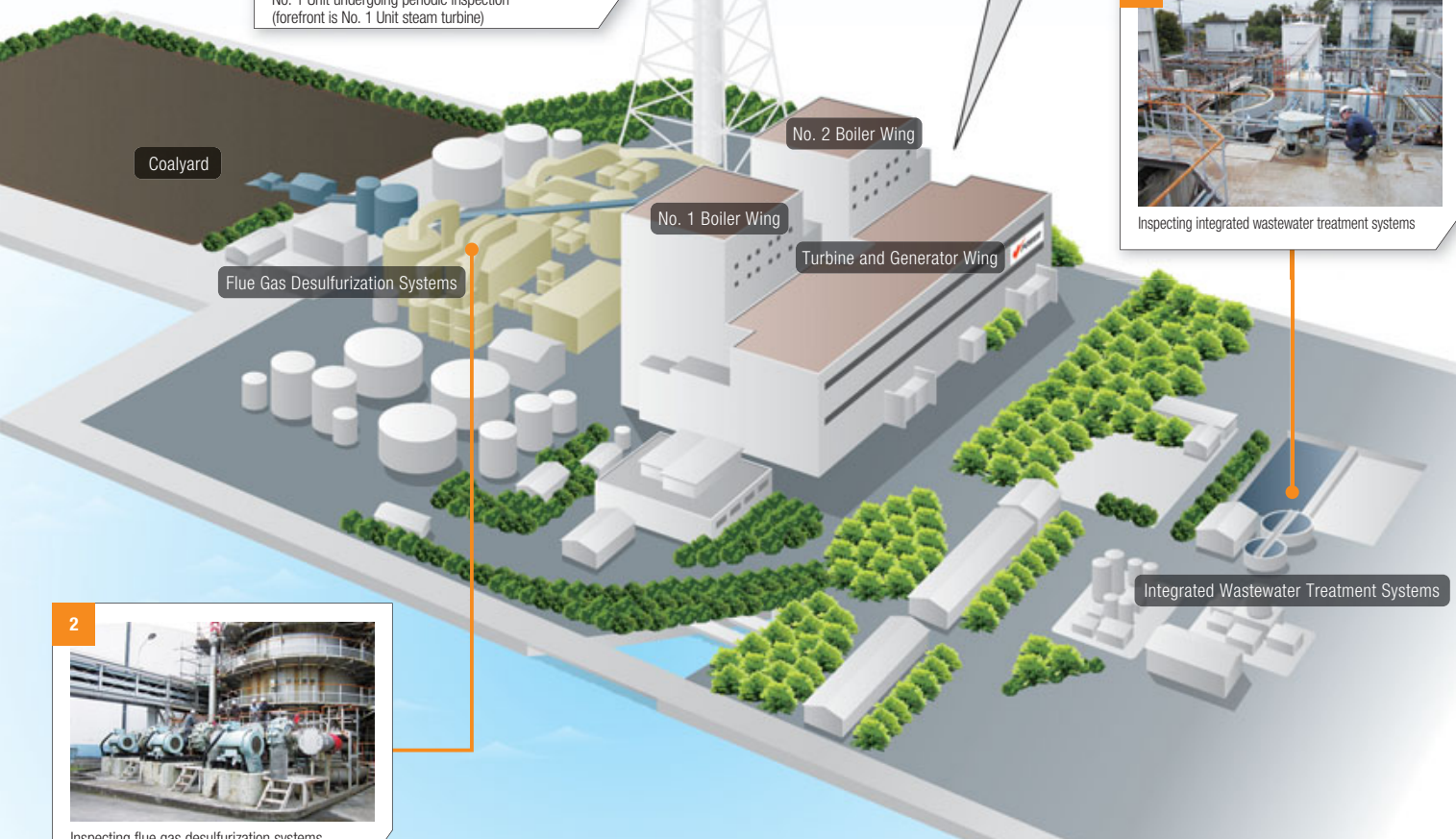
No. 1 Unit undergoing periodic inspection (forefront is No. 1 Unit steam turbine)



3

Inspecting integrated wastewater treatment systems

2

Inspecting flue gas desulfurization systems

1 Appropriate Maintenance of Thermal Power Facilities

It is absolutely essential to take a medium to long-term perspective and create maintenance plans in order to carry on stable operation of thermal power facilities and assure their reliability.

Ever since the Takasago Thermal Power Station started operation, it has sustained its thermal efficiency*1 and this is something we take great pride in. The greatest reason for this is that we do not fail to perform appropriate maintenance, including preventive maintenance and planned repairs. Conducting proper maintenance of electric power facilities (maintaining their thermal efficiency) reduces the amount of coal that has to be consumed to generate the same amount of electric power. This cuts down on carbon dioxide (CO_2) emissions, which means this relates very closely to the environmental aspect of the matter.

Drawing up appropriate maintenance plans requires investigation of various matters, including technological aspects and cost aspects. We will continue to deal with these matters using the technology J-POWER possesses for maintaining and operating advanced coal-fired power stations.

Hideyuki Inoue
Plant Engineering Group, Takasago Thermal Power Station
Thermal Power Department, J-POWER

2 Inspection and Maintenance of Flue Gas Desulfurization Systems

Takasago Thermal Power Station has seen 43 years go by since its No. 1 Unit entered operation. I think the fact that this old power station is in service and in full operation is proof that the people involved have been working together to carry out appropriate facility maintenance and operation management.

Flue gas desulfurization systems are devices that remove sulfur oxides (SOx)*2 from (desulfurize) exhaust gases from the boilers. They are essential systems for environmental protection at coal-fired power stations. Flue gas desulfurization systems have tanks called absorption towers that are equipped with numerous pumps. Inside the absorption towers, the exhaust gases and liquids are brought into contact to perform desulfurization. When the performance of the pumps is degraded, the system becomes unable to remove sulfur oxides, so we have always paid attention to any unusual sounds or other symptoms from the pumps. We carry on our day-to-day inspection and maintenance work with the constant aim of early detection and early repair of abnormalities in every pump.

Although the Takasago Thermal Power Station is old, I intend to put all my strength into maintaining it while constantly considering what I can do and what is needed for it to continue stable operation into the future.

Toshio Soga
Maintenance Group, Takasago Company
JPec Co., Ltd.

3 Operation Management of Integrated Wastewater Treatment Systems

The integrated wastewater treatment systems at Takasago Thermal Power Station deals with the wastewater produced by electric power facilities and flue gas desulfurization systems as well as rainwater recovered on our grounds and other such water. We put this water through appropriate treatment by chemical treatment, filtering, and precipitation according to the water quality. Controls on discharge of wastewater outside our grounds are based on the Water Pollution Control Law, the Law Concerning Special Measures for Conservation of the Environment of the Seto Inland Sea, and agreements with prefectural and municipal governments. We consider compliance with these to be our greatest mission as we engage in operation management of integrated wastewater treatment systems.

Takasago Thermal Power Station has changed from exclusive use of domestic coal to use of overseas coal, and this has also caused changes in the properties of the wastewater. Advanced wastewater treatment technology and operation management are necessary in order to keep track of wastewater properties, which change with the operating conditions of the electric power facilities, and to obtain full performance from wastewater treatment facilities.

I intend to continue my efforts to have all our employees here understand this historic power station and also understand and observe legal statutes and regulations so that we can keep the power station in stable operation.

Miyuki Inoue
Operating Group, Takasago Company
JPec Co., Ltd.

4 Comments from Younger Employees Stable Operation of Electric Power Facilities

I am presently engaged in operations work at the power station. My work is to discover abnormalities in the equipment promptly by monitoring the operation of electric power facilities and conducting patrols, then to deal with the abnormalities so that the station can provide a steady supply of electric power.

My work also involves using the simulator facilities at the power station and at the Wakamatsu Thermal Power Training Center (see p. 28) in Kitakyushu City to improve our operations technology so as to enable rapid, accurate judgment and action in response when accidents occur.

The operation of electric power facilities requires not only specialized technical abilities but also acquisition of official qualifications and a variety of skills, such as management ability and ability to communicate well. I will continue to study so that I can make the maximum use of my capabilities and be able to contribute to providing a stable supply of electric power.

Daisuke Naoi
Operating Group, Takasago Thermal Power Station
Thermal Power Department, J-POWER

References

*1 Thermal efficiency
The ratio of the electric power generated (converted to thermal units) to the heat energy input to an electric power facility.

*2 Sulfur oxides (SOx)
The general term for compounds of sulfur and oxygen is abbreviated as SOx. These include sulfur dioxide (SO_2), sulfur trioxide (SO_3), and sulfuric acid mist (H_2SO_4). SOx are generated when coal and heavy oil containing sulfur are fired as fuel in factories and thermal power stations, and they are released into the atmosphere in exhaust gases. They are a source of atmospheric pollution, for instance as a substance responsible for acid rain.

Transmission and Transformer Facilities

J-POWER owns and operates approximately 2,400 km of transmission lines that link the islands of Honshu, Hokkaido, Shikoku, and Kyushu, as well as three extra high-voltage substations, four AC-DC converter stations, and one frequency converter station. J-POWER thus plays a major role in the overall operation of Japan's electric power grid.

Upholding the Main Power Artery Connecting Honshu and Shikoku: The Honshi Interconnecting Line

The Honshi Interconnecting Line, one of the power transmission lines under the control of the West Transmission Line Maintenance Center, is an inter-regional interconnecting line that links the Shikoku region and the Chugoku region. It is a facility that contributes to power interchange between these two regions, and more broadly in western Japan. One distinguishing feature of the Honshi Interconnecting Line is that it has 500 kV oil-filled (OF) cable*1 strung even across the Seto-Ohashi Bridge. Its maintenance must cover the cable itself, cable storage facilities, disaster prevention and facility monitoring systems, ventilators and other secondary equipment and facilities, and a wide variety of civil engineering, and architectural structures and other facilities. Center personnel are united in recognizing the importance of this power transmission line and in making the effort to conduct regular patrols and inspections and make appropriate repairs, doing all that is necessary to deal with the problems that arise with the passage of time.

Patrolling the Honshi Interconnecting Line

Mitsumasa Asano
Sub-Leader
West Transmission Line Maintenance Center,
West Regional Headquarters
Hydropower and Transmission System Department, J-POWER

On-Site Technical Capabilities in Support of a Stable Power Supply (Nishi-Tokyo Substation)

The Nishi-Tokyo substation is a large-scale primary substation with 20 transmission line circuits and four main transformers, with a facility capacity of 1,350 MVA. These facilities are maintained jointly by J-POWER Nishi-Tokyo Power Administration Office and the Nishi-Tokyo Office of JPHYTEC Co., Ltd. It has been 55 years since the substation began operating, and the question of how to take appropriate measures with deteriorated facilities has become an issue. In addition to concerns about obtaining repair parts and the dwindling number of manufacturer technicians, the fact of being a center that is important to grid operation makes it difficult to shut down facilities to work on them. Therefore it is important to proceed systematically and efficiently with facility renewal and repairs. We are also working to maintain and improve our on-site technical capabilities in maintenance and operation with the primary aim of supporting the stable supply of power.

Inspecting a transformer

Katsuhiko Kawai
Director, Nishi Tokyo Power Administration Office, East Regional Headquarters
Hydropower and Transmission System Department, J-POWER
(Presently Director, Nagoya Power Administration Office, Chubu Regional Headquarters,
Hydropower and Transmission System Department)

Information Technology and Telecommunications Facility

J-POWER telecommunications for electric power systems are used for a wide variety of purposes, including protection, monitoring, control, and operational administration of power facilities. They perform vital functions as the nervous system of the electric power business. We conduct steady, regular maintenance, operation, and monitoring of these electric power telecommunications facilities, thus contributing to the stable supply of electric power.

Steel telecommunications tower at the Head Office

Maintaining Reliability and Supporting Adoption of Advanced Information Technology

Network Monitoring Center

J-POWER's business sites, power generation and distribution facilities, and other such establishments are distributed throughout Japan. What connects them is a communication network that must be designed and built with a high degree of reliability so that communications will not be interrupted even by an earthquake or other such disaster. The way our network has been given redundancy through the use of microwave radio, fiber-optic cable, and so on is one example of this.

Information and communications services are growing more diverse, and the technology is also developing rapidly. This means that we will maintain the solid structure we have used to date while studying the renewal of facilities in the medium to long-term and entertaining possibilities for the introduction of new technology.

Our mission is to uphold the functionality of this information and communications network with its nationwide structure, and to constantly maintain it in good operating condition, in order to contribute to the operation of power stations and the electric power grid.

Youichi Taira
Control Center, IT and Telecommunications Office
Corporate Planning and Administration Department, J-POWER

The stable operation of power facilities is essential to stable profitability in the domestic wholesale electricity business, which is the profit center for J-POWER Group. It is also extremely important to the fulfillment of our responsibility to provide a stable supply of electric power.

For this reason, as well, we are committed to enhancing the diagnostic capabilities of the facilities owned by J-POWER Group and making every effort toward preventive maintenance. In this way, we will focus our energies on assuring the stable operation of our various facilities over the long term.

References

*1 OF cable
Abbreviation for oil-filled cable. This cable has its interior filled with insulating oil to improve its insulating properties.

Helping Ensure the Stable Supply of Electricity

The power generating facilities of J-POWER Group constitute a stable supply capacity, while the company's transmission, substation, and communications equipment bear a portion of the load for the nationwide system of power companies. The company also contributes to the stable supply of electricity as a system of wide area interconnection that connects different regions.

Unifying Electric Power in Japan

Electric Power Distribution on a Nationwide Scale

J-POWER owns and operates approximately 2,400 km of transmission lines and eight substations and converter stations that link Japan's disparate regional power companies together. In this way it plays a major role in the overall operation of Japan's electricity grid. It also operates essential facilities that support power transmission over a wide area in Japan, including extra-high-voltage transmission lines that connect Japan's main island of Honshu with the other main islands of Hokkaido, Shikoku, and Kyushu, and the Sakuma Frequency Converter Station, the first facility in Japan that has made possible the transmission of electricity between the differing frequencies of Eastern Japan (50 Hz) and Western Japan (60 Hz).

Sakuma Frequency Converter Station (Shizuoka Prefecture)

Additionally, the Central Load Dispatching Center issues appropriate operating instructions (load dispatching) on a 24-hour basis to power stations and other facilities in order to help keep the electricity grid stable while maintaining stable, efficient operations at domestic power facilities owned by J-POWER.

At the same time, stable grid operations are supported by remote monitoring and operations that utilize the latest in information technology. We possess a communications network that includes highly reliable microwave radio circuits, fiber-optic cable, and other such components that we employ to conduct high-precision operation.

Central Load Dispatching Center

Middle & West Regional Control Center Enters Operation

The Middle & West Regional Control Center (in Kasugai City, Aichi Prefecture) started operating on April 1, 2010. This facility integrates the West Regional Control Center (in Saijo City, Ehime Prefecture) and the Central Regional Control Center (in Kasugai City, Aichi Prefecture) that were previously in operation under the new name of Middle & West Regional Control Center. This control center has completely changed over from the former centralized system that used large computers to a new distributed system that uses general-purpose computers.

Control center operators from both regions were assigned to the factory testing, installation work, and local testing involved in this renovation so that they could learn the new system's functions in advance. This process was then augmented by preparations such as training for local operators carried out in advance, with the result that operation commenced according to schedule on April 1, 2010.

The Middle & West Regional Control Center was assigned control over hydroelectric power stations (31 locations, combined output of 3.5937 GW), the Sakuma Frequency Converter Station, and the Nagoya Substation. This means that the center conducts management across an extremely wide range of facilities at once, ranging from the Sakuma Power Station and other power stations in the Tenryu River water system in Shizuoka Prefecture, in the east, to Sendaigawa No. 1 and No. 2 Power Stations in Kagoshima Prefecture, in the far west.

In commencing operation of the Middle & West Regional Control Center, J-POWER completed its renewal of nationwide regional control center facilities that it had been gradually carrying out by seeking to further heighten its facilities' functionality and increase the efficiency of its operation management system. This inaugurated a system in which operations of nationwide hydroelectric power generator and transformer facilities are to be conducted from three places, the North Regional Control Center (in Hakodate City, Hokkaido), the East Regional Control Center (in Kawagoe City, Saitama Prefecture), and the Middle & West Regional Control Center (in Kasugai city, Aichi Prefecture).

Opening of the Middle & West Regional Control Center (Aichi Prefecture)

Contributing to Wide Area Operation of the Hokkaido-Honshu Electric Power Grid

The only interconnecting facility to link the islands of Hokkaido and Honshu, the Hokkaido-Honshu Electric Power Interconnection Facility (the Kitahon HVDC link) is Japan's first extra- high-voltage DC transmission facility. It is made up of three large parts: (1) an AC-DC converter station that converts AC to DC and DC to AC; (2) overhead transmission lines approximately 124 km in length on the Hokkaido and Honshu sides together; and (3) a long-distance submarine cable approximately 43 km in length that crosses the Tsugaru Straits. It has been 30 years or more since this facility commenced operation in 1979. Its capacity, initially 150 MW, was increased to 300 MW in 1980, then 600 MW in 1993. It is contributing to wide area operation of the Hokkaido and Honshu electric power grids.

One purpose of the Kitahon HVDC Link is to enable power interchange with other regions when disaster occurs or when electric power demand increases suddenly. The facility also controls load flow*1 and regulates frequency during periods of normality, performing a key role in stabilizing frequencies on the electric power grid.

Kitahon HVDC Link Kamikita Converter Station (Aomori Prefecture)

References

*1 Load flow
The general term for the flow of electric power (electricity) on the electric power grid, which is the integrated system from the generation of electric power, through distribution, up to demand. It is normal for load flow to flow from the power source toward the demand location, but load flows are not necessarily fixed in size or other properties, depending on the configuration of the electric power grid, and they sometimes fluctuate with the season or time of day.

Stable Procurement of Coal

Coal Mining Projects in Australia

J-POWER Group seeks stable procurement over the long term of coal for use in coal-fired power stations, and we therefore own stakes in coal mining projects in the states of Queensland and New South Wales in Australia. Of these, the Blair Athol Coal Mine has until now been the key mine, and it will be closing down after 25 years or more since it began exporting. Meanwhile, we began taking coal from new coal mines, the Clermont Coal Mine and the Narrabri Coal Mine, in 2010.

The Clermont Coal Mine held a grand mine opening on October 15, 2010, with participation not only by the people concerned from J-POWER and its three partners (Rio Tinto, Mitsubishi Corporation, and Japan Coal Development Co., Ltd.), but also the Governor of Queensland, the Japanese Ambassador, concerned parties from local communities, and people from the Japanese power utilities. We are engaging steadily in development and operational management of these existing coal mining projects in order to realize stable coal procurement and assure our revenues.

Our aim is to continue diversifying our sources for coal procurement and securing revenues at the upstream end of the coal business. To that end, we will also study new coal mine investment projects that are relatively cost competitive, paying careful attention to the coal supply-and-demand balance and competitor activity, and we will continue taking steps to participate in new coal mining projects.

Clermont Coal Mine (Australia)

Narrabri Coal Mine (Australia)

Stable Transportation of Coal

Stable Transportation of Coal

J-POWER Group uses many different types of coal, and transporting them to the various power stations requires 200 or more voyages per year. Measures we take for stable transportation include the long-term engagement of specialized vessels to carry purchased coal and the conclusion of contracts of affreightment with the shipping companies.

Voice **We are striving to realize stable imports of coal.**

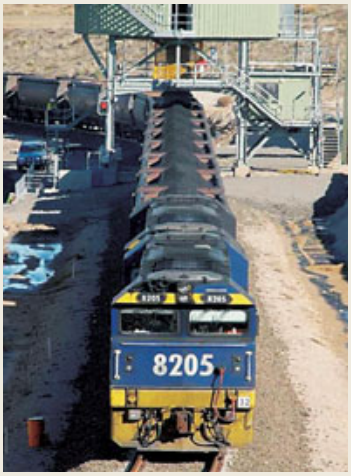
Measures for Coal Mine Investments with a View to Stable Procurement of Coal

Hiroyuki Mochida
Business Development Group
Energy Business Department
J-POWER

J-POWER imports coal as the fuel for our coal-fired power stations largely from Australia and Indonesia. In Australia, we own rights in coal mining projects and manage our investments through our local Group company, J-POWER Australia Pty., Ltd. (JPA).

J-POWER itself is in the position of a purchaser of coal for use in power generation. However, JPA is in the position of a seller that produces and markets coal. As such, it coordinates with J-POWER while engaging in sound project management through participation in regular meetings (four times per year) with each coal mining project as well as in unscheduled technical meetings.

The operation and profitability of coal mines are affected by a variety of different factors in addition to natural disasters such as heavy rains and flooding, including crowded conditions at the shipping port, coal market prices, and foreign exchange movements. Therefore we engage in steady, day-to-day execution of duties as required from a variety of perspectives in order to implement measures for stable coal procurement by means of our coal mining investments.



Loading coal cars at Narrabri (Australia)

Contributing to Stable Supply over the Long Term

Maintaining Stable Supply by Thoroughgoing Attention to Fundamentals

The Matsushima Thermal Power Station started operation in 1981 as the first large-scale thermal power station (two 500 MW units) in Japan fueled exclusively by overseas coal. Since then it has played an important role as a wide area power source supplying electricity to the western Japan region, and it has furnished operating expertise and advanced technology to the power stations that have come after it. Today, even 30 years after it commenced operation, we still make thoroughgoing efforts on the fundamentals, including operation management, checking and analysis of operational data, everyday patrols, and regular ongoing measures for safety and hygiene, and the station continues in stable operation.

Matsushima Thermal Power Station (Nagasaki Prefecture)

Mission as a Wide Area Power Source

In June 2010, the Matsuura Thermal Power Station's No. 1 Unit reached its 20th year since beginning commercial operation. Following the start of operation of the No. 1 Unit (1 GW) in June 1990, it was joined by the No. 2 Unit (1 GW), which began operating in July 1997. The two have a combined output of 2 GW of electric power that is supplied to the Kyushu, Chugoku, and Shikoku areas, carrying out its mission as a wide area power source that supports the provision of a stable supply of electric power to the western Japan region. In the future, too, we will strive to promote appropriate maintenance and operation, to reduce CO_2 by the co-combustion of biomass fuel, and to take other such measures with the aim of contributing to the stable supply of electric power and functioning as a power station in harmony with local communities and the environment.

* Regarding the co-combustion of biomass fuel, please see page 57.

Matsuura Thermal Power Station (Nagasaki Prefecture)

Toward Long-Term Stable Supply

The Tachibanawan Thermal Power Station started operation in July 2000 as a high-efficiency coal-fired power station using ultra-supercritical (USC) technology. Since then, it has been serving as a wide area power source that satisfies strict environmental standards while supplying electric power to the western Japan region.

Now, in its tenth year since commencing operation, some of the facilities and equipment are coming up to their time for renewal. The employees will work together with all their strength to perform maintenance on the power station and keep it in stable operation so that it can continue providing electric power with efficiency and stability for the coming 20 or 30 years.

Tachibanawan Thermal Power Station (Tokushima Prefecture)

COLUMN

Thermal Power Training Center Reaches 10,000 Students

The Thermal Power Training Center was established in 1988 in the Wakamatsu Operations and General Management Office (Kitakyushu City) as an organization to conduct technical training of J-POWER Group employees.

The center provides simulator training (start-up, shut-down, and accident response training, evaluation testing) for thermal power station operators and specialized subject training (theory of valves, pumps, and other equipment, disassembly and assembly skills) for maintenance personnel. Its purpose is to maintain and improve practical competence.

The number of trainees reached the noteworthy total of 10,000 in May 2010. These consisted mainly of J-POWER Group employees together with employees of independent power producers (IPP) and trainees from other countries.

Going forward, we will continue to provide training with the aim of developing technical staff with the advanced practical capability for thinking about what to do and putting it into practice themselves.

Specialized subject training

Specialized subject training

Accident response training

Plant operation simulator training

Developing Technologies for Stable Power Supply

In order to support the stable supply of electricity, J-POWER Group engages in technology development related to the stable operation and maintenance of electric power facilities, the reduction of the environmental load, and the effective utilization of limited resources.

Ensuring Safe, Secure Power Facility Operations

J-POWER has set up the Chigasaki Research Institute and the Wakamatsu Research Institute under the Technology Development Center. These facilities work in coordination with the relevant Head Office departments, the thermal power stations, the regional headquarters, branches, and other units concerned to promote the development of technology that supports the stable supply of electricity. The Chigasaki Research Institute was founded in 1960 as a civil engineering testing center to support large-scale hydropower development. Its organization was subsequently expanded to keep up with J-POWER business developments, and the institute presently has Civil Engineering Laboratory, Thermal Plant Engineering Laboratory, Material Science Laboratory, Power System Engineering Laboratory, as well as Administration group. This institute engages in various kinds of technology development in addition to the kinds described below, including development of various technologies involved in the construction, operation, and maintenance of hydropower, thermal power, wind power, and transmission facilities.

Its other activities include hosting civil engineering workshops, dispatch of instructors to universities, committees, and other such organizations, study tours for members of the public, outreach science classes, and other activities that make advantageous use of institute facilities and personnel resources. In 2010, we held various celebrations of the Chigasaki Research Institute's 50th year of operation, including an anniversary ceremony, planting of Shokawa Sakura (see p. 50), issuance of a commemorative publication, a community concert, and exchanges with local enterprises. We are committed to continuing steadfastly with the Chigasaki Research Institute's work of J-POWER technology development aimed toward the frontiers of energy and the environment.

Technology Development Center Chigasaki Research Institute (Kanagawa Prefecture)

At the 50th anniversary ceremony

Community concert (50th anniversary event)

Anniversary tree-planting underway

Increasing the Reliability of Grid Facilities

Power Grid Analysis

With the object of maintaining stable operation of electric power facilities as well as the voltage, frequency, and other aspects of power quality, the Chigasaki Research Institute runs Power System Engineering Laboratory where power grid analysis simulators are used to verify and analyze the operation of control systems for electric power sources, direct current substations, and other such facilities. These analyses aid in improving the operational reliability of facility control systems and enable a more precise response in case of lightning strikes and other such events, as well.

Power grid analysis simulator

Working to Protect the Dam Reservoir and River Environment

Efficient Technology for Aspirating and Flushing Dam Reservoir Sediment

Sand and gravel from mountains and other upstream areas are washed down during floods into dam reservoirs, where they accumulate. This sand and gravel, which is referred to as sediment, can be a factor causing flooding in the vicinity of the dam reservoir or upstream from it, diminishment of dam reservoir capacity, and riverbed degradation when the downstream supply of sand and gravel from the dam is reduced.

There are locations in J-POWER dam reservoirs where large amounts of sediment have accumulated. We are going to be required, for the future, to drastically limit the impact on the natural environment of downstream rivers and other such areas while continuing to supply dam reservoir sediment downstream.

At present, we are confirming the functionality and making improvements to the sand aspirating and disposal method as a technology for efficiently aspirating and removing this dam reservoir sediment. This technology uses the difference in water level between the dam reservoir and the discharge location and other such factors to draw out sediment through conduit-like equipment placed inside the reservoir and discharge it downstream from the dam.

Experimenting with sucking in sediment by the sand aspirating and disposal method

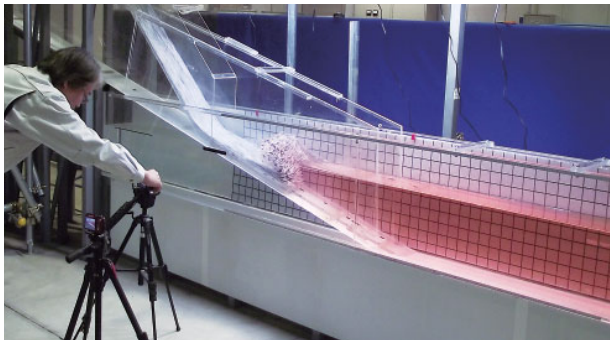
Protecting Power Stations from Natural Disasters

Clarification of the Mechanism that Generates Waves of Various Kinds

Waves include more than just waves at sea caused by winds and tsunami caused by earthquakes. There are also waves generated by natural disasters on land, such as when large-scale slope failures, avalanches, pyroclastic flows, or other such phenomena enter a body of water.

There are cases of such waves caused by natural disasters on land that have occurred in Japan, and there is a possibility that they may occur, for instance, due to a slope failure close to a lake or dam reservoir.

J-POWER has used simulations and the latest analytical models to ascertain the mechanisms that generate various kinds of wave, and we are engaged in development of technology that will contribute to coastal power station structure and dam safety evaluations.



Experiment being conducted on water surface elevation due to an avalanche

Supporting Large-Scale Thermal Power Stations

Accurate Determination of the Lifespan of High-Temperature Equipment

The equipment and piping at power stations includes large items that cannot be easily replaced. At thermal power stations, the soundness of heat-resistant steel that is exposed to an environment of high temperatures and high pressures is critical to stable operation. Accurate lifespan assessment is therefore required.

Lifespan assessments of heatresistant steel have been conducted from long ago. However, the mechanisms of deterioration can change as the development of materials progresses, so the goal is to establish accurate assessment technologies that are permanently geared to the type of steel involved. Our coal-fired power stations that have adopted ultra-supercritical (USC) technology, in particular, have achieved power generating efficiency at the top world level with the support of high chrome ferrite heat-resistant steel[*1]. The Material Science Laboratory at the Chigasaki Research Institute is carrying on creep testing and other such work using a large single-axis creep tester to establish lifespan assessment technology for this type of steel with CO_2 reduction in mind, as well.

Large single-axis creep tester (maximum load of 200 kN) used to collect lifespan assessment data

Aiming for Diversification of Fuels

Evaluating Fuel Suitability for Thermal Power Stations

J-POWER's thermal power stations use coal as their main fuel. Supplies of high-grade bituminous coal and sub-bituminous coal that have relatively high heating value and low moisture content have been growing tight in recent years, and expectations for the use of lignite and other low-grade coal are rising. Attention is also turning to expanded use of biomass in order to contribute to reduction of CO_2 emissions. Since these kinds of low-grade fuel yield low heating value per weight, it is necessary to transport them to the power stations efficiently. There are some fuels that undergo spontaneous combustion more readily, and these must be safely transportable and storable. It is also necessary to maintain good combustibility and environmental properties in the boiler, and to avoid ash deposition, corrosion, and other such problems. These are the purposes we have in mind in seeking to establish technology for assessing fuel suitability.

Electrically heated drop tube furnace (DTF) used to measure fuel combustion properties

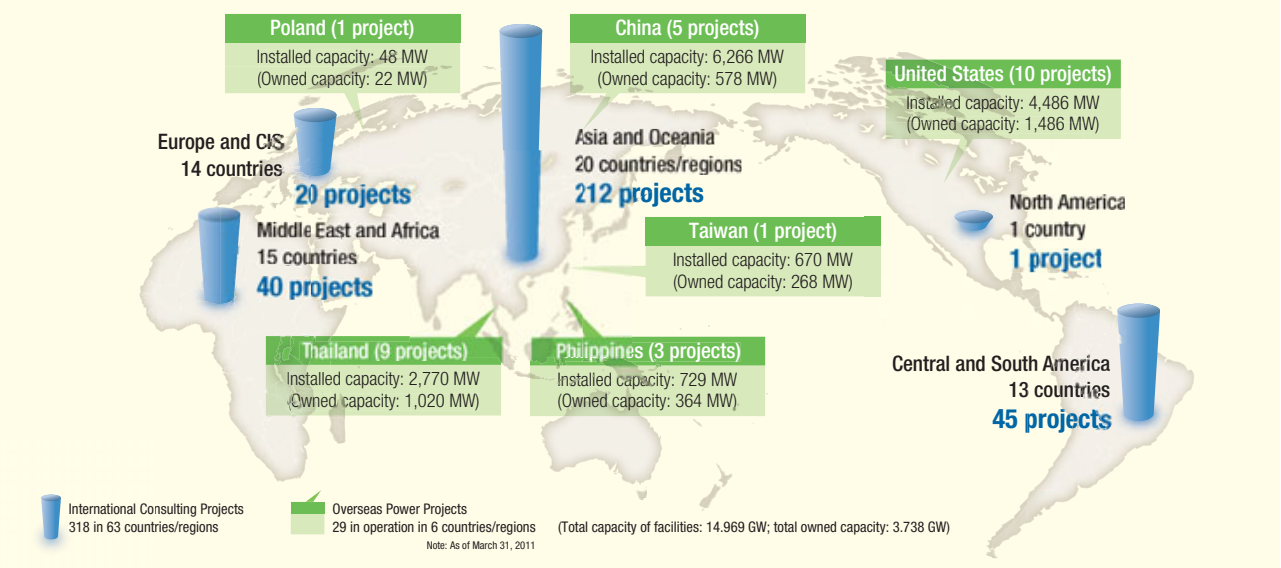
References

*1 High chrome ferrite heat-resistant steel
Steel with the chrome content increased to make it capable of withstanding the high temperatures and high pressures found in ultra-supercritical (USC) and other such technology.

