J-POWER Group

SUSTAINABILITY REPORT 2012

J-POWER Group

SUSTAINABILITY REPORT | 2012

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 Special Feature in this report introduces the J-POWER Group's initiatives in the area of coal-fired power generation in order to realize a stable supply of power.
- 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.
- The opinions of experts outside the company have been sought regarding issues and expectations in relation to the J-POWER group. (See p. 81)
- To ensure objective credibility, this report has been independently assured by Ernst & Young Shin-Nihon Sustainability Institute Co., Ltd. (For details, see p. 83)
- A questionnaire survey was conducted in order to gauge the opinions of readers concerning the FY 2011 Report. (A summary can be found on p. 80)

Period covered:
April 2011 - March 2012
(January - December 2011 for those companies with a January – December fiscal year. Also, some articles may include content from April 2012 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 2012 Version
Global Reporting Initiative (GRI), Sustainability Reporting Guidelines 2006

Report issued since: 1998

Published in: September 2012

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 2012."
Information on business plans and financial data are provided in its Annual Reports.
http://www.jpower.co.jp/english/

Contents

J-POWER Group Overview (As of the end of March 2012)

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: 2,321
	J-POWER Group: 6,983
Business category	Electric Utility

Profile

J-POWER was founded as an electricity wholesaler by the Japanese government in 1952. It 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 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.

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

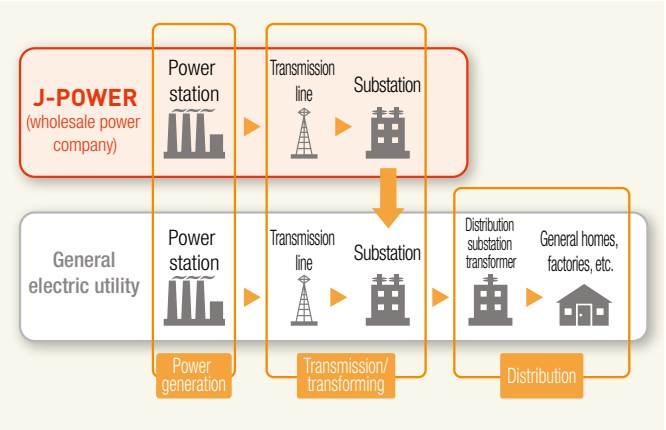
Transmission lines		2,408 km
AC power transmission lines		2,141 km
DC power transmission lines		267 km
Substations (output)	3	4.29 million kVA
Frequency converter station (output)	1	0.3 GW
AC/DC converter stations (output)	4	2 GW

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

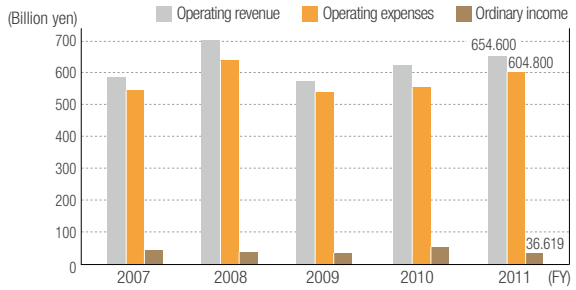
Power generation facilities (output)

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

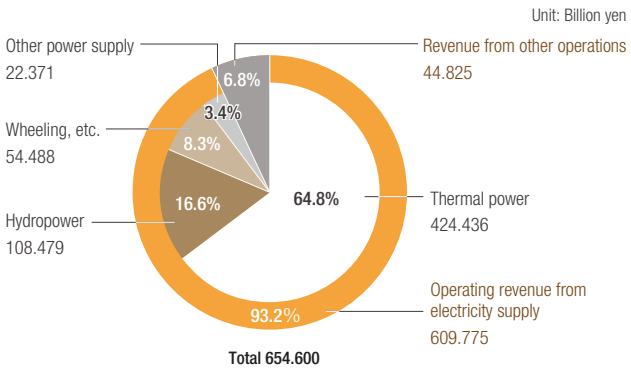
How J-POWER Differs from General Electric Utilities



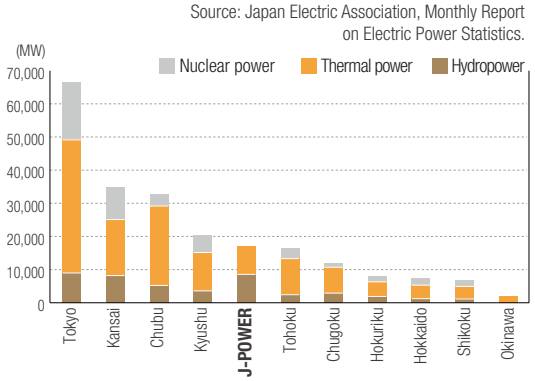
Consolidated Business Results



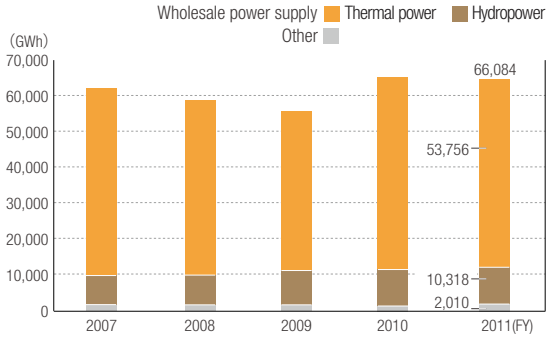
Breakdown of Consolidated Sales



Output of J-POWER and 10 Electric Power Companies



Electric Power Sold



Note: Percentage ownership is not taken into account.

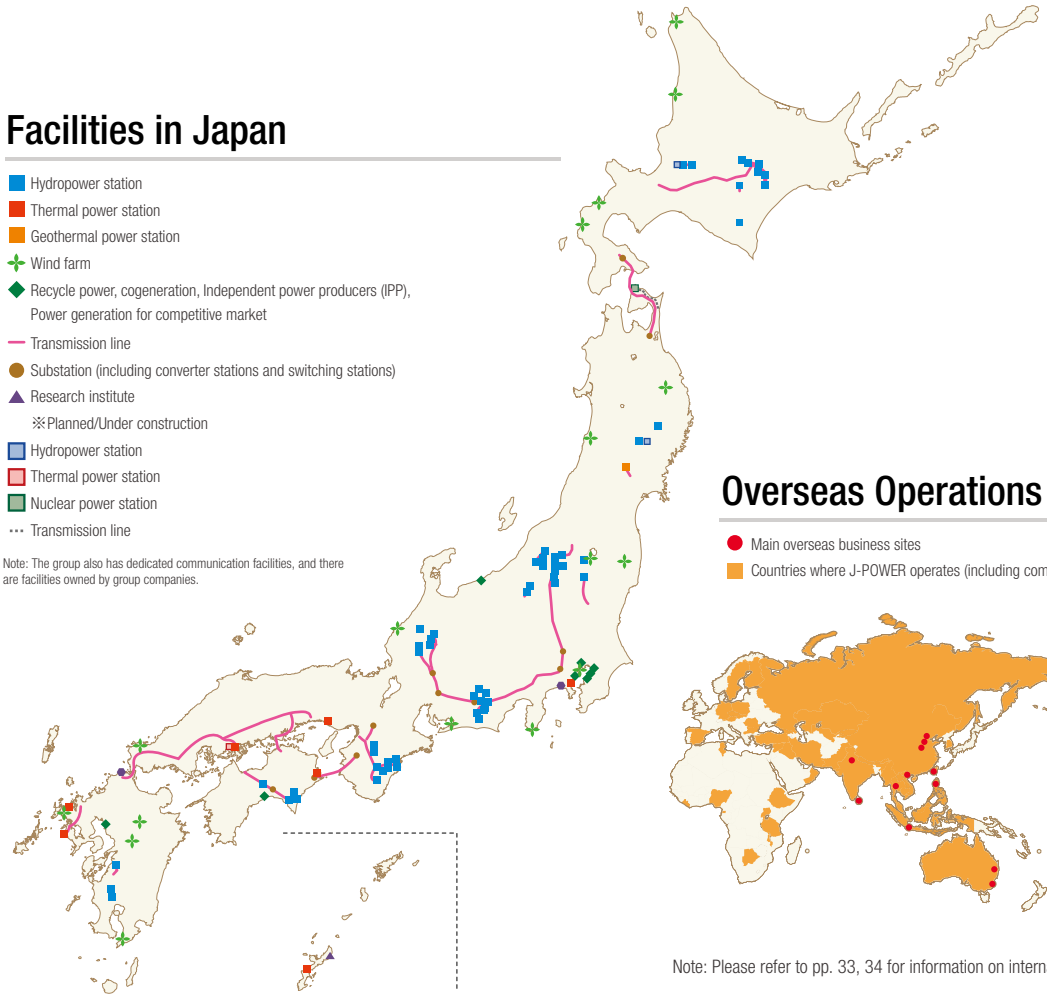
Facilities in Japan

- Hydropower station
- Thermal power station
- Geothermal power station
- Wind farm
- Recycle power, cogeneration, Independent power producers (IPP), Power generation for competitive market
- Transmission line
- Substation (including converter stations and switching stations)
- Research institute

※Planned/Under construction

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

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



Overseas Operations

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

Note: Please refer to pp. 33, 34 for information on international consulting and power generation projects.

Major Consolidated Subsidiaries

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 23 other companies

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 11 other companies

Environment and energy

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

Electricity business

Bay Side Energy Co., Ltd. (Chuo-ku, Tokyo)
ITOIGAWA POWER Inc. (Itoigawa-shi, Niigata)
Ichihara Power Co., Ltd. (Ichihara-shi, Chiba)
J-Wind Co., Ltd. (Chuo-ku, Tokyo)
and 9 other companies

J-POWER Group
69 consolidated subsidiaries

Supply of power generation fuel and equipment

J-POWER AUSTRALIA PTY.LTD. (Australia)
J-POWER RESOURCES CO., LTD. (Chuo-ku, Tokyo)
Miyazaki Wood Pellet Co., Ltd. (Kobayashi-shi, Miyazaki)
and 4 other companies

Service

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

Other

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

Telecommunications

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

Message from the President

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.

Over a year has passed since the Great East Japan Earthquake of March 2011, and Japan's electricity business faces a growing level of uncertainty. Now that the nation's nuclear power stations are on extended shutdown, some of the questions include how to deal with the electric power supply crunch, with tightening supply and demand for fossil energy resources and with global environmental problems. Another unknown is the direction of policy discussions over environmental and energy policy and electric power system reform.

I believe that the more uncertain the situation, the more the J-POWER Group needs to return consistently to our corporate philosophy that states, "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."

In order to "meet people's needs for energy without fail," the first mission of J-POWER Group is to help provide a stable supply of electric power. While East Japan still 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 ensure that measures for enhancing safety are implemented and we constantly and appropriately incorporate new knowledge. We make every effort to build safe power stations that have the trust of people in the local community.

We also 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 thank everyone sincerely for their continuing support.

July 2012

President 北村雅良

Masayoshi Kitamura

J-POWER Group's Corporate Social Responsibility (CSR)

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 standard 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.

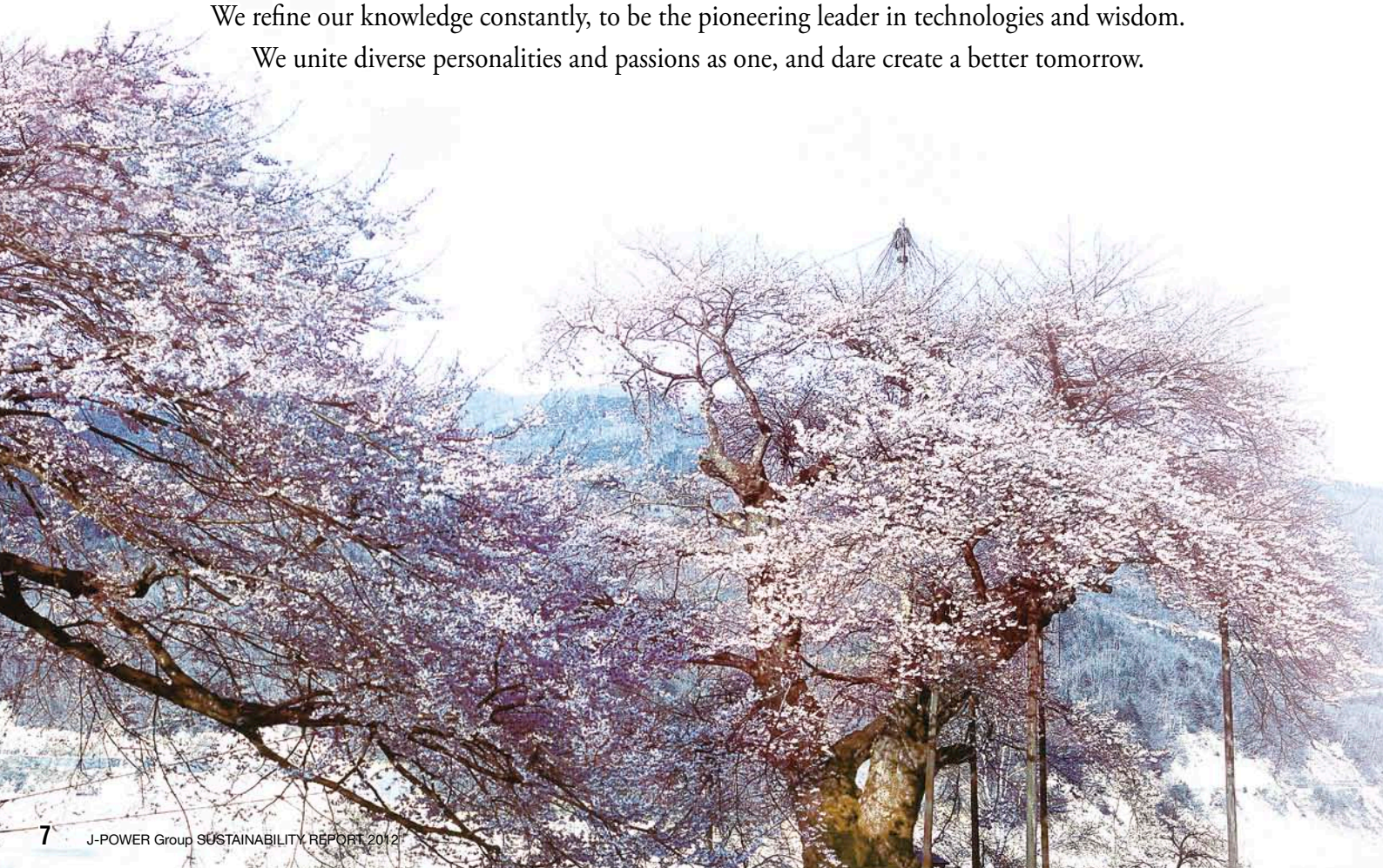
J-POWER Group Corporate Philosophy (Established September 11, 1998)

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

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

Environmental conservation

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

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 supply capacity through 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	

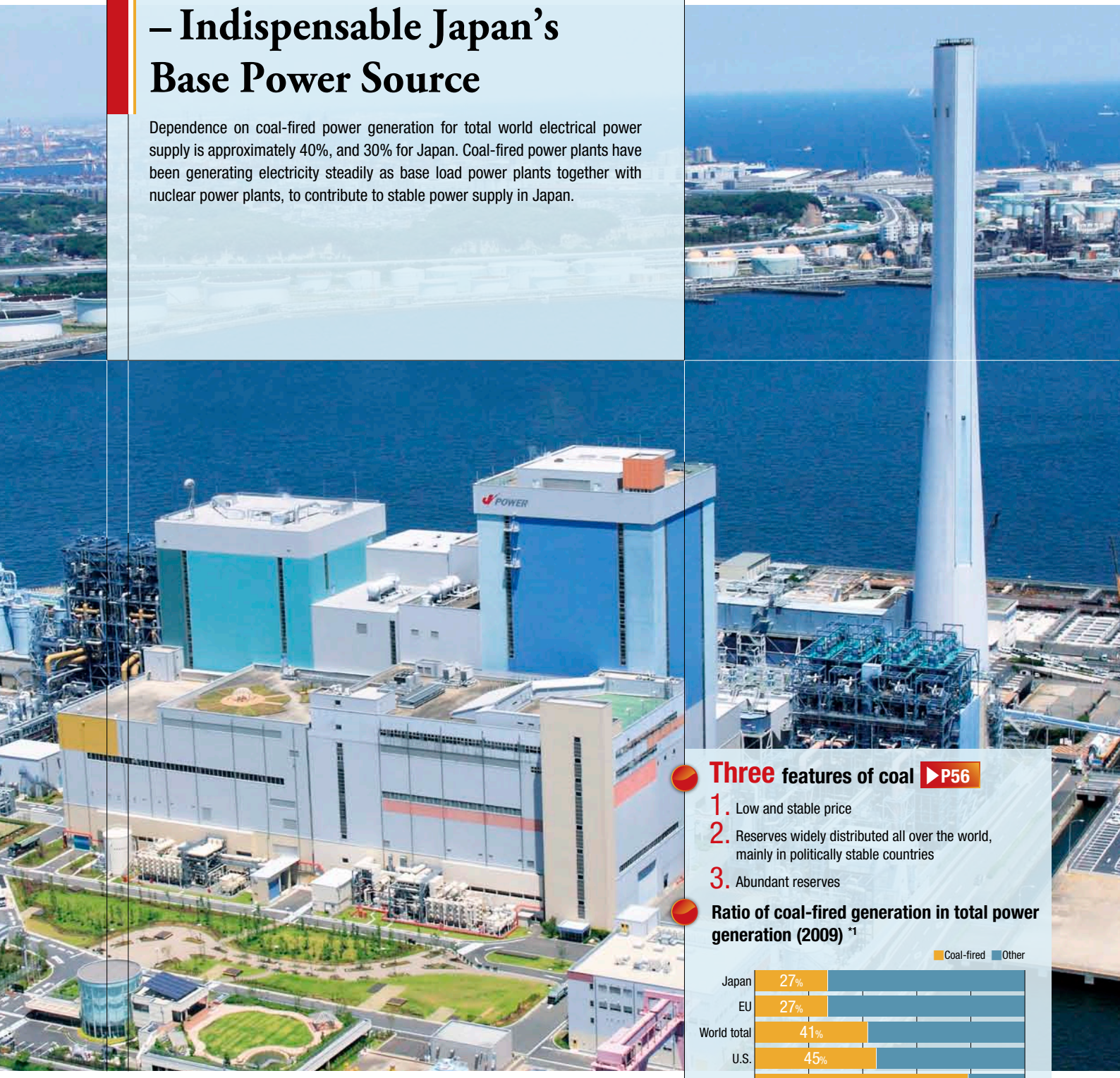
Notes:
1. See the Company website for Direction of Management and Near-Term Managerial Policy of the J-POWER Group.
(Japanese) http://www.jpower.co.jp/annual_rep/ann20000.html
(English) http://www.jpower.co.jp/english/ir/ir22000.html
2. J-POWER Group's environmental management targets are set out on pp. 49-50 of this report.