Overseas Operations

J-POWER Group's corporate philosophy calls on us "to play our part for the sustainable development of Japan and the rest of the world." Taking this as our basic approach, and leveraging the accomplishments and know-how we have acquired through some 50 years of overseas operations, we are engaging in international consulting projects, which involve technical cooperation to develop power sources and protect the environment, and in overseas power generation projects, which involve our participation in businesses in which we invest capital and technology. As of the end of March 2011, we had 29 overseas power generation projects in six countries/regions operating electric power facilities with a capacity of approximately 3.74 GW (owned capacity), making this the second pillar of J-POWER Group management.

International Consulting Projects and Overseas Power Generation Projects



International Consulting Projects around the World

J-POWER Technology Earns Trust Overseas

J-POWER Group's overseas operations began with our entry into the field of international technology cooperation, which was prompted by revisions to Japan's Electric Power Development Promotion Law in 1960. All along, we have used the technology and trust developed in Japan to support sustainable development. Starting with the Tacna Hydropower Project in Peru in 1962, our track record in international consulting projects stands at 318 total projects in 63 countries/regions as of the end of March 2011.

For many years and in countries around the world, our international consulting projects have drawn on our technologies and experience in hydropower and thermal power to assess environmental impacts, transfer technology for removing sulfur and nitrogen during coal-fired power generation, and plan, design and supervise the construction of hydropower stations.

Recent projects we have undertaken in new markets and fields include the Java-Sumatra interconnection transmission line project in Indonesia and the Preparing Hydropower Development for Energy Crisis Project in Nepal. In addition, we implemented a project supporting the formulation of a Master Plan for Hydropower Development in Uganda, Africa on a contract for the Japan International Cooperation Agency (JICA) in FY 2010.

These international consulting projects will help our host countries develop a stable supply of energy into the future and reduce environmental burdens by first surveying socioeconomic conditions and energy consumption and demand trends in the countries and then transferring technology from our experience and knowledge through individual projects.

Field visit by trainees from other countries
(Ishikawa Coal Thermal Power Station in Okinawa Prefecture)

Son La Hydroelectric Power Station (Vietnam)

Overseas Consulting Projects Contracted in FY 2010 (New Projects)

Country/region	Type	Project Name	Project Overview or Description of Operation
Indonesia	Power transmission	Java - Sumatra Interconnection Transmission Line Project	Transmit 500 kV power over 233 km of AC power transmission line, 630 km of DC power transmission line, and 35 km of DC submarine cable in order to transmit 3 GW to the island of Java from the 3.6 GW at three locations of thermal power stations being planned as independent power producers (IPP) in the south of the island of Sumatra.
Latin America Caribbean Region	Energy conservation	JICA Training Course for the Improvement of Energy Efficiency Policies for the Promotion of Co-financing with the IDB in Central America and the Caribbean Region	Implement training for the purpose of providing an understanding of Japan's energy conservation policy and measures, clarifying the policies and measures that will be needed in the Latin America and Caribbean (LAC) region in the future, and form the starting points for studying coordination and cooperation with the JICA and the IDB. In light of the results, study and make recommendations regarding the desired modality of coordination and cooperation, with a focus on co-financing.
Nepal	Hydropower	Preparing Hydropower Development for Energy Crisis	A plan meant to deal with this country's serious electric power shortage by constructing a hydropower station with 127 MW capacity on the Seti River near Pokhara City, west of Kathmandu.
India	Thermal	Pre-primary Study of Efficiency and Environmental Improvement of Coal-fired Power Stations, Wanakbori Unit #1, GSECL	To ascertain the facilities and operating conditions of No. 1 Unit of the Wanakbori Power Station (1.47 GW) in Gujarat State, to assess the station's energy conservation, environmental, and operation and maintenance (O&M) state, and to formulate suggestions for improvement.
Taiwan	Thermal	Feasibility Study for Existing Taiwan Coal Fired Power Plant	Renewal of No. 1 and 2 Units (each 500 MW) and No. 3 and 4 Units (each 550 MW) of Hsing-ta Coal-Fired Power Station, located approximately 30 km north-northeast of Kaohsiung.

An Active Part in Overseas Power Generation

Building a "Second Pillar" of Management

Thailand

Thailand has allowed private capitalization in the power generating sector since 1992 as it seeks to diversify its electricity business. Starting in 2000, J-POWER Group has been working with independent power producers (IPPs) in Thailand to keep up with the power demand in that country, which continues to grow from both industry and citizens. By taking part in numerous IPP and SPP projects, we are improving the electric power situation in Thailand and promoting its economic development with both funding and technology.

Particularly, the Kaeng Khoi 2 Power Station, which began commercial operation in Thailand in 2008, is helping to provide a continuous, stable supply of electric power as one of the most important electricity providers in the country. In addition to the conventional electricity business, we are also developing and promoting biomass power generation, for instance at the Roi-Et Biomass Power Station, in Northeast Thailand, which uses rice chaff as fuel. This is contributing to the effective use of untapped resources and reduction of CO_2 emissions.

We are currently developing IPPs in two locations and SPPs[*1] in seven locations.

Roi-Et Biomass Power Station (Thailand)

U.S.A.

J-POWER Group has been wholeheartedly pursuing business in the US since we set up a local affiliate in 2005. We currently have 10 power stations in the country with owned capacity of about 1.49 GW, accounting for some 40% of our power generation business outside Japan.

Although most of our overseas power generating business has been in the high-growth region of Asia, the US offers features different from the Asian market, such as the relatively advanced state of its electricity business system, the universality of its currency, and the maturity of its generating assets sales markets. Having business in the US as part of our portfolio is significant also for our business pursuits in Asia.

Also, being relatively unknown in the US at the time of our market entry there made it more of a struggle for J-POWER Group than in Asia. In the process, we had to work hard to gain access to many projects, build networks with other enterprises and bring talent on board, but these efforts have paid off well.

Recently, we finished our first construction project, the Orange Grove Power Station in California, a state with very stringent environmental protection rules. We successfully brought this power station into operation, and it has been a valuable experience for us. We will use this asset to conduct our next project in a sustained initiative to provide a stable supply of electric power in the US.

Orange Grove Power Station (U.S.A)

China

With its rapid economic development, China has brought some 60 - 100 GW of new power sources online every year since 2002, and most of this has come from coal-fired power stations. Most of the conventional thermal power stations, however, have been of small scale, so they had low power generating efficiency and were unsatisfactory in terms of environmental protection. The Chinese government has adopted a policy of building larger power stations and reducing the number of small ones in order to improve this situation by increasing the efficiency of power generation and lowering its environmental impact on the country as a whole.

J-POWER Group has done consulting projects in China for over 30 years and is also a partner in power generating projects. Using our track record and advanced power generating technology, we are currently involved in the development and operation of many power stations.

In the area of coal-fired thermal power, the Tianshi Power Station makes effective use of low-grade coal, and 10 stations are in stable operation under the Gemeng International Energy Co., Ltd. In the area of renewable energy, the Shuhe Hydropower Station in the Han River Basin has begun operation of all units.

Because some environmental problems have no borders, J-POWER Group will continue to spread its technology to contribute to sustainable development.

Tianshi Power Station (China)

Asia

In the Asia region, J-POWER Group is undertaking overseas power generating projects in the Philippines, Taiwan, and other areas in addition to Thailand and China.

The CBK Project in the Philippines is J-POWER Group's first hydropower IPP project, and it consists of three facilities: the Caliraya and Botocan ordinary hydropower stations and the Kalayaan pumped-storage hydropower station. As well as being an investor in this project, the Group is also in charge of operations and maintenance. As such, we provide the local engineering staff with guidance and endeavor to maintain stable operation. As the Philippines' only pumped-storage power station, Kalayaan in particular helps adjust supply to demand fluctuations and plays a big role in stabilizing the power system.

Chiahui Power of Taiwan is a high-efficiency gas-turbine combined-cycle power generation project we are undertaking jointly with Asia Cement Corporation of Taiwan. In this project J-POWER Group helped to build the station and gave technical support during its early operation, and since then we have continued to post staff locally. Through our active engagement for the company's sound management and stable operation, we are contributing to the stable supply of electric power in Taiwan.

CBK Power's Kalayaan Pumped-Storage Hydropower Station (Philippines)

References

*1 SPP (Small Power Producers)
A system that guarantees purchases of power from small-scale power producers; it promotes the introduction of cogeneration and other energy-efficient equipment.

Social Responsibilities

Part 2

Enhancing Communication

J-POWER Group is supported by a wide range of stakeholders. In order to continue earning the trust of stakeholders, we will continue conducting business activities rooted in sincerity and striving to enhance communication.

Harmony between J-POWER Group and Society

J-POWER Group Approach to Social Contribution Activities

"We pursue harmony with the environment, and thrive in the trust of communities where we live and work. We regard profits as the source of our growth, and share the fruits with the society." Under this corporate philosophy, J-POWER Group has long engaged in social contribution activities as a member of society to help society develop soundly and sustainably.

Our activities largely fall into two categories: **community involvement** and **harmonizing energy supply with the environment**. We place high value on open communication with local community members and people working to harmonize energy supply with the environment and on sharing knowledge and learning with one another. We will steadily engage in activities on this basis as well as support the volunteer activities of our employees.

Community Involvement

J-POWER Group's activities are supported by the communities where our power stations and other facilities are located. Every employee is committed to being a good resident in these local communities. In addition, our business sites and offices strive to be good corporate citizens that benefit communities and society as a whole. We will strive to exist harmoniously with local communities and grow together with society through activities that are accepted and trusted by local residents.

Provided Land for a Heliport and Weed Clearing (Nagasaki Prefecture)

At the request of local communities, the Matsushima Thermal Power Station provided the Yoshihara Playing Field located on its property on Matsushima Island in Oseto Town, Saikai City, Nagasaki Prefecture, for use as a heliport by the air ambulance starting in 2007. Twice a year, in summer and winter, the local residents on Matsushima Island join with us in clearing weeds from the area. In FY 2010, this was done on January 23.

Since Matsushima is an island at some distance off the coast, this facility is an extremely effective use of the land for those of us who are employees working there as well as for residents of the island. People apparently feel a great sense of security knowing their lives will be saved if they go to that facility. By working side by side with the people of Matsushima on clearing weeds, we are broadening and strengthening our ties with local communities.

Work on clearing weeds
(Matsushima Thermal Power Station, Nagasaki Prefecture)

Youth Soccer Tournament (Hyogo Prefecture)

The Takasago Thermal Power Station in Takasago City, Hyogo Prefecture, organized the J-POWER Cup youth soccer tournament, which was held at that power station on March 5, 2011.

The tournament started in 2002, and this year is its tenth. Participating teams at present come from local communities in Takasago and Kakogawa, of course, and some from as far away as Toyooka City. The tournament is run jointly with the participants' parents and guardians and local soccer teams. For sixth graders, in particular, it seems that taking part in these games is a real goal because this is their last tournament before graduating from elementary school. This year, again, the competitors are displaying the kind of playing appropriate for the tournament's objective of fostering consideration for others, a feeling of gratitude, and a sense of camaraderie through soccer. In addition to improving their technique, the point is to help the players grow up into people who are rich in spirit. We intend to continue with these games in the future as a familiar, friendly activity for local communities.

In the heat of the competition
(Takasago Thermal Power Station, Hyogo Prefecture)

Sakuramichi Nature Run (Gifu Prefecture)

The Sakuramichi International Nature Run was held on April 17, 2010, over a 250-km course linking Nagoya City and Kanazawa City. J-POWER's Miboro Power Administration Office cooperated by supplying volunteer staff to operate an aid station. This athletic event was started in 1994, inspired by the anecdote of the late Ryoji Sato, who heard about the Shokawa Sakura and was moved to declare that he wanted to connect the Pacific

Scene inside the aid station
(Miboro Power Administration Office, Gifu Prefecture)

and Japan Sea coasts with a corridor of cherry trees. The Miboro Power Administration Office has cooperated with this event since the first one. On the day of the event, people make a chain of goodwill stretching along the line of cherry trees from the Pacific Ocean to the Japan Sea.

● Shokawa Sakura
http://www.sakura.jpower.co.jp/ (Japanese only)

Iizumi Shrine Festival (Ehime Prefecture)

The festival of Iizumi Shrine, located in Saijo City, Ehime Prefecture, took place over the two days of October 16-17, 2010. Every J-POWER Group unit in the Saijo District cooperated with the conduct of the festival. On the day before the festival, our Group employees and family members conducted a preliminary grass clearing and clean-up of the festival site. This festival involves 100 or more men and women, young and old, carrying 11 gorgeous floats called taiko drum platforms throughout the city. On the day of the festival, we offered the float carriers our company grounds for a rest stop, and our employees cooperated further by providing festival participants with tea breaks and toilet facilities.

Taiko drum platforms on a rest stop
(J-POWER Saijo District, Ehime Prefecture)

Harmonizing Energy Supply with the Environment

In order for people to lead enriching lives, both energy, which supports enriching lives, and a better environment are needed. Leveraging environmental knowledge acquired through our business activities to date, we partner with people seeking to harmonize energy supply with the environment and conduct activities to raise awareness and develop technologies for energy and the environment in an effort to facilitate the sustainable development of Japan and the rest of the world.

Releasing Young Salmon into the River (Hokkaido)

Citizens held a gathering to release young salmon into the Ikushunbetsu River in Iwamizawa City, Hokkaido, on April 13, 2010. This event was started in 1992 as an expression of regional concern for beautification of the river and the desire to leave a bountiful environment for the next generation. J-POWER cooperated with the event by regulating the flow of water at the Katsurazawa Power Station so that the release could take place reliably and safely. On the day of the event, approximately 14,900 young salmon were released. These young salmon had been supplied to educational and other institutions at 53 locations in the city where children raised them for some three months. The children who took part in the release could be heard calling out to the young salmon to come back to their home river.

Come back here to this river again!
(Katsurazawa Power Station, Hokkaido)

One-day Power Station Open House (Hiroshima Prefecture)

The Takehara Thermal Power Station located in Takehara City, Hiroshima Prefecture, held its 17th power station open house, called Fureai Up Takehara, on May 23, 2010. The day turned out rainy, and participants were half the number of usual years, but there were still more than 1,700 local residents visiting on that day. Station personnel organized power station tours through the No. 3 main building and releases of young red sea bream and flounder using thermal water discharge were greatly enjoyed not only by the children but by adults, as well. The event also included performances by the brass band from the local Takehara Junior High School, display of patrol cars and fire trucks by the Takehara police and fire departments, and sales of homemade cookies by welfare organizations. With presentations by members of the community included in this way, the open house has taken root as an enjoyable event carried on by J-POWER and the people of the area together.

Scene of the open house day event (Takehara Thermal Power Station, Hiroshima Prefecture)

Electricity Class (Okayama Prefecture)

The West Transmission Line Maintenance Center located in Kurashiki City, Okayama Prefecture, held an electricity class for fourth-graders at the local Honjo Elementary School on July 29, 2010. The children learned about electricity by making “fruit batteries” with lemons, conducting storage battery experiments using the superabsorbent resin in disposable diapers, and other such activities. After their experiments, the children boarded a bus and crossed the Seto-Ohashi Bridge to go tour the J-POWER underground electric power line facility. One of the teachers in charge remarked, “I feel that the children came to understand how essential electricity is in our lives, and how so many people are making it possible for us to have electricity.” This is just a modest activity, but we will be very happy if the participating children feel even slightly more familiar with science and use electricity with care.

Giving advice that children find it easy to understand
(West Transmission Line Maintenance Center, Okayama Prefecture)

Broadening Reach of the Experiential Learning Project for Ecology and Energy

The Experiential Learning Project for Ecology and Energy is a social contribution activity that J-POWER Group is engaging in with the aim of "Harmonizing Energy Supply with the Environment." People's lives are enriched by energy and the natural environment. In order to achieve a society of sustainable growth that makes effective use of limited energy resources and the bounties of nature, we must cultivate the technology and the state of mind that treats both energy and the natural environment with care as "connections" rather than as antagonistic entities.

The company works with people who are aiming for a sustainable society to organize the "Ecology and Energy Experiential Learning Tour" and the "Ecology and Energy Café." Now, six years since this project began, it is showing signs of a broadening reach.

Ecology and Energy Experiential Learning Tour

This is an experiential study tour conducted with the cooperation of specialists in environmental education. Participants experience a power station and nature using all their senses, and enjoy themselves together while learning about the connections between the natural environment and the energy that supports people's lives. Study of the possibility of such tours started in 2005, and the tours themselves began in 2007 with the Okutadami version for elementary school students and their parents. We have also started university student tours with content geared to students at that level. We subsequently expanded the locations to include Shirakawa Village in Gifu Prefecture with the Miboro Tour starting in 2010.

Every tour has been very well received by the participants, whose typical comments include, "It was fun!" and "I would like to take the tour again if I have the opportunity."

Parents and children on a tour in the power station grounds (Miboro Power Station, Gifu Prefecture)

http://www.jpower.co.jp/ecoene/index.html (Japanese only)

Ecology and Energy Café

This is a new forum for learning where topics suggested by guests are used to stimulate relaxed and earnest thinking about ecology and energy as things that are concerned with themselves. We started this café in 2009 in response to the request of university students who had taken part in past tours and said they wanted to learn more about ecology and energy. At the café, people learn from each other by talking together, and become aware of connections between ecology and energy and people's lives, deepening their knowledge. There is a focus on university students who have taken the Ecology and Energy Experiential Learning Tour, but employees of J-POWER Group and members of the public at large are welcomed.

Participants converse while writing down everyone's opinions
(Public Relation Office, Secretarial Affairs and Public Relation Department, Tokyo)

Voice Comments from Participants

Good to Have More People Who Are Fans of J-POWER and of Shirakawa Village

When the Miboro Dam was built, my grandfather moved downstream and started a Japanese-style inn. Our relationship with J-POWER has continued since that time. J-POWER has been a great help, the way they have taken part in the local Shirakawa Village Doburoku Festival and our Athletics Festivals and other events of that kind. Now I have been very impressed to see how happy and excited the children were when taking part in this tour. I was also very moved by the program that helped me learn about the links between the forests and water and electricity in our local natural setting. I hope you will go on holding these tours for a long time and increase the number of people who are fans of J-POWER and of Shirakawa Village.

Mr. Kusakabe operates a local inn

Voice Comments from Participants

Thinking about Ecology and Energy in Terms of Familiar Things

The person who handled the Ecology and Energy Experiential Learning Tour I took recommended the Ecology and Energy Café to me, and that's why I took part. This wasn't my first time to experience a world café-type format, but it was very stimulating to be able to interact with so many regular adult members of society.

It's easy to talk about big things, but I think that actually doing them is no simple matter. When I look back at my life up to now, I feel that I would like to take some kind of action about ecology and energy in a way that is familiar and close at hand. What we can do as individuals is small, but I think that if many people carry out something small, then it can be a source of great strength.

Mr. Shigeno, participant in the university student tour and the café

Photo: Mr. Seiichi Kodama

Overseas Operations

Environmentally Considerate Power Station Construction

Tianshi Thermal Power Station, Shanxi Province, China

The Tianshi Thermal Power Station in Shanxi Province, China, is a waste coal-fired thermal power station established as a joint venture by J-POWER and Chinese partners. The Tianshi Thermal Power Station is sited in a coke[*1]-producing region. Illegal dumping of coal waste[*2] given off by coke production there had caused local environmental conditions to deteriorate, which had become a problem for the region. J-POWER made the decision to participate in this project in part because the power station would make effective use of low-grade coal and coal waste as fuel.

The power station was established as a comprehensive utilization-type power generation project designed to conserve and effectively use resources in an environmentally considerate manner. The first power station of its kind in China involving foreign capital, the power station has been operating smoothly since it went online in May 2001.

Support for Elementary Schools in Areas Neighboring the Tianshi Thermal Power Station

We are working to provide a stable supply of electric power by means of the above project. At the same time, we have repeatedly studied the possibilities for making some kind of contribution to society in the region where the power station is located.

Like Japan, China has established an official "Children's Day," which falls on June 1 of each year. There are four towns in the vicinity of the Tianshi Thermal Power Station and they each have elementary schools. To help celebrate Children's Day, every year since FY 2005 the Tianshi Thermal Power Station has invited children from one of the local schools to the facility for a tour, Q&A and other activities. The power station is also donating stationery items to the other elementary schools in the village. The power station's entryway features drawings of the facility made by the children, which is a great source of enjoyment. We intend to continue pursuing this kind of positive activity in the future, as well, and will work to make a contribution to neighboring areas.

Local elementary school students taking a power station tour

Fostering the Next Generation

Implementing Internships

Three companies of J-POWER Group (J-POWER, JPHYTEC Co., Ltd., and JPec Co., Ltd.) are offering summer internships for science students in graduate school, university, or technical college. The internships provide experience in part of the operations at power stations and other facilities where J-POWER makes its contribution to the stable supply of electricity in Japan. The purpose is to help the interns confirm the results of their learning, stimulate their motivation to learn, and assist them in making future occupation choices. In FY 2010, 35 interns from all areas of Japan took up the challenge of practical training in the maintenance and operation of electric power facilities.

University students accompanying a safety patrol of the facility

Communication with Society

The ISOGO Energy Plaza

The ISOGO Energy Plaza is our Public Relations Building that was opened in August 2010 to help realize harmony with local communities. It is a place where you can learn the details of the system at the Isogo Thermal Power Station, which rises to the world's highest level of power generating efficiency and environmental performance for coal-fired thermal power. Specifically, the exhibits on the first floor of this Public Relations Building are a complete 1/100-scale model of a power station, as well as models and images of every electric power facility. On the second story of the building is the Hamakaze Plaza, a rooftop greening facility. Everyone from the region is welcome to visit the Public Relations Building freely, and to wander through it.

ISOGO Energy Plaza
(Public Relations Building, Kanagawa Prefecture)

- Open Hours: Public Relations Building 10:00-16:30
  Hamakaze Plaza 09:00-16:30
- Closed: Tuesdays, New Years

Tools for Communicating with Society

In addition to publicizing environmental protection measures we take, J-POWER Group also communicates a range of information by means of public relations activities. We use various kinds of pamphlets, public relations videos, television commercials, newspaper advertisements, and other such means to inform everyone in easily understandable terms about harmonizing energy and the environment.

- J-POWER Website

We have set up a contact point to receive inquiries by e-mail and telephone, and we are working to realize two-way communication with all interested parties.

- Corporate Brochure

An overview of J-POWER's overall business activities.

- J-POWER Navi-Map

J-POWER businesses and initiatives are presented in map form to make them understandable at a glance.

- J-POWER Card

J-POWER initiatives and related matters are presented for children.

References

*1 Coke
A greyish-black, porous solid formed when coal is dried by distillation at high temperatures to remove the volatile portions.

*2 Coal waste
The debris and poor-quality coal remaining at coal mines after the coal has been selected out.

Promoting Business Activities

J-POWER Group works to earn the trust of shareholders, investors, and business partners by promoting its business activities, which are rooted in sincerity. We are also working to deepen trust by facilitating understanding of our activities and seeking views and opinions on them through enhanced communication.

Communicating with Shareholders and Investors

J-POWER Group conducts timely disclosure of corporate information as well as a range of activities to deepen understanding of our business operations, reflecting the importance we place on communicating with shareholders and investors.

Communicating with Institutional Investors

For institutional investors, we hold briefings on management plans and financial results, actively hold meetings as the need arises, and work to provide opportunities for direct dialogue with management and other company members. In addition, we provide an annual report and other investor relations tools of various kinds, and make information available on our website in order to convey messages from management and other detailed information.

Communicating with Individual Investors

For individual investors, we hold corporate presentations, publish a corporate newsletter aimed at individual investors, provide information via our website and make efforts to enhance disclosure. A section called “Communicating with Individual Investors” has been added to the J-POWER website, creating an environment that allows individual investors easy access to the information they want.

Briefing for individual investors

Communicating with Individual Shareholders

For individual shareholders, we issue a biannual shareholder newsletter (“Kabunushi Tsushin”) to further shareholder understanding of our business activities. We also conduct regular questionnaire surveys and constantly work to improve our communication based on the responses we receive. We also offer an information service called the J-POWER Club that sends pamphlets and other such materials and distributes e-mail newsletters on a membership basis.

Toward Further Improved Communication

We intend to continue enhancing communication with shareholders and investors.

IR Tools

We provide information to shareholders and investors using our website and a variety of other investor relations tools.

- **Annual Report**

- **Shareholder Newsletter**

- **Fact Book**

- **Notice of “J-POWER Club” opening for applications**

Tour of Power Station

We conduct tours of power stations around the country several times a year to help institutional investors and shareholders become more familiar with J-POWER Group and deepen their understanding. We intend to continue allowing as many visitors as possible to view both our hydropower stations and our thermal power stations.

Tour of Power Station (Isogo Thermal Power Station, Kanagawa Prefecture)

Committed to Business Partners

The business activities of J-POWER Group are supported by a large number of business partners. Rooted in good relations with business partners, we will play our part for the sustainable development of Japan and the rest of the world.

Reduce Greenhouse Gases with Low-Temperature Sewage Sludge Carbonization Technology (See Page 58)

J-POWER Group is acting jointly with the Tsukishima Kikai Group to promote a recycling business that converts sewage sludge into fuel. This uses technology for low-temperature carbonization of sewage sludge to manufacture fuel in an end-to-end system for facility design, implementation, maintenance management, operation, marketing of manufactured fuel, and co-combustion at coal-fired power stations. The Tsukishima Kikai Group has a lengthy track record in the field of sewage waste treatment, and it has been engaged in this business jointly from the research and development of the core technology, which is the low-temperature sewage sludge carbonization technology. Work has proceeded on commercialization of fuel from the Hiroshima City-Seibu Water Resources Center (50 tons of dewatered sludge per day each from two systems), the Osaka City-Hirano Sewage Treatment Plant (150 tons of dewatered sludge per day), and the Kumamoto City-Nambu Purification Center (50 tons of dewatered sludge per day). We anticipate greenhouse gas reductions of approximately 13,100 t-CO_2/year at sewage treatment plants and approximately 19,800 t-CO_2/year at coal-fired power stations. We will continue this joint work to expand and disseminate this approach.

Sewage sludge fuel conversion facility under construction
(Hiroshima City-Seibu Water Resources Center)

Voice Comments from Business Partners

Aiming for Dissemination and Expansion of Recycling Systems with Long-Term Stability

Low-temperature sewage sludge carbonization is a technology that we have jointly developed from the start with the end user of the manufactured fuel, J-POWER. The two of us have united in handling the project from development, through proposals to customers, up to commercialization. There were some painful times, too, when we argued heatedly, but we were both able to get through with our enthusiasm, and I feel very strongly that our enthusiasm is what enabled us to obtain the three contracts we have made so far. We will not stop there. As the leader in the business of waste conversion to fuel, we are committed to working on further improvements and making every possible effort with J-POWER to spread and expand our business.

Mr. Hiroyuki Yokomaku
Leader, Thermal Technology Group 2
Solution Technology Department
Tsukishima Kikai Co., Ltd

Measures for Rigorous Compliance with the Waste Management and Public Cleansing Act

J-POWER Group has taken measures for rigorous compliance with the Waste Management and Public Cleansing Act. We have sought the cooperation of the AMITA Institute for Sustainable Economies in assessing our waste material risk and implementing training to upgrade our skills in waste matter disposal.

For the waste material risk assessment, we make the rounds of local units and check documents relating to waste disposal contracts, check the status of manifest management, and make on-site checks of waste storage locations and other such places. By the end of FY 2010, we had conducted risk assessments at 26 local unit locations. The risk assessment results were distributed through the respective departments in charge at the J-POWER Head Office to the local units. We strive to share information.

Meanwhile, training to upgrade our skills in waste matter disposal was implemented to promote understanding of the Waste Management and Public Cleansing Act and to further optimize our waste disposal operations. This training centered on Fundamentals of the Waste Management and Public Cleansing Act, Waste Disposal Outsourcing Contracts, and Manifest Management. A cumulative total of 481 J-POWER Group employees had received training by the end of FY 2010.

Going forward, we will make every effort to continue conducting waste material risk assessments and training to upgrade our waste disposal operations skills so as to comply rigorously with the Waste Management and Public Cleansing Act and reduce our waste material risk.

Voice Comments from Business Partners

Toward Compliance with the Waste Management and Public Cleansing Act

For waste management, it is important not only to promote recycling, which is easy to present the case for externally, but also to ensure compliance with laws and regulations and to ensure the reliability of disposal contractors. Since these are behind-the-scenes matters, there are many enterprises that have inadequate measures in this area, and I respect J-POWER Group for its positive initiatives. We have actually been visiting all the business sites since 2006, checking on compliance with the Waste Management and Public Cleansing Act, organizing the waste disposal contractor checklist, the Waste Management and Public Cleansing Act Q&A lists, and other materials, and holding twice-yearly seminars. The Waste Management and Public Cleansing Act was amended this year, necessitating some further measures, but we hope that we will be allowed to support J-POWER Group's waste management in whatever ways we are able.

Mr. Masazumi Horiguchi
Director, Environmental Risk Advisory Office
AMITA Institute for Sustainable Economies

Developing Human Resources and Creating a Dynamic Workplace

J-POWER Group strives to provide safe, comfortable working environments for every one of our employees. We consider human resources to be valuable assets upholding our fundamental sustainability as a corporation. At the same time, we endeavor to create a corporate culture that respects the character and individuality of our employees and makes them feel it worthwhile to constantly take on new challenges.

J-POWER Group's Basic Philosophy on Human Resources

Building a Human Resources Foundation for Sustainable Group Growth

In order to support the sustainable growth of a corporation, it is necessary for all our employees to cultivate their individual skills and abilities and to generate new ideas in order to continue creating added value.

At J-POWER Group, we place the greatest importance on measures to secure and develop human resources as a way to strengthen the corporate foundation and seek sustainable growth. We are reinforcing the foundation for career development, with a focus on CDP[*1] programs, establishing workplace environments and systems that make advantageous use of diversity, and promoting work-life balance in order to improve individual skills and workforce productivity.

Developing Group Human Resources and Creating Dynamic Workplaces

Securing Human Resources

In order to grow continuously while harmonizing energy supply with the environment, J-POWER Group aims at stably recruiting new employees from various fields and age groups and creating opportunities that enable them to thrive.

With regard to personnel hiring and utilization, the J-POWER Compliance Code (see p. 82) stipulates respect for individuality and human rights and prohibits discrimination. We are also conducting awareness-raising on these matters in level-specific training and in human rights training conducted within each unit. (In FY 2010, a total of 67 employees underwent human rights training at our various units.)

We are currently creating systems and working environments that enable our diverse personnel to fully demonstrate their capabilities, without regard for gender, age or other such distinctions.

Employment of New Graduates (J-POWER)

	FY 2009	FY 2010	FY 2011
Men	60	75	69
Women	5	5	8
Total	65	80	77

Promoting the Employment of the Elderly

Under our system of continuing employment for workers who have reached retirement age, starting in FY 2010 we extended the employment cut-off period to age 65 as a way of further expanding our utilization of the elderly. In combination with the personnel registration system, which introduces job opportunities in the Group, we will harness the experience, technology, and motivation to work possessed by older people in the Group and make use of it for the sustained growth of our business. As of March 31, 2011, 320 employees had taken advantage of the continuing employment system and related programs.

Employing People with Disabilities

Our employment ratio for people with disabilities was 1.9% as of June 1, 2011, thereby exceeding the legal requirement. A "consultation desk to provide employment assistance and information on working environments to employees with disabilities" has been established, and we will continue to enhance working environments through such initiatives as making office buildings barrier-free and promoting greater understanding among all employees.

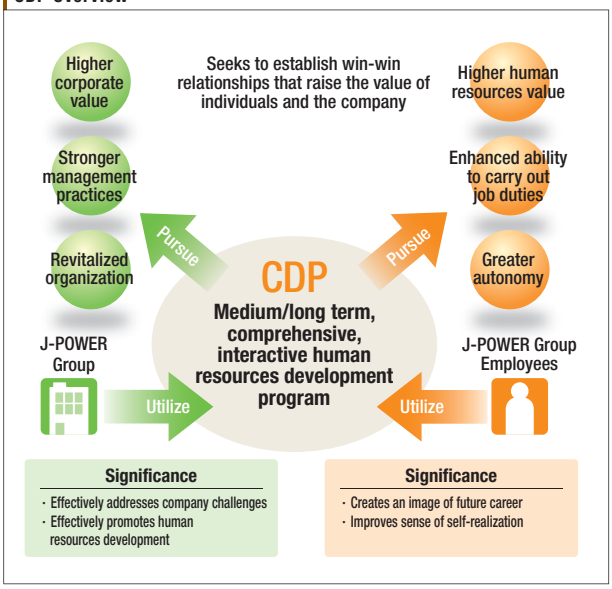
References

*1 CDP: Career Development Program
CDP refers to programs for developing human resources and specific skills through career development. CDP programs seek to effectively promote human resources development by combining skill development based on knowledge and experience accumulated in performing daily work activities (on-the-job training) and skill development based on training (including self-study) that takes place away from daily activities (off-the-job training).

Human Resources Development

J-POWER Group aims to develop all of its employees into independent, highly talented personnel (professional human resources) who refine a multiplicity of specialized skills and knowledge so as to contribute to achievement of organizational objectives from a broad perspective. We have adopted CDP as an education and training program that is effective for that purpose. The program provides management with specific guidelines for fostering personnel. It provides employees with an interactive development tool that helps them think about their own career trajectories and take the initiative in developing their abilities and raising their value to the company. We encourage employees to make active use of the program.

CDP Overview



Human Resources Development Programs

J-POWER Group believes in the importance of using work itself, particularly on-the-job training, to enable employees to improve their job performance and facilitate their growth. At the same time, as the scope of our business activities has expanded, we have established programs to systematically train personnel through a well-designed plan so that their abilities are fully utilized.

Evaluation and Assessment System

J-POWER Group established an evaluation system in 2004 that is based upon a goal management system. Through initiatives aimed at achievement of specific goals, the system encourages every employee to perform work autonomously, heighten his or her achievement motivation, and improve his or her work performance. We also seek to realize our organizational strategies by having employees engage in mutual collaborative action that is based upon organizational goals.

Various Training Programs

We implement a variety of training programs as off-JT (off-job training)[*1] at J-POWER Group. There are level-specific training courses designed to provide employees with business knowledge and management skills matched to their qualifications and age. We also provide career training for employees to review their careers to date and consider their next career. We also conduct objective-specific training for acquisition of a wide range of business skills as well as divisional training for enhancement and specialization of knowledge and skills required by the particular division.

We have established technical training facilities in Chigasaki, Kanagawa Prefecture for civil and architectural engineering divisions; Kawagoe, Saitama Prefecture for hydropower, transmission, and telecommunications divisions; and Kitakyushu, Fukuoka Prefecture for thermal power divisions. We systematically conduct training for engineers in technical divisions at these facilities. Level-specific training is held at the Human Resources Development Center in Tokyo's Chuo Ward. Our efforts are aimed at fostering personnel in line with our career development programs (CDP).

Track Record in Level-Specific Training, Career Training and Objective-Specific Training (J-POWER)

	FY 2008	FY 2009	FY 2010
Level-Specific Training	193	180	122
Career Training	162	176	153
Objective-Specific Training	185	202	188
Total	540	558	463

Training for new Thermal Power Division employees

Combined business leader training

Helping Employees Voluntarily Develop Their Careers and Abilities

J-POWER introduced a self-assessment system for employees to convey their career intentions to the company once a year and discuss them with their immediate superiors. The system was introduced to facilitate career-related discussions between employees and management. We also have a voluntary training incentive program and an academic training program that provide financial assistance to employees who attend foreign language classes or business school or take a correspondence course after work or on weekends. These programs are aimed at helping employees develop their abilities on their own initiative.

Participation in the Voluntary Training Incentive Program (J-POWER)

	FY 2008	FY 2009	FY 2010
School attendance	76	66	58
Correspondence	78	75	63

References

*1 Off-JT
This is the abbreviation for Off-the-Job Training. It is a method of developing capabilities by having employees engage in study away from the workplace so they will acquire knowledge and skills.

Improving the Workplace to Achieve Invigoration

Toward Realization of a Work-Life Balance

J-POWER Group believes that a better work-life balance can help ensure labor productivity and lead to improved efficiency. We are actively developing working environments and cultures that enable every employee to autonomously enhance their work and personal life and focus on highly creative work.

Creating Time

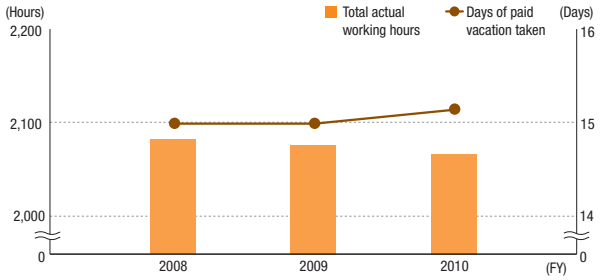
Appropriate working hours has been established as a common goal for all units in order to properly manage hours and improve employee productivity.

The company is promoting activities such as introducing case studies of initiatives taken by various units, holding workshops, and so on. We are also increasing the number of days when everyone leaves work together, along with other such measures to encourage leaving work at a fixed time, and inviting outside instructors to give lectures on work-life balance.

Campaign to Encourage Employees to Take Continuous Days of Leave

J-POWER Group is taking steps toward a reduction in the annual total hours actually worked. We are carrying on campaigns to encourage employees to take more continuous days of leave, for instance by displaying messages on the duty roster system and on the screen of the in-house portal site during the summer and winter seasons, when the rate of people taking leave is higher.

Change in Total Actual Working Hours and Paid Vacation Taken (J-POWER)



Improving the Workplace Environment to Help Employees Work in Diverse Ways

J-POWER has established a wide range of options in work and leave programs so that employees will be able to demonstrate their abilities fully in accordance with their life circumstances.

We are improving our balance support system that provides for a healthy work-life balance by granting leave, arranging shorter working hours, or taking other such measures, in particular for employees who are involved in child-rearing or caring for elderly family members.

We are also developing a framework to support employee engagement in a wide range of activities by a leave system and other measures to allow voluntary participation in local exchange activities, volunteer programs, and the like.

Overview of the Balance Support System for Realization of Work-Life Balance

Main Revisions to Balance Support System in FY 2011

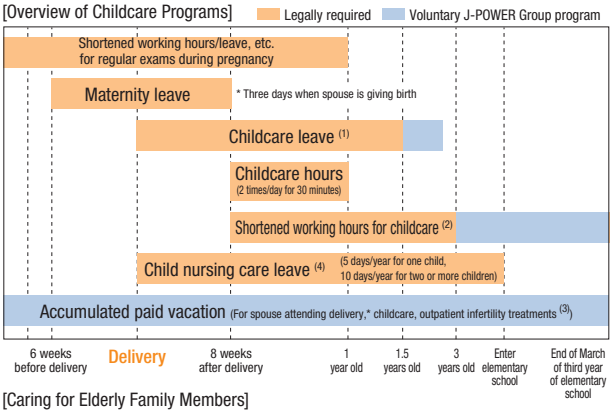
Childcare leave (1)
- Extend to end of April of year following fiscal year containing the day on which the age of two full years is reached
- Make first two weeks paid

Working hours shortened for childcare (2)
- Extend to end of March of third year of elementary school

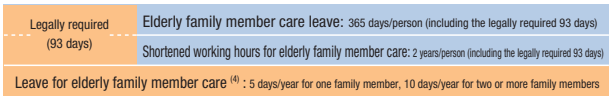
Accumulated paid vacation (3)
- Added outpatient visits for infertility treatment to conditions of use

Nursing and elder care leave (4)
- Enable leave in half-day units in addition to full-day units

[Overview of Childcare Programs]



[Caring for Elderly Family Members]



COLUMN

Acquired Kurumin mark certification

J-POWER has achieved all the objectives defined in the General Employers Action Plan based on the Act for Measures to Support the Development of the Next Generation. In FY 2010, therefore, we were certified by the Tokyo Labor Bureau as an enterprise that actively engages the provisions of the above law, and we were authorized to display the Kurumin certification mark.

We received this certification in recognition of the various measures we had implemented in our first Action Plan (April 1, 2005 to March 31, 2010). These include increasing the convenience of our system of childcare leave and shortened working hours and related matters, reducing the number of overtime hours worked, encouraging employees to take annual paid leave, and providing a day to invite families to the workplace (Family Welcome Day, see page 42).

We went on to formulate the second Action Plan, and we are presently pursuing measures relating to the support of development of the next generation in line with this plan.

The Kurumin Mark

Specific Content of the Second Action Plan

Plan Period April 1, 2010-March 31, 2013

Objectives
1. Heighten the flexibility of childcare and other related systems and improve the workplace environment to make those systems easier to use.
2. Take measures to create time for promoting work-life balance.
3. Take steps for exchange with local communities and support the fostering of children and young people.

Voice Using the Childcare Vacation* System

* The Childcare Vacation system was integrated into the Childcare Leave system, which has similar arrangements. (FY 2011 revision)

I took childcare vacation when my second son was four months old. My oldest son was going to kindergarten, so my wife wasn't able to go make the customary stay with her own parents after this one was born, and I wanted to lighten the burden on her of housework and other things. That was why I took leave.

Spending all that time together, I got a real, direct feeling for how my children were growing day by day. I wasn't just helping take care of my youngest son. I was also able to spend time with my oldest son, so I feel that I have grown closer to him, as well. Sometimes spending all that time with a child taking care of him was exhausting because I had to stay alert, but I found that the more I took care of them, the more I felt my love for them welling up in me. That period of childcare and housework helped me come to grips with my commitment as a father.

I still have the habit now of lending a hand with the childcare and housework on my days off. On weekdays, too, I want to spend as much time as I can watching my boys grow, so that is good motivation to handle my work more efficiently in order to finish it and hurry home.

Kazuya Yokoi
Finance Office, Accounting and Finance Department
J-POWER

I took childcare vacation when my oldest daughter was nine months old. On weekdays I never had very much time to spend with my children, and it seemed as though I was leaving it all up to my wife for most of the day. So, in the hope of reducing the load on my wife and getting as much more time for communication with my child as I could, I used this leave system.

Although it was only for a short time, spending every day with my child gave me a better sense for knowing what they were trying to communicate with little actions and expressions. I could understand their feelings better, and I realized anew what an important presence the father is in child-rearing. My wife handled housework and childcare, and I handled my job and childcare. Both of us were able to balance the two things, and it was an opportunity to learn with certainty how that balance creates family ties as well as smiles.

I am grateful to my superiors and colleagues who created this system and this kind of environment.

Ryosuke Nakashima
Attached to Accounting and Finance Department
J-POWER

Moral Harassment Consultation Desk

A consultation desk has been established for employees to discuss working hours and the working environment as well as sexual harassment, power harassment, and other issues. We have also developed in-house regulations, manuals, and other such resources, and we have implemented education for increased awareness in level-specific training courses as measures to resolve problems as well as to prevent them.

We check into problems presented to the consultation desks for the prevention of sexual harassment with due consideration for protecting the consulter's privacy, and take steps toward resolution.

Our goal is a working environment where human rights and individuality are respected and where diverse personnel are completely at ease in going about their work.

Booklet on Preventing Harassment

Communicating with Employees

J-POWER Group communicates through an in-house portal website in order to reliably convey management information to each and every employee, and we also issue a monthly in-house periodical called J-POWERs. We are committed to providing our employees with appropriate information.

In FY 2010, we held Family Welcome Day as a communication event in which we gave tours of the J-POWER Head Office building to employee family members. We planned this event as a way to have the family members who support our employees gain a better understanding of the work that is done as well as of the workplace. We also planned it to gain a new recognition of the existence of the family.

We will communicate fully with the Worker's Union, building up a cooperative relationship, as we implement the policy of work-life balance.

Tour of the Head Office building

Voice By Means of Worker's Union Activities

My Worker's Union executive activities began in June 1999, and I have been involved in the annual spring offensive wage raise negotiations, labor-management consultations, safety and health affairs, promotion of work-life balance, promotion of equal rights for men and women, organizational administration, and so on. I held positions as the J-POWER Group Worker's Union Vice Chairman and JPec Worker's Union Executive Committee Chairman, and am presently continuing my activities as a Special Executive Committee Member of the J-POWER Group Worker's Union at the Organizational Bureau of the Federation of Electric Power Related Industry Workers' Unions of Japan. There are things that we cannot do by ourselves, and forming the workers' union organization gives us great strength so that we can, step by step, make our way toward a better working environment.

By means of various different workers' union activities, I have learned the importance of initiating action myself and the power of having encounters and connections with people. We should create many supporters for ourselves in people. If we do that, then it will naturally lead to action and generate power. Workers' union activities are where you can do this.

Kaoru Hatakeyama
Special Executive Committee Member
J-POWER Group Workers' Union

Safety and Health Management

J-POWER Group "always seeks to heighten safety consciousness in expediting work, and gives highest priority to assuring the safety of the public and of the workers." In addition, we aim for "creation of a safe, healthful workplace that provides job satisfaction as the foundation for business activities." We operate occupational safety and health management systems within the Group and promote overall safety management, thus working to prevent workplace accidents and maintain or improve employee health.

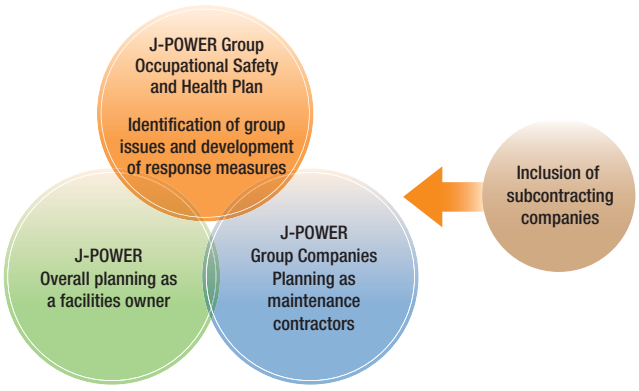
Drawing up Plans and Engaging in Activities Based on Mutual Cooperation

At J-POWER Group, common issues pertaining to the Group as a whole and approaches to addressing them are compiled into a "J-POWER Group plan for occupational safety and health." Based on this overall plan, each Group company formulates its own plan for occupational safety and health that takes into account its own positions and responsibilities, and each company promotes J-POWER Group activities for occupational safety and health.

In drawing up the Group plan, J-POWER checks to ensure that comprehensive safety and health management is being conducted appropriately from the perspective of facilities owners and outsourcers. At the same time, companies in J-POWER Group engage in safety and health management and activities autonomously from the perspective of implementing organizations with direct responsibility for maintenance and other such operations.

The majority of accidents in recent fiscal years have been workplace accidents involving contractors connected with construction and other work. In order to prevent occupational accidents, it is essential that our activities are unified and collaboration takes place with partner companies on the front lines. To this end, we work toward more vigorous communication between the workplaces and the people concerned, to include subcontractors, so that they will be permeated by safety consciousness. We also implement safety promotion councils, safety patrols, safety training, traffic safety workshops, and other safety activities, and with the cooperation of the parties involved, we are engaged in continuous efforts to prevent recurring workplace accidents and traffic accidents.

Operational Safety and Health Planning through Mutual Collaboration



J-POWER Group Safety and Health Initiatives

J-POWER Group has established the following priorities as common themes in safety and health activities.

1 Safety Priorities
(1) Enhance communication
(2) Prevent recurring workplace accidents
(3) Prevent traffic accidents resulting in injury or death and other commuting-related accidents

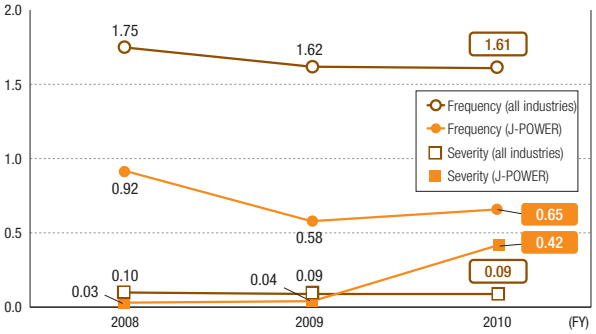
2 Health Issues
(1) Promote mental and physical health

Incidence of workplace accidents

	FY 2008	FY 2009	FY 2010
Deaths	0	1	1
Serious Injury	8	6	6
Minor Injury	9	5	6

* **Incidence of workplace accidents**: Accidents involving J-POWER employees and accidents involving contractors (principal contractors and subcontractors) doing construction and other work ordered by J-POWER

Accident Frequency* and Severity*



***Frequency**: Index of the frequency of accident occurrence. (Number of deaths or injuries caused by occupational accidents per one million working hours. Covers accidents causing loss of one day or more of work. Does not include accidents of employees on temporary transfer. This fiscal year, calculation changed from in-house method to Ministry of Health, Labor and Welfare published method. The effect is negligible.)

***Severity**: Index of accident severity. (Number of days of work lost per 1,000 working hours. Covers accidents causing loss of one day or more of work. Does not include accidents of employees on temporary transfer. This fiscal year, calculation changed from in-house method to Ministry of Health, Labor and Welfare published method. The effect is negligible.)

Maintaining the Health of Employees and Their Families

J-POWER Group conducts initiatives designed to help employees and their families maintain or improve their health. We encourage employees and their families to undergo health checkups, provide guidance in the area of health maintenance, and promote prevention of communicable diseases. We also place emphasis on measures to prevent mental health disorders and metabolic syndrome that can lead to lifestyle diseases, which have both become major social issues. Since FY 2008, we have conducted special institutionalized exams and health-related guidance as well as THP activities[*1] to promote physical and mental health.

THP activities put priority on physical health, mental health, and communication with Group employees and others. Every workplace provides guidance on health, nutrition, and exercise, fitness measurement, mental health care in the form of lectures and experiential counseling, and other related activities.

We also hold activities and events to promote communication and development of good exercise habits, including walking events.

Scene of THP exercise lecture, "Ball exercises utilizing breaks and other such times"

References

*1 THP Activities
Activities aimed at total health, both physical and mental, based on Ministry of Health, Labour and Welfare guidelines on Total Health Promotion Plans.

Motogoya Dam (Hokkaido Prefecture)

Environment

Environmental Management in J-POWER Group

J-POWER Group believes that energy production and the environment can coexist in harmony. In light of this corporate philosophy, our environmental management aims to promote greater environmental responsibility while enhancing the economic value of our operations in order to further contribute to the development of a sustainable society.

Environmental Management Vision

The J-POWER Group Environmental Management Vision is made up of a Basic Policy and an Environmental Action Program that defines specific tasks and goals and the means to achieve them. The Environmental Action Program brings together Corporate Targets, which define midterm targets for environmental initiatives, and Environmental Action Guidelines, which orient the initiatives to be implemented each fiscal year. J-POWER Group is working as a whole to realize environmental management in accordance with these targets and guidelines.

J-POWER Group Environmental Management Vision (Revised July 1, 2011)

Basic Policy

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, J-POWER Group will strive to bring together its expertise and its technologies in the utilization of a wide variety of energy sources, including fossil fuels, nuclear power, and renewable energies, to ensure the efficient and uninterrupted supply of the power essential to human life and economic activity.

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

Directing our most intensive efforts towards the provision of a stable energy supply, we will also steadily advance initiatives towards the realization of low-carbon technologies both domestically and internationally, and will contribute to the reduction of CO_2 emissions on a global scale.

To that end, we will work from mid- and long-term perspectives with technology as our central focus to realize a stable supply of energy and reduce CO_2 emissions domestically and internationally through measures including reducing CO_2 emissions from coal-fired power generation, conducting research and development of next-generation low-carbon technologies, and expanding CO_2-free power generation facilities. Our ultimate aim will be the achievement of zero emissions by means of measures including CO_2 capture and storage.

Efforts Relating to Local Environmental Issues

In addition to adopting measures to reduce the environmental impact of our operations, we will seek to operate in harmony with the local environments in which our facilities are located by working to save, recycle and reuse resources in order to limit the amount of waste that we produce.

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.

Action Program

Corporate Targets (Revised July 1, 2011)

1. Efforts Relating to Global Environmental Issues

[Item]

Reducing CO_2 Emissions from Power Generation and Promoting Technological Development

[Target]

As an electric utility, in addition to continuing to contribute to the Environmental Action Plan by the Japanese Electric Utility Industry, looking towards 2020 we are working to provide a stable supply of energy and reduce CO_2 emissions in Japan and overseas by promoting the following measures.

- Work to replace aging coal-fired facilities, such as Takehara Thermal Power Station Unit Nos. 1 and 2, scheduled to be replaced with the latest high-efficiency USC plant technology.
- Promote mixed combustion of biomass fuels in coal-fired power stations (Effective exploitation of untapped resources)
- Contribute to the reduction of CO_2 emissions and technology transfer on a global scale by promoting the overseas expansion of coal-fired power generation using J-POWER's advanced, high-efficiency generation technologies, in particular in the Asian region.
- Promote the development of higher-efficiency oxygen-blown integrated coal gasification combined cycle (IGCC) technology through the realization of the Osaki CoolGen Project.
- Advance research and development in the area of CO_2 capture and storage (CCS) technologies through the implementation of the EAGLE Project, the Osaki CoolGen Project, and the Callide Oxyfuel Project in Australia.
- In relation to the Ohma Nuclear Power Station Plan, do our utmost to ensure the construction of a safe and trusted nuclear facility, always appropriately incorporating the necessary measures for the realization of enhanced safety based on serious consideration of the accident at the Fukushima Daiichi Nuclear Power Station and following government and other guidelines, at the same time maintaining the approval of residents of the region in which the station is located.
- Build new hydropower facilities, expand, upgrade and replace existing facilities, and expand the use of hydroelectric power.
- Significantly expand domestic wind power facilities and advance research and development towards the realization of ocean-based wind power generation technologies.
- Work to develop new geothermal energy sites in Japan.

Item	Target
● Maintain/improve thermal efficiency of thermal power stations [HHV (higher heating value)]	Maintain current level [about 40%] (FY 2008 and each FY thereafter)
● Reduce SF_6 emissions; increase recovery rate during inspection and retirement of equipment	Inspection: at least 97%; Retirement: at least 99% (FY 2008 and each FY thereafter)

2. Efforts Relating to Local Environmental Issues

Item	Target
● Reduce SOx emissions per unit of electric power generated(point of generation, thermal power stations)	Maintain current level [about 0.2 g/kWh] (FY 2008 and each FY thereafter)
● Reduce NOx emissions per unit of electric power generated (point of generation, thermal power stations)	Maintain current level [about 0.5 g/kWh] (FY 2008 and each FY thereafter)
● Increase recycling rate for industrial waste	Maintain current level [about 97%] (FY 2011 and each FY thereafter)
● Protect biological diversity	Consider the protection of biological diversity in relation to business activities

3. Ensuring Transparency and Reliability

Item	Target
● Raise level of environmental management	Continuous improvement of EMSs (FY 2008 and each FY thereafter)

FY 2011 J-POWER Group Environmental Action Guidelines

1 Efforts Relating to Global Environmental Issues

Reducing CO_2 emissions from coal-fired power generation

- Maintain high-efficiency operation at existing thermal power stations
- Promote mixed combustion of biomass fuels in existing thermal power stations
- Advance Takehara Replacement Plan
  - Advance Takehara Replacement Plan for achievement of significant increase in efficiency through replacement of Takehara Thermal Power Station Unit Nos. 1 and 2 with the latest USC plants.
- Transfer high-efficiency coal-fired generation technologies overseas and promote their diffusion
  - Contribute to the reduction of CO_2 emissions and technology transfer on a global scale by promoting the overseas expansion of coal-fired generation using J-POWER's advanced, high-efficiency generation technologies, in particular in the Asian region.

Conducting research and development of next-generation low-carbon technologies

- Proceed with large-scale proving trials of oxygen-blown integrated coal gasification combined cycle (IGCC)
  - Proceed with the Osaki CoolGen Project to develop high-efficiency IGCC generation technologies.
- Proceed with development of CO_2 capture and storage (CCS) technologies
  - Proceed with research and development of pre-combustion CO_2 capture technology in the EAGLE Project.
  - Proceed with proving trials of oxyfuel CO_2 capture and storage technology in the Callide Oxyfuel Project being conducted in Australia.
- Proceed with research and development of ocean-based wind power generation technologies

Expanding CO_2-free power generation facilities

- Work to realize the Ohma Nuclear Power Station Plan, with safety as the top priority
  - In relation to the Ohma Nuclear Power Station Plan, do our utmost to ensure the construction of a safe and trusted nuclear facility, always appropriately incorporating the necessary measures for the realization of enhanced safety based on serious consideration of the accident at the Fukushima Daiichi Nuclear Power Station and following government and other guidelines, at the same time maintaining the approval of residents of the region in which the station is located.
- Expand use of renewable energies
  - Maintain stable operation of existing hydroelectric, geothermal, wind power and recycling power stations.
  - Increase efficiency through upgrades of existing hydroelectric facilities.
  - Proceed with new hydroelectric, geothermal and wind power developments. Proceed with development towards the significant expansion of power stations, particularly in the case of wind power.
  - Establish Japan's largest concentration and tracking photovoltaic system in the Wakamatsu Operations and General Management Office.
  - Promote development of renewable energies in developing countries, and provide support.

Other

- Promote energy saving
  - Promote reduction of internal consumption rate at power stations.
  - Promote energy conservation measures in offices.
    - Promote energy conservation measures in offices with consideration of criteria for judgment stipulated for businesses by the revised Energy Use Law.
    - Work to conserve energy at our Headquarters towards compliance with the Tokyo Metropolitan Ordinance on Environmental Protection. In particular, respond appropriately to requests for emergency energy conservation this summer.
  - Reduce environmental load by promoting increased efficiency when transporting raw materials, etc.
  - Reduce environmental load through measures including use of public transportation, increased operation efficiency of company vehicles, and promotion of eco driving.
  - Promote energyand resource-conserving measures in employees' households, such as use of the Household Eco-Account Book.
  - Support measures to promote the spread of energy conservation.
- Promote use of bilateral offset mechanism and Kyoto mechanisms
- Control release of GHGs other than CO_2, including sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and nitrous oxide (N_2O)

2 Efforts Relating to Local Environmental Issues

Reduction of Environmental Load

- Continue to reduce emissions
  - Properly manage waste incineration and environmental equipment in order to control emissions of SOx, NOx, and soot.
  - Properly manage wastewater treatment facilities to control discharges of substances causing water pollution.
  - Properly manage facilities to prevent noise, vibration and odors.
  - Properly manage facilities to prevent pollution of soil and groundwater.
- 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 station and equipment when constructing or renovating facilities

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 reduction of waste from construction, upgrading and demolition work, and reuse and recycling of materials and equipment.
  - Work to reduce quantities used of water, chemicals, lubricating oil, etc.
  - Work to curb volume of office waste (copy paper, etc.) and promote reuse.
  - Rigorously collect and separate paper, bottles, cans, plastic and other waste, and promote reuse and recycling.
- Maintain and continue green purchasing efforts in line with the J-POWER Group Green Purchasing Guidelines
  - Maintain and continue green purchasing of office goods.
  - Maintain and continue the use low-pollution vehicles, etc.
- Properly maintain and manage landfill sites and implement closing procedures

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)
  - Survey and manage the amounts of chemical substances subject to the PRTR Law that are emitted and transported, notify the appropriate authorities and publish this information.
- Take appropriate measures to deal with dioxins
  - Appropriately manage waste incinerators, and survey and report on exhaust gases and ash in accord with the Act on Special Measures concerning Countermeasures against Dioxin.
  - Observe the stipulations of the Waste Disposal and Public Cleansing Act and the Act on Special Measures concerning Countermeasures against Dioxin when waste incinerators are scrapped.
- Properly manage and dispose PCBs
  - Appropriately store and manage substances based on the stipulations of the Waste Disposal and Public Cleansing Act, the Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes, the Electricity Business Act, and the Fire Service Act.

- Progressively treat waste products containing high concentrations of PCBs in accord with J-POWER Group's Basic Policy for the Treatment of PCBs (based on the government's PCB Wide Area Treatment Plan).
- Appropriately manage and store waste products containing trace amounts of PCBs, including wiping cloths, tools, etc. with PCBs adhering, until a scheme for the effective and rational treatment of such waste products comes into effect. (Appropriately manage and reduce the risk of PCB leakage in the case of devices still in use containing trace amounts of PCBs.)

- Strive to reduce volumes of hazardous chemicals handled
- Respond appropriately to asbestos-related issues
  - Adopt appropriate measures to prevent the dispersal of asbestos based on J-POWER Group's Basic Policy concerning Asbestos, while systematically removing asbestos and replacing it with alternative substances.

Natural Environment and Biodiversity Conservation Initiatives

- Take the natural environment and biodiversity into account in the various stages of business
  - Conduct surveys, measurements and assessments of the effect of business activities on the natural environment and biological diversity, and work to protect the natural environment and biological diversity at each stage of the business process, including planning, design, construction and power station operation.
- Give consideration to rare animal and plant species on land
  - Give consideration to the protection of ecosystems and species diversity on land, and work to protect rare animal and plant species and their habitats.
- Give consideration to aquatic environments
  - Consider aquatic environments such as oceans and river systems including balancing reservoirs and storage reservoirs in the operation of power stations.
- Implement forest conservation initiatives
  - Institute appropriate protections for company-owned forests based on J-POWER Group Forest Protection Guidelines.
  - Promote the use of unexploited offcuts in forests.

Environmental Conservation Initiatives in Overseas Projects

- Promote overseas transfer of environmental protection technologies
  - Promote transfer of environmental technologies for thermal and hydroelectric power stations.
- Incorporate environment-friendly initiatives when formulating development plans and considering investment in projects, and ensure that those initiatives are carried out

Implementation of Accurate Environmental Impact Assessments

- Conduct surveys, measurements and assessments of environmental impact of business activities on the basis of the applicable laws and regulations, reflect the results in the details of business activities, and consider environmental protection.

3 Ensuring Transparency and Reliability

1. Continual Improvement of Environmental Management (Greater Reliability)

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
  - Assess the actual status of environmental burden and set targets and formulate plans for the protection of the environment.
  - Systematically conduct internal environmental audits and periodically evaluate and improve details of environmental activities in order to meet targets.
- Raise employee awareness of environmental issues
  - Systematically conduct education and training programs regarding environmental laws and regulations applicable to business activities.
  - Promote environmental education using e-learning, etc.
- Utilize environmental accounting and eco-efficiency indicators
- Request cooperation of business partners in environmental activities
- Strengthen risk management
  - Work to implement measures to prevent environmentally harmful incidents and ensure essential communication and appropriate responses in an emergency.

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
  - Accurately identify laws and regulations, agreements, etc. applicable to business activities, and work to respond effectively, educate employees, and ensure appropriate operation and verification.
- Fully comply with environment-related laws, regulations, agreements, and other rules
  - Make precise improvements to equipment and operations in order to prevent pollution of the surrounding environment.
  - Conduct risk diagnoses in relation to waste products and education programs for employees responsible for waste disposal in order to ensure appropriate disposal of waste. In addition, apply J-POWER Group Guidelines for the Selection of Industrial Waste Disposal Contractors and expand use of electronic manifests.

2. Communication with Society (Greater Transparency)

Publication of Environmental Information

- Formulate environmental reports
  - Report on environmental measures with consideration of social demands, such as environmental reporting guidelines for Sustainability Reports.
  - Work to increase reliability and transparency by having environmental data published in Sustainability Reports checked by third parties.

Increased Engagement in Environmental Communication

- Carry out environmental communication
  - Conduct publicity programs via website, internal Group publications, etc.
  - Conduct publicity programs targeting visitors to offices, PR centers, etc.
  - Communicate with experts and other third parties.
  - Receive external assessments such as environmental ratings.
  - Conduct environment-related social contribution activities such as providing support for environmental education.
- Carry out regional environmental conservation activities
  - Independently implement regional environmental protection activities.
  - Participate in clean-up events, beautification activities, tree planting events and similar activities organized by small cities, towns and villages, neighborhoods, etc.

FY 2010 Results

Corporate Targets,* midterm targets that the Group as a whole is expected to work towards, are set as part of the Action Programs for the J-POWER Group Environmental Management Vision. The majority of the items included in the Corporate Targets prior to their revision on July 1, 2011 had FY 2010 as their target year, and, as indicated below, all the FY 2010 Corporate Targets were achieved.

* In addition to Group-wide corporate targets, business divisions and affiliates set their own targets tailored to their operations.

	Item	Target	Base-year performance, etc	FY 2009 performance	
Part 2 Efforts Relating to Global Environmental Issues	● Reduce CO_2 emissions per unit of electric power sold (domestic and overseas operations)	Approx. 10% reduction from FY 2002 level (in FY 2010)	FY 2002 0.72 ($kg\text{-}CO_2/kWh$)	0.66 ($kg\text{-}CO_2/kWh$)	
	● Maintain/improve thermal efficiency of thermal power stations [HHV (higher heating value)]	Maintain current level [about 40%] (FY 2008 and each FY thereafter)	FY 2008 40.1% (Reference: LHV*1 = 41.1%)	40.3% (Reference: LHV = 41.4%)	
	● Reduce SF_6 emissions; increase recovery rate during inspection and retirement of equipment	Inspection: at least 97% Retirement: at least 99% (FY 2008 and each FY thereafter)	FY 2008 Inspection: 99% Retirement: 99%	Inspection: 99% Retirement: 99%	
	● Reduce electric power consumption at offices	At least 4% reduction from FY 2006 (in FY 2010) <At least 1% annual reduction>	FY 2006 22.82 (GWh)	21.07 (GWh) 4% annual decrease	
	● Reduce fuel consumption by offices (gasoline equivalent)	At least 4% reduction from FY 2006 (in FY 2010) <At least 1% annual reduction>	FY 2006 1,644 (kl)	1,348 (kl) 3% annual increase	
Part 3 Efforts Relating to Local Environmental Issues	● Reduce SOx emissions per unit of electric power generated (point of generation, thermal power stations)	Maintain current level [about 0.2 g/kWh] (FY 2008 and each FY thereafter)	FY 2008 0.20 (g/kWh)	0.16 (g/kWh)	
	● Reduce NOx emissions per unit of electric power generated (point of generation, thermal power stations)	Maintain current level [about 0.5 g/kWh] (FY 2008 and each FY thereafter)	FY 2008 0.50 (g/kWh)	0.44 (g/kWh)	
	● Increase recycling rate for industrial waste	97% (by the end of FY 2010)	—	98%	
	● Increase paper recycling rate	At least 85% (by the end of FY 2010) <At least 1% annual increase>	—	85% 6% annual decrease	
	● Increase rate of green purchasing of office supplies (stationery, etc.)	At least 80% (by the end of FY 2010)	—	77%	
	● Increase percentage of recycled copy paper purchased	At least 99% (by the end of FY 2010) <At least 1% annual increase>	—	99% 1% annual increase	
	● Increase percentage of low-emission vehicles	At least 90% (by the end of FY 2010)	—	93%	
Part 4 Ensuring Transparency and Reliability	● Raise level of environmental management	Continuous improvement of EMSs (FY 2008 and each FY thereafter)	—	Consistent use of PDCA cycle	

Shokawa Sakura trees (Two old cherry trees planted in an area that would have been flooded as a result of the construction of the Miboro Dam in Gifu Prefecture in 1960 were transplanted to an elevated site at the side of the dam lake. The trees symbolize the commitment of J-POWER Group to coexistence between energy and the environment).