◀ 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).

Special Feature

Coal-fired Power Generation – Indispensable Japan's Base Power Source

Dependence on coal-fired power generation for total world electrical power supply is approximately 40%, and 30% for Japan. Coal-fired power plants have been generating electricity steadily as base load power plants together with nuclear power plants, to contribute to stable power supply in Japan.



Three features of coal ▶P56

1. Low and stable price
2. Reserves widely distributed all over the world, mainly in politically stable countries
3. Abundant reserves

Ratio of coal-fired generation in total power generation (2009) *1

*1 Source: IEA World Energy Outlook 2011

The True Value of Coal-fired Power Generation

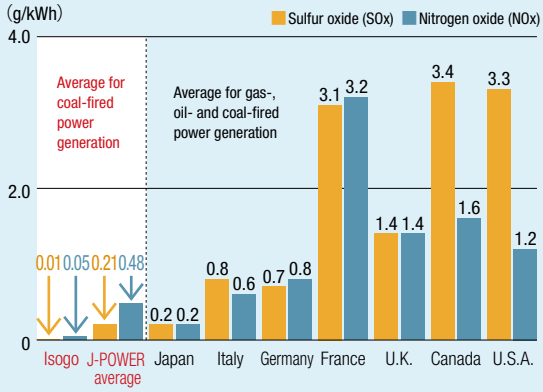
Coal is economical energy source with widespread distribution of abundant reserves throughout the world, and this fact makes it an excellent energy source in terms of energy security. Because of this advantage, coal is an important fuel for electrical power generation, presently supplying more than 40% of the world's electricity demand. The International Energy Agency (IEA) predicts that the use of coal will continue to increase throughout the world for a couple of decades.

Many years of technological development efforts have seen Japan develop the world's most efficient ultra-supercritical (USC) power generation technology, which is already widely used in coal-fired power generation within the country. The further diffusion of Japan's high-efficiency USC generation technology around the world will reduce CO_2 emissions on a global scale and make a major contribution to realizing sustainable low-carbon societies. In addition, efforts are also proceeding in the development and practical application of next-generation technologies including integrated gasification combined cycle (IGCC) generation and carbon capture and storage (CCS), looking towards the realization of zero-emission coal-fired power generation.

Conventional pollutants are no more emitted as state-of-art environmental technologies introduced

Modern coal-fired power generation is a clean energy source. State-of-the-art environmental technologies reduce the emissions of pollutants including SOx, NOx and dust to the levels equivalent to those of gas-fired power generation.

International comparison of SOx and NOx emissions per 1 kWh of power generation*2

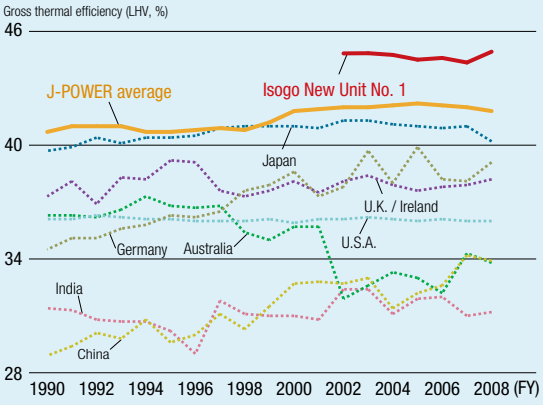


CO_2 reduction through highly efficient power generation technology and co-combustion with biomass fuel

As coal-fired power generation with USC technology is prevalent in Japan, this makes the nation's coal-fired power generation the world's most efficient. It reduces CO_2 emissions per unit of power generated while reducing fuel costs.

In addition, CO_2 emissions can be further reduced through the co-combustion with CO_2-free biomass fuel (see p. 59).

Comparison of thermal efficiency of coal-fired power generation around the world*3



*2 Source: Overseas (Results for 2005) = Emissions: OECD Environmental Data Compendium 2006/2007
Amount of power generated: IEA Energy Balances of OECD Countries 2008 Edition
Japan (Results for 2010) = Materials published by The Federation of Electric Power Companies of Japan
Figures for Isogo and J-POWER derived from results for 2011

*3 Source: Compiled from Ecofys International Comparison Fossil Power Efficiency 2011

J-POWER's Technologies leading the World

Kouetsu Sato

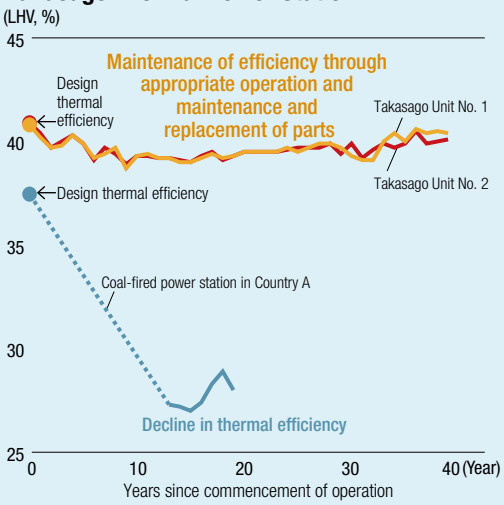
Technology Group Leader
Takasago Thermal Power Station

In the 44 years since it commenced operation, Takasago Thermal Power Station has operated for a total of 320,000 hours. In terms of human age, the station would be more than 80 years old, but it is still in active service of power generation at full capacity.

Visitors to our facility often ask how we have achieved such high-efficiency operation for so many years, and we answer that there is no special secret, just proper operation and maintenance and appropriate replacement of parts. Our staff is very fond of the plant and takes good care of it precisely because of its age. Deterioration is impossible to avoid as the facility ages, and so we ensure that any problems are detected through daily patrols and detailed examinations conducted during periodic inspections, enabling us to conduct repairs before problems become serious.

We will continue in our careful operation and meticulous maintenance in order to keep the plant running into the future. We would like to make our Takasago Thermal Power Station the world's oldest excellent power plant.

Changes in thermal efficiency of Takasago Thermal Power Station*1



Takasago Thermal Power Station

Maintaining high thermal efficiency through optimized maintenance and repair

1960 1970 1980 1990

History of J-POWER's coal-fired power stations (■Commencement of operation ●Development trend of coal-fired power generation technologies)

1967
■Former Isogo Thermal Power Station (265 MW × 2)
●Conclusion of first domestic pollution control agreement (1964)
■Takehara Thermal Power Station Unit No. 1 (250 MW)
●World's first flue gas denitration equipment (1982)

1968
■Takasago Thermal Power Station (250 MW × 2)
●Japan's first flue gas desulfurization equipment (1975)

1981
■Matsushima Thermal Power Station (500 MW × 2)
●Japan's first overseas coal-fired power station
●Japan's first supercritical (SC) coal-fired power station

1983
■Takehara Thermal Power Station Unit No. 3 (700 MW)

1986
■Ishikawa Thermal Power Station (156 MW × 2)

1990
■Matsuura Thermal Power Station Unit No. 1 (1 GW)

1995
■Takehara Thermal Power Station Unit No. 2 (350 MW)
●Japan's first atmospheric pressure fluidized bed boiler


Takasago Thermal Power Station
(Hyogo Prefecture)


Matsushima Thermal Power Station
(Nagasaki Prefecture)

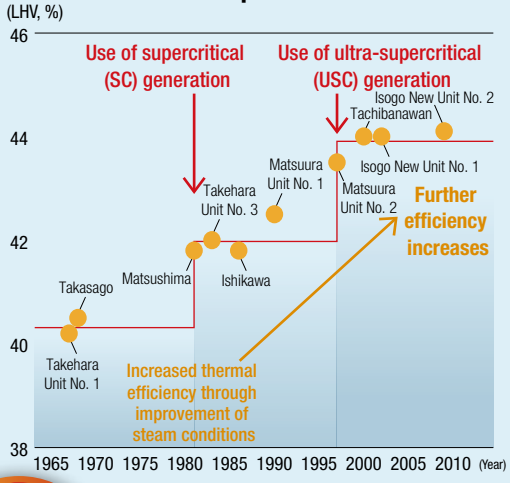

Ishikawa Coal Thermal Power Station
(Okinawa Prefecture)

*1 Source: Compiled from materials published by The Federation of Electric Power Companies of Japan

Special Feature

Coal-fired Power Generation – Indispensable Japan's Base Power Sources

History of improvements in generating efficiency of J-POWER coal-fired power stations



Isogo Thermal Power Station, located in the city of Yokohama, is an urban power station with the world's highest standards of environmental performance and energy efficiency, but is also compact and elegant in its external appearance.

After approximately 40 years in operation of the old 550 MW coal-fired power station, replacement work was conducted to build the new 1,200 MW station, and a variety of new and sophisticated technologies were introduced for the first time in Japan, including tower boilers and dry flue gas desulfurization equipment. We are proud that the rebirth of Isogo Thermal Power Station has been a successful achievement of J-POWER's clean coal technologies accumulated over half a century.

Since Isogo New Unit No. 2 commenced operation in July 2009, visitors to the plant have made many appreciative comments, noting how clean and appealing the plant is, and telling us that it makes them rethink their image of coal-fired power generation. We will be happy if many more people come to see the station and take away feelings of surprise and new discovery concerning coal-fired power stations.

Hiroyuki Uchinaga

Thermal Generation Design Section
Technology Group
(Now the Thermal Generation Construction Department)
Isogo Thermal Power Station

Isogo Thermal Power Station

The fruit of half a century of clean coal technologies

2000 2010 2020 2030

1997
- Matsuura Thermal Power Station Unit No. 2 (1 GW)
  - Japan's first ultra-supercritical (USC) facility

2000
- Tachibanawan Thermal Power Station (1.05 GW × 2)

2002
- Isogo Thermal Power Station New Unit No. 1 (600 MW)
  - Japan's first dry flue gas desulfurization equipment

2009
- Isogo Thermal Power Station New Unit No. 2 (600 MW)

2016 (Planned)
- Central Java Power Station, Indonesia (1 GW × 2)
  - Indonesia's first ultra-supercritical (USC) facility
- Oxygen-blown integrated gasification combined cycle generation Station for proving trials (170 MW-class)
  - Oxygen-blown integrated gasification combined cycle generation (IGCC)
  - CO_2 separation and capture technology
  - Integrated gasification fuel cell generation (IGFC)

2020 (Planned)
- Takehara Thermal Power Station New Unit No. 1 (600 MW)


Takehara Thermal Power Station
(Hiroshima Prefecture)


Matsuura Thermal Power Station
(Nagasaki Prefecture)

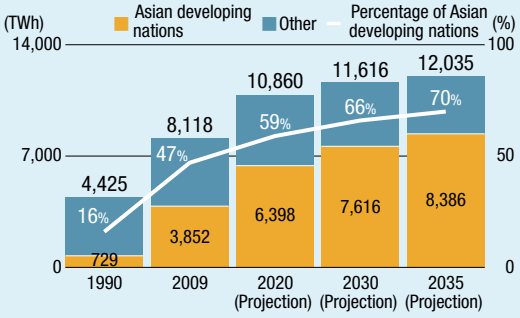

Tachibanawan Thermal Power Station
(Tokushima Prefecture)

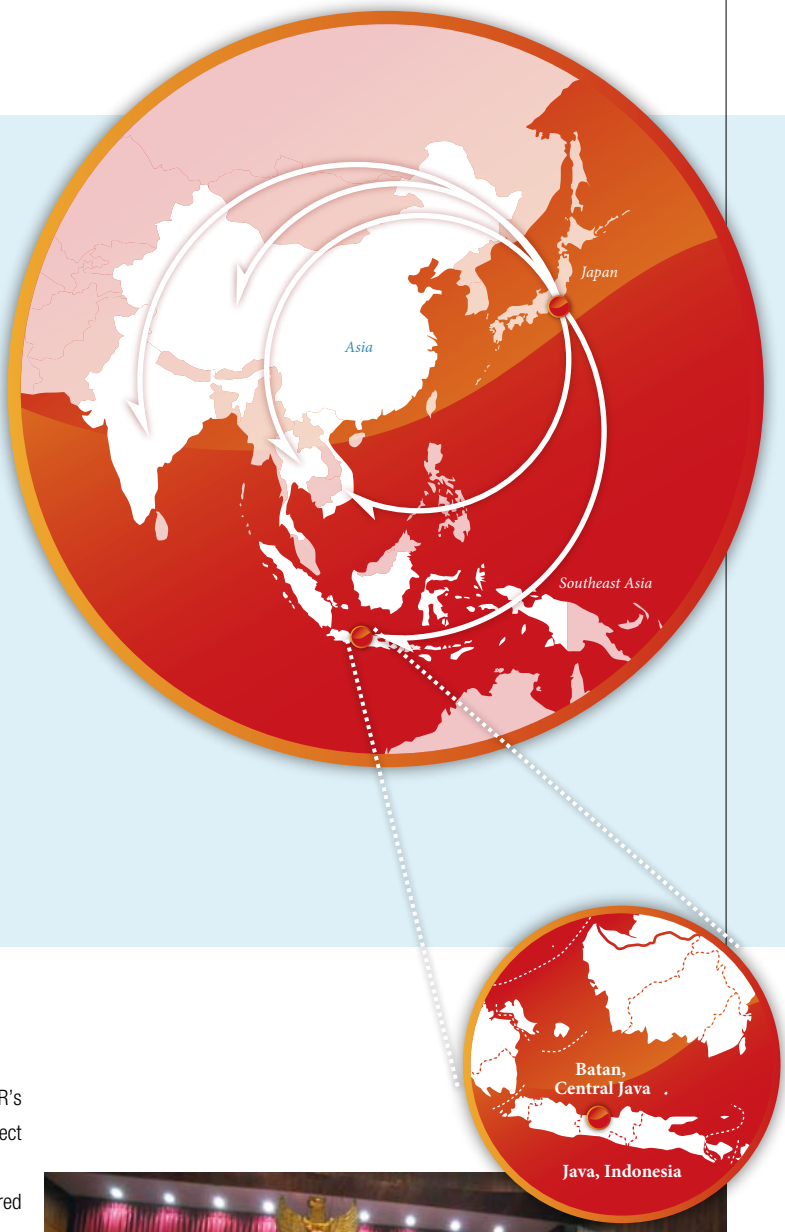

Isogo Thermal Power Station
(Yokohama City)

Taking J-POWER's Technologies to the World

Worldwide coal-fired power generation is expected to increase further in the future. Against this background, J-POWER is contributing to the reduction of CO_2 emissions on a global scale by introducing its technologies and expertise to the energy-hungry Asian region, working to defuse the clean and high-efficiency coal-fired power generation in the region.

Projection for amount of coal-fired power generation worldwide*1





Central Java Project ▶P58

Together with our partners including one local partner, J-POWER's consortium has finalized an agreement for Asia's largest IPP*2 project (1 GW×2), on the island of Java in Indonesia.

The construction of Indonesia's first high-efficiency USC coal-fired power plant will enable us to realize J-POWER's goal of using its clean coal technologies and expertise to reduce CO_2 emissions on a global scale.


Image of completed station


Signing ceremony in Central Java

Special Feature

Coal-fired Power Generation – Indispensable Japan's Base Power Sources

*1 Source: IEA World Energy Outlook 2011 (New Policy Scenarios)
*2 IPP: Independent power producer

Technological Development towards Zero CO_2 Emissions

The Direction of Technological Development

CO_2 capture and storage (CCS) is expected to be a key technology to realize significant CO_2 emission reductions, but its application to coal-fired power generation results in substantial declines in power generation efficiency, and it has therefore not yet been put into commercial use. J-POWER is engaged in research and development of further high-efficiency power generation technologies, as well as in the development of technologies to increase the efficiency of CCS, with a particular focus on CO_2 separation and capture technologies.