	FY 2010 performance	Evaluation of FY 2010 and next steps	Further Information
	0.65 (kg-CO_2/kWh)	J-POWER Group met its target for FY 2010 with an emissions rate of 0.65kg-CO_2/kWh for the total volume of power sold by the Group in FY 2010, representing a decrease of around 10% against FY 2002 figures. This result was achieved through the reduction of our emissions intensity by means of initiatives such as reducing the emissions intensity of thermal generation by increasing efficiency, increasing sales of hydroelectric power, and significantly increasing sales of wind power, in addition to the redemption of carbon credits.	P53
	40.5% (Reference: LHV = 41.6%)	J-POWER Group met its target, realizing a total thermal efficiency of 40.5% (HHV) for thermal power generation thanks to efforts to maintain high-efficiency operation in existing thermal power stations and to adopt high-efficiency technologies when upgrading facilities. We will continue working to maintain and improve energy efficiency in our thermal power stations.	P83
	Inspection: 99% Retirement: 99%	The FY 2010 target was met, with a recovery rate of 99.5% during inspections and 99.3% at retirement, thanks to efforts to curb emissions during equipment inspection through careful and consistent recovery and reuse. We will continue to stress careful and consistent recovery and reuse to curb atmospheric emissions of SF_6 from gas insulation equipment.	P67
	21.40 (GWh) 2% annual increase	Office power use increased by 2% against FY 2009, but this represented a decrease of 6% against FY 2006 figures, and our target was therefore met.	P66
	1,292 (kl) 4% annual decrease	Office fuel use decreased by 4% against FY 2009, representing a decrease of 21% against FY 2006 figures, and our target was therefore met.	P66
	0.17 (g/kWh)	Thanks to fuel control and correct operation of flue gas desulfurization systems, we were able to curb SOx emissions to maintain the level of emissions per unit of power generated. We will continue our efforts to curb emissions through good management practices.	P70
	0.48 (g/kWh)	Thanks to fuel control and proper operation of flue gas desulfurization systems, we were able to curb NOx emissions to maintain the current level of emissions per unit of power generated. We will continue our efforts to curb emissions through good management practices.	P70
	97%	The target for the end of the FY 2010 was exceeded thanks to steps to promote recycling of coal ash and reduce industrial waste generated by maintenance and operation of power stations. We will go on working to maintain this level.	P71
	95% 10% annual increase	As a result of conscientiously sorting and collecting used paper and promoting its reuse, we increased our rate of recycling of paper by 10% against FY 2009, and met the targets set for the end of FY 2010.	P72
	82%	Thanks to efforts to promote green purchasing in accordance with the J-POWER Group Green Purchasing Guidelines, the rate increased by 5% against FY 2009, and we met the targets set for the end of FY 2010.	P72
	99% Against previous FY ±0%	The target set for the end of FY 2010 was met thanks to efforts to maximize use of recycled copy paper.	P72
	93%	Thanks to efforts to promote green purchasing in accordance with the J-POWER Group Green Purchasing Guidelines, the targets set for the end of FY 2010 were met.	P72
	Consistent use of PDCA cycle	Efforts were made to raise the level of environmental management through consistent implementation of the PDCA cycle. We will remain diligent in striving for continual improvement.	P76

*1: LHV (lower heating value) estimated from actual HHV (higher heating value) using conversion coefficients supplied in the Agency of Natural Resources and Energy's Comprehensive Energy Statistics (FY 2004 edition).

Business Activities and the Environment (FY 2010)

The charts below detail the resource consumption and environmental load of J-POWER Group operations within Japan.

Note: Figures represent the aggregate of all J-POWER Group companies (J-POWER and consolidated subsidiaries); in the case of joint investments, figures are prorated according to the ratio of capital contribution.

INPUT

Thermal Power Generation

● Fuel

Coal (wet)	21.35 million tons
Heavy oil	42,000 kl
Light oil	26,000 kl
Natural gas	60 million Nm^3
Biomass	8,000 tons
● Industrial-use water	7.59 million m^3

Notes:
1. Apart from waste water, almost all industrial-use water used in thermal power stations is released into the atmosphere as steam.
2. River water used in hydroelectric stations is not included in the input figures, as all such water is returned to the river after power generation.
3. While steam is used in geothermal power stations, hot water is returned underground after power generation via an injection well.

● Major Chemicals Consumed (undiluted equivalents)

Limestone ($CaCO_3$)	182,000 tons
Ammonia (NH_3)	15,000 tons

Hydropower Generation

● Power for pumped storage	1,100 GWh

Geothermal Power Generation

● Steam	0.57 million tons
● Hot water	2.91 million tons

Internal Use at Business Sites and Offices

● Electricity (purchased)

Business sites	45.16 GWh
Offices	17.51 GWh

● Fuel (gasoline equivalent)

Business sites	9,077 kl
Offices	1,292 kl

● Drinking water

Business sites	180,000 m^3
Offices	420,000 m^3

● Copy paper (A4 equivalent)	57 million sheets

Business Activities

Electric Power Generated

Thermal
58,400 GWh

Hydroelectric
11,300 GWh

Geothermal/Wind
500 GWh

Auxiliary power for operation and transmission loss: 4,000 GWh

Volume of electric power sold: 65,500 GWh

Pumped storage hydroelectric power output: 800 GWh

Total **66,300** GWh

Note: Due to rounding, figures may not add up to totals.

● Major Resources Recycled

Percentages indicate recycling rate.

Coal ash	1.90 million tons (98.1%)	Other industrial waste	33,000 tons (51.3%)
Sludge (excluding gypsum)	4,000 tons (32.5%)	Waste paper	435 tons (94.7%)
Gypsum (desulfurization byproduct)	320,000 tons (100%)	Driftwood from dam reservoirs	14,000 m^3 (93.8%)
Sulfuric acid (desulfurization byproduct)	29,000 tons (100%)		

Supply

The electricity generated at our power stations is supplied through regional power companies to end users throughout Japan. The 65,500 GWh of wholesale electric power we sold last year is equivalent to approximately 7% of total electric power sold by regional power companies.*

* Total electric power sold in FY 2010 was 906,400 GWh, according to confirmed figures on electricity demand published by the Federation of Electric Power Companies of Japan.

Effective Utilization (cement plants, etc.)

OUTPUT

Thermal Power Stations

● Emissions into the Atmosphere

CO_2	47.01 million t-CO_2
SOx	10,000 tons
NOx	28,000 tons
Soot and dust	1,000 tons

● Emissions into Bodies of Water

Waste water	3.53 million m^3
Waste water COD	13 tons

Geothermal Power Station

● Hot water	3.06 million tons

CO_2 Emissions from Business-Site and Office Activities

● Business sites	42,000 t-CO_2
● Offices	9,000 t-CO_2

Waste

● Industrial waste

Coal ash	36,000 tons
Other	41,000 tons

● Specially controlled industrial waste

Specially controlled industrial waste	800 tons

● Non-industrial waste

Waste paper	24 tons
Driftwood from dam reservoirs	900 m^3

Environmental Accounting and Eco-Efficiency

J-POWER Group regards environmental accounting as an important tool for environmental management. Through ongoing disclosure of environmental accounting data, we aim to further enhance the reliability and adequacy of information on cost and effectiveness. Improving eco-efficiency (production per environmental load) is one of the goals outlined as part of our basic stance in the Basic Policy section of the J-POWER Group Environmental Management Vision.

Note: Additional data provided on p. 87, Reference Data.

Environmental Accounting

To calculate the costs and benefits of J-POWER Group's environmental conservation activities in FY 2010 in keeping with the nature of our business, we referred to the Environmental Accounting Guidelines 2005 issued by the Ministry of the Environment.

Environmental Conservation Cost and Benefit

Total costs for FY 2010 were approximately 52.4 billion yen, with pollution control costs for preventing contamination of the air, water, etc., accounting for about 43% of the total.

When considering environmental load, the nature of our business requires that instead of tabulating total emissions, we assess the overall environmental conservation benefit of our conservation measures on the basis of emissions intensity, thermal efficiency, and reuse/recycling rate.

Economic Benefit

Efforts contributing to earnings and cost reductions were calculated to have had an economic benefit of approximately 9.2 billion yen.

Economic Benefits

(Unit: billion yen)

Category	Details	Benefit
Revenue	Sales of marketable commodities from coal ash, gypsum, and sulfuric acid	0.3
Cost reduction	Reduction in fuel costs due to improved coal-fired thermal efficiency (introduction of USC)	3.3
	Reduction in disposal costs due to coal ash, gypsum, and sulfuric acid recycling	5.6
Total		9.2

Conservation Costs and Benefits

Category	Major measures and efforts	Cost (billion yen)	Environmental conservation benefit	FY 2010
Pollution control	Air pollution control (desulfurization/denitrification, soot and dust treatment), water pollution control (waste-water treatment), etc.	22.8	SOx emissions intensity (g/kWh)	0.17
			NOx emissions intensity (g/kWh)	0.48
			Soot and dust emissions intensity (g/kWh)	0.01
Global environmental conservation	Measures to reduce greenhouse gas emissions (maintaining high-efficiency operation of thermal power stations, developing renewable and untapped energy sources, maintaining energy-saving equipment, curbing of greenhouse gas emissions other than CO_2)	4.0	CO_2 emissions intensity (kg-CO_2/kWh)	0.65
			Average coal-fired thermal efficiency (%)	40.5
Resource recycling	Waste reduction through reuse and recycling, treatment and disposal of waste	16.0	Coal ash recycling rate (%)	98.1
			Industrial waste recycling rate (%)	97
			Gypsum recycling rate (%)	100
			Volume of driftwood recycled (1,000 m^3)	14
Other	Research and development, social activities, etc.	9.6		
Total		52.4		

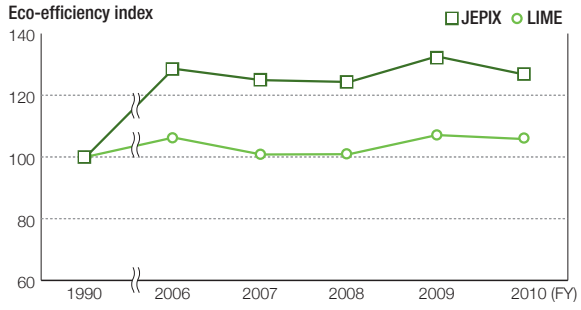
Note: For detailed data regarding each category, see p. 83–84, Fiscal Year Data, in the Reference Data section.

Eco-Efficiency

In J-POWER Group, we have used JEPIX*1 and LIME*2 to evaluate the efficiency of our efforts to this point. Although the two methods assign different coefficients to various aspects of the environment, both indicate an overall trend of improving eco-efficiency since FY 1990.

As our medium- to long-term tasks henceforth, we are working to reduce the environmental load by improving the efficiency of energy use, which is closely tied to increased eco-efficiency, and developing renewable energy sources.

Integrated Index of Eco-Efficiency (electric power sold per environmental load)



Note: Eco-efficiency: 100 = FY 1990 integrated index (electric power sold per environmental load).

References

*1 JEPIX (Environmental Priorities Index for Japan)
An index that calculates a single score for overall environmental impact using the Ecopoints system, which assigns weights to more than 300 environmental pollutants according to their impact on water and air quality.

*2 LIME (Life-cycle Impact assessment Method based on Endpoint modeling)
An integrated environmental impact assessment method that assigns weights to potentially harmful substances by scientifically analyzing their contribution to such environmental problems as global warming and destruction of the ozone layer and calculating their damage to human health, ecosystems, etc.

Environment

Part 2

Efforts Relating to Global Environmental Issues

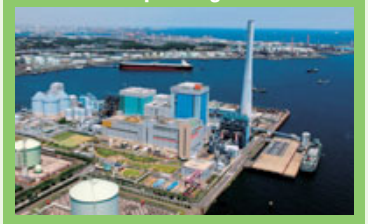
Global warming is one of the most serious long-term issues to be faced by humanity this century. As the international community seeks a new environmental framework, Japan is examining the introduction of a variety of systems and measures towards the realization of a low-carbon society.

Focusing on the concept of the coexistence of energy and the environment, J-POWER Group regards measures to combat global warming as a top management priority and is pursuing these initiatives vigorously.

J-POWER Group's Efforts Relating to Global Environmental Issues —Basic Policy—

Directing our most intensive efforts towards the provision of a stable energy supply, we will also steadily advance initiatives towards the realization of low-carbon technologies both domestically and internationally, and will contribute to the reduction of CO_2 emissions on a global scale. To that end, we will work from mid- and long-term perspectives with technology as our central focus to realize a stable supply of energy and reduce CO_2 emissions domestically and internationally through measures including reducing CO_2 emissions from coal-fired power generation, conducting research and development of next-generation low-carbon technologies, and expanding CO_2-free power generation facilities. Our ultimate aim will be the achievement of zero emissions by means of measures including CO_2 capture and storage.

Reducing CO_2 emissions from coal-fired power generation



We will maintain high-efficiency operation, and will implement measures including expanding the application of biomass mixed combustion, replacing aging thermal power stations, and deploying high-efficiency coal-fired power generation internationally.

Conducting research and development of next-generation low-carbon technologies

We will conduct research and development in areas including further high-efficiency power generation technologies, CO_2 capture and storage technologies, and technologies for ocean-based wind power generation.

Making efforts to reduce CO_2 Emissions

Expanding CO_2-free power generation facilities

While sparing no efforts in continuing to develop nuclear power stations, with safety as our top priority and with the understanding of the local communities in the areas in which the facilities are located, we will also work to expand our use of hydroelectric, wind power, and geothermal generation.

CO_2 Emissions in FY 2010

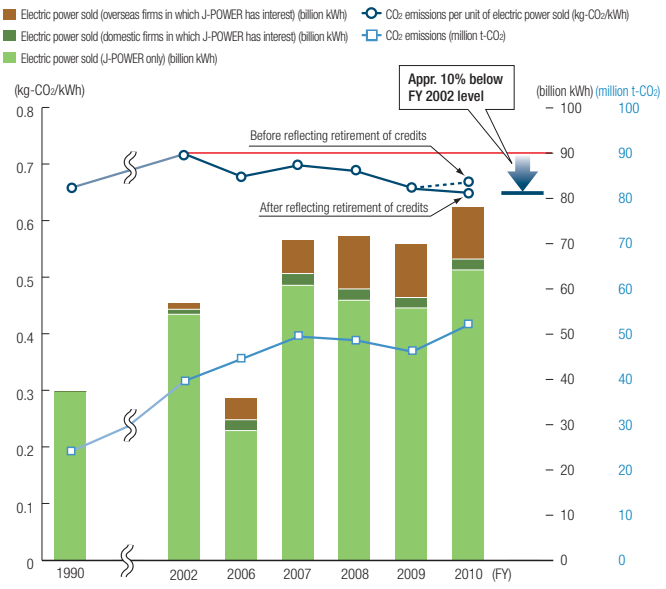
In FY 2010, J-POWER Group[*1] sold approximately 77,900 GWh of electric power, an increase of about 11% against the previous year. CO_2 emissions over the same period were 52.54 million t-CO_2, representing an increase of approximately 13%.

In FY 2010, initiatives including achieving improved CO_2 emission intensity of our domestic thermal power generation facilities by realizing increased efficiency, increasing our sales of hydroelectric power, and significantly increasing our sales of electric power generated by wind power facilities,[*2] in addition to the retirement of carbon credits, saw us realize a level of CO_2 emissions per unit of electric power sold of 0.65 kg-CO_2/kWh. We thereby satisfied our corporate target of achieving a reduction of approximately 10% against the figures for FY 2002, and were able to contribute to the Environmental Action Plan by the Federation of Electric Power Companies.

*1 Calculated based on sales figures for J-POWER and for consolidated affiliates (22 companies in Japan and 24 overseas), pro-rated for J-POWER's ownership share.

*2 Comparing figures for FY 2002 and FY 2010:
Emission intensity of domestic thermal power generation: 0.87 kg-CO_2/kWh (2002) → 0.86 kg-CO_2/kWh (2010) 1% decrease
Sales of hydroelectric power: 8,902 GWh (2002) → 10,267 GWh (2010) 15% increase
Sales of electric power generated by wind power facilities: 69 GWh (2002) → 442 GWh (2010) Approximately six-fold increase

Results for volume of power sold, CO_2 emissions, and CO_2 emission intensity for J-POWER Group (Japan and overseas)



COLUMN

Coal Use and Measures to Counter Global Warming

J-POWER Group is one of the largest coal users in Japan, consuming approximately 20 million tons of coal per year at seven coal-fired power stations. With a total capacity of 8.4 GW, these stations account for approximately 20% of Japan's total coal-fired generating capacity.

As a leading company in the area of coal-fired power generation, we are working actively to engage in research, conduct proving trials, and commercially develop clean coal technologies in Japan. By engaging in technology transfers that make the outcomes of these programs available overseas, we are also, in helping to control global CO_2 emissions and reduce energy consumption, contributing to the stable supply of energy on a global scale.

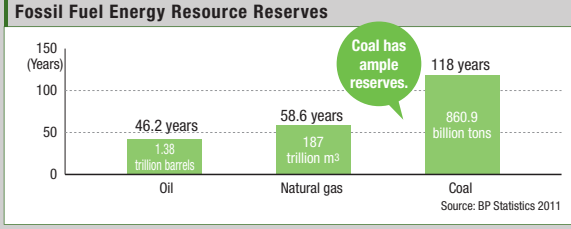
The Significance of Effective Coal Use in Today's World

The world today depends on fossil fuels for most of its energy needs. Among these fuels, coal has more abundant reserves than oil or natural gas. Moreover, it is available globally including Asia rather than being concentrated in the Middle East, and is therefore used throughout the world as a main energy source. Coal-fired power generation accounts for around 40% of the world's current electricity production, and coal is expected to continue to be a major source of energy, helping to meet ever-rising global energy demands in China, India and elsewhere.

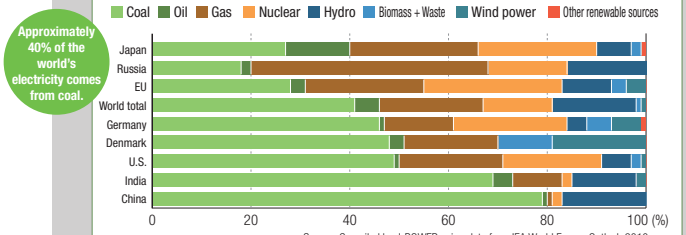
For Japan, dependent on overseas sources for the majority of its energy resources, coal will continue to be essential in keeping a robust and flexible energy mix.

At the same time, when coal and other fossil fuels are burned they generate CO_2, a greenhouse gas. As demand for energy increases, the world faces the issue of how to reduce emissions of CO_2 and other greenhouse gases. Against this background, J-POWER is working to reduce CO_2 emissions from coal-fired power generation through the use of clean coal technologies.

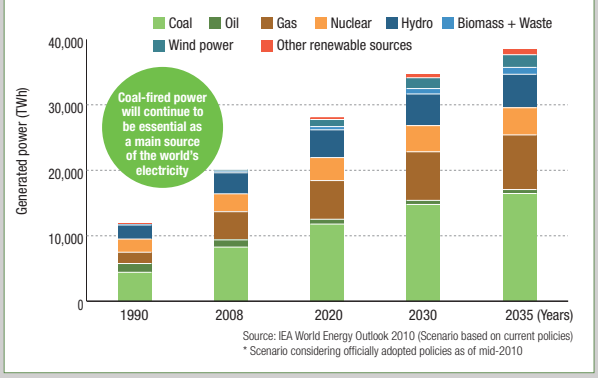
Fossil Fuel Energy Resource Reserves



Electricity Generation Worldwide by Source



Global Power Generation Trends and Outlook by Energy Source



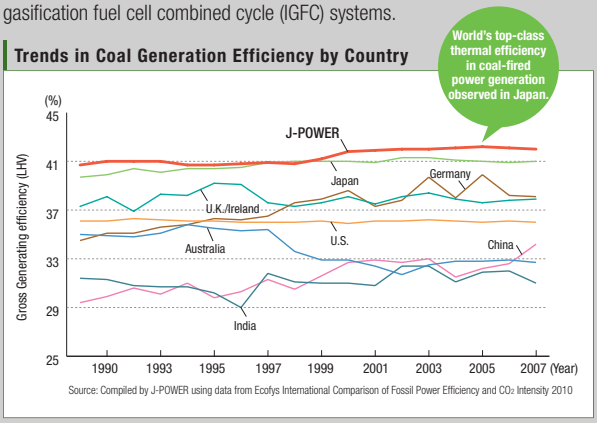
The Significance of Improving Coal-Fired Power Generation Efficiency

Increasing the efficiency of power generation is an effective means of reducing CO_2 emissions from thermal power stations. In Japan, however, coal-fired power stations generate electricity with higher energy efficiency than other countries by raising the temperature and pressure in steam turbines to ultra super critical (USC) conditions.

If this high-performance technology should be applied in the United States, China, and India, calculations show that CO_2 emissions in these three countries could be reduced by around 1.3 billion tons annually, an amount equivalent to Japan's annual total of CO_2 emissions and 5% of the world total. It is therefore important to transfer and disseminate these high-efficiency power generation technologies.

In addition, J-POWER Group is pioneering efforts to develop next-generation coal-utilization technologies aiming to achieve further high efficiency, including integrated coal gasification combined cycle (IGCC) and integrated coal gasification fuel cell combined cycle (IGFC) systems.

Trends in Coal Generation Efficiency by Country

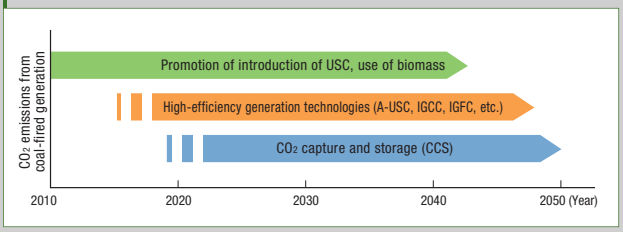


Ultimate Goal: Zero CO_2 Emissions

Projects are under way around the world to develop carbon dioxide capture and storage (CCS) technology, and it is thought that CCS will have a major role to play in fighting global warming in the future.

J-POWER Group is also conducting R&D towards increasing the efficiency of IGCC + CO_2 separation and capture systems (see p. 60), and is participating in the Callide Oxyfuel Combustion Project, which is attempting to verify the viability of a system of CO_2 capture and underground storage using oxyfuel technology (see p. 60).

Towards Zero CO_2 Emissions



Reducing CO_2 Emissions from Coal-Fired Power Generation

The energy use efficiency of J-POWER Group's coal-fired power stations is among the highest in the world, thanks to our ongoing efforts to develop and actively incorporate cutting-edge technologies. We are moving ahead as a Group with the realization of even greater energy use efficiency and reduced CO_2 emissions for coal-fired power generation through the use of biomass fuels and the overseas expansion of our coal-fired generation business, which employs high-efficiency generation technologies.

The World's Cleanest Coal-fired Generation –Isogo Thermal Power Station–

Isogo Thermal Power Station (Yokohama City)

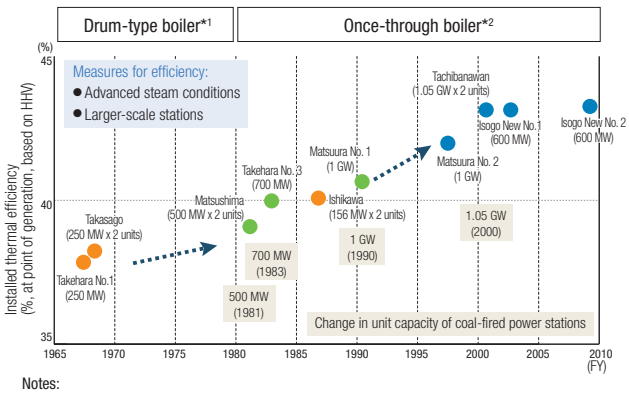
The Isogo Thermal Power Station new No. 2 unit (capacity: 600 MW), under construction since October 2005, began operating commercially in July 2009. With the new No. 1 unit up and running as well, this marks the completion of a massive project to replace the whole generating equipment at Isogo Thermal Power Station. Seeking to realize the world's cleanest coal-fired generation bringing together the cream of J-POWER's clean coal technologies, we have enhanced the station's thermal efficiency by applying ultra-supercritical (USC) technology, the world's most advanced (main steam at 25 MPa and 600ºC). In the new No. 2 unit, moreover, the reheated steam temperature was raised another 10ºC to 620ºC, to boost heat efficiency even higher and further reduce CO_2 emissions.

The installation of the latest environmental pollution control equipments has resulted in the achievement of extremely low SOx and NOx emissions, both an order of magnitude lower than figures for major industrial nations, making the Isogo Thermal Power Station one of the world's most advanced coal-fired power stations in terms of controlling environmental impact.

Overview of Isogo Thermal Power Station

Item	Old No. 1 and 2 Units		New No. 1 and 2 Units		
Output	No. 1 Unit 265 MW No. 2 Unit 265 MW Total 530 MW		No. 1 Unit 600 MW No. 2 Unit 600 MW Total 1,200 MW		
Fuel	Coal (domestic)		Coal (overseas)		
Coal storage	Outdoor storage		Indoor storage (silo)		
Boiler	Natural circulation drum-type boiler		Tower-type once-through boiler		
Flue gas denitrification system	———		Dry-type flue gas denitrification system (selective catalytic reduction of nitrogen oxide with ammonia) Denitrification efficiency: No.1 Unit 87.5% No.2 Unit 91.9%		
Dust precipitator	Electrostatic precipitator Wet-type flue gas desulfurization system	Dust-collecting efficiency: 99.75%	Electrostatic precipitator Dry-type flue gas desulfurization system	Dust-collecting efficiency	No. 1 Unit 99.94% No. 2 Unit 99.97%
Flue gas desulfurization system	Wet-type flue gas desulfurization system (lime gypsum process) Desulfurization efficiency: 89%		Dry-type flue gas desulfurization system (activated coke adsorption process)	Desulfurization efficiency	No. 1 Unit 95.0% No. 2 Unit 97.8%
Smokestacks	No. 1 Unit 120 m No. 2 Unit 140 m		200 m (two-stack centralized type)		
Coal ash use	Coal ash utilization rate 90% or more (Amount generated: 170,000 tons/year)		Coal ash utilization rate 90% or more (Amount generated: 380,000 tons/year)		
Proportion of greenification to total area	15%		20%		
Port facilities	Coal unloading wharf-Oil unloading pier × 1		Coal unloading wharf × 1 Coal ash loading-Oil unloading pier × 1		

Power Generation Efficiency by J-POWER Thermal Power Stations



Notes:

- Sub-critical: Steam pressure less than 22.1 MPa
- Super critical: Steam pressure at least 22.1 MPa and steam temperatures up to 566ºC
- Ultra super critical: Steam pressure at least 22.1 MPa and steam temperatures exceeding 566ºC

*1 Drum-type boiler These boilers have steam drums in which steam and water are separated, and the steam is released.

*2 Once-through boiler These boilers do not use steam drums, but produce steam in the flow inside steam pipes.

Takehara Thermal Power Station Replacement Project

J-POWER is currently implementing environmental assessment procedures related to the planned replacement of Unit No. 1 (output: 250 MW) and Unit No. 2 (output: 350 MW) of Takehara Thermal Power Station with a new Unit No. 1 (output: 600 MW), looking towards the commencement of commercial operation in 2020.

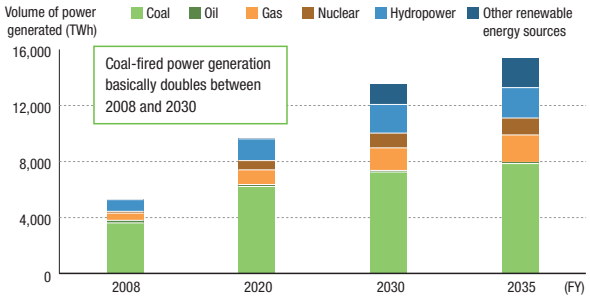
At present, Unit Nos. 1-3 of the Takehara Thermal Power Station are in operation, generating a total output of 1.3 GW. However, more than 43 years have passed since Unit No. 1 began operation in July 1967, and more than 36 years have passed since Unit No. 2 began operation in June 1974, necessitating measures to respond to their age-related deterioration. The Replacement Plan for these units actively engages with the issue of global warming, and will see us introducing the latest technologies in order to reduce environmental impact from SOx, NOx and other pollutants, in addition to dramatically increasing energy use efficiency, thus reducing CO_2 emissions from the facility.

Takehara Thermal Power Station (Hiroshima Prefecture)

Overseas Transfer and Diffusion of High-efficiency Coal-fired Power Generation Technologies, with a Focus on Asia

Based on expectations that demand for power will continue to steadily increase in Asia, and that coal-fired power generation will continue to supply the greater part of this demand, it is predicted that the amount of power generated and the number of facilities in operation in the region will each increase approximately twofold by 2030 (IEA). Given limitations on energy resources and the need to reduce CO_2 emissions, we are seeing the beginning of a full-fledged transition from conventional low-efficiency subcritical plants to high-efficiency plants in Asia's coal-fired power generation sector. J-POWER's goal is to contribute to the simultaneous realization of growth in Asia and the reduction of environmental burden through the use of Japan's clean coal technologies.

Volume of power generated in Asian developing nations (New policy scenario*)



Source: Compiled by J-POWER using data from IEA World Energy Outlook 2010
* Scenario that considers announced policy pledges, etc. around the world (including pledges without definite schedules for implementation)

Central Java Coal-fired Power Station Project, Indonesia

In partnership with ITOCHU Corporation and Indonesia's PT Adaro Energy Tbk., J-POWER was granted preferential negotiating rights for a new coal-fired IPP project put out for international tender by the Indonesian government in April 2011.

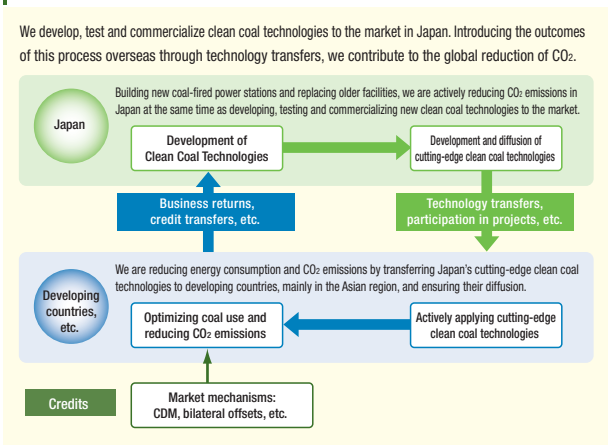
Indonesia (Java)

This will be Asia's largest-scale IPP project, involving the construction of a coal-fired power station with a total output of 2 GW in Central Java, and the conclusion of a 25-year long-term power purchase agreement (PPA) with Perusahaan Listrik Negara (PLN), Indonesia's state-owned power utility.

The project will use sub-bituminous coal produced in Indonesia as fuel, and will be Indonesia's first power station to employ large-scale boilers (1 GW × 2) using low environmental impact ultra-supercritical (USC) technologies.

J-POWER owns and operates coal-fired power stations generating approximately 8.4 GW domestically, and has made active efforts to expand its power generation business overseas. Making use of the high-efficiency coal-fired power generation technologies that J-POWER has fostered over many years and encompassing the construction, operation and maintenance of what will be Indonesia's largest and most advanced coal-fired power station, this project can be expected to contribute to the stable supply of power and the reduction of the burden on the environment in the nation, in addition to promoting the transfer and diffusion of advanced technologies. We believe that the project will also be able to serve as a model for the future deployment of high-efficiency coal-fired power generation technologies in the Asian region.

Cycle of reduction of CO_2 emissions on a global scale through introduction of high-efficiency coal-fired power generation (clean coal) technologies



Advancing Biomass Mixed Combustion

Japan has many still-untapped carbon neutral[*1] biomass energy sources (biological resources), such as forestry offcuts and sewage sludge. The most effective means of utilizing these resources is in mixed combustion of biomass fuel in coal-fired power stations (i.e., burning the biomass resources in boilers together with coal as fuel for the generation of power). Seeking to make use of these untapped energy sources and at the same time to reduce CO_2 emissions from coal-fired power generation, J-POWER Group is actively grappling with a variety of issues encountered as it pushes ahead with the manufacture of biomass fuels and their combustion in coal-fired power stations.