The EAGLE Project*3 ▶P61

Development of technologies for high-efficiency power generation using coal

Integrated gasification combined cycle (IGCC) generation is a technology that seeks to realize higher power generation efficiency by gasifying coal to use it in combined cycle power generation. As oxygen-blown coal gasification enables conversion of flammable gases into highly concentrated CO_2 and H_2, it is possible to conduct efficient CO_2 separation and capture. The EAGLE Project being conducted at J-POWER's Wakamatsu Research Institute is engaged in the research and development of oxygen-blown coal gasification technologies and CO_2 separation and capture technologies with pilot scale test facilities. The results and findings of the project are attracting worldwide attention.

External view of EAGLE pilot plant test facility
(Kita-Kyushu)

The Osaki CoolGen Project ▶P61

Large-scale proving trials of oxygen-blown coal gasification technologies

The Osaki CoolGen Project involves the application of the oxygen-blown coal gasification and CO_2 separation and capture technologies in a 170 MW IGCC facility for large-scale demonstration testing, based on the technologies developed in the EAGLE Project. Following system evaluation of the coal gasification, the project will study the optimization of the CO_2 separation and capture system. The project aims to construct triple combined cycle generation (integrated gasification fuel cell combined cycle generation, IGFC) by adding fuel cells to the two-stage combined cycle of gas turbine and steam turbine, in order to realize even higher power generation efficiency in the future.

Image of completed facility for proving trials

Aiming for the ultimate target of zero CO_2 emissions

Towards sustainable development for Japan and the world

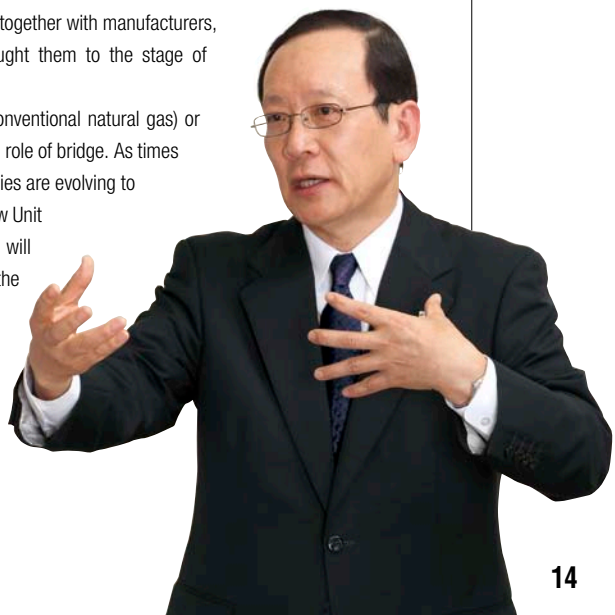
Coal-fired Power Generation Technologies: The Evolving Bridge

In 1979, when the world was in the throes of an oil crisis, an international team of specialists in the field of energy brought together by Carroll Wilson, the first General Manager of the U.S. Nuclear Regulatory Commission, produced a report entitled Coal: Bridge to the Future. At that time, "future" meant fast-breeder reactors, a next-generation nuclear technology. In other words, the expectation was that coal-fired power generation would function as a bridge to the commercial application of fast-breeder reactors.

Japanese technologies played a significant role in responding to that expectation. J-POWER, working together with manufacturers, developed world-leading environmentally friendly coal-fired power generation technologies and brought them to the stage of commercial application. And today, Japan is at the world forefront in clean coal technologies.

Thirty years later, we are now involved in a nuclear crisis. "Future" now means shale gas (an unconventional natural gas) or renewable energies. But whichever is the future, it is coal-fired power generation that is again playing the role of bridge. As times have changed, greater sophistication is demanded, and Japanese coal-fired power generation technologies are evolving to the next stage and expanding into a fast-developing Asia. In Japan, Takehara Thermal Power Station New Unit No. 1, and overseas, the Central Java Power Station, are attracting attention as new stars. J-POWER will continue to push forward the evolution of coal-fired generation technologies, seeking to contribute to the realization of sustainable development throughout the world.

Yoshihiko Sakanashi Executive Vice President



*3 EAGLE: Coal **E**nergy **A**pplication for **G**as **L**iquid & **E**lectricity
Development of multipurpose coal gasification technology.

The Ohma Nuclear Power Station

Introduction

Nuclear power is an important power source that is indispensable from the perspective of maintaining a stable energy supply, and it is also effective in responding to the issue of global warming. J-POWER is therefore proceeding with the construction of a nuclear power station (Advanced Boiling Water Reactor (ABWR); Power Generating Capacity: 1,383 MW) in Ohma-machi, Shimokita-gun, Aomori Prefecture.

At present, we are proceeding with examination of the safety enhancement measures shown at the right, with consideration of the accident at the Fukushima Daiichi Nuclear Power Station.

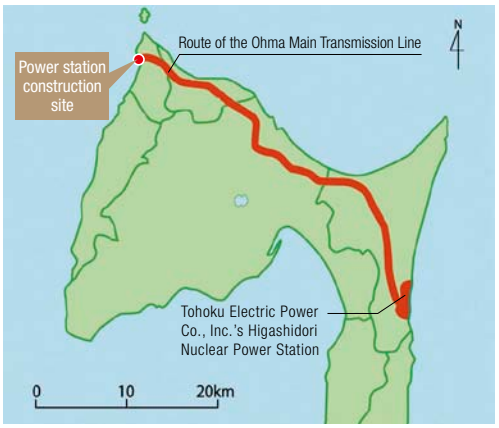


Diagram of Ohma Nuclear Power Station position (Aomori Prefecture)

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

We are putting the following measures in place at the Ohma Nuclear Power Station based on the experience of the accident at the Fukushima Daiichi Nuclear Power Station.

1. Safety enhancement measures - Measures against tsunami, ensuring power sources, etc. (May 2011)

Measures against tsunami

We are adopting the following measures to mitigate the impact of a tsunami and to prevent flooding of the main buildings and protect the equipment in those buildings from seawater.

- Installation of seawall around main buildings
- Use of waterproof structures for external doors of main buildings, etc.
- Improvement of waterproofing of rooms in which equipment important to safety is located

Ensuring power sources

We are adopting the following measures to prepare for an emergency situation in which power sources external to the nuclear power station are unavailable and emergency diesel generators are inoperative.

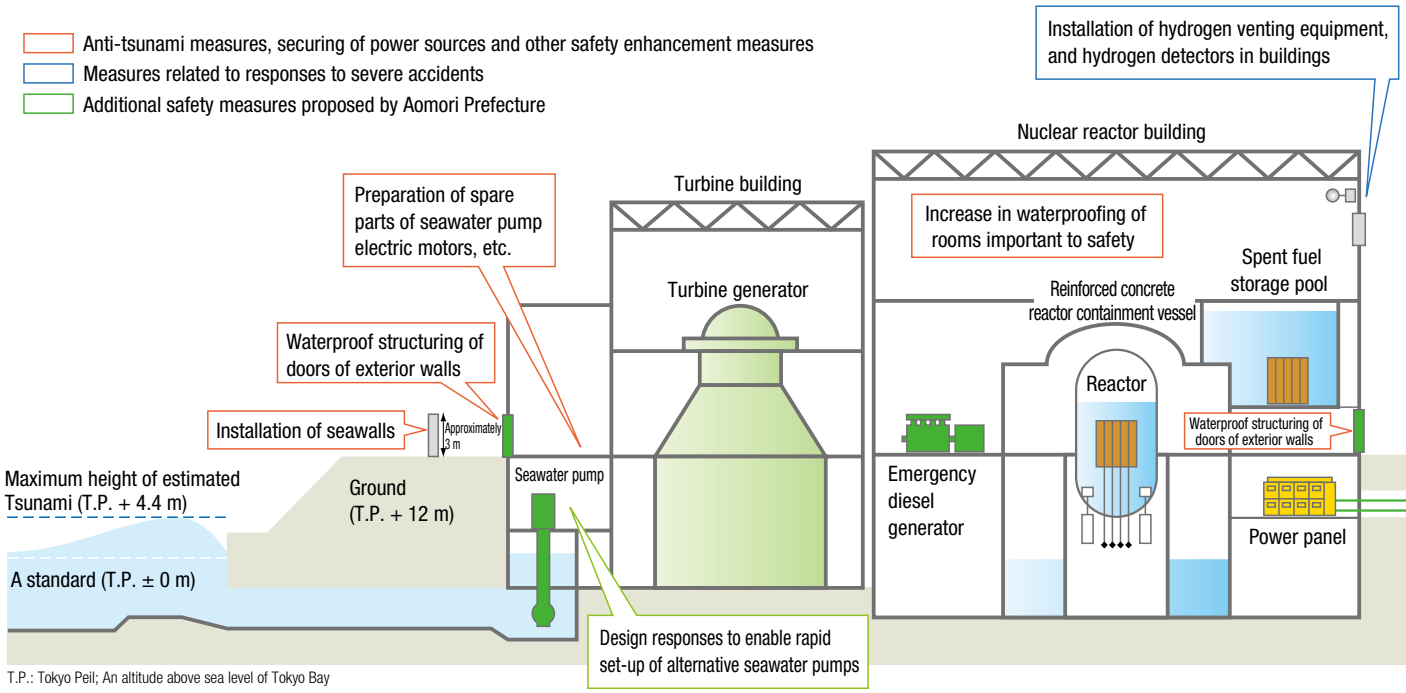
- Positioning of emergency generators in elevated areas that will not be affected by a tsunami
- Preparation of power supply vehicles and other equipment

Ensuring ultimate heat removal functions

We are adopting the following measures to ensure functions for the cooling of the reactors and spent fuel storage pools in an emergency.

- Ensuring of ability to supply power from emergency generators or from power supply vehicles, etc.
- Preparation of alternative methods of pumping water (portable power pumps, etc.)
- Preparation of alternative water sources
- Preparation of spare parts for seawater pump motors, etc.

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



T.P.: Tokyo Peil; An altitude above sea level of Tokyo Bay

2. Measures for response to severe accidents (July 2011)

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

- Securing of a functional working environment in the central control room
- Securing of means of communication within the power station facility
- Preparation of materials and equipment such as protective clothing for high-radiation environments, establishment of radiation management system
- Installation of hydrogen venting equipment, and hydrogen detectors in buildings
- Preparation of rubble-clearing vehicle

3. Additional safety enhancement measures based on proposals by Aomori Prefecture (December 2011)

●Consistent implementation of safety measures (Design changes or additional measures)

- Raising of height of oil dikes for oil tanks
- Design responses to enable rapid set-up of alternative seawater pumps
- Installation of permanent power cables from emergency generators
- Construction of seismic isolation emergency response office
- Reinforcement of water tanks

●Enhancement of earthquake/tsunami responses

We work constantly to stay abreast of the very latest studies and research trends concerning earthquakes and tsunami, and continuously gather and collate wide-ranging information, striving to implement appropriate responses in ensuring seismic safety and other measures.

●Working for disaster prevention

In addition to formulating a nuclear utility emergency preparedness plan based on the specific characteristics of the local area, we also collaborate and cooperate in regional disaster prevention initiatives.

●Development and enhancement of training

To enable us to implement precise responses in an emergency, we work continuously to increase our risk management capacity, for example by conducting training exercises modeling severe weather conditions or responses in the early morning or late at night, and by formulating procedural manuals.

●Enhancement of inter-company cooperation

Seeking to further increase facility safety and technological capacity and to enhance their ability to respond in a nuclear emergency, five companies that operate nuclear facilities in Aomori Prefecture* have joined together to create a cooperative system, enabling them to exchange information, conduct relief drills, and provide support via equipment and personnel in an emergency, among other activities.

●Active efforts to introduce superior safety technologies

We make efforts to collect information on the latest trends, and we actively introduce new safety-related technologies that are both effective and usable.

4. 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.

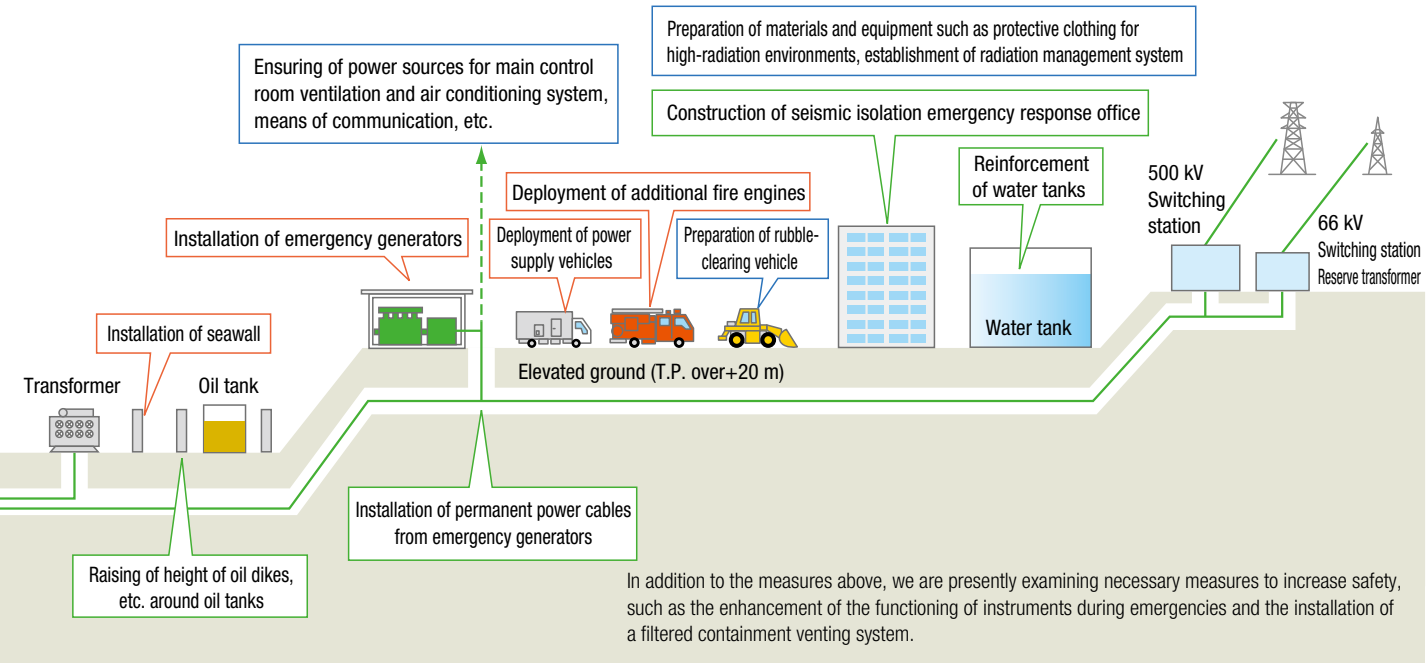
Going forward, we will continue to work to create a safe power station, always appropriately reflecting the necessary measures based on government guidelines and other relevant information.

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)

* Tohoku Electric Power Co., Inc., Tokyo Electric Power Co., Inc., Japan Nuclear Fuel Limited, Recyclable-Fuel Storage Company, and J-POWER.



The Ohma Nuclear Power Station

Artist's rendering of completed Ohma Nuclear Power Station

Status of construction of Ohma Nuclear Power Station (Spring 2012)

Harmony with the Local Community

At the Ohma Nuclear Power Station, we are pursuing a variety of initiatives in order to ensure the understanding and trust of every member of the local community.

We are now in the 22nd year of publication of our public relations magazine for local residents, which looks at topics of local interest in addition to providing information on construction plans and the state of progress of construction.

In addition, we work with local schools to support the education of the coming generations, for example by hosting visits by groups of schoolchildren for the study of geological strata and cooperating in comprehensive study programs. We also participate in local festivals and other events on an ongoing basis.

Based on the experience of the Great East Japan Earthquake, our employees are also visiting houses and businesses in Ohma-machi, Kazamaura-mura and Sai-mura in northern Shimokita-gun, explaining the ways in which we are enhancing the safety of the Ohma Nuclear Power Station and other matters, and communicating with local residents regarding their questions and opinions.

Communicating with local people

Governance

Initiatives for Enhancing Corporate Value

Sakuma Dam (Shizuoka and Aichi prefectures)

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

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.

Revision of Executive Officer System

We revised our executive officer system as of June 26, 2012 to better define functions and lines of authority in the execution of duties. Under the new system, directors have a supervisory function, and the representative director, who has business administrative authority under the Companies Act, together with managing officers and executive officers, hold executive functions. This has clarified responsibilities and authority, enabling precise and prompt decision-making and efficient corporate management.

Governance with Outside Executives

At J-POWER, the representative director and executive officers that administer the business and the outside directors that take part in Company management decisions from an independent point of view supervise each other by attending the meetings of the Board of Directors and other means.

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.

Council System

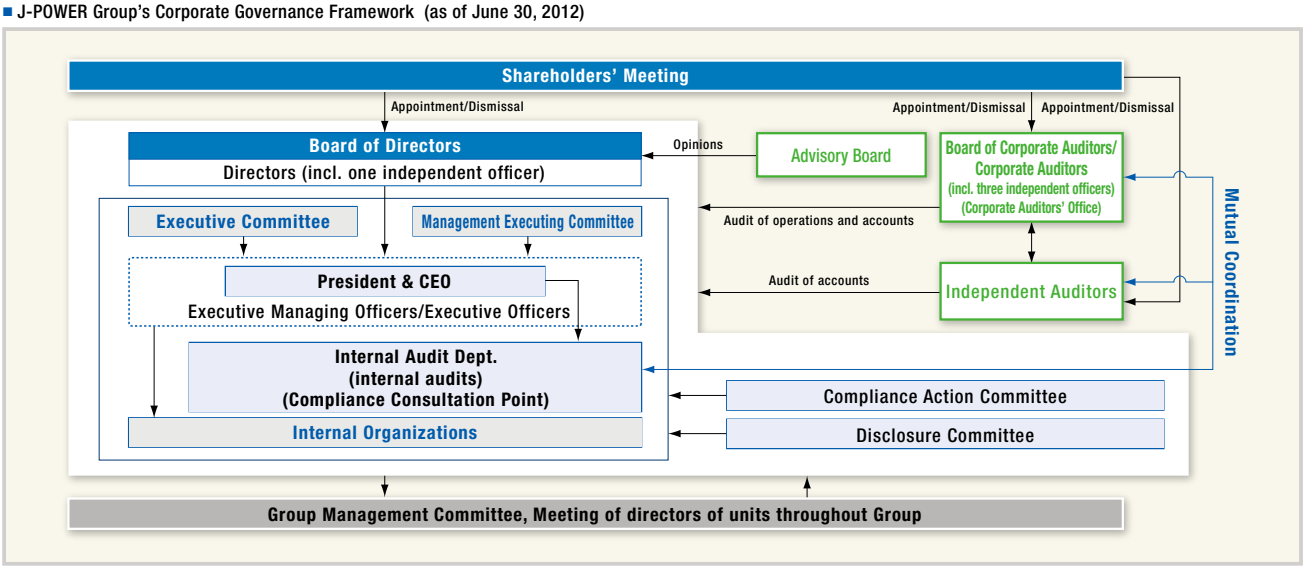
To ensure that directors' duties are carried out efficiently, functions have been allocated to bodies other than the Board of Directors. Specifically, the Executive Committee has been established to deliberate on specific matters, in particular matters of key importance to the Company as a whole from among those being handled by the president and executive vice 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.

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 (as of June 30, 2012)



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 to enhance corporate governance. The Advisory Board allows outside experts to provide diverse and objective opinions and uses them to enhance corporate value.

Group-Wide Initiatives

J-POWER's basic policy on the administration of subsidiaries and affiliates calls for comprehensive, Group-wide development in accordance with the Group's management plan, and subsidiaries and affiliates are managed in line with internal regulations.

We additionally optimize work within our group of companies through a Group management meeting, and have also set up the J-POWER Summit, a meeting of directors of units throughout the Group, to share information in the entire Group. The summit, 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, and to 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 take the lead in the preparation, operation and evaluation of our internal control system as based on an "Internal Control Reporting System on Financial Reporting" as required under the Financial Instruments and Exchange Law.

In FY 2011, 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 2012.

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.

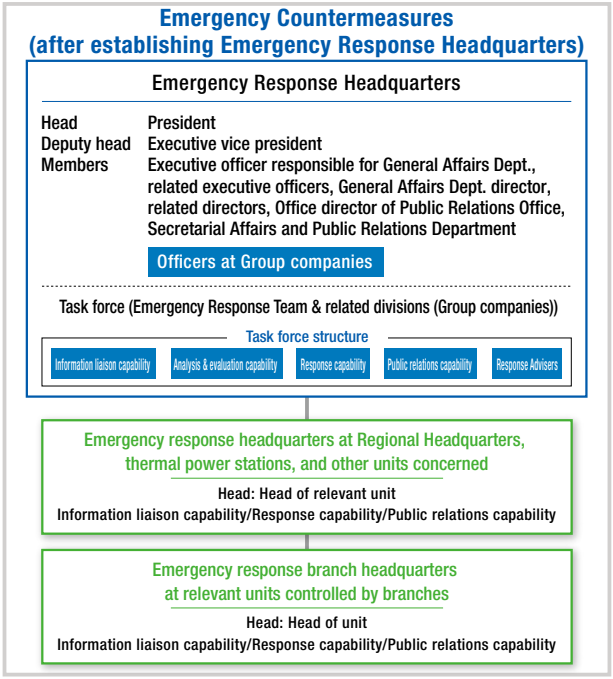
- Prediction of emergencies and rapid first response when they do occur
- Identification of risks, collection and management of risk information
- Training

2 Emergency managers and emergency duty personnel

Emergency managers and duty personnel are appointed in each head office division and local unit, 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

J-POWER Group recognizes a variety of events as emergencies, but one of the greatest emergencies for us as an electricity wholesaler would occur if the equipment that produces and distributes electric power suffered a malfunction that prevented us from supplying electric power. 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 endeavors to prevent natural disaster-caused equipment malfunctions, etc. by such means as having systems in place to restore equipment functions as rapidly as possible when natural disasters affect the maintenance and operation of facilities such as power stations, transmission lines, substations and control stations (which remotely operate power stations), and by conducting reinforcement engineering works that incorporate state-of-the-art earthquake-resistant design concepts.

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. We additionally conduct regular patrols and inspections of electricity generation, transmission, substation, and communications equipment to prevent man-made emergencies.

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. We conduct patrols and inspections of these as a part of day-to-day routine so they will not cause major supply disruptions, and equipment with compromised functionality and damage is repaired or replaced as necessary. In addition, we regularly perform meticulous inspections to check the performance of key equipment and conduct preventative maintenance to avoid equipment malfunctions.

4 Other

Anticipating the possibility of an emergency such as a new strain of influenza threatening to impede operations, J-POWER adopted a "New Strains of Influenza Action Plan" in April 2007 and has responded accordingly. We also have a system in place to deal with other situations that could cause loss or impairment of J-POWER's management resources. This is designed to ensure business continuity by following Crisis Management Rules.

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 based on the disaster prevention operational plans, 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 each unit to improve its practical ability to take disaster countermeasures so that emergency situations can be handled smoothly and appropriately.

Disaster response training
(Isogo Thermal Power Station (Yokohama City))

General disaster response training (head office)

Response in Light of Recent Natural Disasters

The Disaster Prevention Task Force, a cross-sectional organization within J-POWER established as based on our crisis management rules, has noted that recent natural disasters have caused very great damage, as seen for example in the Great East Japan Earthquake (also known as the Tohoku-Pacific Ocean Earthquake) of March 11, 2011 and in cases of typhoon and heavy rainfall. In light of these, the task force closely watches moves by public agencies (such as the Central Disaster Prevention Council) and analyzes impacts on facilities associated with J-POWER. To fulfill our mission as a designated public institution, especially to prevent man-made damage and public pollution and ensure business continuity and the rapid recovery of power generation facilities, the task force establishes basic policies and studies technological measures for further strengthening anti-disaster measures.

The principle initiative taken so far has been to study the extent of impact to facilities associated with J-POWER in the event of an earthquake/tsunami of the most severe class (in consideration of the various possibilities announced by public agencies such as the Central Disaster Prevention Council), and in the event of unusual flooding as based on analysis of data from past typhoons and heavy rainfalls.

Specifically, the task force has been studying and implementing measures with the aim of further improving the safety and reliability of J-POWER facilities, such as 1) at thermal and hydroelectric power

Report

Response in light of Niigata/Fukushima downpour and Tropical Storm Talas (Typhoon No. 12) in 2011

The year 2011 brought the Niigata/Fukushima downpour and record rainfall from Tropical Storm Talas (Typhoon No. 12). The weather caused serious flood damage in the Tadami and Kumano river basins. Additionally, many local persons asked J-POWER to make changes, including in the way we release information about our dams and in the way we operate those dams. J-POWER takes input from the community very sincerely. Thus we set up a Technical Study Committee that accepted comments and guidance from persons of learning and experience as it studied measures for improving dam operations. Since the start of this year's flood season (June 2012), it has provisionally put into effect the improvement measures listed on the right.

1. Response in light of Niigata/Fukushima downpour (Tadami River Basin)
   - Make voluntary dam operations improvements (provisionally operate Okutadami Dam and Tagokura Dam at 2 m and 3 m below full water level, respectively, when flood waters occur during flood season)
   - Take sedimentation controls at Taki Dam
   - Improve flow of information to local governments and river administrators concerned
2. Response in light of Tropical Storm Talas (Typhoon No. 12) (Kumano River Basin)
   - Make voluntary dam operations improvements (when major flooding expected, provisionally operate Ikehara Dam at 1.5 m below current standard water level (3.0 m below current standard water level when exceptionally major flooding expected) and Kazeya Dam at 1.0 m below current standard water level)
   - Improve flow of information to local governments and river administrators concerned

stations, measures against leaks of hazardous substances and measures to evaluate power generation facility seismic durability and damage from tsunami and flooding, with measures to maintain function in these events; 2) at power conversion and transmission facilities, measures to evaluate seismic durability and maintain function of power source facilities, transmission lines, converter stations, etc. that are directly connected to power generation facilities; and 3) at communications facilities, measures against communications malfunctions as a result of anticipated shaking or collapse of foundation ground.

It has also been diligently studying hard and soft ways to further strengthen preparations against major earthquakes, which could include a Tokai/Tonankai/Nankai earthquake or an earthquake directly beneath the Tokyo metropolitan area, either of which could happen in the near future.

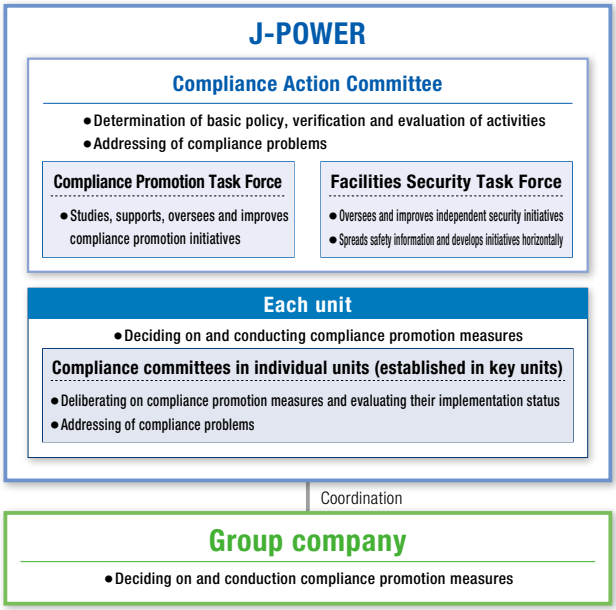
Taking full consideration of past disasters, J-POWER will continue to strengthen our disaster countermeasures and anti-disaster systems by cultivating an anti-disaster awareness among our employees and making them better able to take countermeasures.

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 lawabiding spirit, while our Compliance Code (see p. 86) 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). Group companies also participate in the compliance committees, and 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 as compliance initiatives proceed at the Group-wide level.

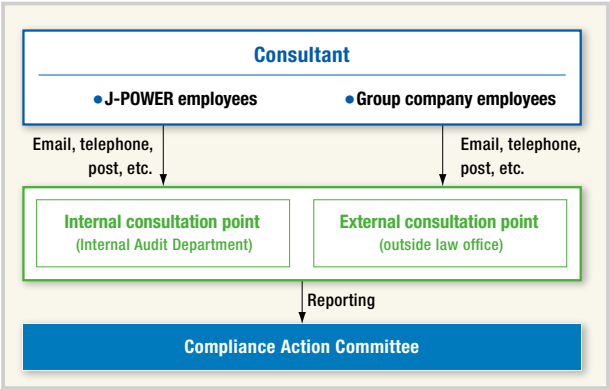
■ J-POWER Group Compliance Promotion Structure



Compliance Consultation Points

J-POWER Group 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 Consultation Points



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 training and lectures on the subject of compliance and ensure opportunities for executives and unit site employees to trade views 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 compliance questionnaire surveys to learn the state of compliance awareness among J-POWER Group employees and use the results for subsequent compliance activities.


A meeting for executives and unit site employees to trade views

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.

No cases with major social impacts were confirmed for FY 2011.

Information Security Activities

As companies have become increasingly informationoriented and are making ever-greater use of IT, the significance of information security is growing. However, along with the growing use of IT, there are increasing cases of cyberterrorism and other threats targeting certain businesses and groups. As part of the vital infrastructure, J-POWER Group has the duty to build nuclear power stations and provide stable supplies of electricity. Given this important duty, we seek to enhance information security and maintain it at a higher level, and we continuously implement a variety of measures to achieve these goals.

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.

We continue to expand the business of the J-POWER Group, not only our power generation business in Japan but also businesses overseas. This increases the need to conduct proper information management that earns the trust of society as we steadily run our business. 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. Also, the General Affairs Department's IT Office, which is specially tasked with ensuring security, collaborates with the Nuclear Power Division to take strong measures in the construction of the Ohma Nuclear Power Station.

Specific Measures

Each fiscal year, security practices are improved and plans written based on the state of activities the previous fiscal year. Information security measures are then taken accordingly. Major measures are as follows.

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
- General Affairs Department's IT Promotion Office, appointed to provide general management of information security, promotes the development of rules and the implementation of specific measures
- 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
- Reports are written periodically on the state of information security, and those concerned are informed and educated about information security each quarter
- Information security patrols are conducted at power stations and awareness-raising initiatives are implemented for maintenance personnel
- Gives training using scenario of an information security incident

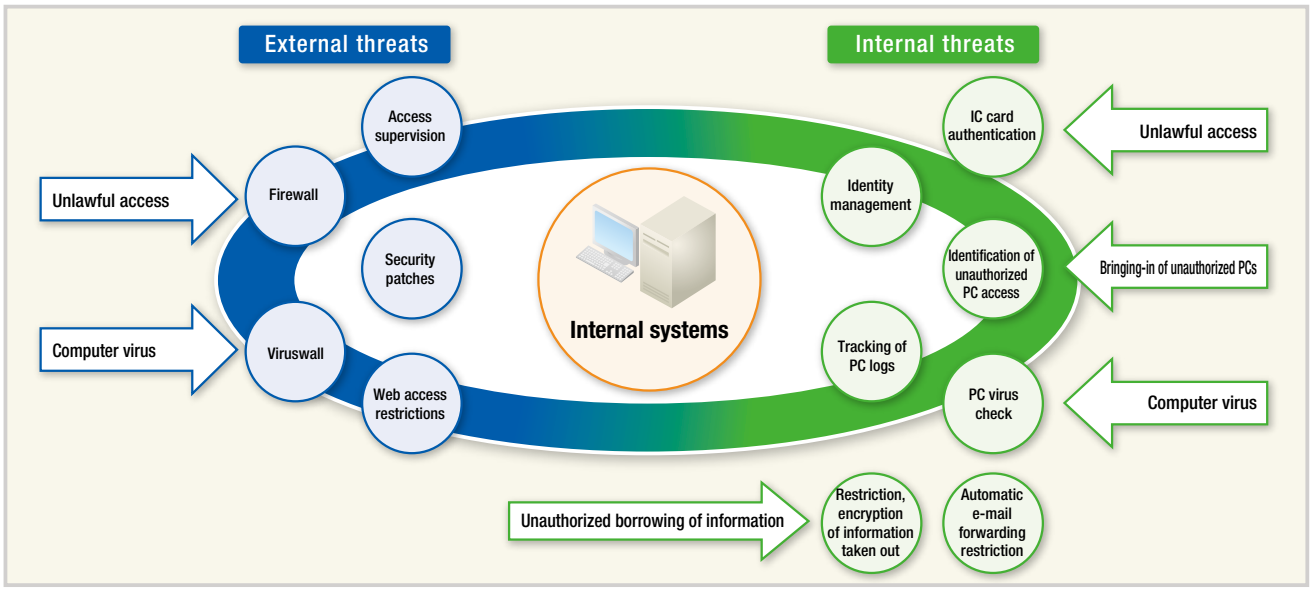
3 Physical measures

- Locking control (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



Social Responsibilities

Part 1

Measures for a Stable Supply of Electricity

Part 2

Enhancing Communication

Isogo Thermal Power Station (Yokohama City)

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.

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.

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

Okutadami Power Station (Fukushima Prefecture)

Awara Wind Farm (Fukui Prefecture)

Minami-Kawagoe Substation (Saitama Prefecture)

Tachibanawan Thermal Power Station (Tokushima Prefecture)

Main facilities

- Hydroelectric power stations
- Thermal power stations
- Geothermal power stations
- Wind farms
- Recycling power generation, cogeneration, independent power producers (IPP), power generation for a competitive market
- Transmission lines
- Substations (including converter stations and switching stations)
- Research institutes, etc.