Status of biomass mixed combustion initiatives

Biomass resources	Wood		Sewage sludge		Carbonization of ordinary waste
	Chips	Pellets	Low-temperature carbonization	Oil desiccation	
Examples of biomass fuels					
Characteristics of biomass fuels	Scrap construction timber is chipped and used. It has about half the calorific value of coal.	Forest offcuts with a high moisture content are dried and turned into pellets. They have about 70% of the calorific value of coal.	Sewage sludge is carbonized at low temperatures in order to control the production of N_2O when it is burned and to produce a usable fuel. The fuel produces little odor and has 50-70% of the calorific value of coal.	Sewage sludge and waste cooking oil are mixed and heated to remove the water content and create fuel. This fuel has a calorific value about the same as that of coal.	General waste is carbonized to create a fuel able to be stored for long periods. It has about half the calorific value of coal.
Sites for the production of biomass fuel	Nagasaki City, Nagasaki Prefecture	Kobayashi City, Miyazaki Prefecture*	❶ Hiroshima City, Hiroshima Prefecture* ❷ Osaka City, Osaka Prefecture* ❸ Kumamoto City, Kumamoto Prefecture*	Fukuoka City, Fukuoka Prefecture	Under consideration
Mixed combustion in coal-fired power stations	Being conducted in J-POWER's Matsuura Thermal Power Station	Being tested in J-POWER's Matsuura Thermal Power Station	❶ and ❷: Scheduled for J-POWER's Takehara Thermal Power Station and other facilities ❸: Scheduled for J-POWER's Matsuura Thermal Power Station and Kyushu Electric Power's Matsuura Power Station	Being conducted in J-POWER's Matsuura Thermal Power Station	Under consideration

* Sites at which J-POWER is also involved in the manufacture of biomass fuel.

Promoting the Mixed Combustion of Forestry Offcut Biomass in Coal-Fired Power Stations

Looking towards the effective use of unused domestic abandoned forest thinnings and the development of renewable energy sources, and seeking to utilize them as fuel for the generation of power, in December 2009, J-POWER, in collaboration with the Miyazaki Prefecture Federation Forest Owners' Cooperative Association, established Miyazaki Wood Pellet Co., Ltd, a company devoted to the manufacture of wood pellet fuel, in Kobayashi City, Miyazaki Prefecture. The establishment of the company was supported by Miyazaki Prefecture's Forest Management Acceleration and Forestry Revitalization Project. To date we have proceeded with the construction of a wood pellet fuel manufacturing plant, which was completed and commenced operation in March 2011. The plant is Japan's largest, with an annual production capacity of 25,000 tons. Aiming to reduce CO_2 emissions from coal-fired power stations, we intend to burn the wood pellet fuel together with coal at our Matsuura Thermal Power Station in Nagasaki Prefecture.

Proving trials of mixed combustion of forestry offcut biomass with coal

Matsuura Thermal Power Station
(coal-fired)
- Total output: 2 GW (1 GW × 2)


Equipment for receiving and supplying wood pellet fuel

Miyazaki Wood Pellet Co., Ltd
(New company for the manufacture of wood pellets)
- Forestry offcut processing capacity
  ··· 80,000 m^3/year
- Pellet production capacity
  ··· 25,000 tons/year


Wood pellet fuel manufacturing plant

References

*1 Carbon neutral
Refers to the emission and absorption of equivalent levels of CO_2 in the life cycle. The amount of CO_2 emitted by the combustion of biomass is not counted, because it is equivalent to the amount of CO_2 absorbed by the biomass up to that point.

Initiatives in the Area of Sewage Sludge Fuel Manufacture

J-POWER Group is engaging in projects for the production of fuel from sewage sludge, aiming towards mixed combustion in J-POWER-owned coal-fired power stations.

Sewage sludge fuel manufacturing initiative in Hiroshima City

We will utilize the DBO[*1] method at the Hiroshima City-Seibu Water Resources Center, employing Japan's first low-temperature carbonization technology to process approximately 28,000 tons of sewage sludge per year, producing approximately 4,500 tons of fuel. This fuel will be used in coal-fired power stations operated by J-POWER. This initiative, scheduled to commence operation in April 2012, will reduce greenhouse gas emissions from the sewage treatment plant and the coal-fired power stations by an amount corresponding to approximately 15,100 t-CO_2 per year.

Sewage sludge fuel manufacturing initiative in Kumamoto City

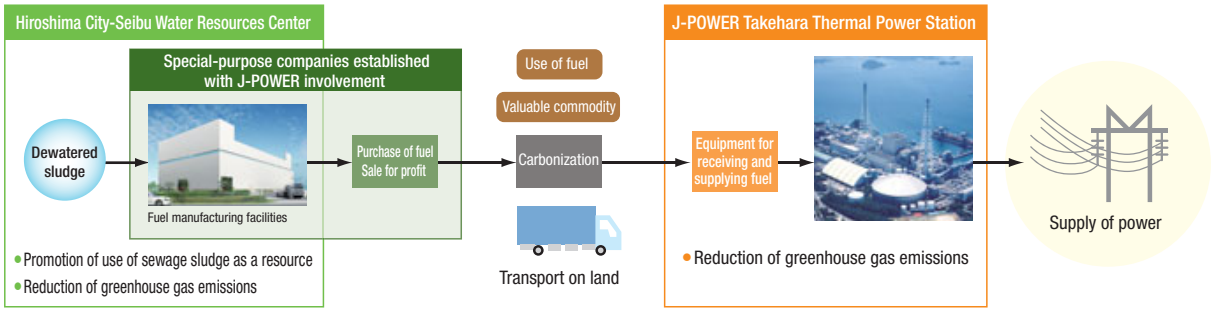
At the Kumamoto City-Nambu Purification Center, we will utilize the DBO method, as in Hiroshima, and will process approximately 16,000 tons of sewage sludge per year, producing approximately 2,300 tons of fuel. The fuel will be used in coal-fired power stations operated by J-POWER and Kyushu Electric Power Co., Inc. This initiative, scheduled to commence operation in April 2013, will reduce greenhouse gas emissions from the sewage treatment plant and the coal-fired power stations by an amount corresponding to approximately 6,300 t-CO_2 per year.

Sewage sludge fuel manufacturing initiative in Osaka City

Using the PFI (BTO[*2]) method in a first for Japan, at the Osaka City-Hirano Sewage Treatment Plant we will process approximately 49,000 tons of sewage sludge per year, producing approximately 8,600 tons of fuel. The fuel will be used in coal-fired power stations operated by J-POWER. This initiative, scheduled to commence operation in April 2014, will reduce greenhouse gas emissions from the sewage treatment plant and the coal-fired power stations by an amount corresponding to approximately 11,500 t-CO_2 per year.

Centers for manufacture of sewage sludge fuel and J-POWER coal-fired power stations

Overall flow of mixed combustion of sewage sludge fuel at coal-fired power station



List of J-POWER sewage sludge fuel manufacturing initiatives

Classification	Hiroshima	Kumamoto	Osaka
Location	Hiroshima City-Seibu Water Resources Center	Kumamoto City-Nambu Purification Center	Osaka City-Hirano Sewage Treatment Plant
Fuel manufacturing method	Low-temperature carbonization	Low-temperature carbonization	Low-temperature carbonization
Planned processing capacity (Dewatered sludge)	Approx. 28,000 t/year	Approx. 16,000 t/year	Approx. 49,000 t/year
Scheduled period of operation	20 years from April 2012	20 years from April 2013	20 years from April 2014
Reduction of greenhouse gas emissions			
❶ Sewage treatment plants	Approx. 8,700 t-CO_2	Approx. 2,900 t-CO_2	Approx. 1,500 t-CO_2
❷ Thermal power stations	Approx. 6,400 t-CO_2	Approx. 3,400 t-CO_2	Approx. 10,000 t-CO_2
❸ Total	Approx. 15,100 t-CO_2 (Corresponding to approx. 3,000 ordinary households)	Approx. 6,300 t-CO_2 (Corresponding to approx. 1,300 ordinary households)	Approx. 11,500 t-CO_2 (Corresponding to approx. 2,300 ordinary households)
Mixed combustion in coal-fired power stations	J-POWER Takehara Thermal Power Station Unit No. 2, etc.	J-POWER Matsuura Thermal Power Station Kyushu Electric Power Co., Inc. Matsuura Power Station	J-POWER coal-fired power stations (Takehara Unit No. 2, etc.)

References

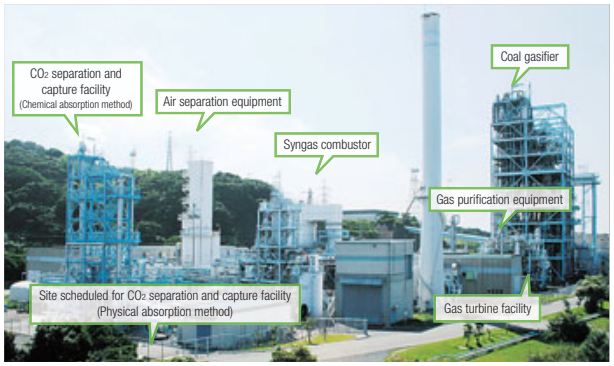
*1 DBO
A method in which the government procures funds and commissions private enterprise to Design, Build and Operate a facility.

*2 BTO
A method in which a private company Builds a facility using its own funds, Transfers ownership rights to the government following completion, and subsequently Operates the facility.

Conducting Research and Development of Next-Generation Low-Carbon Technologies

Seeking to develop technologies that will reduce the carbon emissions associated with sources of electric power, J-POWER Group is actively engaged in research and development programs concerning higher-efficiency coal-fired power generation technologies, CO_2 capture and storage technologies, and next-generation renewable energy generation technologies.

Research and Development of Integrated Coal Gasification Combined Cycle (IGCC) and CO_2 Capture Technologies



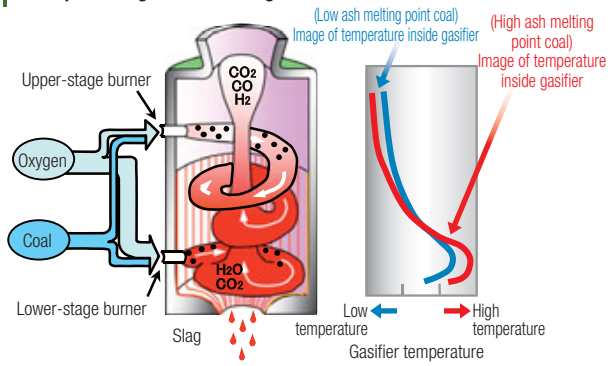
External view of EAGLE Pilot Plant test facility (Wakamatsu Ward, Kitakyushu City)

EAGLE*1 Project

The EAGLE Project is a technological development project that seeks to develop the world's cleanest coal technology, balancing the high-efficiency use of coal with the achievement of zero emissions of CO_2.

J-POWER has been vigorously pursuing the EAGLE Project in its Wakamatsu Research Institute Technology Development Center, located in Kitakyushu City, since FY 2002. The aim of the project is to convert coal into a combustible gas (consisting mainly of CO and H_2) through oxygen-blown gasification, and to realize an integrated coal gasification combined cycle (IGCC) system in which this gas is used to drive a gas turbine to produce electricity and, at the same time, the exhaust heat is used to drive a steam turbine to generate electricity. By means of this project, J-POWER has developed a coal gasifier that can be used with a wide range of coal types, and has also achieved the world's highest level of cold gas efficiency*2. In addition, we are proceeding with research and development to realize higher efficiency in the technology employed to separate and capture CO_2 from the coal gas produced by the coal gasification generation system through the application of a physical absorption method.

Conceptual diagram of EAGLE gasifier



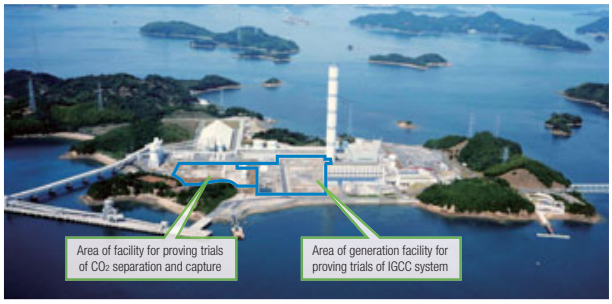
- Control of the temperature in the gasifier results in excellent gasification performance.
- The unit is applicable to many coal types, from low ash melting point to high ash melting point coals.

EAGLE Pilot Plant test facility specifications

Type of coal gasifier	Oxygen-blown two-stage entrained bed
• Volume of coal processed	150 tons/day
• Gasification pressure	2.5 MPa
• Gasification temperature	1,300 – 1,800°C
Capture method for CO_2 separation and capture unit	Chemical absorption / Physical absorption (Under construction)
• Volume of gas produced	1,000 m^3N/h
• CO_2 capture performance	Approx. 24 tons/day
• Purity of captured CO_2	99% or higher / 98% or higher
Type of generation	Gas turbine generation
• Output	8 MW

"Osaki CoolGen" Large-scale Proving Trials

In 2009, Chugoku Electric Power Co., Inc. and J-POWER jointly established a new company, Osaki CoolGen Corporation, in order to conduct large-scale proving trials based on the outcomes of the EAGLE Project and the findings it has produced, looking towards the commercial use of IGCC and CO_2 capture technologies. These proving trials are intended to examine the reliability, economic efficiency, and operability of a 170 MW oxygen-blown

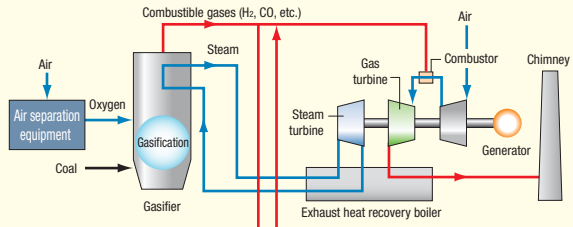


Plan of facility for proving trials
(Located in the compound of Chugoku Electric Power Co., Inc's Osaki Power Station in Hiroshima Prefecture)

Overview of system used in proving trials (Oxygen-blown integrated coal gasification combined cycle)

Integrated coal gasification combined cycle (IGCC*)

- Coal is gasified and converted into combustible gases (H_2, CO, etc.), and used as fuel for gas turbines.
- Produces steam using exhaust heat from gas turbines and heat from gasifier.



*IGCC: Integrated Coal Gasification Combined Cycle

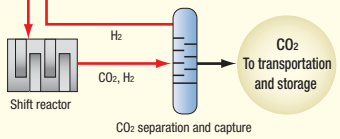
Technologies for CO_2 separation and capture

CO_2 separation and capture

- CO_2 is separated and captured following the conversion of CO in the combustible gas to CO_2 and H_2 via a shift reaction.

Shift reaction

- A catalytic reaction that produces CO_2 and H_2 when water vapor is added to CO.



References

*1 EAGLE
Coal Energy Application for Gas Liquid & Electricity
Development of multi-purpose coal gasification technology

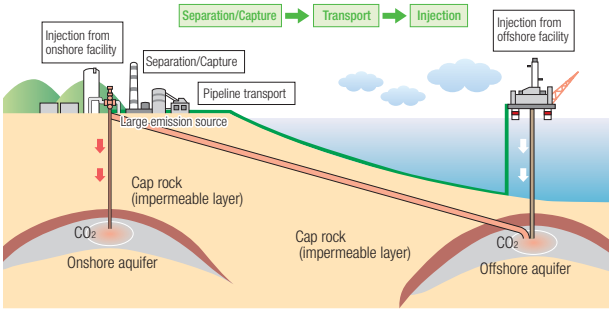
*2 Cold gas efficiency
Cold gas efficiency refers to the ratio of the calorific value of the syngas to the calorific value of the coal supplied to the gasifier. Used as an indicator of energy conversion efficiency, it is a representative value that expresses the rate of carbon conversion and coal gasification performance.

IGCC system (scheduled for commencement of use in 2017) and to examine through testing the feasibility of the latest CO_2 separation and capture technology (scheduled for commencement of use in 2021). On this basis, we are aiming towards the achievement of even greater efficiency through the realization of an integrated coal gasification fuel cell combined cycle (IGFC) technology, which will incorporate fuel cells in the oxygen-blown IGCC system. This series of technological development projects looks towards the realization of the "Cool Gen Project"*1 proposed in a report made by a government deliberative committee.

Research and Development of Carbon (Dioxide) Capture and Storage (CCS) Technologies

CCS technologies are technologies for the separation and capture of CO_2 from large-scale emission sources such as coal-fired power stations, and, following transportation, its stable storage deep underground (1,000 m or more). Capable of realizing large-scale reductions in CO_2 emissions, they are considered to be one of the more promising technologies in combating global warming. Based on our experience in the operation and maintenance of coal-fired power stations, we have adopted a user's perspective in conducting development programs to seek a method of CO_2 separation and capture suited to use in coal-fired power stations from both the technological and the economic perspectives, in addition to engaging in research that will shed light on the behavior of CO_2 in underground storage.

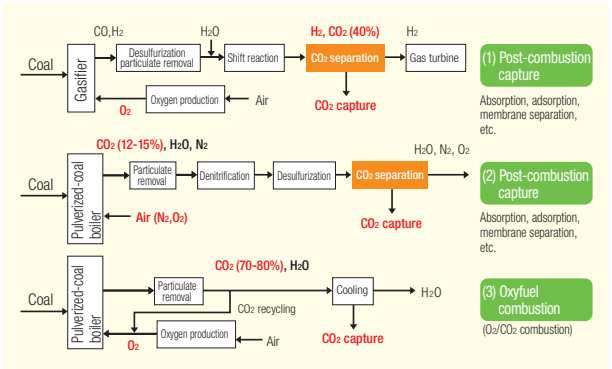
CCS Concept



Source: Reference material for March 14, 2006 meeting, Global Environment Committee, Central Environment Council

The three technologies listed below are available for the separation and capture of CO_2 emitted by coal-fired power stations. The EAGLE Project and Osaki CoolGen employ pre-combustion capture.

CO_2 Capture from Coal-Fired Power Generation



Study of an Integrated System for CO_2 Capture and Storage: The Callide Oxyfuel Combustion Project

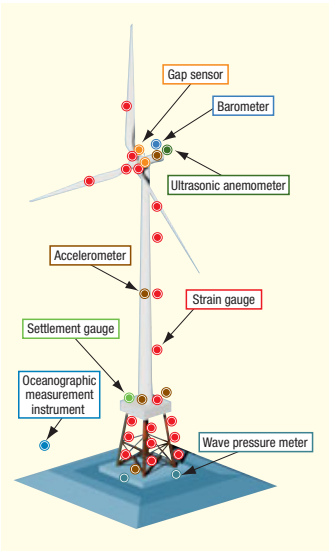
In oxyfuel combustion, oxygen is supplied to a pulverized coal-fired boiler instead of air in order to thicken the concentration of CO_2 in the exhaust gas, reducing the amount of energy required for CO_2 capture. J-POWER Group is participating in the Callide Oxyfuel Combustion Project being conducted at the Callide A Power Station (pulverized coal-fired, 30 MW) in Queensland, Australia. This project is conducting the world's first demonstration of an integrated system for the capture and underground storage of CO_2 using oxyfuel combustion technology. Reconstruction work is largely completed, and proving trials are scheduled to commence in 2012.

Callide A Power Station (During reconstruction work)

Research and Development of Offshore Wind Power Generation Technologies

Among available renewable energy sources, development of wind power has been pushed ahead due to its low generation cost and the comparative ease of siting facilities. Expectations are increasing for offshore wind power generation given higher wind speeds and a consequent reduced level of variation in output, the ability to construct larger-scale facilities, and the superiority of this form of generation from the perspective of the environment in comparison to land-based generation. Embedded offshore wind turbine developments are already in commercial use and have reached large scales, chiefly in Europe. However, Japan's severe environmental conditions, such as typhoons, high waves and lightning storms, in addition to the fact that we possess little data concerning meteorological and hydrographic conditions on the ocean, make it necessary to engage in a variety of technological developments to ensure that the design, construction, operation and maintenance of the facilities are tailored to Japan's natural environment.

Looking towards the realization of offshore wind power generation systems, J-POWER will conduct joint proving trials of a system employing 2 MW gearless wind turbines offshore from Kitakyushu City in Fukuoka Prefecture in collaboration with the New Energy and Industrial Technology Development Organization (NEDO). The project will be conducted from August 2011 to February 2015, and the participants are presently obtaining the necessary permissions and making preparations including system interconnections. At the same time, land-based test for upscaling the wind turbines will also be conducted using 2.7 MW gearless turbines, one class above those used in the off-shore test .



External view of offshore wind turbines

References

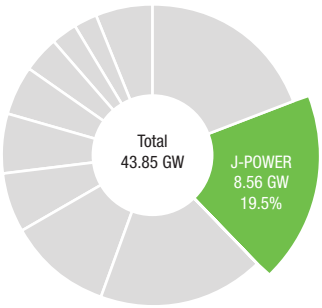
*1 Cool Gen Project
The Cool Gen Project is a plan proposed in June 2009 by the Clean Coal Subcommittee of the Mining Committee of the Advisory Committee for Natural Resources and Energy of the Ministry of Economy, Trade and Industry. The project seeks to promote research towards the realization of "zero-emission coal-fired generation" through the combination of IGCC, IGFC (which aims towards the ultimate form of coal-fired generation), and CO_2 capture and storage (CCS).

Expanding CO_2-Free Power Generation Facilities

J-POWER Group is working to curb CO_2 emissions by proceeding with the construction of nuclear power stations (see p. 11), providing a source of power that does not emit CO_2, and expanding its use of such renewable energy sources as hydro, wind, biomass, and geothermal power.

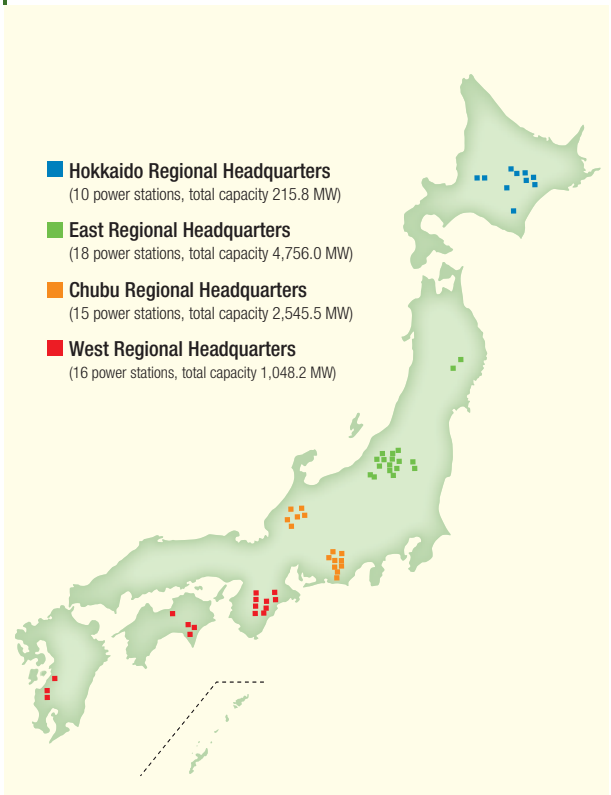
J-POWER Group's Hydropower

J-POWER Share of Japan's Installed Hydropower Capacity (as of April, 2011)



Note: Excludes home power systems.
Source: Agency for Natural Resources and Energy, Electric Power Statistics.

Location of J-POWER Hydropower Stations (Japan)



Hydropower generation utilizes the energy of falling water to turn a water turbine and generate electricity. The typical approach is to build a dam on the upper reaches of a river, storing the water necessary for generating power in the dam reservoir. Power output can easily be adjusted to match demand by altering the amount of water used; when no electricity is needed, the turbine is stopped and the water is stored up in the dam reservoir. In this way, water is converted to electricity with a minimum of waste.

In addition to being a precious, entirely domestic power source, hydroelectric power is a renewable source of energy that does not emit CO_2 during the process of power generation. Today, with measures to combat global warming as urgent necessity, we are observing an increase in the value of hydroelectric power.

J-POWER currently operates 59 hydropower stations across the country (see p. 62) with a combined capacity of 8.56 GW, consisting of almost 20% of the total installed capacity of Japan's hydropower facilities. In FY 2010, we sold 10,200 GWh of electricity through hydropower facilities, representing a reduction in CO_2 emissions of approximately 3.6 million t-CO_2.

J-POWER has more than a half-century of experience in the development, construction and operation of hydropower stations, from such large-scale facilities as Sakuma Power Station, which began operating in 1956, to our pumped-storage power stations,[*1] which are able to respond to fluctuations in peak demand by converting power to potential energy of water and storing it during periods of low demand.

J-POWER is working to increase the efficiency and reliability of aging hydroelectric power facilities by replacing their main electrical equipment with the latest technologies (see p. 63). Through these measures, we are striving to make effective use of hydropower, a renewable energy source, at the same time as ensuring a stable supply of power.

Hydroelectric Power Developments Presently Underway

In February 2011, J-POWER commenced work towards the construction of the Isawa No. 1 Power Station (maximum output 14.2 MW) on the right bank of the Isawa River directly below the Isawa Dam, a special multipurpose dam being constructed by the Ministry of Land, Infrastructure, Transport and Tourism in Oshu City, Iwate Prefecture. We also intend to jointly construct the Isawa No. 3 Power Station (maximum output 1.5 MW) with the Iwate Prefectural Enterprise Bureau. The power generated by these facilities will be supplied to Tohoku Electric Power Co., Inc. using a newly constructed transmission line of approximately 3.3 km in length, which will be co-owned by the Iwate Prefectural Enterprise Bureau and J-POWER.

The Hokkaido Development Bureau is regrading the existing Katsurazawa Dam (a special multipurpose dam) in Mikasa City, Hokkaido Prefecture, as part of the Ikushunbetsu River Comprehensive Development Project. J-POWER intends to participate in this project by scrapping its existing hydropower station on the river and constructing the New Katsurazawa Power Station (maximum output 16.8 MW).

We are also working to ensure that hydropower generation makes effective use of the river maintenance discharge conducted to protect the riverine environment downstream from the existing dam.

References

*1 Pumped-storage power station
Pumped-storage power generation is a method of hydropower generation in which water is pumped from a lower reservoir to a higher reservoir during periods of low demand such as late at night or weekends, and then released back into the lower reservoir during periods of high demand.

J-POWER Group's Hydropower Initiatives ~Half a Century of Large-Scale Hydroelectric Generation~

J-POWER was established in 1952 to engage in large-scale and difficult hydropower developments in order to alleviate the postwar energy shortage. Over the course of the half-century that has passed since then, J-POWER has established 59 hydropower stations across the country. Between 2009 and 2011, three of our large-scale hydroelectric stations, the Tagokura and Okutadami Power Stations in Fukushima Prefecture and the Miboro Power Station in Gifu Prefecture, successively celebrated 50 years of operation.

Below, we introduce these three large-scale hydroelectric power stations, looking back on J-POWER's initiatives in the construction and operation of hydropower facilities.

J-POWER Group's Hydropower Initiatives

Commencement of operation	Facility name		Maximum output (kW)
Jan. 1954	Isawa No. 1	Iwate	14,600
Dec. 1954	Towa	Iwate	27,000
Sep. 1955	Nishiyoshino No. 2	Nara	13,100
Oct. 1955	Ashoro	Hokkaido	40,000
Jan. 1956	Nukabira	Hokkaido	42,000
Apr. 1956	Sakuma	Shizuoka	350,000
Nov. 1956	Nishiyoshino No. 1	Nara	33,000
Sep. 1957	Katsurazawa	Hokkaido	15,000
Oct. 1957	Kumaoi	Hokkaido	4,900
Jan. 1958	Meto No. 1	Hokkaido	27,400
Jan. 1958	Akiba No. 1	Shizuoka	45,300
Feb. 1958	Kuromatagawa No. 1	Niigata	61,500
Feb. 1958	Suezawa	Niigata	1,500
Jun. 1958	Akiba No. 2	Shizuoka	34,900
Sep. 1958	Setoishi	Kumamoto	20,000
Oct. 1958	Meto No. 2	Hokkaido	28,100
May 1959	Tagokura	Fukushima	395,000
Jul. 1960	Nagayama	Kochi	37,000
Oct. 1960	Totsugawa No. 1	Nara	75,000
Dec. 1960	Okutadami	Fukushima	560,000
Jan. 1961	Miboro	Gifu	215,000
Sep. 1961	Owase No. 2	Mie	25,000
Dec. 1961	Taki	Fukushima	92,000
Jan. 1962	Totsugawa No. 2	Wakayama	58,000
Apr. 1962	Owase No.1	Mie	40,000
Sep. 1962	Hombetsu	Hokkaido	25,000
Jan. 1963	Futamata	Kochi	72,100
Nov. 1963	Otori	Fukushima	182,000
Dec. 1963	Miboro No. 2	Gifu	59,200
Jan. 1964	Kuromatagawa No. 2	Niigata	17,000
Sep. 1964	Ikehara	Nara	350,000
Oct. 1964	Sendaigawa No. 2	Kagoshima	15,000
Jan. 1965	Horoka	Hokkaido	10,000
Feb. 1965	Sendaigawa No. 1	Kagoshima	120,000
Jun. 1965	Yanase	Kochi	36,000
Jul. 1965	Nanairo	Wakayama	82,000
Aug. 1965	Komori	Mie	30,000
May 1968	Yugami	Fukui	54,000
May 1968	Nagano	Fukui	220,000
Dec. 1968	Otsumata	Fukushima	38,000
May 1969	Misakubo	Shizuoka	50,000
Nov. 1971	Ogamigo	Gifu	20,000
Feb. 1972	Sameura	Kochi	42,000
Nov. 1972	Shintoyone	Aichi	1,125,000
Jun. 1973	Numappara	Tochigi	675,000
Apr. 1977	Funagira	Shizuoka	32,000
Jul. 1978	Okukiyotsu	Niigata	1,000,000
Aug. 1979	Tedorigawa No.1	Ishikawa	250,000
Jul. 1982	Sakuma No. 2	Shizuoka	32,000
Jun. 1985	Hayakido	Nagano	11,200
Dec. 1985	Aburumagawa	Niigata	5,100
Nov. 1987	Kumaushi	Hokkaido	15,400
Apr. 1988	Shimogo	Fukushima	1,000,000
Jul. 1989	Tadami	Fukushima	65,000
Aug. 1991	Akiba No. 3	Shizuoka	46,900
Apr. 1994	Kurotani	Fukushima	19,600
Jun. 1996	Okukiyotsu No. 2	Niigata	600,000
Jul. 1997	Satsunaigawa	Hokkaido	8,000
Jun. 2003	Okutadami (Maintenance discharge)	Fukushima	2,700

Tagokura Power Station

(Fukushima Prefecture)

Construction of the Tagokura Power Station commenced in 1955, and the station began operation in 1959. The dam's total storage capacity of 494 million m^3 and the power station's total output of 395 MW make this the second-largest hydroelectric dam in Japan, excluding dams used for pumped-storage generation.

Half a century has elapsed since the station commenced operation, and at present we are engaged in a comprehensive upgrade of its main equipment, including water turbines and generators, in order to increase the reliability of the station and the efficiency of the generating equipment. (See p. 63.) Upgrades of three of the station's four generators were completed by FY 2010, and the remaining generator is scheduled for upgrade in 2012. When the upgrade work is completed on all four generators, the station's maximum output will increase from 380 MW to 400 MW.

Okutadami Power Station

(Fukushima Prefecture)

Construction of the Okutadami Power Station commenced in 1954. The construction encountered difficulties including heavy snows in winter and problems in transporting materials, and took six years to commence operation of Units No. 1-3 in 1960.

Following this, a fourth unit was constructed in 2003, giving the station four generators for a maximum output of 560 MW, the highest for a standard hydroelectric facility in Japan (excluding pumped-storage facilities). River maintenance discharges are carried out in order to restore the flow of the river at the outlet of the Okutadami Dam, and in 2003, an additional generation facility was constructed to allow us to make effective use of its maintenance discharge, enabling us to generate a further 2.7 MW. (See the bottom of the chronological table at left.)

Miboro Power Station

(Gifu Prefecture)

Construction of the Miboro Power Station commenced in 1957, and the station began operation in 1961. By contrast with the Okutadami and Tagokura Dams, which are concrete gravity dams, the Miboro Dam is a rockfill dam, constructed by piling and compacting naturally occurring earth and rocks. The power station is located 210 m directly below the dam, and produces 215 MW of power using two turbines. This power is supplied to the Kansai region. When the station was constructed, two very old cherry trees growing in the area that would be flooded by the reservoir were transplanted to the side of the dam lake at the suggestion of Tatsunosuke Takasaki, the first president of Electric Power Development Co., Ltd. Now known as the Shokawa Sakura, the trees produce beautiful blossoms in spring. (See p. 50.)