* Planned, under construction

- Hydroelectric power stations
- Thermal power stations
- Nuclear power stations
- Transmission lines

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

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 substations and converter stations at eight locations that supply power generated by the company to our demand areas. Our facilities also link Japan's disparate regional power companies together, thus playing a major role in the wide-area operation of Japan's electricity grid as a whole. Particularly noteworthy are the Kitahon DC Trunk Line that interconnects the islands of Hokkaido and Honshu, the Honshi Interconnecting Line and Anan Kihoku DC Trunk Line that link the islands of Honshu and Shikoku, and the Kanmon Interconnecting Line that links the islands of Honshu and Kyushu, as well as other extra-high-voltage transmission lines. Another key capability comes from the Sakuma Frequency Converter Station, the first such facility in Japan to enable power transmission between the differing frequencies of Eastern Japan (50 Hz) and Western Japan (60 Hz). J-POWER facilities like these perform important functions in wide-area transmission of power across Japan as well as in improvement of power quality, and they have made major contributions to responses to the power shortages caused by the Great East Japan Earthquake.

Tadami Main Transmission Line (Gunma Prefecture)

Kitahon HVDC Link Kamikita Converter Station (Aomori Prefecture)

Sakuma Frequency Converter Station (Shizuoka Prefecture)

Operation Management of Power Stations and Other Facilities

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. For our hydroelectric power facilities, we have divided the country into three regions that are operated by three control centers, the North Regional Control Center (Hokkaido), the East Regional Control Center (Saitama Prefecture), and the Middle & West Regional Control Center (Aichi Prefecture). J-POWER has been taking steps to upgrade the equipment at the various regional control centers with the aim of heightening the functionality of our facilities and increasing the efficiency of our operation management system. The equipment upgrades of all regional control centers were completed without incident and operations began again in April 2010.

Central Load Dispatching Center

East Regional Control Center (Saitama Prefecture)

At the same time, J-POWER is engaging in stable grid operations by means of remote monitoring and control using the latest in information technology. To that end, we possess an information telecommunications network of highly reliable microwave radio circuits, fiber-optic cable, and other such elements that we employ to conduct high-precision operation. This information telecommunications network is configured as a trunk system of microwave radio links that extend the length of Japan from Hokkaido in the north to Kyushu in the south, and when the branches leading off to our various business sites are included, the system is approximately 5,900 km in length.

Facilities Maintenance and Technology Transmission

The J-POWER Group possesses facilities of various different kinds, including power generation, substation, power transmission, telecommunications, civil engineering, and construction. We maintain the functionality of our facilities by engaging in high-quality facility maintenance that prevents problems before they occur, and so contribute to the stable provision of electric power in Japan as well as to the stabilization of Japan's power grid. Our power generation and substation facilities are monitored on a 24-hour basis, with everyday patrols for early detection of equipment abnormalities. We also conduct regular overhaul inspections of facilities and other such activities to assure the reliability of facilities, and we make every effort to prevent accidents and incidents before they can occur.

We also engage in various activities to maintain readiness against the occurrence of natural disasters or accidents, including establishment of information contact routes, maintenance of mutual assistance systems with related locations, stockpiling of supplies for recovery from accidents, and training for dealing with accidents. We implement these measures during ordinary times so that we will be able to implement countermeasures certainly and rapidly in the event of emergency.

We are also making every effort to improve and pass on the facilities maintenance capability and other such technical capabilities that we have cultivated in various different fields. We are using workplace OJT*1, training facilities, and so on to provide training of all kinds with the aim of "developing human resources" and "upgrading the technical capabilities" of our employees.

Hydroelectric Power Facility Operations

The J-POWER Group possesses hydroelectric power stations at 59 locations throughout Japan that it operates, together with substations and converter stations, from three regional control centers that conduct centralized control nationwide on a 24-hour basis. We engage in day-to-day patrol inspections, regular facility inspections, and other such on-site activities for early detection of abnormalities in the facilities, and we also take measures to prevent facility accidents before they occur. If abnormalities do occur, employees immediately rush to the site where they ascertain the situation and also engage in recovery operations. We make every effort to recover facilities promptly.

The Hydropower Division makes a regular practice of setting objectives for facilities maintenance technology, facilities operation technology, facilities construction technology, and so on in light of the particular characteristics of the work involved and implementing systematic, efficient education accordingly.

The Electric Section conducts technical training at the Kawagoe Training Center (in Saitama Prefecture) using simulators and other such facilities for maintaining and fostering the practical skills of operators and on-site maintenance personnel in order to maintain the stable operation of hydroelectric power facilities.

In the Civil Engineering Section, the Chigasaki Research Institute (in Kanagawa Prefecture) runs practical training on dam operations using dam simulators located onsite as well as Civil Engineering Technology Training, a comprehensive training program for J-POWER Group employees involved in the field. The practical training on dam operations seeks to further raise the level of dam operators by such measures as implementing simulator exercises that reflect data from the severe rain storms that occurred in Niigata and Fukushima Prefectures in July 2011.

Electric Section Operations (Kawagoe Training Center in Saitama Prefecture)

Civil Engineering Section Operations (Chigasaki Research Institute in Kanagawa Prefecture)

Voice

Transmitting Our Technology to Future Generations

At the time it was built, Miboro Dam and Power Station (Gifu Prefecture) was called the top such structure in the Far East. It reached its 50th year in 2011, and the partner organizations that inherited the care of these facilities and are maintaining them are the J-POWER Miboro Power Administration Office and the JPHYTEC Miboro site. There are some younger personnel among them who are having their first experience of on-site work, but they are ever eager and "There's no better place to learn than on-site."

Given recent developments, hydroelectric power has been receiving more and more attention as a renewable energy source, and even though this facility is respected because of its age, it will not do to leave it as it was long ago. It has to be handled from a broad perspective that includes facility maintenance, to include full use of technology to monitor the state of the facility, and other considerations. This is the work we are engaged in every day.

In order to keep the facility going well into the future, we also feel it is our mission as the elders to pass on our technology to the next generation and see that they receive it securely while making the most of their new thoughts and perceptions.

Akihiro Niwaya
Director
Miboro Power Administration Office

References

*1 OJT
On-the-job training for employees in the workplace.

Thermal Power Facility Operations

The J-POWER Group possesses eight thermal power stations in Japan (including one geothermal facility). We are making every effort for early detection and early handling of abnormalities at our thermal power stations by monitoring the operation of thermal power facilities and conducting patrols on an everyday basis. We also accurately identify the facility operating conditions that change according to the type of coal, and we carry on operation management so that key equipment and environmental equipment will achieve full functionality. In addition, we conduct planning from a medium- to long-term perspective for preventive maintenance and planned repairs so as to assure the stable operation and reliability of our power stations, and we strive to implement appropriate maintenance.

The Thermal Power Division is engaged in upgrading and transmitting our technical capabilities by taking such measures as placing the operations and maintenance technology we have cultivated in running these thermal power stations into in-house databases for sharing, and holding conferences for managers and other responsible people. With the aim of fostering technicians who have a high level of practical capability that enables them to think and take action on their own, we are implementing simulator training at the Wakamatsu Operations and General Management Office Thermal Power Training Center (Kitakyushu City) for thermal power station operators (start-up, shutdown, accident handling) as well as specialized training for maintenance personnel (equipment theory, disassembly and assembly skills).

Training underway at the Thermal Power Training Center (Kitakyushu City)

In Order to Fulfill the Role of Wide-Area Power Source

Matsuura Thermal Power Station was constructed as J-POWER's first jointly sited location (jointly with Kyushu Electric Power Co., Inc.). The No. 1 unit started commercial operation in June 1990, and the No. 2 unit in July 1997. The No. 2 unit was the first in Japan to introduce ultra-supercritical (USC) technology (main steam at 593°C and reheated steam at 593°C), and it has been a pathfinder in higher-efficiency coal-fired power generation.

Each generator has an output of 1 GW. They perform a critical function as a wide-area power source, and the electricity they generate supports the power supply to western Japan.

We are taking every possible care to deal with the electric power supply-demand situation, which has grown tighter nationwide since the earthquake disaster, and we are engaging in measures for stable operation. In order to detect advance signs of equipment trouble as early as possible, we implement carefully planned patrols and detailed inspections. In order to enable immediate response in the unlikely event that trouble does occur, we prepare for emergencies by conducting training, checking our systems for liaison, and so on. Everyone at the power station is united, including people from cooperating companies, in the effort to minimize the periods of plant shutdown during the regular work of maintenance and inspection as well as periodic inspection work, and to make it possible to conduct repairs safely and smoothly.

Matsushima Thermal Power Station (Nagasaki Prefecture)

Report

About the Fire on the Grounds of Isogo Thermal Power Station

At about 22:00 on November 24, 2011, a fire was detected near the CI-3 conveyor in the screen crusher room*1 at Isogo Thermal Power Station. The Fire Department was notified and fire extinguishing activities were begun starting at 22:12. At 00:09 on November 25, an explosion occurred near the upper portion of Coal Silo C. At the time the fire started, the power station was operating at full capacity, with the No. 1 unit generating 600 MW and the No. 2 unit generating 600 MW. The generators were shut down because of the fire and explosion, and the fire was extinguished at 15:38 on the 25th.

When the fire broke out, an Accident Countermeasures Committee was immediately formed within the company. The committee investigated the cause of the incident and studied measures to prevent recurrence. We also formed an Expert Evaluation Committee made up of outside experts in order to obtain an objective evaluation of the effectiveness of our measures.

The examinations conducted by the in-house and external committees determined the likelihood that the fire started in a conveyor belt tensioner device and that the fire occurred due to either spontaneous combustion or frictional heat generation or possibly a combination of the two.

Based on these in-house and external initiatives to ascertain the cause of the fire, we have implemented measures in terms of both physical plant and operations to prevent recurrence (installed sprinkler equipment, reinforced monitoring systems, etc.). At present, therefore, we have brought No. 1 and No. 2 units back into operation. This incident was the cause of great concern as well as inconvenience to residents of the area and other parties involved, and we wish to offer our heartfelt apologies to all. J-POWER is instituting thoroughgoing measures here and at our other thermal power stations to prevent any such incident from occurring again, and we will sustain these efforts.

References

*1 Screen crusher room
A facility placed midway along the conveyor that transports coal, this is a room containing the screen crusher equipment, which screens out large clumps of coal and crushes them.

Power Transmission and Substation Facility Operations

Transmission and substation facilities are located in various different environments, from mountainsides to cityscapes, and they are exposed to harsh natural conditions of wind, snow, lightning, sea salt, and so on. Therefore we conduct regular patrol inspections and do our best to detect facility abnormalities early. At the same time, we also conduct facility repairs with a preventive maintenance perspective, and we take measures to prevent facility accidents before they can happen. As a response to the tighter electric power supply and demand since the earthquake disaster, in particular, we have taken measures to implement positive independent security measures as well as to optimize and upgrade our facilities maintenance. In order to coexist harmoniously with local communities, we are also promoting the systematic updating of aging facilities and the rebuilding of power transmission lines in conjunction with changes in the local environment.

We conduct maintenance work training using training pylons and carry on accident response training to prepare for facility accidents with the aim of upgrading and transmitting our technical capabilities that are necessary for facilities maintenance of these power transmission and substation facilities. These programs are conducted at the J-POWER Group's Sano Power Transmission Skill Training Center (Tochigi Prefecture). We are also taking steps to upgrade technical capabilities by providing Power Transmission Line Construction Technology Training to teach power transmission line construction and design technology, as well as Substation Technology Training to teach design technology for large-scale substation construction work.

We engage in our operations with the understanding that it is the mission of J-POWER to carry on steady maintenance of our power transmission and substation facilities and to work to provide a stable supply of electric power.

Sano Power Transmission Skill Training Center (Tochigi Prefecture)

Information Telecommunication Facility Operations

J-POWER business sites, power generation facilities, and distribution facilities are distributed throughout Japan, and the information telecommunications network that links them together is employed for such purposes as remote monitoring and control using advanced information technology, and for protection of the power transmission grid. This network must therefore be highly reliable so that communications are not broken when earthquakes or other such disasters occur. To that end, we have implemented network redundancy*1 through the use of microwave radio, fiber-optic cable, and other such means, and we are engaging in facility design and construction aimed at maintaining and improving reliability by such means as upgrading to equipment that incorporates the rapidly progressing advances in information telecommunications technology. In order to provide for stable operation, we also conduct regular patrols and inspections, maintain a constant grasp on the state of our facilities, and conduct appropriate preventive maintenance. We further perform constant monitoring of the operational status of our facilities, so that when an abnormality occurs, we can act with the organizations concerned to make operational adjustments to the telecommunications network. Our aim then is the speedy restoration of service. The implementation of these measures to maintain and improve reliability also requires efforts to upgrade and transmit our technical capabilities. Our training facilities therefore provide equipment identical to the microwave radio and other equipment in actual use, and we conduct practical skill training to upgrade our capability to apply solutions.

We are committed to making a contribution to the stable operation of power generation and distribution facilities by maintaining the functionality and constant soundness of our nationally configured information telecommunications network.

Network Monitoring Center

Column » Electricity Interchange by the Sakuma Frequency Converter Station and Kitahon HVDC Link in FY 2011

The Sakuma Frequency Converter Station (facility capacity 300 MW) was established in 1965 as the country's first frequency conversion facility, and it interconnects the power grids in Eastern and Western Japan, which have different frequencies. At the same time, the Kitahon HVDC Link, (facility capacity 600 MW) entered operation in 1979 as Japan's first high-voltage DC transmission facility. Using a submarine cable laid across the Tsugaru Straits, it ties together the power grids on the islands of Hokkaido and Honshu. These facilities convert alternating current to direct current (AC/DC conversion), enabling the Sakuma Frequency Converter Station to interconnect the differing frequencies of Eastern Japan (50 Hz) and Western Japan (60 Hz) and enabling the Kitahon HVDC Link, to achieve long-distance power transmission over a submarine cable. These facilities additionally conduct electricity interchange (load flow control) variably according to supply and demand conditions, and they further contribute to maintaining the quality of electric power by suppressing frequency fluctuations that occur due to sudden load changes in the power grid or other such reasons (frequency control).

Hakodate Converter Station of Kitahon HVDC Link (Hakodate City)

References

*1 Redundancy:
The practice of preparing for system outages caused by natural disaster, equipment malfunction, etc. by configuring two or more parallel systems, putting them in place, and keeping them constantly operational so that the required functionality can be maintained by at least one of the systems.

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.

In September 2011, we also entered an agreement with Aston Resources Limited (Aston) to acquire a 10% interest in the Maules Creek Coal Mine in New South Wales that is being developed by Aston with the aim of starting production in 2013. At the same time, this is also an agreement for our long-term purchase of steam coal from that mine. Maules Creek is a coal mine offering both superior quality and profitability, and plans call for the production of coking coal (semi-soft coking coal)*1 and high-quality steam coal*1.

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

Measures for the 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

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

J-POWER invested in an export-oriented coal mine (Blair Athol Coal Mine) in Australia in 1982 in order to develop coal-fired power stations overseas for our company. Since then, we have been securing investment opportunities in blue-chip coal mines to use as leverage in coal transactions matched to the rise in coal procurement that has accompanied our increase in coal-fired thermal power.

At present, J-POWER is the largest user of steam coal in Japan, at approximately 21 million tons of coal annually. We import the coal mainly from Australia and Indonesia. In Australia, we own and manage our interests in coal mine projects through our local affiliate, J-POWER Australia Pty., Ltd. (JPA).

JPA is in the position of a seller that produces and markets coal. As such, JPA coordinates with J-POWER while checking on the status of development and keeping track of problems through participation in regular meetings and technical meetings held at each coal mining project as well as through communication with other project participants. These are among the measures JPA takes for stable coal procurement through investment in coal mines.

Loading coal cars at Narrabri (Australia)

Hiroyuki Mochida
Planning Office
Energy Business Department
J-POWER

References

*1 Coking coal (semi-soft coking coal) and steam coal:
Coking coal is mainly used in iron making while steam coal is used in electric power generation.

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 Division. They work in coordination with the departments concerned, the thermal power stations, the regional headquarters, branches, and other units to promote the development of technology that supports the provision of a stable supply of electricity.

Of these facilities, the Chigasaki Research Institute was founded in 1960 as the 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 a Civil Engineering Laboratory, a Thermal Plant Engineering Laboratory, a Material Science Laboratory, and a Power System Engineering Laboratory as units of a comprehensive research and development organization. As such, the institute engages in a variety of research and development relating to the construction, operation, and maintenance management of hydropower, thermal power, wind power, and other such power facilities as well as of electric power distribution facilities.

In addition, the institute's research facilities are used as the site of practical training in dam operation for employees involved in civil engineering, as well as for participation in academic societies, publication of research results, joint research with outside organizations, acquisition of academic degrees, dispatch of instructors to universities, and other such activities. In these ways, we are putting our efforts into the development of specialist technicians who have global capabilities.

At the same time, we also engage actively in exchanges with local corporations in Chigasaki City, we receive study tours for members of the public, and conduct other such activities that contribute to widespread instruction in electric power and science and technology as well as to their dissemination.