Comprehensive Upgrades of Hydroelectric Facilities

J-POWER is upgrading all of the main equipment at its aging hydroelectric power facilities. We are working to effectively exploit this precious, entirely domestic, and renewable energy source by comprehensively upgrading water turbines, generators, main transformers and other equipment, extending the lives of the facilities and increasing the reliability of equipment. In addition, we are improving generation efficiency and increasing maximum output and the volume of power generated through the application of optimized designs based on the very latest design technologies.

At the Tagokura Power Station in Fukushima Prefecture, we are proceeding with a plan that will see us successively upgrade the main electrical equipment in each of the facility's four units in the eight-year period between 2004 and 2012. Work has already been completed on Units No. 2 – 4. We are moving ahead with work on Unit No.1, and expect to have completed all work on the station by the end of May 2012. The upgrade work is being conducted on the basis of a plan that will increase the maximum output of each unit by 5 MW, increasing the total output of the facility from 380 MW to 400 MW.

We also carried out comprehensive upgrade work at the Nukabira Power Station in Hokkaido from 2006 to 2009, upgrading the main generation equipment (water turbines, generators and auxiliary equipment) in Units No. 1 and 2. This work was successfully completed, and the station is now in normal operation. We will continue to work to increase the reliability of our facilities, reviewing plans for comprehensive upgrade work at further sites in addition to other measures.

Tagokura Power Station (Fukushima Prefecture): Comprehensive upgrade work

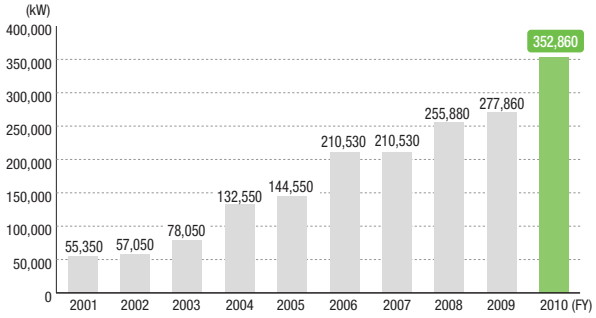
Wind Power Development

Wind power is a clean, renewable energy source that emits no CO_2 in the electricity generating process. In resource-poor Japan, expectations are high for this valuable, 100% domestic energy source. Making maximum use of know-how accumulated through decades of experience building, operating, and maintaining hydroelectric and thermal power stations and transmission lines, J-POWER Group is positioned to handle every phase of a wind power project, from the initial study of wind conditions and project planning to construction, operation, and maintenance.

In February 2011, we commenced commercial operation of the Awara Wind Farm (10 generators, 20 MW) and the Hiyama Kogen Wind Farm (14 generators, 28 MW), giving us a total of 18 wind farms nationwide (208 generators, 352.86 MW), representing a share of approximately 13% of Japan's total installed wind power capacity (prorated according to ownership share). In FY 2010, we sold approximately 440 GWh of wind power, for an emissions reduction of approximately 160 kt-CO_2. Overseas, operation of the Zajaczkowo Windfarm in Poland (24 generators, 48 MW) is proceeding smoothly.

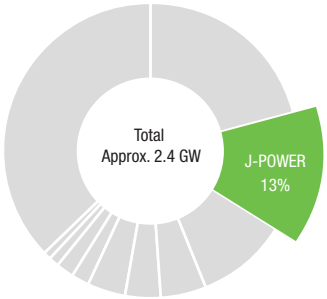
Awara Wind Farm (Fukui Prefecture)

Growth in J-POWER Group Installed Wind Power Capacity (Japan)



Note: Figures represent combined installed capacity of facilities in which J-POWER Group has an ownership interest, non-prorated.

Share of domestic wind power facilities (As of end of March 2011)



Note: Based on a survey by the Japan Wind Power Association (prorated according to investment share)

Voice Isawa Hydro Project Construction Office

Trying to Save Electricity! ~Overcoming the Effects of the Great East Japan Earthquake – Tohoku and Iwate, Keep on Trying!~

With the construction of the Isawa Dam by the Ministry of Land, Infrastructure, Transport and Tourism, we have decommissioned the Isawa No. 1 Power Station, our first power station, and we are in the process of construction of a new Isawa No. 1 Power Station on the right bank of the river directly below the dam. The new station is scheduled to commence operation in July 2014. The site for the station is in Oshu City, located inland in the south of Iwate Prefecture, in an area with an abundant natural environment rich in greenery, where an alluvial fan spreads out from the Yakeishi Mountain Range.

The area is famous for the Nambu iron wind bells produced there as a traditional craft product, and during the summer period its train stations are decorated with large numbers of the bells, welcoming visitors with their beautiful sound and relieving the summer heat. Around 20 km to the south, the visitor will find the World Heritage-listed cultural legacy of Hiraizumi, such as the Chusonji and Moutsuji temples, offering an atmosphere rich in history.

At this site steeped in history and blessed with natural beauty, we are actively working to protect the surrounding environment, for example by saving energy through using less lighting and turning off lighting when it is not needed, and conducting clean-up activities along the routes taken to reach the site. The Great East Japan Earthquake on March 11 caused enormous damage across a wide area of northeastern and eastern Japan. We are confident that this construction project, resulting in a "New" Isawa No. 1 Power Station reborn after half a century, will make a significant contribution to the recovery of the disaster-hit regions.

Michiyo Sato and Chieko Sugawara
General Affairs Group,
Isawa Hydro Project Construction Office, J-POWER

Locations of J-POWER Wind Power Facilities (Japan)


Tomamae Winvilla Wind Farm (Tomamae, Hokkaido)


Aso-Nishihara Wind Farm (Nishihara, Kumamoto)


Koriyama-Nunobiki Kogen Wind Farm (Koriyama, Fukushima)


Irozaki Wind Farm (Minami Izu, Shizuoka)

Geothermal Power

Geothermal energy is a renewable and entirely domestically produced energy, and one that produces virtually no emissions of CO_2. In March 1975, we commenced operation of the Onikobe Geothermal Power Station (Osaki, Miyagi Prefecture) in order to make effective use of this precious form of energy, and the station has been in continuous operation for 36 years.

We are also proceeding with surveys towards new geothermal developments in Japan and other countries. In April 2010, we established Yuzawa Geothermal Co. Ltd. together with Mitsubishi Materials Corporation and Mitsubishi Gas Chemical Company, Inc., and we have conducted geothermal surveys and studies of the feasibility of new geothermal developments in promising regions of Akita Prefecture. In the same year, we also conducted fumarole tests in surveyed wells. By effectively exploiting geothermal energy, J-POWER Group is seeking to contribute to further reductions in CO_2 emissions.

Unfortunately, on October 17, 2010 an accident involving the eruption of hot water from a hole in the ground occurred at the Onikobe Geothermal Power Station. Our profound sympathies go out to everyone who has been affected by this accident, and we pray for the repose of the soul of the man who was killed, and for the rapid recovery of the injured man. As we move forward, we will not forget this incident, and we will put safety measures in place and work to ensure that no similar accidents ever occur again, remaining firm in our efforts to exploit geothermal power.

Solar Power

Solar Power

In March 2008 operations began at Hibikinada Solar Power Station, which was built on reclaimed land in the Hibikinada district of Kitakyushu's Wakamatsu Ward. This solar power system, approved by the New Energy and Industrial Technology Development Organization (NEDO) in FY 2007 as a Field Test Project on New Photovoltaic Power Generation Technology, has an installed capacity of 1,000 kW (1 MW). It consists of 5,600 solar cell modules of the polycrystal silicon type, each measuring 1.29 by 0.99 m. The field test is collecting a variety of actual-load operating data to enable evaluation of a new type of control system using a high-capacity power conditioner. In one year, the facility generated about 1,200 MWh of electricity, for an emissions reduction benefit equivalent to approximately 420 t-CO_2. From FY 2011, we plan to install a concentration and tracking photovoltaic system with an output of 150 kW, the largest facility of this type in Japan.

Hibikinada Solar Power Station (Kitakyushu)

Environmental and Recycling Programs

Omuta Recycle Power Station

Since December 2002 J-POWER Group has been operating a highefficiency waste-power station in Omuta, Fukuoka Prefecture, that uses refuse-derived fuel (RDF) made by shredding, drying, and pelletizing nonindustrial waste.

Omuta Recycle Power Station (Fukuoka Prefecture)

Upgrade and Operation of the Narumi Waste Incineration Power Generation Plant, Nagoya

J-POWER Group is also participating in a project involving gasification power generation using non-industrial waste. At the Narumi Waste Incineration Power Generation Plant in Nagoya, waste is not only used to generate power, but also reduced to molten slags and metals that can be recycled. The facility began operating in July 2009.

Narumi Waste Incineration Power Generation Plant, Nagoya

Efforts to Conserve Energy / Utilization of the Kyoto Mechanisms and Other Measures

Seeking to reduce emissions of CO_2 and other environmentally damaging substances, J-POWER Group is actively working to conserve energy through measures such as the adjustment of the air conditioning temperature and the intensity of lighting in its offices, and the realization of increased efficiency in the transportation of raw materials. We also appropriately manage other substances, including greenhouse gases other than CO_2 (SF_6, HFC, PFC, N_2O, CH_4) and substances that deplete the ozone layer (designated CFCs and halons), and control any emissions to the greatest extent possible. In order to contribute to the reduction of CO_2 emissions on a global scale, we are also proceeding with activities making use of Kyoto mechanisms and other frameworks, in addition to supporting the government's efforts towards the creation of new frameworks, such as the bilateral offset mechanism.

Stepping Up Energy Conservation

Curbing Energy Use at the Office and at Home

J-POWER Group's business sites follow such energysaving policies as lights off during lunch break, reduced power supply to equipment on standby, and environmentally-friendly driving. In addition, we make a point of selecting equipment meeting strict specifications for energy efficiency whenever we build new office buildings or replace company vehicles. We have also commenced activities using the Ministry of the Environment's "Household Eco-Account Book", as a means of encouraging our employees to save energy and resources in their own homes.

In addition, we have put the following measures in place in response to the Great East Japan Earthquake: ❶ Using higher settings for air conditioning systems during the summer; ❷ Reducing lighting; ❸ Using energy-saving settings for PCs and other office equipment; and ❹ Encouraging employees to take consecutive leave during summer.

In order to broaden the scope of these measures, we are also calling for energy conservation in employee dormitories, company housing and other company-related accommodation.

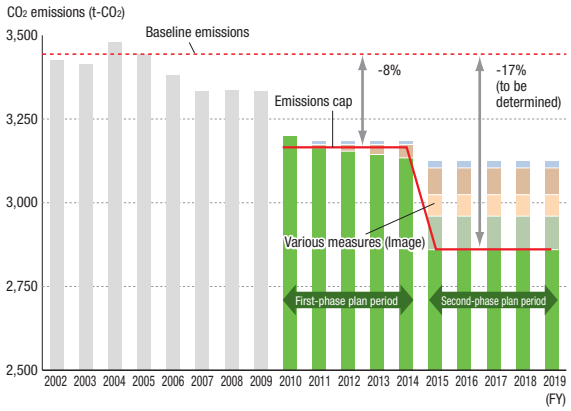
http://www.eco-family.go.jp/index.html (Japanese only)

Responses to the Tokyo Metropolitan Environment Security Ordinance

The Tokyo Metropolitan Government Cap-and-Trade Program established by the Tokyo Metropolitan Environment Security Ordinance commenced in April 2010, and J-POWER's Headquarters, located in Ginza in Tokyo's Chuo Ward, has been designated as an Office Building for the Implementation of Special Measures to Combat Global Warming (February 2010). J-POWER has consistently worked to conserve energy in its Headquarters building, and the introduction of operational measures such as increasing the number of days when employees are required to leave the office at a fixed time and reducing the use of lighting, in addition to equipment-related measures including the installation of a heat pump hot water system (EcoCute), the application of inverter control of water supply pumps, and the use of energy-saving V-belts enabled us to reduce CO_2 emissions by more than 100 t-CO_2 in FY 2010 against the previous fiscal year.

In future, we intend to implement further operational and equipment-related measures, which together with Tokyo small and medium-sized office-credits obtained from the measures put in place by J-POWER Group companies and the results of other initiatives, will enable us to satisfy the obligations set out in our First-phase Plan period.

Emissions and related measures at J-POWER Headquarters during First-phase and Second-phase Plan periods (Image)



Support for Promotion of Energy-saving Measures in Developing Countries

In addition to curbing emissions of GHG, the introduction of energy conservation measures is becoming increasingly important in developing countries, where the energy supply and demand situation is expected to become increasingly severe in future. J-POWER is supporting the introduction of energy conservation measures in developing countries, chiefly on the basis of commissions from the Japan International Cooperation Agency (JICA). In FY 2010, J-POWER provided information on Japanese energy conservation policies, offered support for the formulation of energy conservation policies and the training of personnel, conducted pilot energy conservation projects, created software to promote the conservation of energy, supplied energy-related diagnostic technologies and upgraded equipment, and conducted training programs and workshops for the governments of Sri Lanka, Indonesia, and 13 Central and South American countries. In the future, we will go on contributing to energy conservation and the reduction of CO_2 emissions in developing countries by means of activities of this type.

JICA Indonesia: Training in Japan

District Heating Projects in the Middle East

J-POWER has joined together with Sumitomo Corporation and the United Arab Emirates (UAE)-based company Tabreed to establish Sahara Cooling Limited, and will take part in a district cooling project in the UAE. J-POWER

has already provided consulting services for district heating projects in Japan and overseas, and we are building on that experience together with our expertise in the design, management, maintenance and operation of hydroelectric and thermal power stations, to improve the operating stability and increase the efficiency of the system's cooling plants.

At present, the UAE district cooling project involves six cooling plants with a total capacity of 54,500 RTs[*1]. District cooling helps save energy by centralizing the thermal energy source for greater efficiency and by permitting load leveling among multiple users. Tabreed has estimated that by shifting to a district cooling system, the UAE could cut energy consumption by 55% compared with the use of individual cooling units. With demand recently growing in the UAE and neighboring countries for environmentally friendly, energysaving district cooling systems, J-POWER plans to expand its Middle East operations and to continue taking part in projects designed to reduce the burden on the environment.

Interior view of heat supply plant

Measures to Curb Greenhouse Gases Other than CO_2

The Kyoto Protocol (see p. 88) covers five greenhouse gases in addition to CO_2. Where emissions by the electric utility industry are concerned, the contribution of these other gases to global warming is about 1/310 that of CO_2.*

Measures for Reducing Emissions of Other Greenhouse Gases

Gas	Applications and measures for reducing emissions
Sulfur hexafluoride (SF_6)	Used for insulation in gas insulation equipment. J-POWER Group works to reduce emissions through rigorous recovery and reuse during inspection and disposal. In FY 2010, our rate of recovery and reuse was 99%.
Hydrofluorocarbons (HFCs)	Used as refrigerant in air-conditioning equipment, etc. Their use is expected to increase as they are adopted to replace CFCs regulated in Law Concerning the Protection of the Ozone Layer. J-POWER Group works to reduce HFC emissions through cooperative efforts to recover and reuse such gases, as well as preventing leaks during installation and repair.
Perfluorocarbons (PFCs)	PFCs may be used as refrigerants and insulating agents for transformers, but are not stocked by J-POWER Group.
Nitrous oxide (N_2O)	N_2O is released by the combustion of fossil fuels, but we are working to minimize emissions through measures such as increasing the efficiency of thermal power stations. (In FY 2010, emissions totaled approximately 1,650 t.)
Methane (CH_4)	As CH_4 concentrations in flue gases from thermal power stations are below average atmospheric concentrations, emissions are effectively zero.

One of these, SF_6, is a gas which displays excellent insulating performance and is safe and stable. It is used in the electricity industry in gas circuit breakers, gas-insulated switchgears, and other devices. In order to limit the release of SF_6 into the atmosphere, we have established as targets the achievement of a 97% or higher recovery rate when equipment is inspected, and a 99% or higher rate when equipment is retired, and we are working consistently to recover and reuse the substance. In 2010, our recovery rate during both inspection and retirement of equipment was 99%.

* Federation of Electric Power Companies of Japan, Environmental Action Plan by the Japanese Electric Utility Industry (September 2010).

Protecting the Ozone Layer

The ozone layer in the upper stratosphere (about 20 – 40 km above the earth) plays an important role in protecting life on earth by absorbing harmful ultraviolet rays in sunlight. However, there are concerns that when released into the environment, specified chlorofluorocarbons (CFCs) and halons, which are widely used as refrigerants and cleaning agents, reach the stratosphere and there, through exposure to powerful ultraviolet rays, produce chlorine and bromine that can destroy the ozone layer. This will impact seriously on human health and the earth's ecosystems. For this reason, the volume of production and use of these substances has been restricted internationally.

In J-POWER Group, we periodically monitor our stocks and consumption of these substances and are working to limit their emission through proper management and control. (see p. 84)

About Specified Chlorofluorocarbons and Halons

Ozone layer-depleting substances are chemically stable substances containing chlorine or bromine in their molecules, such as specified chlorofluorocarbons and halons. Like HFCs, PFCs, and SF_6, these substances are also strong greenhouse gases.

The Ozone Layer Protection Law (the Law concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures) terms substances that are regulated based on the Montreal Protocol "Designated Substances," and stipulates a phased reduction of the volume of production and consumption of these substances in accord with the regulation schedule. As a result, production of halons was completely phased out at the end of 1993, and production of specified chlorofluorocarbons at the end of 1995. The production of other ozone layer-depleting substances is also being successively phased out.

Stocks and consumption of specified chlorofluorocarbons and halons

Category	End of FY 2010 (tons)		Use
Specified chlorofluorocarbons	Stock: 1.0	Consumption: 0.0	Refrigerant
Halons	Stock: 4.6	Consumption: 0.0	Fire extinguishers
Other chlorofluorocarbons, etc.	Stock: 11.9	Consumption: 0.2	Refrigerant
Total	Stock: 17.5	Consumption: 0.1	———
Alternative chlorofluorocarbons (HFCs)	Stock: 12.0	Consumption: 0.1	Refrigerant

References

*1 RT (refrigeration ton)
A unit used to measure refrigerating capacity. 1 RT is the thermal energy necessary to freeze a ton of water at 0°C in 24 hours.
1 RT is also about the capacity needed to cool the average Japanese house.

Utilization of the Kyoto Mechanisms and Other Measures

Overview of CDM Project Development

The Kyoto Protocol (see p. 88) sets numerical targets to reduce greenhouse gas emissions for industrialized nations. Under the protocol, the Kyoto Mechanisms (see p. 88) (CDM, JI, and emissions trading) have been established as tools by which industrial nations can achieve their targets in an economically rational manner while providing technical and financial support for greenhouse gas emissions reduction in developing countries.

As of the end of March 2011, of the CDM and JI projects that J-POWER Group is involved in developing, 14 had been registered as CDM projects, and one as a JI[*1] project.

Outline of Clean Development Mechanism

Clean Development Mechanism (CDM)
(Kyoto Protocol, Article 12)

A system by means of which industrialized countries and developing countries engage in joint GHG emissions reduction projects, and the industrialized countries (the investing countries) are able to make the reductions achieved accountable towards the achievement of their own emissions reduction targets.

CDM/JI projects that J-POWER Group is involved as a Project Participant (registered projects)

CDM/JI	Country	Project name / details
CDM	Chile	Graneros Plant Fuel Switching Project / Fuel switching
		Metrogas Watt's Alimentos Package Cogeneration Project / energy efficiency
	Colombia	La Vuelta and La Herradura Hydroelectric Project / Use of renewable energy
	Brazil	Aquarius Hydroelectric Project / Use of renewable energy
		Caieiras landfill gas emission reduction / Recovery and reduction of methane gas from landfill
	China	Hydroelectric power: Sichuan Province (2 projects), Shanxi Province, Yunnan Province, Xinjiang Uighur Autonomous Region (1 project each) / Use of renewable energy
		Recovery of waste heat from Jiangsu cement plant / Waste heat recovery and power generation
		Methane recovery project in Shaanxi Province / Recovery of biogas and power generation
		Low pressure gas recovery in Shandong Province (2 projects) / Recovery of exhaust gas from oil refinery and use for heating
JI	Hungary	Recovery of methane from hot spring / Cogeneration using untapped energy source

Major Activity in FY 2010

● Participation in CDM/JI Projects

In FY 2010, we had a total of five projects (one hydropower project in each of Sichuan Province, Yunnan Province, and the Xinjiang Uighur Autonomous Region, and two low pressure gas recovery projects in Shandong Province) registered as CDM projects by the CDM Executive Board.[*2]

We will also continue to follow up CDM/JI projects that have been registered, including projects for the use of renewable energies such as hydropower and projects for the effective use of methane gas produced by hot springs conducted in Central and South American, Asian and Eastern European countries.

Low Pressure Gas Recovery Project in Shandong Province (China)

Shaanxi Province Methane Recovery (China)

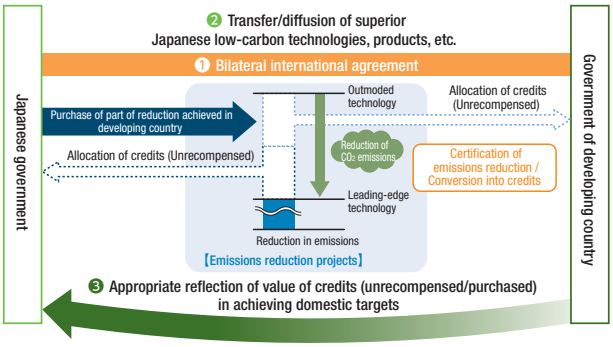
● Measures to Obtain Domestic Carbon Credits

The domestic credits system in Japan is a system under which the GHG emissions reductions achieved by small and medium-sized enterprises and other organizations as a result of the provision of technologies, funding and other assistance by larger companies are certified, and are able to be used towards the achievement of the emissions reduction targets for those larger companies set in voluntary action plans and trial reductions trading schemes. J-POWER has had two projects registered under this system to date. In FY 2010, credits totaling 143 t from these projects were certified. We will continue to actively seek out opportunities for CO_2 reduction projects in Japan.

Bilateral Offset Mechanism

The bilateral offset mechanism is a new mechanism by means of which the contributions of companies supplying Japan's world-leading low-carbon technologies, products, infrastructure and production equipment are appropriately assessed and can then be converted to reductions of GHG emissions in Japan. Looking towards the conclusion of bilateral or multilateral agreements, the Japanese government is currently attempting to originate concrete emissions reduction projects that can be conducted with developing countries and promoting the establishment of such projects, in addition to giving consideration to the best means of implementing the transfer and deployment of technologies, establishing methods of evaluating contributions, and creating financing and other systems for project implementation. J-POWER Group is supporting these efforts, and is contributing to the development of this mechanism.

Bilateral Offset Mechanism



References

*1 JI
Joint Implementation. A mechanism that allows Annex I countries to jointly conduct GHG emissions reduction projects, and allot the reductions between them. Reductions achieved between 2008 and 2012 are the subject of Joint Implementation.

*2 CDM Executive Board
The organization that manages and oversees CDM projects. Among other functions, it is responsible for registration of CDM projects, and accreditation, temporary suspension of accreditation, termination of accreditation and reaccreditation of designated operational entities.

Efforts Relating to Local Environmental Issues

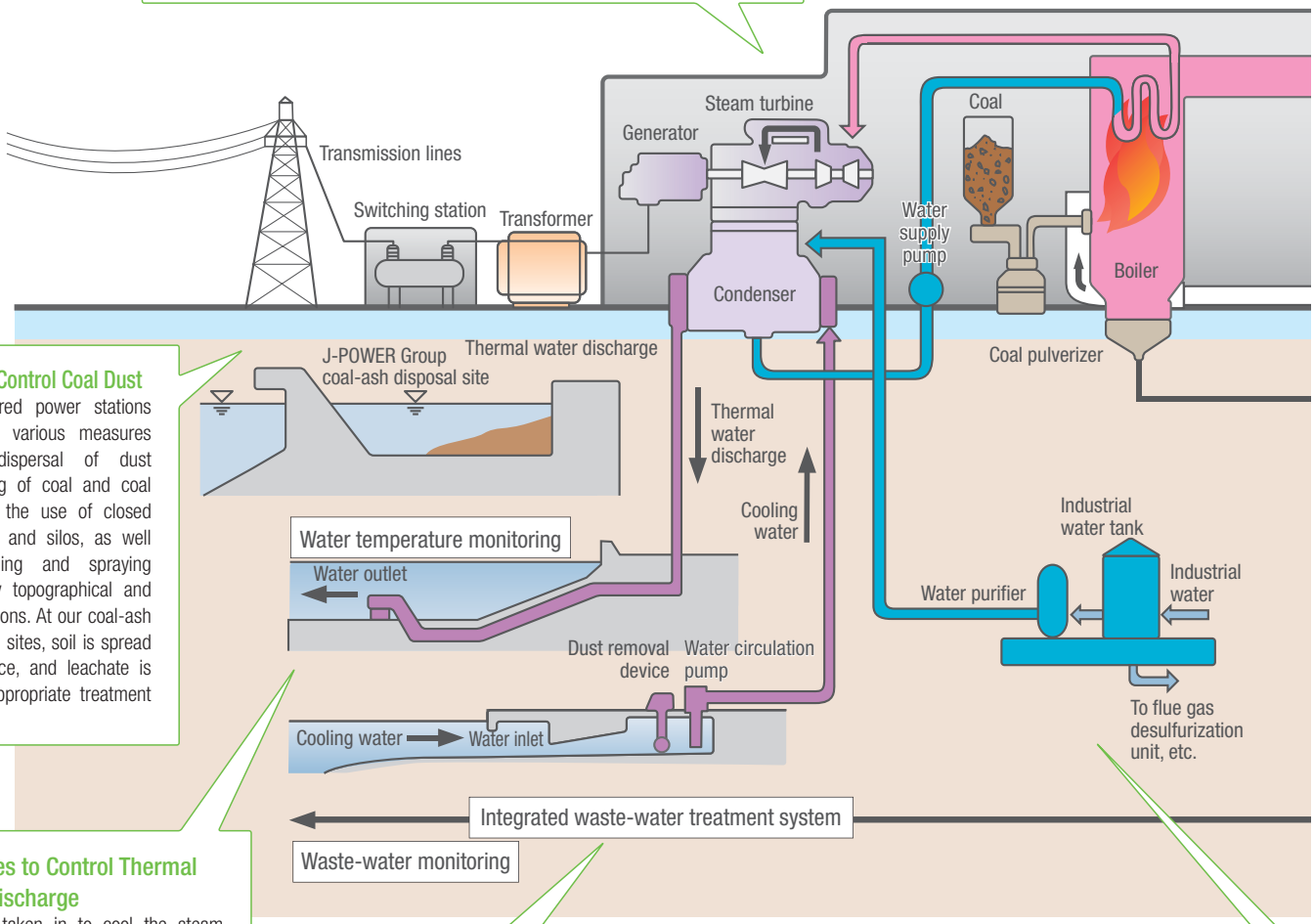
J-POWER Group recognizes that protecting the local environment, including maintaining biodiversity, and ensuring the safety and preserving the living environment of local residents forms the foundation for harmony with local communities, and therefore strives to function in harmony with the local environment, for example by taking measures to minimize the environmental impact of our operations.

Environmental Measures at Coal-Fired Power Stations

Seeking to minimize impact on the local environment from the operation of our coal-fired power stations, J-POWER Group employs the latest environmental technology and know-how to prevent air and water pollution, noise and vibration, and other harmful effects.

Noise and Vibration Control

We work to prevent noise and vibration pollution by keeping such noise- and vibration-emitting equipment as boilers, turbines, and exhaust fans inside buildings. For outdoor equipment, we install soundproof covers and sound barriers as needed. Noise and vibration levels are periodically measured at the boundaries of our sites to ensure that they meet regulatory standards.



Measures to Control Coal Dust

At our coal-fired power stations we implement various measures to prevent dispersal of dust during handling of coal and coal ash, including the use of closed conveyor belts and silos, as well as windshielding and spraying as dictated by topographical and weather conditions. At our coal-ash landfill disposal sites, soil is spread over the surface, and leachate is treated with appropriate treatment systems.

Measures to Control Thermal Water Discharge

Seawater taken in to cool the steam used in power generation is released as thermal water discharge. We control intake and discharge properly to prevent any negative impact on marine life in the vicinity, and monitor the temperature of thermal water discharge around the clock to ensure that it remains within the limits established by environmental agreements.

Water Pollution Control

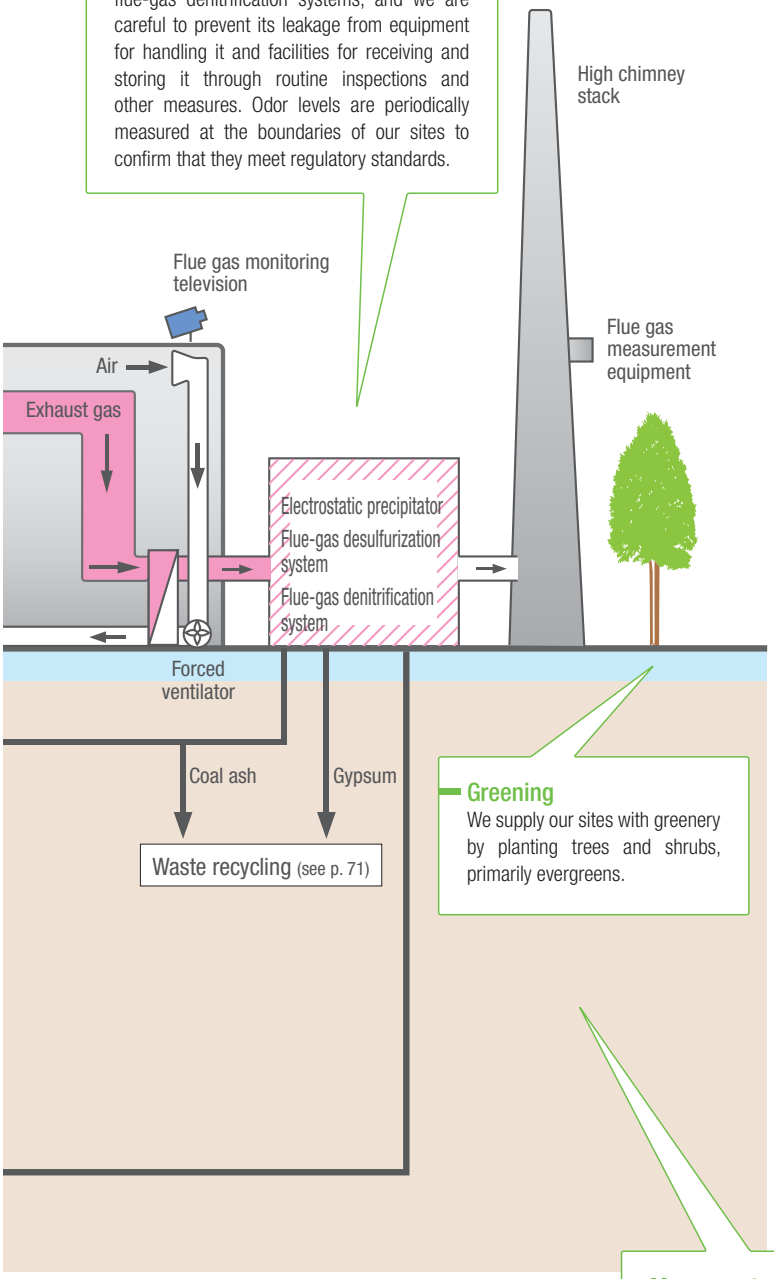
Waste water from such facilities as desulfurization units and offices is appropriately treated in integrated waste-water treatment systems, through coagulation, precipitation, filtration, and so forth. Treated water is routinely monitored by automatic measuring equipment and analyzed periodically to ensure that it meets the standards set under the Water Pollution Control Law and environmental conservation agreements.

Odor Control

Ammonia is used in such equipment as our flue-gas denitrification systems, and we are careful to prevent its leakage from equipment for handling it and facilities for receiving and storing it through routine inspections and other measures. Odor levels are periodically measured at the boundaries of our sites to confirm that they meet regulatory standards.

Air Pollution Control

Combustion of coal and other fuels can generate sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust. To reduce these emissions we have improved our combustion methods and installed such flue-gas treatment equipment as desulfurization and denitrification systems and electrostatic precipitators. Although the performance of equipment varies with its date of installation, at each facility we have installed the newest technology available at the time to remove pollutants with maximum efficiency. This equipment operates automatically with the aid of monitoring devices that continuously measure the content of flue gas. In addition, human operators monitor the equipment 24 hours a day to ensure a swift response in the event of any malfunction.

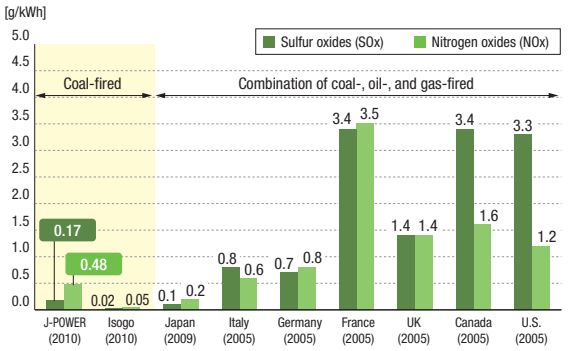


Flue-gas Emissions, FY 2010

Substance	Equipment efficiency (removal efficiency)	Emissions	Emissions intensity
SOx	64–99%	10,100 tons	0.17g/kWh
NOx	72–94%	28,000 tons	0.48g/kWh
Soot and dust	99% (as designed)	800 tons	0.01g/kWh

Notes:
1. Emissions intensity: Emissions per unit of electricity generated at thermal power stations.
2. Emissions of soot and dust are calculated on the basis of measurements taken monthly.