Chigasaki Research Institute of the Technology Development Division (Kanagawa Prefecture)

Parent and child study tour (scene of an experiment in liquefaction)

Practical training in dam operation

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

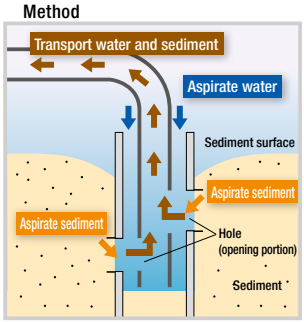
Development of Efficient Technology for Aspirating and Supplying Dam Sediment

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 developing a vertical double-pipe aspiration method to aspirate sediment and to transport sediment in order to supply it downstream from the dam. This is an efficient technology for aspirating and supplying sediment from medium and small dam reservoirs, and it works with vertical double pipes with multiple holes placed in the dam reservoir and used in combination with transport pipes.

■ Vertical Double-Pipe Aspiration Method



View of experiment in aspirating sediment

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 heat-resistant steel have been conducted since 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*2 and other such work using a large single-axis creep tester to establish lifespan assessment technology for this type of steel.

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

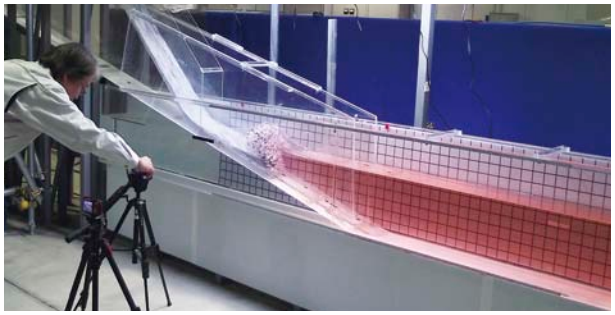
Protecting Power Stations from Natural Disasters

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

Aiming for Diversification of Fuels

Evaluating Fuel Suitability for Thermal Power Stations

The main fuel of J-POWER's thermal power stations is coal. 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. We are also promoting the co-combustion of biomass fuel in order to contribute to reduction of CO_2 emissions as a global warming countermeasure. When using these low-grade fuels, some of which undergo spontaneous combustion more readily, we must be able to transport and store those fuels safely. It is also necessary to maintain good combustibility and environmental properties in the boiler, and to avoid ash deposition, corrosion, and other such problems. With these purposes in mind, we are seeking to establish technology for assessing fuel suitability by promoting research in particular on the assessment of coal ash adhesion and spontaneous combustibility.

Air circulation tester used to assess spontaneous combustibility

References

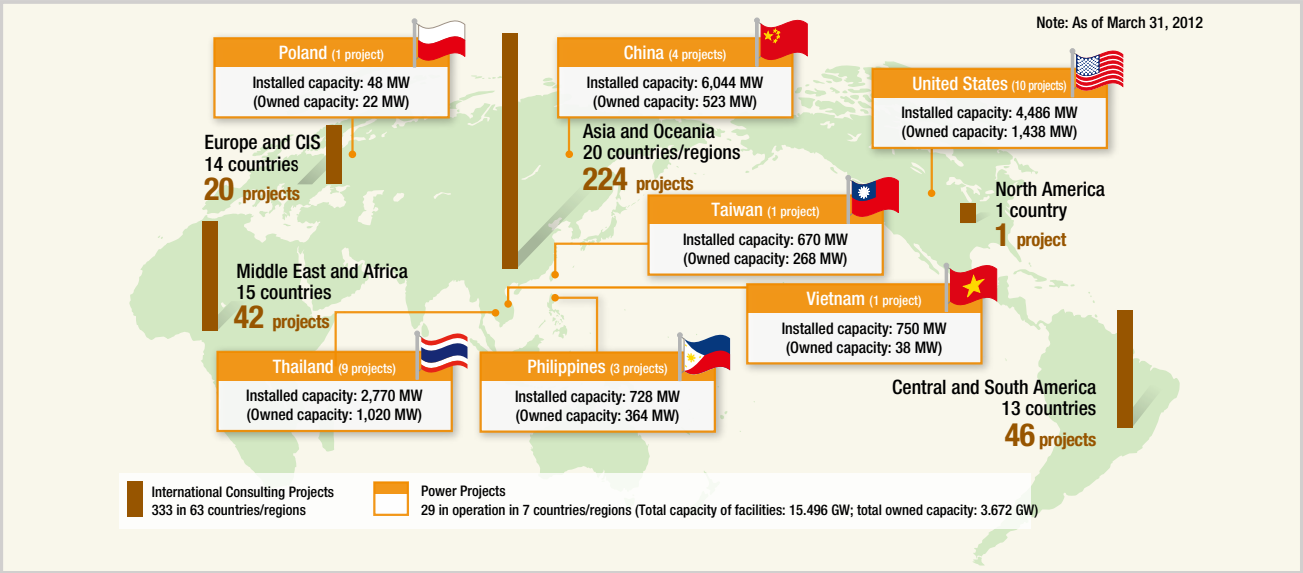
*1 High chrome ferrite heat-resistant steel
Steel with the chrome content increased to make it capable of withstanding the high temperatures and high pressures found in ultra-supercritical (USC) and other such technology.

*2 Creep testing
Creep is the phenomenon of progressive deformation over time under constant stress, and the testing equipment causes creep in test pieces under various conditions in order to acquire information for lifespan assessment.

Overseas Operations

The 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 through the investment of capital and technology. As of the end of March 2012, we had 29 overseas power generation projects in seven countries/regions operating electric power facilities with a capacity of approximately 3.67 GW (owned capacity), making this the second pillar of J-POWER Group management.

■ International Consulting Projects and Overseas Power Generation Projects



International Consulting Projects

J-POWER Technology Earns Trust Overseas

The 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. We have been using the technology and trust we developed through our business in Japan to expand our international consulting projects for the purpose of sustainable development. Starting with the Tacna Hydropower Project in Peru in 1962, our track record in international consulting projects has reached a cumulative total of 333 projects in 63 countries/regions as of the end of March 2012.

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 Upper Seti Hydropower Project in Nepal. Starting in FY 2011, we have also implemented a project supporting the formulation of a Pumped Storage Hydropower Development in Maharashtra State, India.


Group training for Indonesian engineers in Japan


Upper Kotmale Hydropower Project
(under construction in Sri Lanka)

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.

■ Main Overseas Consulting Projects in FY 2011

Country	Type	Project Name	Project Overview/Description of Service
Uganda	Hydropower	Preparatory Survey on Ayago Hydropower Project	Formulation of a long-term power development plan including plans to import and export electric power as well as a hydropower development master plan consistent with power transmission development plans.
Nepal	Hydropower	Nationwide Master Plan Study on Storage-type Hydroelectric Power Development in Nepal	Formulation of a reservoir-type hydropower station master plan (20-year plan) to cope with domestic demand.
Sri Lanka	Hydropower	Upper Kotmale Hydropower Project	Construction of a daily balancing reservoir, a headrace, and a 150-MW power station on the Kotmale River, a tributary of the Mahaweli River.
Indonesia	Thermal Power	Keramasan Power Plant Extension Project	Construction of gas combined cycle power plants (80 MW) on the grounds of Keramasan Thermal Power Station on the outskirts of Palembang City.
Vietnam	Thermal Power	Nghi Son 1 Thermal Power Plant Construction Supervisor	Construction of 2×300 MW coal-fired power plants in the Nghi Son district located 350 km to the southwest of Hanoi.
India	Facility diagnosis	Study on Renovation & Modernization/ Complete Replacement of Old Coal-based Thermal Power Stations in India	Placing the focus on obsolescent coal-fired power stations, collect information and verify the present status of two types of power facility, namely (1) power facilities to be replaced as highly efficient power stations (scrap and build) and (2) power facilities to be renovated and modernized to improve thermal efficiency. In addition, taking the necessity and cost-effectiveness of replacement or renovation & modernization into account, gather the basic information for considering support in the form of a Japanese ODA loan.
Turkey	Energy management	Data Collection Survey on Efficient Energy Management of the Public Building in Turkey	Conduct analysis of the current status of systems and measures for energy efficiency improvement and conservation (EE&C) in buildings, while also providing recommendations and advice regarding pilot projects for EE&C being carried on by the government in Turkey. Provide a systematic view of policy issues and technical issues involved in expansion of pilot projects, and provide suggestions regarding Japanese ODA loans and technical cooperation.

Overseas Power Generation Projects

[Thailand] Contributing to Thailand's Economic Development

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*1 and SPP*2 projects, we are improving the electric power situation in Thailand and promoting its economic development with both funding and technology.

The Kaeng Khoi 2 Power Station, which began commercial operation in Thailand in 2008, is helping to provide a 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 Green 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 in seven locations.


Roi-Et Green Biomass Power Station (Thailand)

[U.S.A.] Business Built up Through Collaboration with Numerous Corporations

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 1.44 GW, accounting for some 40% of our power generation business outside Japan. The US offers features that differ from the conspicuously high-growth 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. Conducting business in the US is also significant for our business pursuits in Asia. The J-POWER Group was relatively unknown in the US at the time of our market entry there, but our efforts there to gain access to many projects, build networks with other enterprises, and bring talent on board have paid off well.

We recently completed our first US construction project, the Orange Grove Power Station in California, a state with very stringent environmental protection rules. The power station has now commenced operation, and we intend to use this experience as a foundation for implementing the next project as we continue our sustained initiative.


Orange Grove Power Station (U.S.A.)

[China] Exchanges for a Period of Over 30 Years Contributed to Improved Power Generating Efficiency and Reduced Environmental Impact

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.

The J-POWER Group has taken part in the development and operation of many power stations, making effective use of its more than 30 years of experience participating in projects and technical exchanges. In the area of coal-fired thermal power, the Tianshi Power Station makes effective use of low-grade coal, and 13 stations are in stable operation under the Gemeng International Energy Co., Ltd. In the area of renewable energy, the Xihe and Shuhe Power Stations (hydropower) in the Han River are in stable operation. We are now also participating in the Hezhou Power Station Project to build a new USC coal-fired power station (two 1-GW units) in the Guangxi Zhuang Autonomous Region. Some environmental problems have no borders, and we will continue to apply the J-POWER Group's technology for this reason, as well.

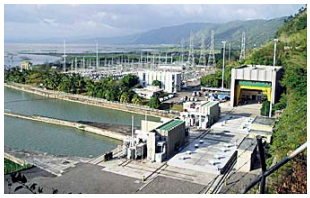

Hezhou Power Station (China)

[Asian Countries and Regions] Power Generating Projects Expand in Asian Countries and Regions

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

Of these, the CBK Project in the Philippines is the J-POWER Group's first hydropower IPP project, and it consists of the Caliraya, Botocan, and Kalayaan hydropower stations. Kalayaan Power Station does not only sell the electricity it generates: As the country's only pumped-storage hydropower station, it also plays an important role in adjusting voltage, frequency, and other such factors. In Taiwan, Chiahui Power is a high-efficiency gas-turbine combined cycle power generation project we are undertaking jointly with Asia Cement Corporation of Taiwan. J-POWER dispatched staff to the site for this project, we have taken active part in assuring Chiahui Power's sound management and stable operation, and in these ways we are contributing to the stable supply of electric power in Taiwan.

In 2011, we acquired a development project in Indonesia for coal-fired power generation (the Central Java Project, 2 GW). This is J-POWER's first project for new coal-fired power development, and it will be a high-efficiency, low-environmental-impact plant that uses domestically produced sub-bituminous coal. (See p. 58.)


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

References

*1 IPP
Independent Power Producer

*2 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.

Tokyo Selling Bread from the Swan Bakery

Baked goods from the Swan Bakery's Ginza branch are sold in the company shop and café that JP Business Service Corporation operates at the J-POWER head office. The Swan Bakery was established on the philosophy of "realizing a society where persons with disabilities and without disabilities work together and live together," and there are now 280 or more people with disabilities engaging actively in responsible work at shops throughout Japan. A wide variety of freshly baked bread and rolls is delivered every morning for sale in the company shop and café at the J-POWER head office, serving as a source of good cheer and energy to Group employees.

Delicious baked goods are very popular items (J-POWER head office, 3rd floor company shop)

Nagasaki Matsushima Sakurazaka Cherry Blossom Festival

J-POWER Matsushima Thermal Power Station has been cooperating with the local Oseto-cho community to hold the Matsushima Sakurazaka Cherry Blossom Festival since 2010. This festival is an occasion not only for enjoying the abundance of cherry trees on the J-POWER grounds, but also for numerous other enjoyable events, including performances, a photography contest, homemade booths, a workshop on making the flying "bamboo dragonfly" toy led by community elders, and tea ceremony performed by local high school students. The 2011 festival missed the cherry blossom opening due to cold weather, but crowds of Oseto-cho residents came over to the island to make it a lively event.

Scene of the main festival venue
(Matsushima Thermal Power Station, Nagasaki Prefecture)

Tokushima Awa Odori Dance Festival in Anan City

Tokushima Prefecture where the J-POWER Tachibanawan Thermal Power Station is located is famous throughout Japan for the Awa Odori Dance Festival. The local community of Anan City, site of the power station, is no exception, and in summer every year the Anan Summer Festival is held, with large numbers of dancers putting on the spectacle of the Awa Odori Dance Festival. The power station is also involved every year, and all personnel join in performing the Awa Odori dance. The J-POWER Awa Odori group is known in the area for having a large number of members, and the 2011 festival had over 100 station personnel and family members taking part in the exciting night-time festivities.

Anan City Awa Odori Dance Festival J-POWER Awa Odori Group
(Tachibanawan Thermal Power Station, Tokushima Prefecture)

Kagoshima Sendaigawa Sweetfish Festival

The town of Satsuma-cho in Satsuma County, Kagoshima Prefecture, where J-POWER Sendaigawa No. 1 and No. 2 Power Stations are located, holds an Ayu Sweetfish Festival every year timed to coincide with the annual opening of the sweetfish fishing season on June 1. With the local fishermen's cooperative as the main organizer, the purpose of the festival is to popularize the local sweetfish and to publicize the importance of water resources. J-POWER Minami Kyushu Power Administration Office has also supported this purpose from the very first time the event was held, and cooperates as a member of the Executive Committee. Large numbers of visitors enjoyed the 2011 festival, which featured such free attractions as some 3,000 salt-broiled sweetfish, cotton candy, and "yo-yo fishing" for water balloons.

Sweetfish being broiled in salt at the festival (Minami Kyushu Power Administration Office, Kagoshima Prefecture)

Niigata Children's Ski School at Yakushi Ski Resort

Uonuma City in Niigata Prefecture, where the J-POWER Koide Power Administration Office is located, is noted as one of the heaviest snowfall regions in Japan. Volunteers offer a Children's Ski School every winter at the Yakushi Ski Resort in this area. This year, which marked the school's 30th anniversary, the enrollment was the highest ever at 173 students and it was very active. Our Power Administration Office there has been contributing numbered bibs for the children and engaging in other such activities since 2009 to show our support for a program that fosters healthy children and cultivates appreciation of the benefits and the importance of nature through activities rooted in the local environment.

Children get a skiing lesson (Koide Power Administration Office, Niigata 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.

Hokkaido Handicraft Workshop and Facility Tour

The J-POWER Group Hakodate District invites the fifth- and sixth-year classes at nearby Togeshita Elementary School to a handicraft workshop and tour of the facility every year. On that day, the grounds that are otherwise always quiet resound from morning with the voices of children. In the handicraft workshop, they make a Handy Eco Light. The children observe how a motor makes a light bulb light up, and they mount a motor on a hand truck to run it like a car. Going on to the facility tour, they make a circuit of the grounds while observing the equipment. A time for questions and answers is also set aside, and a good time is had by all.

A view of the handicraft workshop (Kitahon Power Administration Office, Hokkaido)

Tokyo J-POWER Kurokawa Community Forest

J-POWER Group Nishi Tokyo District is using part of the company property for environmental learning with the people of nearby Kurigidai Elementary School. Initially we worked with students from the school to plant trees on this property, but this year, which is the sixth year of the program, the students went into the woods planted by preceding students to learn about energy and the environment. In addition to their hands-on study with direct experience in the woods, the students were given a tour of the Nishi-Tokyo Substation and a review session on a later day so they could gain a direct feeling for how electricity is produced from the bounty of nature and the efforts of many people.

Observing leaves (J-POWER Nishi Tokyo District, Machida City)

The Experiential Learning Project for Ecology and Energy Symbolizes the Harmonious Coexistence of Energy and the Environment

The Experiential Learning Project for Ecology and Energy is a symbolic program in our social contribution activity, and J-POWER Group is engaging in it 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, seven years since it began, this program is broadening in various ways, including our initial efforts to develop a new Thermal Power Session (a learning tour program offering a unique experience set in a thermal power station).

Ecology and Energy Experiential Learning Tour (Okutadami Session)

In the familiar yet secluded Okutadami area, we have been cooperating with Keep, Inc. (an environmental NPO) since 2007 on this support program for experiential learning about energy and the environment.

Participants find out about the mysterious interrelationship of forests, water, and electricity through enjoyable walks in the forest, experiential tours of power stations, conducting a laboratory for learning about the forest, and other such activities. At present, the Okutadami session of the program organizes two types of tour, one for elementary school students and parents and another for university students.

In FY 2011, the damage caused by heavy rainstorms in Niigata Prefecture in late July made it necessary to cancel the scheduled tour for elementary school students and parents. Thanks to the efforts of the organizations involved, however, we were able to reschedule the tour and hold it in early September with nine family groups participating.