International Comparison of SOx and NOx Emissions Intensity for Thermal Generation



Notes:
1. Formulated by J-POWER based on data from the Federation of Electric Power Companies of Japan. Data for Japan represents 10 electric utilities and J-POWER.
2. Emissions intensity for coal-fired generation is shown for J-POWER and Isogo.
3. Other than for J-POWER and Isogo, emissions intensity for a combination of coal-, oil-, and gas-fired generation is shown.
4. "Isogo" refers to J-POWER's Isogo Thermal Power Station.

Greening

We supply our sites with greenery by planting trees and shrubs, primarily evergreens.

Measures to Prevent Soil Pollution

From FY 2004 through FY 2006, we conducted studies at all J-POWER Group domestic sites and determined that they were free of soil or groundwater contamination. We will continue working diligently to prevent soil and groundwater pollution.

Cutting Back on Industrial Water Use

Industrial water is used in such equipment as boilers, cooling systems, and wet-type desulfurization systems, and almost all of it is released into the atmosphere as steam. We are working to reduce our consumption of industrial water through the recovery and reuse of rainwater and waste water that is not released into the atmosphere.

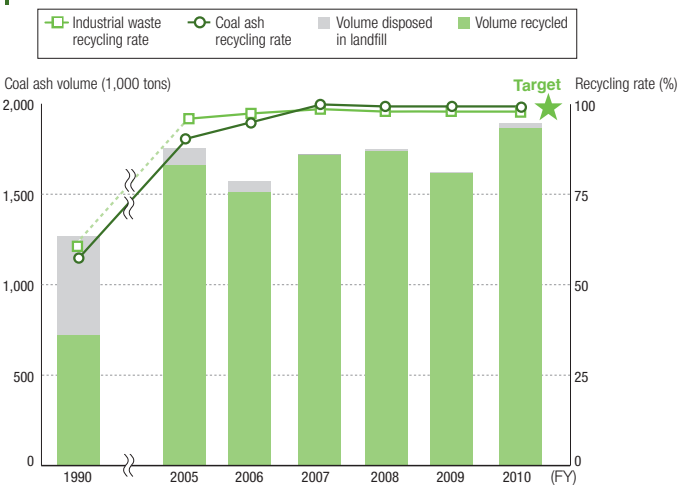
Establishing a Sound Material-Cycle Society

To help establish a sound material-cycle society, J-POWER Group is working hard to reduce the waste we generate and to properly treat and recycle the waste we do produce. We are also pursuing business undertakings that build on these practices.

Recycling and Reduction of Waste

In FY 2010, J-POWER Group generated 2.34 million tons of industrial waste, while recycling or reusing resources totaling 2.26 million tons, or 97%. We intend to promote more extensive recycling of coal ash and further reduce the industrial waste produced by the maintenance and operation of power stations and other business activities to achieve a recycling rate of 97% within J-POWER Group as a whole from FY 2011 onwards, with the goal of achieving zero emissions[*1] of industrial waste (see p. 46, 84).

Industrial Waste and Coal Ash Recycling Rates



Note: The figure for FY 1990 represents J-POWER's recycling rate for coal ash only; figures from FY 2005 onwards and target figures represent the effective recycling rate for all industrial waste produced by all companies of J-POWER Group.

Beneficial Use of Coal Ash and Gypsum

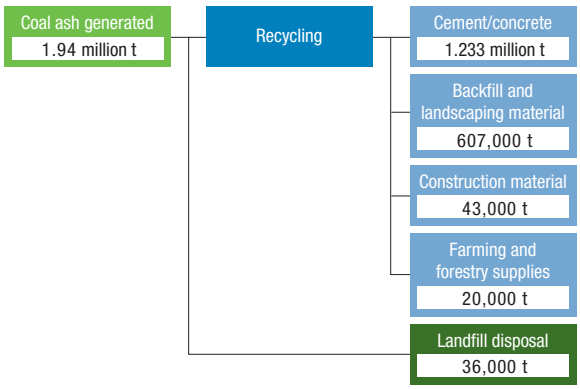
Almost all the coal ash generated by coal-fired power stations is recycled, either as construction material such as a clay substitute in cement and backfill and landscaping material or farming and forestry supplies such as fertilizers (see p. 86). All of the gypsum and sulfuric acid generated by our flue-gas desulfurization systems is recycled.

● Examples of Coal Ash Recycling

We employed fly ash mortar[*2] for surface lining of controlled landfill sites for disposal of coal ash, enabling us to increase our rate of recycling of coal ash.

Surface lining of industrial waste landfill site using fly ash mortar
(J-POWER Hibikinada Waste Disposal Site No. 3, Kita-Kyushu)

Breakdown of Coal Ash Recycling

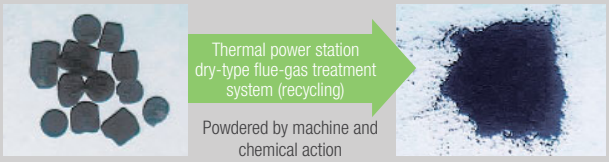


COLUMN

EPO-COAL: Activated Coke Powder for Dioxin Removal

J-POWER Group's powdered dioxin remover EPO-COAL for waste incinerators is a commercial product made from activated coke powder discharged from the dry-type flue gas dentrification units of coal-fired power stations. It is highly regarded by users and equipment manufacturers for its stability of performance, quality and price.

The purpose of J-POWER Group's involvement in this business is not only to reduce waste and raise our recycling rate but also to contribute to the creation of a material-cycle society. We also regard it as integral to our efforts to stem global warming, since recycling can reduce the CO_2 emissions that result from production of the activated coke commonly available on the market. As a member of a society that is striving for harmonious coexistence with the environment, we plan to continue such operations.



Activated coke pellets

EPO-COAL
(activated coke powder)

References

*1 Zero emissions
An initiative advocated by United Nations University to build a system of waste recycling through inter-industry partnerships and reduce the amount of waste (final disposal volume) to a level approaching zero.

*2 Fly ash mortar
A hard substance created by adding a small quantity of cement to coal ash and mixing it with seawater. Combines a high degree of waterproofing ability with strength for use in construction.

Recycling of Construction By-products

We work with subcontractors and others to promote efficient use of byproducts generated by new construction, expansion, and renovation of electric power facilities, as by recycling concrete scrap and cleared timber or making use of loose earth generated during construction within the grounds of the facility.

Making Effective Use of Driftwood from Dam Reservoirs

In J-POWER Group, we are working to effectively recycle the driftwood that flows into the dam reservoirs at our hydropower stations. We put the recovered driftwood to a wide variety of uses, including producing charcoal and extracting pyroligneous acid, in addition to chipping it for use as mulch, boiler fuel, and compost.

Wood chips produced from driftwood

Chips used as ground cover at Ikehara Dam Park (Nara Prefecture)

Activities during 3Rs Promotion Month (J-POWER Headquarters)

Reducing and Recycling Office Waste

All J-POWER Group offices are working to reduce nonindustrial waste by such measures as sorting waste paper, bottles, cans, and plastics; using both sides of copier paper; and reusing envelopes.

With regard to our paper recycling rate, we have been working towards the achievement of our Group-wide Corporate Targets (see p. 49) with increased awareness on the part of our employees, enabling us to successfully meet the targets that we had set up to the end of 2010. We are also promoting the 3Rs in relation to nonindustrial office waste, for example by reducing and thoroughly sorting waste and expanding the scope of items that we reuse.

Promoting Green Purchasing

To contribute to the development of a material-cycle society, we have adopted the J-POWER Group Green Purchasing Guidelines to promote green purchasing throughout J-POWER Group.

These guidelines apply not only to office supplies but to all products and services purchased by members of J-POWER Group. We are pursuing a wide-ranging policy that encourages environmental responsibility among our suppliers and subcontractors, as by stipulating specifications that must be built into construction and other contracts to ensure that subcontractors carry out the work in an environmentally friendly manner.

In addition, we are promoting green purchasing on an ongoing basis by establishing Group-wide Corporate Targets (see p. 49) for our rate of green purchasing of office supplies (stationery) and our rate of purchasing of recycled copy paper, as well as the ratio of low-emission and other non-polluting vehicles among Group company vehicles. We successfully met the targets that we set for the end of 2010.

http://www.jpower.co.jp/company_info/environment/kankyo04gl.html (Japanese only)

3Rs[*1] Promotion Month

We took advantage of the fact that October was 3Rs Promotion Month to conduct activities such as introducing examples of our 3R-related initiatives (J-POWER Headquarters). By means of explaining what we do with the coal ash produced by our business and the driftwood found in our reservoirs, in addition to discussing 3R activities that can be undertaken at home, we sought to increase our employees' understanding of the 3Rs and to increase their awareness of how to put the concepts into action.

References

*1 The 3Rs
The 3Rs are the first letters of the following three words that express the concept of reducing the amount of waste produced and building a recycling-oriented society:
1) Reduce: Curb the amount of waste produced 2) Reuse 3) Recycle: Treat as a recyclable resource

Preserving Biodiversity

In all its business activities, J-POWER Group considers potential impact on biodiversity and strives to achieve harmonious coexistence with the natural environment. When building a new power station or other facility, we carry out environmental impact assessments and adopt appropriate environmental safeguards with the views of local residents in mind. In addition, we carefully monitor outcomes as we pursue environmental policies oriented to harmonious coexistence with nature.

Steps to Preserve Biodiversity

Blakiston's Fish-owl, Tokachi District, Hokkaido Prefecture

The Tokachi district of Hokkaido is home to Blakiston's Fish Owl, classified as Critically Endangered IA in the Japanese Environment Ministry's Red Data Book (Critically Endangered in Hokkaido). As part of its environmental protection activities, J-POWER Group is taking care not to have any impact on the breeding of the owls, for example by scheduling work in the area for periods other than the nesting season.

Blakiston's fish-owl (photo: Kushiro Zoo)

Japanese Golden Eagle, Okutadami-Otori Area

The area around Okutadami Dam and Otori Dam (Fukushima Prefecture, Niigata Prefecture) is home to the Japanese golden eagle, ranked as "endangered IB" in the Environment Ministry's Red Data Book. J-POWER Group is helping protect the eagles by avoiding outdoor work on these dams during the eagle's nesting season. If work needs to be carried out in the vicinity, we determine the status of nesting activity, seek the advice of ornithological experts, and take precautions to reduce vehicle traffic and noise level so as to minimize the impact on nesting activity.

Japanese Golden Eagle chicks

Voice Assisting in Environmental Protection Activities

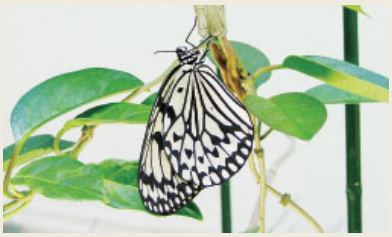
Environmental Education Program
– A Power Station brimming with Butterflies –

We have been conducting this program for students of local elementary schools and their parents at the Ishikawa Coal Thermal Power Station since FY 2008. The grounds of the power station provide a habitat for a wide variety of plants, animals and birds such as Kingfishers, and we make use of this characteristic to offer the opportunity for our visitors to experience nature with all their senses, under the theme "Let's Learn about Nature in Our Local Area."

In addition, more than 20 species of butterfly often seen in Okinawa can be found in the grounds of the station, and so under the theme "Let's Learn about Local Butterflies," we give children the chance to observe their process of development and learn about the plants that they eat, with a particular focus on the Rice Paper Butterfly, Japan's largest with a wingspan of approximately 15 cm, and also the symbol of Uruma City, where the station is located.

Even children with no interest in living creatures run around shouting happily, trying to be the first to discover something. Taking encouragement from comments such as "It was fun learning about different animals" and "There's a lot of nature at a power station!", we will continue to work to introduce the environmental protection activities we conduct at our power stations, spreading the joy of learning.

Shinobu Yamashiro, Operating Group, JPec Co., Ltd., Ishikawa Company



Rice Paper Butterfly

Releasing Rice Paper Butterflies (Ishikawa Coal Thermal Power Station/Okinawa Prefecture)

Harmony with the Aquatic Environment

River Maintenance Discharge

At hydropower stations with dams and conduit-type hydropower stations, the river water taken in upstream from the dam is conducted to the station (positioned downstream from the dam) via a conduit, and this results in a decline in the rate of flow between the dam and the point of discharge of the water back into the river following the generation of power. Because of this, we work to maintain the rate of flow by carrying out river maintenance discharges in consultation with the Ministry of Land, Infrastructure, Transport, and Tourism and other relevant agencies, by releasing an appropriate amount of stored water from the dam. In conducting these river maintenance flow discharges, we are contributing to the maintenance of the river channel and considering the environment by benefiting fish and other aquatic creatures and riverine ecosystems downstream from the dam.

River maintenance discharge (Komori Dam, Mie Prefecture)

Restoration of Wetlands

Plans connected with the Okutadami-Otori Hydro Power Expansion Project called for excavated rock to be used as landfill on the left bank of the river downstream from the Okutadami Dam. Because the area was home to a mountain ecosystem that depends on a wetland environment, we conserved the wetland ecosystem while proceeding with the landfill by creating a new wetland to take the place of the old. We gave scrupulous attention to conducting this work, for example through careful transplantation of flora for the restoration of the wetland, and allowing the old and new wetlands to exist together for as long as possible to encourage dragonflies and other wildlife to migrate naturally. In FY 2005, these efforts were recognized and awarded the Japan Society of Civil Engineers Environment Award. Since then, our surveys have confirmed the continuing presence of rare dragonfly species in the area.

Restored wetlands, Okutadami Power Station

Water Quality of Dam Reservoirs

Typhoons and torrential rains can cause the water in rivers to become muddy, and dam reservoirs, because of their inherent function, tend to retain this muddy water. When this happens, the release of water from the dam reservoir for power generation purposes can prolong the turbidity in the river. In J-POWER Group, we monitor the water quality of our dam reservoirs by installing turbidimeters and performing water quality analyses on water samples. We also monitor the status of turbidity during periods of heavy runoff to enable us to take appropriate countermeasures, for example by dispersing the turbidity at an early stage by means of dam discharges, using surface water intake equipment to prioritize the use of comparatively less turbid surface water for power generation, and using clear water bypass equipment to enable clear water from upstream of the dam to be directly discharged downstream without being stored in the reservoir. In areas where turbidity is severe, we are taking preventive measures by working with the national and prefectural governments in initiatives such as forest management and afforestation programs.

Surface-water intake equipment (Ikehara Dam, Nara Prefecture)

COLUMN

Measures to Prevent Sediment Buildup in Dams

Each year large quantities of earth flow into dam reservoirs from upstream, and a portion of it builds up as sediment at the bottom of the reservoir. Over a long period, this can cause the level of the river bottom to rise, decrease the storage capacity, making it necessary to take measures to prevent the volume of water in the reservoir from falling or runoff causing flooding around the reservoir or upstream. J-POWER Group therefore controls sediment by dredging and removing it or transporting it to another part of the reservoir.

Dredger (Sakuma Dam Shizuoka and Nagano Prefectures)

Management of Chemical Substances

Storage and management of chemical substances in J-POWER Group is rigorous and in full compliance with the law. With regard to PCBs, we are following detoxification treatment procedures in conformance with Japan's regional waste treatment program.

Pollutant Release and Transfer Register (PRTR) Law

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

While J-POWER Group uses chemical substances for painting and coating, treatment of intake water at thermal power stations, and other purposes, we have traditionally managed these substances carefully by monitoring and recording the quantities purchased and used. We are committed to reducing the use of such chemicals and to controlling and managing those we use appropriately, complying with all established procedures. With respect to dioxins, we are working hard to reduce emissions through proper management and oversight of facilities.

PRTR Substance Release and Transfer Volumes (FY 2010)

Substance	Use	Volume handled	Volume released	Volume transferred as waste
71 : Ferric chloride	Wastewater treatment agents	10.36 t/y	—	10,360 kg/y
80 : Xylene	Coating for machinery	1.57 t/y	1,556 kg/y	—
243 : Dioxins	Waste incinerators	—	—	330 mg-TEQ/y
321 : Vanadium compounds	Catalysts	1.49 t/y	—	1,493 kg/y
333 : Hydrazine	Boiler water treatment agents	1.94 t/y	0.01 kg/y	—
405 : Boron compounds	Manure additives	12.19 t/y	0.01 kg/y	—

Notes:
1. Figures represent total release and transfer volumes for all business sites handling 1 ton or more per year of a Class 1 designated chemical substance or 0.5 ton or more per year of a Specific Class 1 designated chemical substance.
2. For dioxins, figures represent total emissions from waste incinerators.

Measures to Reduce Dioxins

J-POWER Group operates incinerators (designated as "specified facilities" under the Act on Special Measures against Dioxins) at three business sites. At these specified facilities we follow appropriate maintenance and management procedures, such as sorting prior to treatment and combustion temperature control. In compliance with the above-mentioned act, the dioxin concentration in the flue gas of these facilities is measured at least once a year and reported to the local government, and in FY 2010, all of them met emissions standards.

Asbestos

J-POWER Group has adopted an asbestos policy, under which we have conducted health checks and surveys of asbestos use in our equipment and buildings and undertaken appropriate countermeasures.

Where we have confirmed the presence of asbestos, we are systematically removing it and switching to alternatives while effectively managing the process to prevent dispersal of asbestos dust. Asbestoscontaining material that has been removed is disposed of in a manner consistent with the Waste Management and Public Cleansing Act.

PCB Waste

Management and Treatment of PCBs

PCBs have been widely used for insulating oil in transformers and other electric devices because of their excellent heat-resistance and insulation properties. Because of their toxicity, however, manufacture and import were outlawed in 1974, and all those in possession of such substances were required to observe stringent storage and management requirements. In July 2001, the Act on Special Measures against PCB Waste came into force, and proper treatment of waste containing PCBs became mandatory.

J-POWER Group began treatment of these substances under the regional waste treatment program in February 2005, and as of March 2011 we had treated approximately 27 kl of insulating oil (containing high concentrations of PCBs). J-POWER Group currently has approximately 109 kl of insulating oil (as of March 2011). This is stored and managed under stringent conditions in 31 warehouses and similar facilities that we have established nationwide.

Trace PCB Contamination

Concerns have been raised by the detection of extremely low levels of PCBs in heavy electrical machinery that would not ordinarily contain PCBs. In J-POWER Group, we are conducting analyses as needed, following stringent management procedures for machinery using insulating oil in which traces of PCBs have been detected, and submitting all paperwork required by the relevant laws and regulations. We will continue to respond to this issue in a conscientious and appropriate manner.

Ensuring Transparency and Reliability

J-POWER Group is working to improve environmental management and ensure legal compliance in all its business activities. By disclosing a wide range of environmental information, we are striving to earn society's trust.

Continual Improvement in Environmental Management

In 2002, 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[*1] certification. By the end of FY 2007, every one of our consolidated subsidiaries at the time had an EMS in place. Henceforth, we will strive for continual improvement in our environmental management. We are also aiming towards the introduction of EMS in all our consolidated subsidiaries from FY 2008 onwards, and some of the companies which do not yet have one are presently conducting reviews towards introduction.

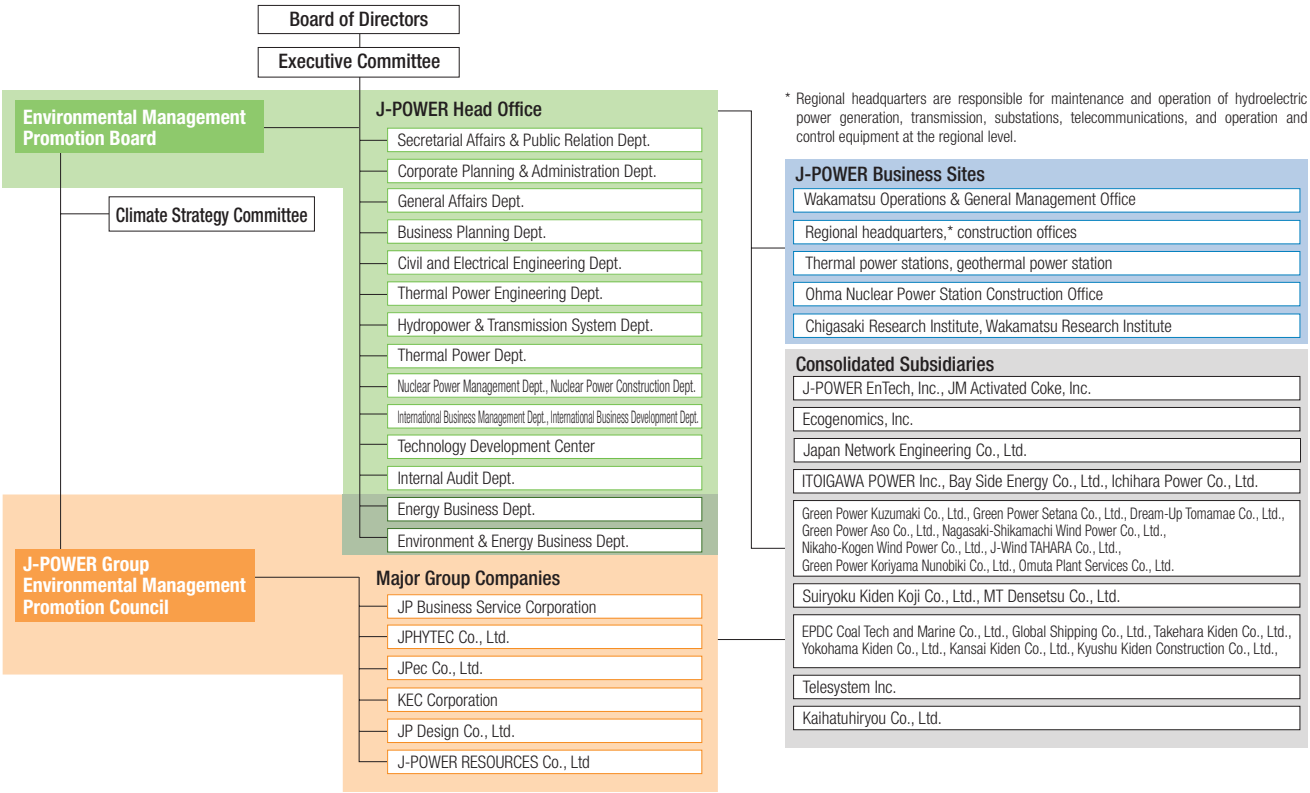
Promotion of Environmental Management

The Environmental Management Promotion Board was established to discuss, coordinate, and report on overall environmental management in J-POWER Group. It is led by a J-POWER executive director in charge of environment and made up of relevant executives and division heads.

The J-POWER Group Environmental Management Promotion Council was established as a subgroup of the Board to encourage cooperation and coordination throughout the group. On the basis of the J-POWER Group Environmental Action Guidelines (see p. 47), reviewed annually by management, each J-POWER Group company or business site draws up its own Environmental Action Plan. They periodically review and evaluate their initiatives and revise the measures to be taken, following the PDCA cycle[*2].

J-POWER Group companies that maintain electric power facilities have received ISO 14001 certification for all business sites involved in their operation or maintenance (thermal power stations, geothermal power stations, regional headquarters, etc.; see p. 82). All other J-POWER Group companies follow EMSs tailored to their own business activities, which they are working continuously to improve.

J-POWER Group Environmental Management Organization Chart (as of March 2011)



References

*1 ISO 14001
Part of the ISO 14000 series of international standards for environmental management adopted by the International Standards Organization (ISO), ISO 14001 specifies the requirements for an environmental management system.

*2 PDCA cycle
Management cycle, consisting of plan, do, check, and act, whose repetition provides the basis for continual improvement in environmental management systems.

Education and Training

J-POWER Group carries out various in-house and external environmental training programs to raise employee awareness and cultivate a sense of personal responsibility regarding environmental issues.

In FY 2010 we implemented a variety of training programs aimed at promoting a better understanding of environmental statutes to ensure full compliance. In addition, 2010 was the International Year of Biodiversity, and we conducted an e-learning program for all Group employees concerning the protection of biological diversity.

Status of Waste Risk Diagnosis
(Isogo Thermal Power Station, Kanagawa Prefecture)

In-House Environmental Training, FY 2010

Level	Category	Course/activity	Participation	Coverage of environmental statutes, compliance, etc.
General	Environmental management (general)	Environmental briefings, various lecture presentations on the environment	Approx. 870 participants	J-POWER Group's efforts
	E-learning	J-POWER Group Sustainability Report (Environment)	81%	Overview of Sustainability Report
		Biological Diversity	84%	Protection of Biological Diversity
Technical	EMS implementation	Internal environmental auditor training	57 trainees	Requirements of ISO 14001, internal environmental audit methods
		Follow-up training for internal environmental auditors	57 trainees	Practice in identifying noncompliance, etc.
	Environmental laws and regulations	Waste management skills upgrade	72 trainees	Understanding of the Waste Management Law, application of guidelines for selecting contractors, etc.
		Waste management risk assessment	6 sites	Verification of legal requirements for contracts, manifestos, etc.
		Environmental law courses by level	149 trainees	Explanation of environmental statutes, etc.
	E-learning	EMS course (advanced)	(Continuing implementation)	Requirements of ISO 14001, audit methods, etc.

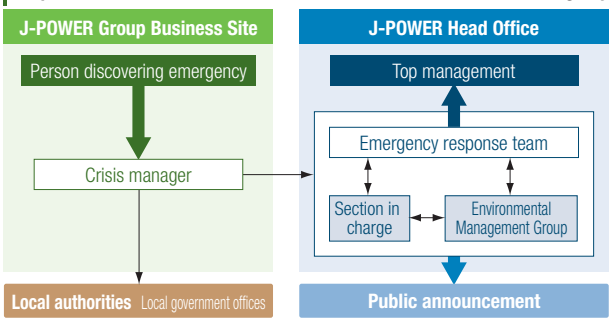
Response in the Event of an Environmental Emergency

In the event of an environmental emergency within the JPOWER Group, the following procedures are to be followed:

(1) The official in charge of crisis management at each business site will take the necessary steps to prevent damage from spreading and will contact the relevant local organizations, the Head Office Emergency Response Team, and the head office section in charge of the business site.

(2) The Head Office Emergency Response Team will promptly report to top management and provide information on the emergency to the media and other interested parties.

Response and Information Disclosure in the Event of an Environmental Emergency



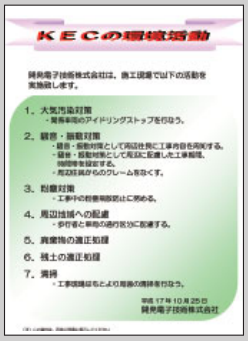
Environmental Incidents

In FY 2010, no infringements of environmental laws or regulations occurred within the Group. One incident, which was reported in the mass media, occurred in the period from June 2010 onwards. We are working to prevent such incidents from recurring by enhancing management procedures and putting other measures in place.

Location	Situation/response
Sakuma Dam reservoir (Toyone-mura, Kita-Shitara-gun, Aichi Prefecture)	On September 21, 2010, an estimated volume of approximately 5.3 kl of light oil flowed into the Sakuma Dam reservoir from a hatch in the hull of an oil supply boat being loaded with oil for supply to a dredger dredging sand in the reservoir. The cause of this incident was a failure to follow procedures for loading oil as set out in the procedural manual. Immediately following the accident, measures were taken to prevent the oil from spreading (positioning of oil fences, etc.) and to clean up the spilled oil (use of absorbent mats, etc.). These measures prevented any oil from spreading downstream from Sakuma Dam. We are working to prevent any similar event from occurring through the introduction of a variety of measures, including fitting oil supply equipment with automatic shut-off systems, revising operating manuals, educating employees to ensure that correct operating procedures are followed, and enhancing our system for liaison with river management and other relevant organizations.

* The following two incidents occurred between April and May 2010.
1) Dispersion of lubricating oil around the foundations of a wind turbine (Nagasaki-Shikamachi Wind Farm)
2) Leakage and dispersion of coal ash during loading for shipping (Takehara Thermal Power Station)
Details of these incidents and the measures taken in response were published in the J-POWER Group Sustainability Report 2010.

● J-POWER Group Sustainability Report 2010
http://www.jpower.co.jp/english/company_info/environment/pdf/er2010pdf/10-all.pdf



COLUMN

KEC Corporation's ISO 14001-related Efforts

KEC Corporation's Headquarters received ISO 14001 certification in December 2005, and all company facilities received certification in the following December. The company is working to conduct environmental activities as a single organizational entity with the President at the top.

In addition to its environmental activities as a member of J-POWER Group, KEC Corporation is also acting in response to requests for ISO 14001-compliant environmental measures from ordinary non-Group businesses (mobile communications companies and gas companies) that form its customers.

In its environmental activities, the company seeks not only to reduce environmental burden and ensure that laws and regulations are obeyed, but also works to instill environmental awareness in employees at its construction sites. The company also engages in construction work with consideration of the surrounding environment, continuously making improvements while employing the PDCA cycle by means of measures such as site patrols and internal audits. (The photograph shows an environmental activities poster that the company has displayed at its construction sites since 2005.)

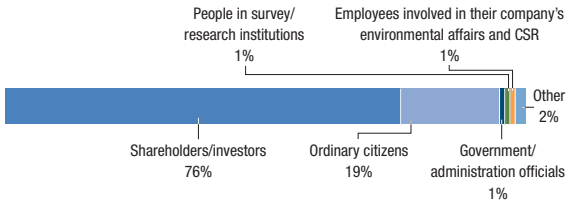
External Evaluation and Outside Opinions

J-POWER Group strives to incorporate third-party evaluations and recommendations, as heard in Sustainability Report questionnaires, reviews, and so on, into our activities. By means of these evaluations and opinions, we determine the kind of business development and environmental activities that others expect of J-POWER Group and work to improve our business activities. We also enhance our transparency and reliability by making such comments public.

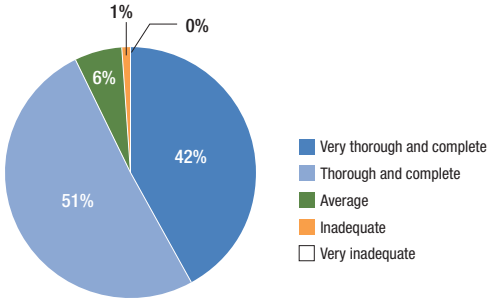
Readers' Opinions

We received many comments from readers in response to the J-POWER Group Sustainability Report 2010 (published July 2010) (552 respondents). We consider these valuable comments to be important guidelines for compiling subsequent reports and for the future initiatives of J-POWER Group, and intend to put their lessons to use in our corporate activities.

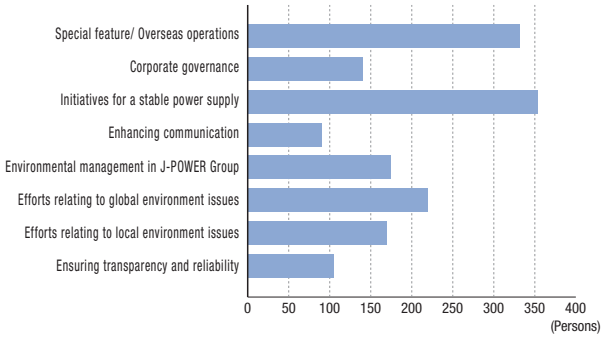
Breakdown of survey respondents



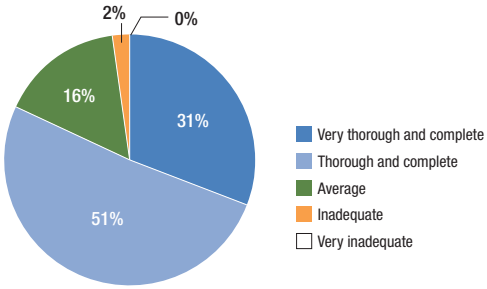
Quantity and quality of information in the report



Items of particular interest (multiple answers)



Design and layout of report



Expectations for J-POWER Group

Typical comments	Our response
I was favorably impressed by the fact that you started by recognizing that the electric power industry necessarily affects the environment. I hope that all your employees will have that same awareness going forward.	The employees of J-POWER Group share a corporate philosophy "to meet people's needs for energy without fail, and play our part for the sustainable development of Japan and the rest of the world," and therefore we engage in various business activities to harmonize our energy supply with the environment.
I hope that the recent nuclear power accident will serve as a lesson and that you will take a hard look at the safety of your nuclear facilities.	J-POWER will continue to study safety enhancement measures in regards to the accident at the Fukushima Daiichi Nuclear Power Station. We work Group-wide to create safe power stations that earn the trust and understanding of the local community. These stations constantly and appropriately reflect the necessary countermeasures as based on national policies and other considerations. [See p. 11-13, "Status of Ohma Nuclear Power Station (Report)" in this report.]
The special feature "Overseas Operations" was very useful. I hope J-POWER's business outside Japan will grow larger.	For about half a century J-POWER Group has conducted overseas consulting projects, including technical cooperation. We have also been engaged in overseas power generation as a second management front. Through these projects we play our part for the sustainable development of the world with the Japanese power industry's environmental conservation and other technologies. [See p. 31-32, "Overseas Operations" in this report.]
I hope that J-POWER will consider the local environment and nature and work to manage living things appropriately in its future environmental protection efforts.	In our business activities, J-POWER Group considers the protection of biodiversity and tries to work in harmony with the natural environment. During new construction, etc. of power stations, we do environmental assessments and appropriately consider environmental protection that also reflects the views of the local community. We also do monitoring as we conduct environmental protection measures to make sure we operate in harmony with the environment.