The tour for university students was carefully divided into time for direct experience, time for learning, time for discussion, and time for individual thinking, and the students reacted very positively. The participants spent their time very enjoyably in a variety of experiences through which they learned about the connections between nature and electricity, which support people in their lives.

We hope to continue helping people learn about energy and the environment through contact with the actual entities themselves, and fostering the hearts and minds and technology that take good care of both energy and the environment by means of this program, which has as its keywords experience, cooperation, and mutual learning.

Blindfolded students line up to make a "caterpillar"
(Ecology and Energy Experiential Learning Tour (Okutadami Elementary School Students and Parents Session), Niigata Prefecture)

The Forest as a Laboratory for Learning
(Ecology and Energy Experiential Learning Tour (Okutadami University Student Session), Niigata Prefecture)

Ecology and Energy Experiential Learning Tour (Miboro Session)

The Miboro Power Station, which is located near the World Heritage site of Shirakawago Village with its gassho-style houses, is the location of our tour for parents and children conducted since 2010 in cooperation with the Toyota Shirakawa-Go Eco-Institute. On the theme of "the journey of water," the program offers a hike in the forest at the source of a river, an experiential tour of the power station, water games centered on hydropower generation, an outdoor learning laboratory, and other such activities through which participants learn about the connections between forests and water and electricity.

The program also includes a twilight walk through the Shirakawago Village of gassho-style houses to make participants think back, however briefly, to times long ago when people did not have electricity in their lives.

At the Shokawa cherry tree, participants are also given the opportunity to hear the passionately expressed memories, thoughts, and feelings of villagers who sacrificed their homes under the dammed-up lake waters for the sake of Japan's development. Many participants remarked on how much they enjoyed the experience, how they would like to do it again if they could, and how they realized the various connections between things that support society.

Making electricity from the power of a waterwheel

Giving hydropower generation a try (Ecology and Energy Experiential Learning Tour (Miboro Session), Gifu Prefecture)

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 use dialogue to show people how they can learn from each other to recognize and learn more about the connections between "Ecology and Energy" and people's lives.

We started this program in 2009 in response to comments from university students who took part in our Ecology and Energy Experiential Learning Tour and said that they wanted to learn more about energy, and that they wanted to follow up on the connections. The program takes place three times over the period from September to the following March, adopting the World Café method so participants can speak with a variety of people and deepen their learning. People in general are taking a greater interest in energy since the Earthquake, and participants give this program high marks for providing opportunities to talk with other people honestly and interestingly about the realities, opportunities that have become more precious than ever.

Students deepen their learning through dialogues shared with all
(Public Relation Office, Secretarial Affairs and Public Relation Department, Tokyo)

Community Concert

The free J-POWER Community Concerts have been held since 1992 throughout Japan, from Kyushu and Okinawa in the south to Hokkaido in the north, as a social responsibility program in the cultural domain.

J-POWER engages in business in every region of Japan, and we hold these concerts both in order to show our gratitude for the ongoing understanding and cooperation of residents in the vicinity of our power stations and other facilities, and out of the desire to be a company that earns still greater trust and popularity as a member of the local community.

Our aim with the Community Concerts is to enable audiences to enjoy authentic classical music in a comfortably relaxed atmosphere where performers and audience are close together. The performers are all major musicians.

The concert programs are centered on classical music, but we also include lyrical ballads, pieces that highlight the distinctive characteristics of the instruments, and songs that are familiar to everyone from cartoon shows and other entertainment, so as to appeal to a wide range of ages.

Mini Community Concert (Miboro Power Administration Office, Gifu Prefecture)

Social Contribution Activities Report 2012

J-POWER Group Case Study Presentation Sessions

Annually since FY 2007, the Public Relation Office has been holding an annual case study presentation session on October 6, the anniversary of J-POWER's listing as a corporation, which is the second anniversary of founding that we celebrate. This event is based upon our Approach to Social Contribution Activities (see p. 35) and expresses our company's desire, as a member of society, for the sound and sustainable development of society, and we hold the presentations as an occasion for information sharing as well as for dissemination and education so that our social contribution initiatives will be long-lived. This year we had presentations from six Group facilities. Each presentation conveyed a clear picture of the measures being taken by that facility, and each was followed by enthusiastic applause that filled the room.

In FY 2011, considering that the event was held approximately six months after the Great East Japan Earthquake, we invited lecturers from Nippon Keidanren Business Services and from Japan NPO Center to provide information on support for earthquake areas from industry, the general public, university students, and other such sources. We also conducted exchanges of views and question-and-answer sessions with employees.

Presentation on measures taken at Tachibanawan Thermal Power Station

Information Sharing Within the J-POWER Group

Questionnaire for All J-POWER Group Facilities

A questionnaire concerning social contribution activities was administered to the entire company in FY 2011. The results are published in Social Contribution Activities Report 2012. In this survey, the response that social contribution means harmonious coexistence with areas where we do business was in the majority. New issues also emerged, such as how the head office, branch offices, and other management organizations can support the power stations, administration and operations offices, and other front-line facilities, and how support can be positioned as a part of management.

Our aim in the Public Relation Office is to build a corporate culture that "gives support to the people who are trying hard," by introducing case studies of various initiatives for social contribution activity taken by individual Group employees and by individual J-POWER Group business units.

Activities to Support Areas Affected by the Great East Japan Earthquake

Iwate Composting Activities Spread Widely in Earthquake-Affected Areas

The J-POWER Group has been engaging in a variety of activities to support people who were affected by the Great East Japan Earthquake. Our intention has been to "pursue assistance activities in the J-POWER way based on the conceptual approach of harmonious coexistence with local communities," and therefore, as part of our social contribution activity, we have started an assistance project using the Takakura Composting Technique devised by Operations Facilitator Takakura of the JPec Wakamatsu Environmental Research Center. This is a technique for decomposing raw garbage generated in households to make compost, and the Takakura Method has been acclaimed in Japan and other countries.

We started this program in September 2011 in cooperation with Tono Econet, an environmental NPO that has its base for activities in Tono City, Iwate Prefecture, and the activity is currently under way in temporary housing at locations such as Ofunato City in Iwate Prefecture. Temporary housing is occupied by people who were forced to leave their own familiar homes. They have lost the interactions with neighbors and other aspects of community they used to enjoy, and some therefore withdraw from contact, feeling unable to fit into life in temporary housing. There are also concerns about a possible deterioration of public safety. The formation of community among the residents of these facilities is therefore an urgent issue.

Our aim in pursuing the present project is to use the composting effort as an aid in forming a sense of community in the temporary housing facilities by making composting into a shared interest among residents and spreading its use as a tool for linking people together.

People who use this composting method have remarked that after they start taking care of the compost, they start wondering how other people's compost is doing, too. Then they just end up talking with each other about how it is going.

When we see smiling people talking together about composting, it certainly appears that composting is steadily becoming a part of life in the disaster area.

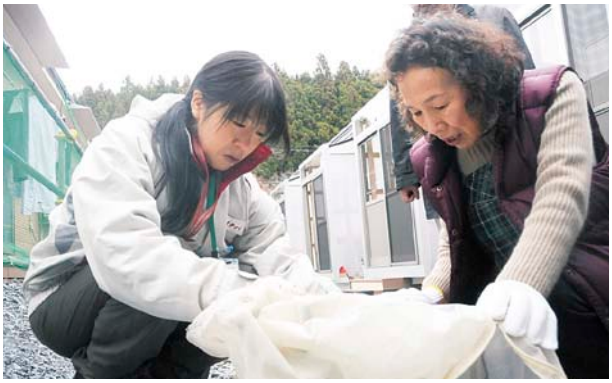
Voice

Composting Technology is a Key to Building a Sustainable Society

We have established our base in Tono City and we are carrying on our activities with a focus on assistance channeled locally in Iwate Prefecture since the Great East Japan Earthquake. Our aim is to form a sustainable society following recovery.

The composting initiative by J-POWER Group turns raw garbage into fertilizer, which is used to grow crops, so this is truly a living example of the sustainable recycling life that we aim for. The reason that people have continued the practice of composting in the disaster area without letting it lapse, as I see it, is that the efforts of Mr. Takakura and Ms. Yaoya have been making composting into an established practice in this area. We want to do all we can to continue pursuing this activity in cooperation with them.

Mr. Katsuhiko Isezaki
Tono Econet NPO



JPec employee (on left) explains composting

Overseas Operations

Thailand Cooperative Assistance on Flood Disaster

In 2011, Thailand experienced record heavy rains of an intensity experienced once in 50 years, causing unprecedented flooding. The downstream portion of the Chao Phraya River, which flows from north to south down the center of Thailand, opens out into broad plains, and the central area from Ayutthaya Province on down suffered serious flood damage over a wide area.

Gulf Electric Public Company (GEC) and GulfJP (GJP), which J-POWER owns interests in, cooperated during the floods by providing affected people with relief goods (small boats, food, etc.). As the flood disaster area grew, the Ministry of Energy of Thailand requested assistance with flooding countermeasure supplies. We responded instantly through the 100% J-POWER subsidiary J-POWER Generation (Thailand) (JPGT) and shipped a total of over 130 submersible drainage pumps by air to Thailand. With the cooperation of the Electricity Generating Authority of Thailand (EGAT), these pumps were used for drainage purposes throughout the flooded areas.

The cooperative assistance we provided on this occasion was made possible by the cooperation of the many people involved.

Relief supplies delivered (submersible drainage pumps)

Philippines CBK Project Activities Include Job Training for Local Residents

The CBK Project on the island of Luzon in the Republic of the Philippines consists of the three power stations at Caliraya (ordinary hydropower, 22.6 MW), Botocan (ordinary hydropower, 20.8 MW), and Kalayaan (pumped storage, 684.6 MW). The project has a total output of 728 MW. Not only does the project sell the electricity it generates to the National Power Corporation of the Philippines, but since Kalayaan is the country's only pumped-storage power station, it plays an important role in adjusting voltage, frequency, and other such factors.

CBK Power Company Limited, which operates this project, implements various programs as part of its contribution to local communities. It has a public education assistance program that includes a scholarship system for students and skill development for teachers. It has a public health assistance program for areas where government support is inadequate.

It also provides job training and other such support to help realize increased employment opportunities for local residents.



Scenes of social contribution in action

China

Support for Elementary Schools Neighboring the Tianshi Thermal Power Station in Shanxi Province, China

The Tianshi Thermal Power Station is a thermal power station established as a joint venture by J-POWER and Chinese partners. The coal waste*1 given off in the course of coke*2 production is used effectively as fuel. The power station has operated uneventfully since coming on-line in May 2001, and in addition to our efforts to provide a stable supply of electric power, we have made repeated studies of possibilities for making a social contribution of some kind in the region where the power station is located.

Every year since FY 2005, therefore, the power station has invited children from neighboring elementary schools to visit the facility for "Children's Day" (the same as Children's Day in Japan) on June 1. The children are given a tour and a question-and-answer session, and they are presented with stationery items. The power station has posted the children's drawings of the facility in the entryway, and they are a great source of enjoyment.


Local elementary school students taking a power station tour

Support for 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 2011, 37 interns from all areas of Japan took up the challenge of practical training in the maintenance and operation of electric power facilities.


Experiencing operation through actual contact with equipment

Communication with Society

11th Exciting Thanksgiving Day

(Open House Day at Takasago Thermal Power Station)

On November 3, 2011, in balmy and clear autumn weather, the Takasago Thermal Power Station held its 11th Open House Day.

This year again, power station personnel produced events with a strong homemade feel. A total of 2,810 visitors came from local communities as well as elsewhere, a greater number than at any of the past events.

Events included tours of the power station, simulated power station operation, soba noodles handmade by station personnel (for the third time this year), a chance to play with the power station promotional character Banko-chan, and a number of shows on stage. Station personnel also operated many of the events, and the open house was a bustling success with lines of people waiting their turn. We hope to continue this in future so that the power station will be a familiar and enjoyable place for members of the local communities.

Open House Day at Takasago Thermal Power Station (Hyogo Prefecture)

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 that are intended to build communication with local areas and communities. We use a variety 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.

Dam cards


We have made cards for J-POWER Group dams that introduce these facilities in easily understandable ways.

J-POWER Card

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

References

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

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

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.

IR Activities for Institutional Investors

For institutional investors, we hold briefings about twice a year on management plans and financial results, actively hold meetings with investors in Japan and other countries as the need arises, and provide opportunities for direct dialogue with management and other company members. In addition, we provide an annual report in Japanese and English, and make information available on our website in order to convey messages from management and other detailed information.

IR Activities for Individual Shareholders and 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 require.

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 hold study tours of power stations throughout Japan several times a year for institutional investors and shareholders to help them feel a still greater closeness to J-POWER Group and to deepen their understanding of it. Going forward, we intend to provide opportunities for as many people as possible to see the J-POWER facilities, whether hydropower or thermal power stations.

We are also disseminating information for shareholders and investors by means of various IR tools, including our website.

We intend to continue enhancing communication with shareholders and investors.

■ **Main IR Tools**

Annual Report

Shareholder Newsletter

Web Pages for Shareholders and Investors

Notice of “J-POWER Club” opening for applications

Briefing for individual investors

Tour of Power Station (Miboro Power Station, Gifu 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.

Independent Power Production in the United States

J-POWER established J-POWER USA in 2005 as a subsidiary company in a suburb of Chicago, Illinois, in the United States. Since it was established, J-POWER USA has been making investments in highly efficient, clean power stations in the United States, so that, as of the end of 2011, J-POWER USA owns 10 power stations in six states. The United States has environmental controls, such as limits on emissions of nitrogen oxides (NOx), sulfur oxides (SOx), and CO_2, that are set up independently by states. We position compliance with these controls among our top operational priorities. This involves more than exerting ourselves to the utmost to maintain power stations with consideration for the environment on the basis of environmental principles we have introduced in Japan. It also means our operators monitor flue gas and keep the surrounding environment clean 24 hours every day without break. In addition to everyday operations, they also hold power station director conferences once every year that bring together the directors of power stations from every state to share their experiences with regulatory and environmental protection compliance. We are making good use of their various experiences as we proceed with our aim of building new power stations in the United States.

Orange Grove Power Stations (United States)

Voice

Collaboration with J-POWER

John Hancock and J-POWER established a joint venture in 2007 for the purpose of joint investment in a United States power generation business. Thanks to this venture, not only were we able to engage in cooperative business with this influential and globally active power company, but this also led to our building a structure for cooperation with J-POWER executives who have a wealth of experience in independent power production in the United States and to invest in a high-quality power station, all results we are very happy about. At present, our joint venture owns a total of nine power stations in six states, with a total output reaching 2.6 GW. The asset management and other capabilities J-POWER has for managing and running a joint venture are quite remarkable, and I would like to note in particular that the company has a splendid compliance philosophy for this complicated context that has statutes and regulations at both federal and state government levels. We hope to continue and to expand our investment through this joint venture.

Jerry Hanrahan
Managing Director
John Hancock Financial Services

Plans to Establish a New Geothermal Power Station

J-POWER together with Mitsubishi Materials Corporation and Mitsubishi Gas Chemical Co., Inc., have established Yuzawa Geothermal Co., Ltd., and we are moving ahead with plans to establish new geothermal power stations in the Wasabizawa area and Akinomiya area of Yuzawa City in Akita Prefecture. (For details, see p. 66.)

Voice

Good Partners Through a Half-Century of Geothermal Business

Our relationship with J-POWER in the geothermal business goes back to the 1960s, the exploration and development period for the Onikobe Geothermal Power Station and the Onuma Geothermal Power Station. That means we have been working together for a half-century or more. Those were the days of Japan's first generation in geothermal business, with your company's Takeharu Hitosugi and my company's Mitsuo Yora and Yasunori Sakai.

From the 1980s to the 1990s, NEDO's Well SN-7D on the grounds of Sumikawa Geothermal Power Plant was Japan's top steam-producing well (steam volume of approximately 150 t/hour), and that became a major joint business project with J-POWER. That was when the people of the second geothermal generation, such as Director Kosoku and Assistant Director Yamada, were active.

Now the new Wasabizawa-Akinomiya geothermal project is coming to a full boil with a view to establishing a large-scale geothermal power station. In April 2010, J-POWER joined with Mitsubishi Gas Chemical Co., Inc., to establish the Yuzawa Geothermal Co., Ltd., and in November 2011, we initiated the environmental impact assessment. Those of us who make up the third geothermal generation are committed to achieving success in this project through effective use of the precious achievements and experiences of the preceding generations and while fostering our young successors in the next generation.

Mitsutaka Banba
Manager, Geothermal and Electric Power
Department, Energy Business Division
Mineral Resources and Recycling Business Unit
Mitsubishi Materials Corporation

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.