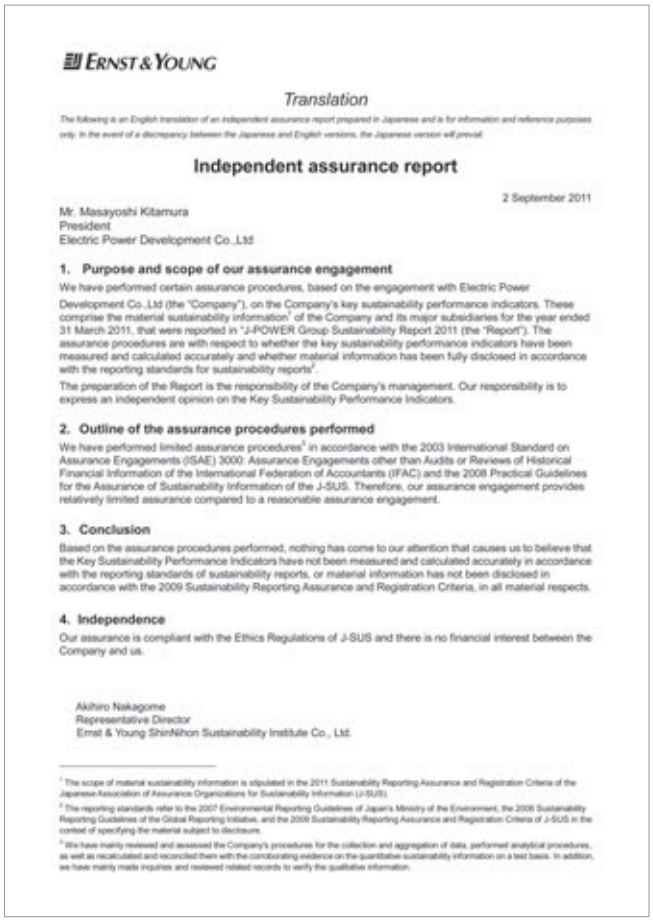
Other comments and our responses can be viewed on our website. **http://www.jpower.co.jp/company_info/environment/pdf/er2011pdf/er11/er11-3/pg.html (Japanese only)**

External Evaluation and Outside Opinions

The Accuracy of This Report

To ensure the accuracy and comprehensiveness of important environmental and societal data as well as performance indicators (hereinafter "sustainability information") contained in the J-POWER Group Sustainability Report 2011, the sustainability information herein has been independently reviewed and certified by Ernst & Young ShinNihon Sustainability Institute Co., Ltd. in accord with the sustainability report review and registration system of the Japanese Association of Assurance Organizations for Sustainability Information (J-SUS). As a result of this review, an "Independent Assurance Report" has been received.

The J-SUS mark on the back cover indicates that the sustainability information contained in this report fulfills the reliability criteria established by the Association for its sustainability report review and registration system.



ERNST & YOUNG

Translation

The following is an English translation of an independent assurance report prepared in Japanese and is for information and reference purposes only. In the event of a discrepancy between the Japanese and English versions, the Japanese version will prevail.

Independent assurance report

2 September 2011

Mr. Masayoshi Kitamura
President
Electric Power Development Co.,Ltd

1. Purpose and scope of our assurance engagement

We have performed certain assurance procedures, based on the engagement with Electric Power Development Co.,Ltd (the "Company"), on the Company's key sustainability performance indicators. These comprise the material sustainability information[1] of the Company and its major subsidiaries for the year ended 31 March 2011, that were reported in "J-POWER Group Sustainability Report 2011 (the "Report"). The assurance procedures are with respect to whether the key sustainability performance indicators have been measured and calculated accurately and whether material information has been fully disclosed in accordance with the reporting standards for sustainability reports[2].

The preparation of the Report is the responsibility of the Company's management. Our responsibility is to express an independent opinion on the Key Sustainability Performance Indicators.

2. Outline of the assurance procedures performed

We have performed limited assurance procedures[3] in accordance with the 2003 International Standard on Assurance Engagements (ISAE) 3000 'Assurance Engagements other than Audits or Reviews of Historical Financial Information' of the International Federation of Accountants (IFAC) and the 2008 Practical Guidelines for the Assurance of Sustainability Information of the J-SUS. Therefore, our assurance engagement provides relatively limited assurance compared to a reasonable assurance engagement.

3. Conclusion

Based on the assurance procedures performed, nothing has come to our attention that causes us to believe that the Key Sustainability Performance Indicators have not been measured and calculated accurately in accordance with the reporting standards of sustainability reports, or material information has not been disclosed in accordance with the 2009 Sustainability Reporting Assurance and Registration Criteria, in all material respects.

4. Independence

Our assurance is compliant with the Ethics Regulations of J-SUS and there is no financial interest between the Company and us.

Akihiro Nakagome
Representative Director
Ernst & Young ShinNihon Sustainability Institute Co., Ltd.

[1] The scope of material sustainability information is stipulated in the 2011 Sustainability Reporting Assurance and Registration Criteria of the Japanese Association of Assurance Organizations for Sustainability Information (J-SUS).

[2] The reporting standards refer to the 2007 Environmental Reporting Guidelines of Japan's Ministry of the Environment, the 2006 Sustainability Reporting Guidelines of the Global Reporting Initiative, and the 2009 Sustainability Reporting Assurance and Registration Criteria of J-SUS in the context of specifying the material subject to disclosure.

[3] We have mainly reviewed and assessed the Company's procedures for the collection and aggregation of data, performed analytical procedures, as well as recalculated and reconciled them with the corroborating evidence on the quantitative sustainability information on a test basis. In addition, we have mainly made inquiries and reviewed related records to verify the qualitative information.

Independent third-party certification of J-POWER Group Sustainability Report 2011

Document review (Kuzuryu Power Administration Office, Fukui Prefecture)

Site inspection (Kuzuryu Power Administration Office, Fukui Prefecture)

Document review (J-POWER head office)

Acquisition of Eco-Leaf Certification

J-POWER's product, electrical power, is certified and registered as "wholesale electricity" under the Eco-Leaf environmental labeling program managed by the Japan Environmental Management Association for Industry (JEMAI). This information is available on the association's website.

ISO 14025 defines three types of environmental labels: I, II, and III. Eco-Leaf is a Type III label, which means the product's environmental load has been quantitatively calculated for every stage of its lifecycle – manufacture, use, and disposal – using the lifecycle assessment (LCA) approach, and this fact has been independently verified.

Information on the Eco-Leaf label can be found on the Japan Environmental Management Association for Industry's website on the right.

ECO LEAF
製品環境情報
No.BF-04-001-F

• Japan Environmental Management Association for Industry
http://www.jemai.or.jp/english/ecoleaf/index.cfm

Sakuma Frequency Converter Station (Shizuoka Prefecture)

Reference Data

J-POWER: Main Business Sites (as of March 2011)

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 Office	Nanae-cho, 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	Ohma-machi, Shimokita-gun, Aomori
	Aomori Branch Office	Aomori-shi, Aomori
Civil and Electrical Engineering Department	Isawa Hydro Project Construction Office	Oshu-shi, Iwate
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
China	Beijing Office
Vietnam	Hanoi Office
Sri Lanka	Upper Kotomale Hydropower Project Office
Vietnam	Son La Hydropower Project Office

Main Consolidated Subsidiaries (as of March 2011)

Company	Percentage ownership (%)	Main business	Location
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	Kuzumaki-machi, Iwate-gun, Iwate Prefecture
Green Power Awara Co., Ltd.	100	Construction and operation of wind power stations	Awara-shi, Fukui Prefecture
Hamanasu Windpower Co., Ltd.	100	Construction and operation of wind power stations	Shimamaki-mura, Shimamaki-gun, Hokkaido
J-WIND TOKIO Co., Ltd.	100	Construction and operation of wind power stations	Chuo-ku, Tokyo
J-Wind TAHARA Co., Ltd.	100	Construction and operation of wind power stations	Tahara-shi, Aichi Prefecture
J-Wind IROUZAKI Co., Ltd.	100	Construction and operation of wind power stations	Minami-Izu-cho, Kamo-gun, Shizuoka Prefecture
Green Power Setana Co., Ltd.	100	Construction and operation of wind power stations	Setana-cho, Kudo-gun, Hokkaido
Green Power Koriyama Nunobiki Co., Ltd.	100	Construction and operation of wind power stations	Koriyama City, Fukushima Prefecture
Green Power TOKIWA Co., Ltd.	97	Construction and operation of wind power stations	Chuo-ku, Tokyo
Green Power Aso Co., Ltd.	87	Construction and operation of wind power stations	Nishihara-mura, Aso-gun, Kumamoto Prefecture
ITOIGAWA POWER Inc.	80	Electric power supply	Itoigawa-shi, Niigata Prefecture
Jpec Co., Ltd.	100	Construction, engineering, design, consulting, and maintenance inspections for thermal and nuclear power plants; unloading and transport of coal for thermal plants, sales of fly ash, and marine transport of coal fuel for electricity generation; environmental protection studies and planning	Chuo-ku, Tokyo
JPHYTEC Co., Ltd.	100	Construction, engineering, design, consulting, and maintenance inspections for hydropower plants and power transmission facilities; real estate indemnity, land surveying, civil engineering work, general architecture, project management	Chiyoda-ku, Tokyo
JP Business Service Corporation	100	Operation of public welfare facilities; building maintenance; administrative, labor, and accounting services; computer software development	Koto-ku, Tokyo
J-POWER RESOURCES Co., Ltd.	100	Import, sales and transport of coal	Chuo-ku, Tokyo
J-POWER EnTech, Inc.	100	Engineering relating to equipment for removal of atmospheric and water pollutants	Minato-ku, Tokyo
KEC Corporation	100	Installation and maintenance of electronic and communications equipment	Bunkyo-ku, Tokyo
JP Design Co., Ltd.	100	Design, administration, research and construction consulting for electric power facilities, general construction, etc.	Chiyoda-ku, Tokyo
EPDC CoalTech and Marine Co., Ltd.	100	Marine transportation of coal ash and fly ash	Chuo-ku, Tokyo
Omuta Plant Service Co., Ltd.	100	Operation and maintenance of waste-fueled power stations	Omuta City, Fukuoka Prefecture
Japan Network Engineering Co., Ltd.	100	Telecommunications business; operation and maintenance of telecommunications facilities	Chuo-ku, Tokyo
Kaihatuhiryou Co., Ltd.	100	Production and sale of fertilizers made using coal ash	Takehara City, Hiroshima Prefecture
J-POWER AUSTRALIA PTY. LTD.	100	Investment in coal mine project in Australia, etc.	Australia
J-POWER Investment Netherlands B. V.	100	Management of overseas investments	Netherlands
J-POWER North America Holdings Co., Ltd.	100	Management of overseas investments	U.S.A.
J-POWER USA Investment Co., Ltd.	100	Management of overseas investments	U.S.A.
J-POWER USA Development Co., Ltd.	100	Research and development and overseas investments	U.S.A.
J-POWER Holdings (Thailand) Co., Ltd.	100	Management of overseas investments	Thailand
J-POWER Generation (Thailand) Co., Ltd.	100	Overseas investment management, research, development, etc.	Thailand
J-POWER USA Generation GP LLC	100	Management of overseas investments	U.S.A.
J-POWER Consulting (CHINA) Co., Ltd.	100	Overseas investment management, research, development, etc.	China

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

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.

Business Sites and Companies Receiving ISO 14001 Certification, Etc. (as of March 2011)

In 2002, 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 2011.

Business Sites and Companies Receiving ISO 14001 Certification, Etc.
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 and Infrastructure 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.

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 FY 1990 is for J-POWER only.

Note: All figures include J-POWER and its consolidated subsidiaries in Japan. Except for the chart for power facilities (peak output), joint ventures have been accounted for based on the percentage ownership.

* The sum of the figures in each column may not equal the total due to rounding.

Power Facilities (maximum output)

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Hydroelectric	GW	7.09	8.56	8.56	8.56	8.56	8.56
Thermal	GW	4.65	8.18	8.18	8.18	8.79	8.79
Coal-fired	GW	4.64	7.95	7.95	7.95	8.55	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	0.02	0.02
Wind power	GW		0.21	0.21	0.25	0.27	0.35
Total	GW	**11.74**	**16.94**	**16.94**	**16.99**	**17.61**	**17.69**

Electricity Output

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Hydroelectric	GWh	12,451	12,212	10,428	9,470	10,004	11,301
Thermal	GWh	29,551	52,429	57,050	53,648	50,742	58,511
Coal-fired	GWh	29,452	51,624	56,260	52,979	50,224	58,084
Natural gas	GWh		701	686	589	415	355
Geothermal	GWh	99	104	104	80	103	72
Wind power	GWh		254	321	322	393	458
Total	GWh	**42,002**	**64,870**	**67,799**	**63,439**	**61,140**	**70,271**

Electric Power Sold

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Hydroelectric (excluding pumped storage)	GWh	10,046	10,633	8,287	8,384	9,214	10,267
Thermal	GWh	27,293	49,128	53,576	50,122	47,364	54,786
Coal-fired	GWh	27,206	48,381	52,842	49,505	46,887	54,388
Natural gas	GWh		652	640	547	383	327
Geothermal	GWh	87	94	94	70	94	71
Wind power	GWh		245	307	310	379	442
Total	GWh	**37,338**	**60,006**	**62,170**	**58,816**	**56,957**	**65,495**

Fuel Consumption

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Coal (dry coal 28 MJ/kg equivalent)	million t	9.56	16.30	17.91	16.97	16.09	18.51
Use intensity (coal-fired thermal)	t/GWh	351	337	339	343	343	340
Natural gas	million m^3N		117	115	99	71	60
Heavy oil	million kl	0.1	0.06	0.05	0.04	0.04	0.04
Diesel	million kl	0.01	0.02	0.03	0.03	0.05	0.03

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

Greenhouse Gas Emissions

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
CO_2 emissions (domestic and overseas power generation)*1	million t-CO_2	24.67	44.91	49.86	49.07	46.52	52.54
	kg-CO_2/kWh	0.66	0.68	0.70	0.69	0.66	0.67
(domestic power generation)*2	million t-CO_2	24.67	42.93	46.84	44.35	41.70	47.84
	kg-CO_2/kWh	0.66	0.70	0.74	0.74	0.72	0.72
SF_6 emissions	t	–	0.1	0.0	0.1	0.0	0.1
Handled	t	–	6.4	4.4	7.9	5.9	12.0
Recovery rate	%	–	99	99	99	99	99
HFC emissions	t	–	0.0	0.1	0.1	0.2	0.1

*1: Based on percentage ownership by J-POWER parent company + consolidated companies (22 in Japan, 24 overseas). 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 the J-POWER parent company and aggregates of figures for consolidated subsidiaries and equity method affiliates for their specific fiscal years, in proportion to our investment ratio.

*2: Based on percentage ownership by J-POWER parent company + consolidated companies (22 in Japan).

Notes: 1. Denominators for emission intensity represent electric power sold.
2. Emissions intensity shown is before considering CO_2 credits.

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

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Average thermal efficiency (at generation point)	%	39.0	40.4	40.3	40.1	40.3	40.5

Usage of Specified CFCs

		Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Specified CFCs	Stocked	t	3.6	1.8	1.8	1.7	1.0	1.0
	Consumed	t	0.7	0.0	0.0	0.0	0.0	0.0
Halons	Stocked	t	4.7	4.3	4.6	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	9.9	9.5	9.2	12.6	11.9
	Consumed	t	0.0	0.3	0.3	0.3	0.1	0.2
HFCs (CFC alternatives)	Stocked	t	–	8.4	5.9	10.8	11.3	12.0
	Consumed	t	–	0.0	0.1	0.1	0.2	0.1

SOx, NOx, and Soot and Dust Emissions

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
SOx emissions	1,000 t	9.9	9.9	11.3	10.6	8.1	10.1
Intensity (thermal)	g/kWh	0.34	0.19	0.20	0.20	0.16	0.17
NOx emissions	1,000 t	26.4	27.9	28.5	26.7	22.3	28.0
Intensity (thermal)	g/kWh	0.90	0.53	0.50	0.50	0.44	0.48
Soot and dust emissions	1,000 t	1.0	0.9	1.0	0.8	0.6	0.8
Intensity (thermal)	g/kWh	0.03	0.02	0.02	0.02	0.01	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 2006	FY 2007	FY 2008	FY 2009	FY 2010
Volume generated	million t	–	1.96	2.18	2.14	2.00	2.34
Volume recycled	million t	–	1.86	2.15	2.10	1.96	2.26
Recycle rate	%	–	95	98	98	98	97

Coal-Ash and Gypsum Recycling

	Unit	FY 1990	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Coal-ash created	1,000 t	1,257	1,556	1,714	1,747	1,669	1,936
Coal-ash recycled	1,000 t	719	1,512	1,711	1,736	1,660	1,900
Coal-ash recycle rate	%	57.2	97.2	99.8	99.4	99.4	98.1
Gypsum created	1,000 t	–	334	360	330	263	320
Gypsum recycle rate	%	100	100	100	100	100	100

Note: For details on coal-ash recycling rate, see p. 71.

Office Power Consumption

	Unit	–	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Power consumed by offices (company total)	GWh	–	22.82	22.23	21.86	21.07	21.40
Head office* power consumption	GWh	–	8.73	8.61	8.61	8.53	8.22
Lighting/power sockets	GWh	–	1.78	1.80	1.72	1.71	1.65

* 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 2006	FY 2007	FY 2008	FY 2009	FY 2010
Consumption	kl	–	1,644	1,339	1,310	1,348	1,292

Rate of procurement of recycled copy paper

	Unit	–	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Copy paper* purchased	million sheets	–	69.53	57.84	56.05	57.17	56.77
Recycled copy paper* purchased	million sheets	–	65.87	54.87	55.18	56.79	56.38
Recycled copy paper* purchase rate	%	–	95	95	98	99	99

* A4 paper-size equivalent

J-POWER Group Eco Business

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.

RP-LUCID High-performance Synthetic Lubricant

Planning and Management, Thermal Power Engineering Department, J-POWER

RP-LUCID* is a high-performance synthetic lubricant setting a new standard with advanced additive technology based on Synerlec, an additive developed by the US firm RoyalPurple. RP-LUCID is currently in use in our thermal power stations, as well as other places such as wind power stations and cement and paper plants, where it has resulted in fewer equipment failures and longer intervals between oil changes.

Synerlec is also helping to conserve energy and run rotating devices more efficiently, since it reduces mechanical loss in sliding parts.

* RP-LUCID: The original name of the lubricant is Royal Purple.

RP-LUCID high-performance lubricant

Flue Gas Desulfurization-Denitrification System – Regenerative Activated Coke Technology: ReACT –

J-POWER EnTech, Inc.

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

ReACT, one of J-POWER EnTech's core technologies, is a flue gas treatment system using activated coke as a medium. The activated coke works as either an adsorbent or a medium to remove multiple pollutants such as sulfur oxides (SOx), nitrogen oxides (NOx), soot, mercury and dioxin from flue gas in one operation, using almost no water. This environmentally friendly technology is widely used in Japan at coal-fired power stations, steel mills, petrochemical facilities, waste incineration plants and other industrial facilities.

The J-POWER Isogo Thermal Power Station New No. 2 Unit has some of the world's cleanest flue gas from a coal-fired power station, and the ability of the ReACT technology to remove sulfur makes a big contribution in part of the unit's exhaust processing facilities.

Additionally, the Wakayama Steel Works of Sumitomo Metal Industries, Ltd. has implemented a compact ReACT system in a very confined space, which has helped to achieve some of the highest denitrification efficiency from sintering flue gas in the steel industry globally and also removes sulfur and dust in one step.

J-POWER has used these results as a steppingstone to expanding our business overseas. In 2009 we entered a technical partnership with Hamon Research-Cottrell, an American major manufacturer of environmental equipment. Because the US regulates mercury in flue gas, there is a growing need for ReACT technology, which can remove mercury at the same time it removes other pollutants, so we expect its usage to grow.

Thus, J-POWER looks forward to supplying such systems in Japan and abroad to help reduce environmental burdens in a wide array of fields.

Dry-Type Desulfurization-Denitrification facility for J-POWER Isogo Thermal Power Station

Flue gas treatment system for Wakayama Steel Works, Sumitomo Metal Industries, Ltd.

Viewing the Environment through the Eyes of Living Things – Flow of Environmental Evaluation Using Biological Indicators –

Ecogenomics, Inc.

http://www.ecogenomics.co.jp/

Based on the concept of "energy and environment," Ecogenomics, Inc. plays a vital role in developing new business fields for J-POWER Group. Seeking "a fusion between the environment and biotechnology," the company uses tools termed "microarrays," formed by mounting a sample of the genetic material of an organism under study on a semiconductor substrate, to test, analyze, and evaluate the effect of various chemical substances, wastewater, water from the environment and other factors on organisms and ecosystems at the genetic level. Ecogenomics is the only company in Japan capable of doing everything from design and production of the environmental evaluation microarrays to actual testing and analysis.

Presently more attention is being given to techniques of evaluating wastewater and so on with bioindicators. Ecogenomics conducts the whole range of such testing with biological organisms.

The company is using environmental biotechnology to ensure that people live harmoniously with nature and to build a truly rich natural environment for all living things.

Environmental evaluation microarray


Microarray production equipment


Biotesting with killifish

Utilizing Coal Ash to Contribute to Agriculture – Potassium Silicate Fertilizer –

Kaihatuhiryou Co., Ltd.

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

Kaihatuhiryou Co., Ltd., a J-POWER Group company, developed the world's first slow-release potassium silicate fertilizer using coal ash from coal-fired power stations. The company began manufacturing the product in 1980 to make more effective use of coal ash. The potassium silicate fertilizer manufactured by the company is sold as a rice farming and garden fertilizer to farmers 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 coal-fired power stations

The use of potassium silicate during rice cultivation improves root growth and helps enhance rice taste.

Guaranteed analysis

Citric acid-soluble potassium	Soluble silicate	Citric acid-soluble magnesium	Citric acid-soluble boron
20%	34%	4%	0.1%

*Citric acid-soluble: Describes fertilizer components that are soluble in a 2% citric acid solution. These components do not dissolve in water, but gradually dissolve in acids secreted by roots and in organic acids in the soil, helping to sustain fertilizer effectiveness. Because of this property, potassium silicate fertilizer is eco-friendly, since there is less runoff of its components to rivers and groundwater.

Fukushima Prefecture New Energy Vision to Contribute to Low-Carbon, Recycling Society – Promoting 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. Under the New Energy Vision, the feasibility of implementing new forms of energy is determined based on local characteristics, and implementation targets are set for each type of energy. Policies are then put in place to promote implementation to meet those targets. Fukushima Prefecture commissioned JP Design in FY 2010 to do a study on establishing a New Energy Vision. As part of this, the company has provided operating support for a committee bringing together persons of learning and experience from many fields, and has supported the establishment of a vision for FY 2020.

Additionally, in consideration of the local characteristics of Fukushima Prefecture, its study considered how much energy can be derived from each type of energy source in future. The results indicated that the vast forest resources of the area could provide biomass energy and heat; that solar energy, with which area citizens are already very familiar, is feasible; and that small-scale hydropower stations can be installed using existing sediment control dams, of which there are already about 950 in the prefecture. JP Design will continue to help prevent global warming through its business in implementing new energy.


An existing sediment control dam, where small-scale hydropower generation might be implemented

Environmental Accounting Data

Environmental Conservation Costs

(billion yen)

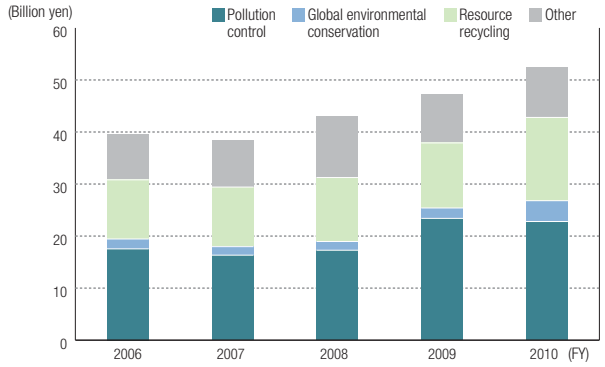
Category	Main measures and efforts	Cost
Pollution control	Air pollution control (desulfurization/ denitrification, soot and dust treatment), water pollution control (waste-water treatment), etc.	22.8
Global environmental conservation	Measures to reduce greenhouse gas emissions (maintaining high-efficiency 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)	4.0
Resource recycling	Waste reduction through reuse and recycling; treatment and disposal of waste	16
Management activities	Monitoring and measurement of environmental load, labor costs for environmental conservation organizations, costs for environmental education, etc.	2.0
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	1.1
Other	Pollution load levy	2.0
Total		52.4

Environmental Conservation Benefits

Environmental conservation benefit	FY 2010
SOx emissions intensity (g/kWh)	0.17
NOx emissions intensity (g/kWh)	0.48
Soot and dust emissions intensity (g/kWh)	0.01
CO_2 emissions intensity (kg-CO_2/kWh)	0.65
Average thermal efficiency of thermal power generation (%)	40.5
Coal ash recycling rate (%)	98.1
Industrial waste recycling rate (%)	97
Gypsum recycling rate (%)	100
Volume of driftwood recycled (1,000 m^3)	14
Employees completing internal environmental auditor training	57
Sustainability report (copies published)	19,000
Environmental pamphlet (copies published)	7,900
Overseas consulting projects (cumulative total)	318

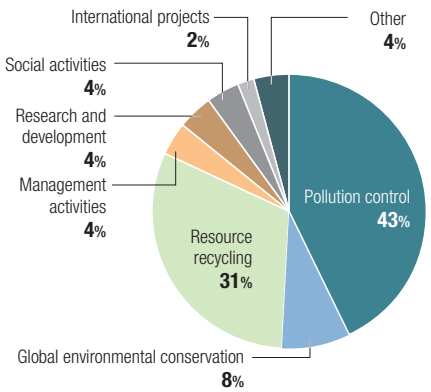
Note: For detailed data on each category, see p. 83–84, Environment-Related Fiscal Year Data, in the Reference Data section.

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, 2010, to March 31, 2011
- 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 194 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% 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%.
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% 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% 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 2010)

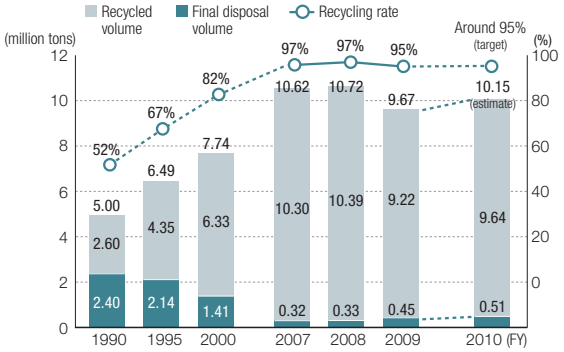
The Environmental Action Plan by the Japanese Electric Utility Industry lays out the electric industry's policy and plan for dealing with global warming and other environmental issues. Each year the plan is reviewed in relation to the industry's progress toward its goals and domestic and international 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 FY 2010, we aim to maintain our waste recycling rate at around 95%.

Waste Recycling Rate Target for the Electric Utility Industry



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

Trends in Recycling of Major Wastes and By-products

(Unit: million tons)

	Type		FY 1990	FY 2007	FY 2008	FY 2009
Waste	Combustion residue, dust and soot (coal ash)	Volume generated	3.47	7.68	7.80	7.02
		Recycled volume (Recycling rate)	1.37 (39%)	7.46 (97%)	7.58 (97%)	6.80 (97%)
	Construction waste material	Volume generated	0.40	0.41	0.38	0.38
		Recycled volume (Recycling rate)	0.21 (53%)	0.40 (98%)	0.37 (97%)	0.37 (96%)
	Scrap metal	Volume generated	0.14	0.22	0.34	0.23
		Recycled volume (Recycling rate)	0.13 (93%)	0.22 (99%)	0.34 (100%)	0.23 (99%)
Byproducts	Gypsum from desulfurization process	Volume generated	0.85	1.97	1.85	1.57
		Recycled volume (Recycling rate)	0.85 (100%)	1.97 (100%)	1.85 (100%)	1.57 (100%)

Measures to Mitigate Climate Change

[CO_2 Emissions Suppression Targets]

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

Goal of 12 FEPC-Affiliated Companies

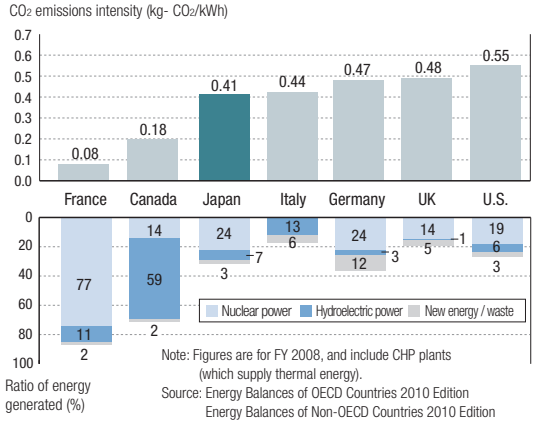
CO_2 emissions (kg-CO_2) = Electric power consumption (electric energy) (kWh) × CO_2 emissions intensity (CO_2 emissions per unit of electric power consumed) (kg-CO_2/kWh)

Electric Utility Industry's CO_2 Emissions

Item \ Fiscal year	FY 1990 (results)	FY 2007 (results)	FY 2008 (results)	FY 2009 (results)	2008 to 2012 (five-year average)
Electric power consumption (billion kWh)	659	920	889	859	(est.) 882
CO_2 emissions (million t- CO_2)	275	417	332	301	(est.) —
CO_2 emissions intensity of user-end electricity (kg- CO_2/kWh)	0.417	0.453	0.373	0.351	(est.) —

Reference Information

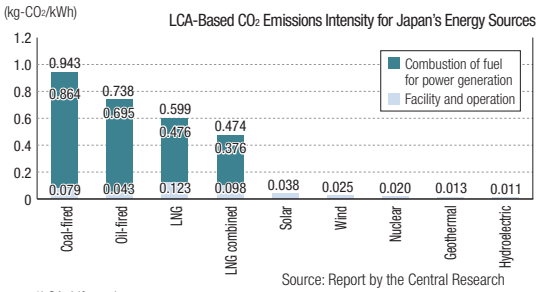
Country-by-Country Comparison of CO_2 Emissions Intensity (per unit of energy generated; preliminary calculation by FEPC)



Note: Figures are for FY 2008, and include CHP plants (which supply thermal energy).
Source: Energy Balances of OECD Countries 2010 Edition
Energy Balances of Non-OECD Countries 2010 Edition

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.



*LCA: Life cycle assessment

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

Glossary

A

Annex I countries
pp. 68, 88

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. 30, 46, 51, 57, 61

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

C

Carbon dioxide capture and storage (CCS)
pp. 46, 54, 60

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. 51

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. 67, 88

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.

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. 71, 75

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. 45, 52

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
p. 52

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. 46, 53, 67, 89

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. 46, 76

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.

G

Green purchasing
p. 72

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)
p. 67

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, 10, 31, 56

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

Industrial waste
pp. 46, 51, 52, 71

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. 54, 60

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, 54, 59

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
Please refer to p. 68, 88.

Kyoto Protocol
Please refer to p. 88.

L

Lower heating value (LHV)
pp. 49, 50

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)
p. 67

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.

N

Nitrogen oxides (NOx)
pp. 46, 51, 55, 70, 85

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)
p. 67

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. 51, 57

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)
p. 67

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)
p. 75

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. 75

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.

Renewable energy
pp. 45, 52, 57, 60, 61

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. 61, 74

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. 51, 70, 85

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. 51

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. 46, 67

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. 46, 51, 55, 70, 85

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, 7, 15, 31~35, 38, 45, 78, 88

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. 46, 55

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

Thermal water discharge
p. 69

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.

Trial emissions trading scheme
p. 68

A mechanism under which participating enterprises, etc., having set voluntary emissions reduction targets, endeavor to reduce their own emissions, and additionally trade emission caps and credits to achieve those targets.

U

Ultra super critical (USC)
pp. 28, 30, 46, 54, 55

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.

V

Voluntary action plan
p. 68

An environmental action plan voluntarily set primarily by industry groups to encourage environmental protection initiatives in each industry sector, such as helping to curb global warming and reduce waste.

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.

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