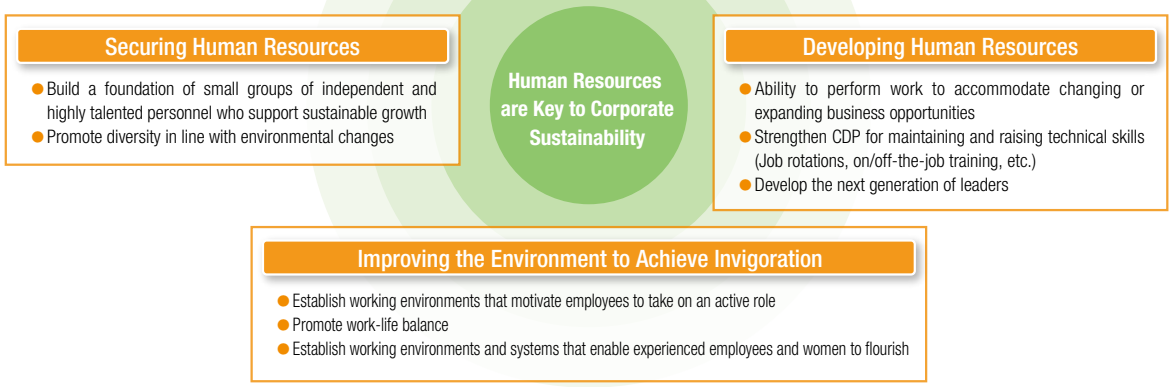
J-POWER Group's Basic Philosophy on Human Resources

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. 86) 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 2011, a total of 103 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 2010	FY 2011	FY 2012
Men	75	69	72
Women	5	8	6
Total	80	77	78

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, 2012, 339 employees had taken advantage of the continuing employment system and related programs.

Employing People with Disabilities

Our employment ratio for people with disabilities was 1.71% as of June 1, 2012. A "consultation desk to provide employment assistance and information on working environments to employees with disabilities" having been established, we will continue to take measures to enhance working environments and promote understanding through such initiatives as making office buildings barrier-free. In the future, we will continue striving to raise the employment ratio.

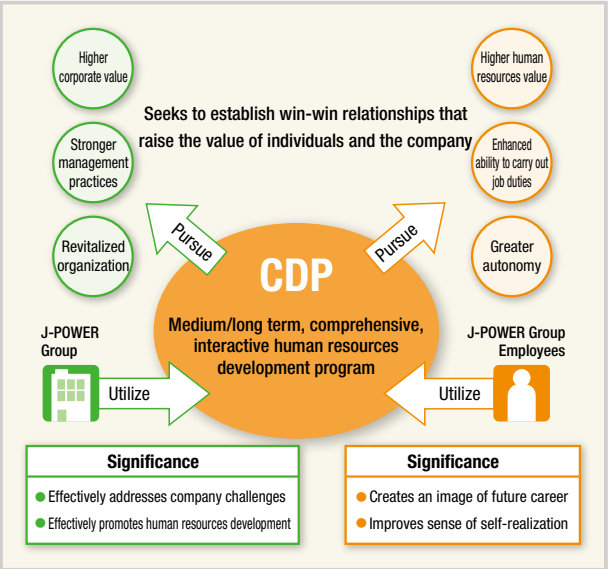
References

*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.

Teaching and Being Taught Environment Building

At J-POWER, the first year after joining the company is positioned as Basic Ability Reinforcement Year while the second year is Networking Ability Reinforcement Year, for which an OJT trainer system and a mentor system, respectively, have been introduced. Specifically, new employees in their first year have trainers assigned to them in the workplace in order to conduct thoroughgoing OJT to strengthen skills. In their second year, employees are assigned mentors outside the workplace to promote communication and career building from a broader perspective.

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 2009	FY 2010	FY 2011
Level-Specific Training	180	122	138
Career Training	176	153	163
Objective-Specific Training	202	188	216
Total	558	463	517


Training for new 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 2009	FY 2010	FY 2011
School attendance	66	58	42
Correspondence	75	63	59

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

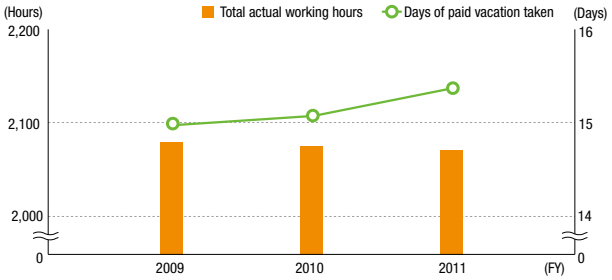
Appropriate working hours has been established as a common goal for all units in order to properly manage hours and improve employee productivity.

The company is promoting activities such as introducing case studies of initiatives taken by various units as well as holding training on work-life balance and time management. 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

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 urging leave on the screen of the in-house portal site during the summer and winter seasons, when the rate of people taking leave rises higher.

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



Improving the Workplace Environment to Help Employees Work in Diverse Ways

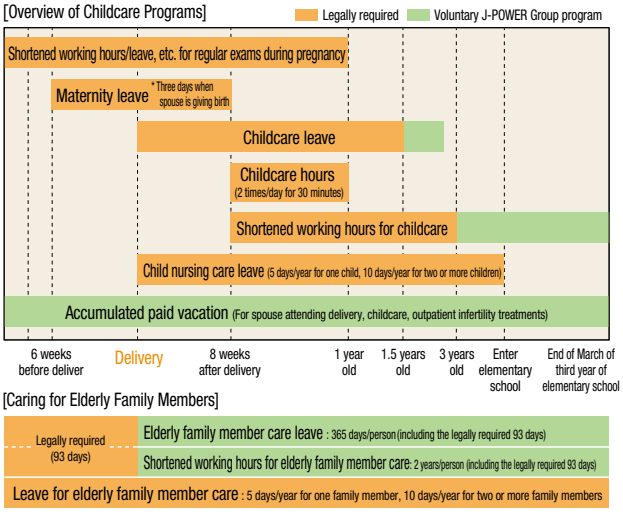
J-POWER has established a wide range of options in work and leave programs so that employees will be able to fully demonstrate their abilities in accordance with their life circumstances. We are improving our various systems that provide for a healthy work-life balance by granting leave, arranging shorter 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 voluntary employee activities by means of a leave system and other measures to allow participation in local exchange activities, volunteer programs, and the like.

■ **FY 2011 Results for Main Use of Childcare and Family Elder Care Support Systems** (J-POWER Group)

System	Number of Users	
	Women	Men
Maternity Leave	16	123
Childcare Leave	19	23
Shortened Working Hours for Childcare	22	—
Nursing Care Leave (Child)	42	66
Elderly Family Member Care Leave	—	1
Leave for Elderly Family Member Care	15	19

■ **Overview of Childcare and Elderly Family Member Care Support Systems**



Voice

Using the Volunteer Leave System

The Great East Japan Earthquake caused major damage in Fukushima Prefecture, where I am from, so I wondered if there were something I could do to help. I decided to use volunteer leave as a way of volunteering in Soma City and Minamisoma City, Fukushima Prefecture.

Before I went into activity, I was filled with uneasiness about what I would be able to do, but when I did even small jobs, such as clearing mud from gutters, or removing the floorboards from an affected house and clearing the mud from under the floor, many people thanked me for it. Also, when I had some contact with people who were victims of the disaster, or other members who were there with me as volunteers, I feel as though those were opportunities for me to grow a great deal myself. I was able to participate in this program because of the understanding shown by my superiors and my colleagues in my workplace, and I am grateful for it.

Tasuku Owada

Takasago Business Site, Area Business Division, JP Business Service Corporation

The author is second from the left in the photograph

Clearing mud from under the floor

"Kurumin" Mark of Next-Generation 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 went on to formulate the second Action Plan (April 1, 2010 to March 31, 2013), and we are presently pursuing measures that will contribute to development of the next generation.

Kurumin

Moral Harassment Consultation Desk

We are working to build a work-friendly workplace by establishing a consultation desk where employees can 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 related to harassment in particular, and we are implementing education for increased awareness in level-specific training courses, posters, and other such measures to resolve problems as well as to prevent them. We check into the facts regarding problems presented to the consultation desks with due consideration for protecting the consultee'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.

Voice

Representing Employees: The J-POWER Group Worker's Union

The J-POWER Group Worker's Union was formed in 2004 from six related unions centered on the precursor J-POWER Group Worker's Union. Since then our organization has represented Group employees while performing a monitoring function to help maintain the soundness of J-POWER Group management. We also engage in labor-management consultation on collective agreements, safety and health promotion activities, and other such matters to facilitate operation of Group businesses in a smooth manner that cuts across organizational boundaries.

We also operate a Group cooperative that is intended to help improve and heighten employees' lives culturally and economically, based on the employees' spirit of mutual cooperation. This forms part of the employment environment, and it has contributed to wide-ranging improvement of employees' lives.

J-POWER Group Worker's Union members

Communicating with Employees

J-POWER Group communicates through an in-house portal website in order to reliably convey information about management 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. We provide readily understandable explanations regarding information of particular importance and other such measures as part of our commitment to provide employees with the correct information.

Exchange that transcends differences in age and job category is carried out by means of cultural and athletic activities as well as THP activities (see p. 47). This further heightens the sense of unity in the J-POWER Group.

In the area of industrial relations, adequate communication is carried out and cooperative relationships are being built up on those measures that require labor and management to work together, such as the improvement of working conditions and matters of work-life balance.

In-house Group periodical *J-POWERs*.

Column

A Guide to the Use of Labor Institutions "J-Life+" on the In-house Intranet

J-Life+ was started in October 2011 on the J-POWER Group intranet. Its purpose is to promote the use of systems for support of childcare and elderly family member care as well as the system for various types of leave to help employees achieve a good balance between their jobs and their private lives and to be able to work energetically.

This site provides explanations, application methods, and timetables under the categories of maternity and childcare, care for elderly family members, and leave. Under communication and FAQ, it tells how to make more skillful use of systems, introduces frequently asked questions and cases, and provides other such information that will be a plus in employees' lives.

"J-Life+" on the in-house intranet

Safety and Health Management

As set forth in our Corporate Conduct Rules (see p. 8), the 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," and to that end we operate occupational safety and health management systems within the Group, promote overall safety management, and work to raise system levels. In these ways, we are striving 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 repetitive-pattern accidents*1 and traffic accidents.

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

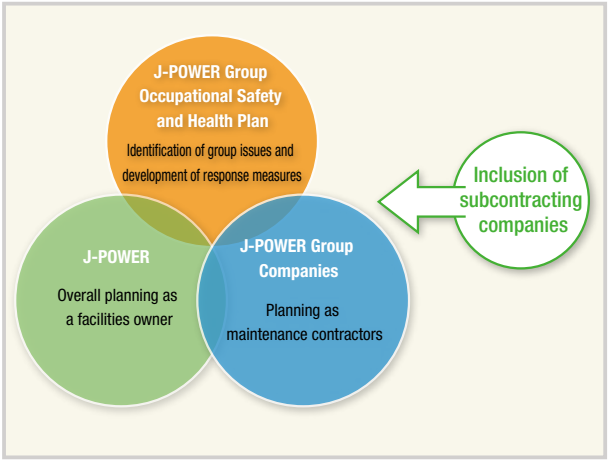
(1) Promote mental and physical health

■ **Incidence of workplace accidents**

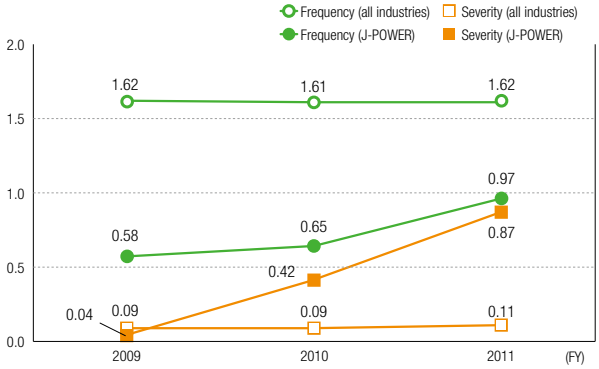
	FY 2009	FY 2010	FY 2011
Deaths	1	1	2
Serious Injury	6	6	6
Minor Injury	5	6	9

* **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
* In FY 2011, two fatal accidents occurred during recovery operations following a rainstorm disaster. We have therefore reinforced safety management measures and awareness to anticipate danger and reduce risk, particularly in disaster recovery and other such work that is not planned in advance or is otherwise irregular.

■ **Operational Safety and Health Planning through Mutual Collaboration**



■ **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. Does not include accidents of employees on temporary transfer.)
* **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.)

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*2 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 activity (walking) in action

References

*1 Repetitive-pattern accidents
Industrial accidents categorized by pattern as falling from heights, falling over, being caught and being pulled in, flying and falling objects, and electric shock (these are accidents that occur with high frequency and tend to have severe effects)

*2 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.

Environment

Part 1

Environmental Management in J-POWER Group

Part 2

Efforts Relating to Global Environmental Issues

Part 3

Efforts Relating to Local Environmental Issues

Part 4

Ensuring Transparency and Reliability

Tomamae Winvilla Power Plant (Hokkaido Prefecture)

Environment Part 1

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.

J-POWER Group 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 (see pp. 51-52), 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.

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.

1 Efforts Relating to Global Environmental Issues (Environment Part 2)

– 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.

Action Program		
Corporate Targets	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.
	Main results for FY 2011	● With regard to the replacement of coal-fired facilities, we conducted procedures for environmental impact assessments towards the replacement of Takehara Thermal Power Station Units No. 1 and 2 with a leading-edge high-efficiency USC plant (New Unit 1). (See p. 58) ● In the area of mixed combustion of biomass resources in coal-fired thermal power stations, we implemented initiatives tailored to the specific target resources in Matsuura Thermal Power Station and Takehara Thermal Power Station. (See pp. 59-60) ● With regard to promotion of the overseas spread of high-efficiency coal-fired generation technologies, we signed a long-term electricity sales contract with Indonesian power companies in relation to power generated by the Central Java Project, the nation's first USC coal-fired facility. (See p. 58) ● In the area of technological development, we completed detailed design, equipment manufacture and facility construction for CO_2 separation and capture via the physical absorption method (tests are still being conducted in relation to the chemical absorption method) as part of the EAGLE Project. In the Osaki CoolGen Project, in addition to conducting procedures for environmental impact assessments towards the realization of the plan, we engaged in research into the optimization of coal gasification combined cycle generation. In the Callide Oxyfuel Project being conducted in Australia, we conducted the world's first oxyfuel combustion at a power station. (See pp. 61-62) ● With regard to the Ohma Nuclear Power Station plan, in addition to proceeding with a variety of studies, for example concerning measures to increase safety, we also engaged in initiatives to help secure the trust and understanding of the local community. (See pp. 15-17) ● In the field of hydroelectric power generation, we moved ahead with the construction of the new Isawa No. 1 Power Plant and the comprehensive upgrade of the Tagokura Power Plant. (See pp. 64-65) ● In the field of wind power generation, as part of a joint research project being conducted with NEDO, we commenced proving trials of a maritime wind power generation system in the ocean off Kitakyushu City. (See p. 62) ● In the field of geothermal energy, we formulated a station construction plan for the development of the Wasabizawa-Akinomiya area, and conducted procedures for an environmental impact assessment. (See p. 66)
Guidelines for the fiscal year	Environmental Action Guidelines (P51)	

Action Program						
Corporate Targets						Guidelines for the fiscal year
Item	Targets	FY 2010 performance	FY 2011 performance	Evaluation of FY 2011 and future initiatives	Further Information	
• Maintain/improve thermal efficiency of thermal power stations [HHV (higher heating value)]	Maintain current level [about 40%] (FY 2008 and each FY thereafter)	40.5% (Reference: LHV*1 = 41.6%)	40.6% (Reference: LHV = 41.7%)	J-POWER Group met its target, realizing a total thermal efficiency of 40.6% (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.	P87	Environmental Action Guidelines (P51)
• 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)	Inspection: 99% Retirement: 99%	Inspection: 99% Retirement: 99%	The FY 2011 target was met, with a recovery rate of 99% during inspections and 99% 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.	P69	

*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).

2 Efforts Relating to Local Environmental Issues (Environment Part 3)

– Basic Policy –

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.

Action Program						
Corporate Targets						Guidelines for the fiscal year
Item	Targets	FY 2010 performance	FY 2011 performance	Evaluation of FY 2011 and future initiatives	Further Information	
• 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)	0.17 g/kWh	0.21 g/kWh	Efforts including the application of fuel control and the appropriate operation of flue gas desulfurization systems saw us curb our SOx emissions and achieve our target for emissions per unit of power generated. We will continue our efforts to curb emissions through good management practices.	P72	Environmental Action Guidelines (P51-52)
• 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)	0.48 g/kWh	0.48 g/kWh	Efforts including the application of fuel control and the appropriate operation of flue gas denitrification systems saw us curb our NOx emissions and realize our emissions target per unit of power generated. We will continue our efforts to curb emissions through good management practices.	P72	
• Increase recycling rate for industrial waste	Maintain current level [about 97%] (FY 2011 and each FY thereafter)	97%	98%	We achieved our targets for the fiscal year through efforts to promote the recycling of coal ash and to reduce industrial waste generated by the maintenance and operation of power stations. We will go on working to maintain this level.	P73	
• Protect biological diversity	Consider the protection of biological diversity in relation to business activities	—	Efforts to Preserve Biodiversity	In addition to initiatives including efforts to harmonize our activities with the aquatic environment and to consider rare animal and plant species, we increased awareness by conducting an e-learning program concerning the protection of biodiversity for all Group employees.	P75-76	

3 Ensuring Transparency and Reliability (Environment Part 4)

– Basic Policy –

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						Guidelines for the fiscal year
Item	Targets	FY 2010 performance	FY 2011 performance	Evaluation of FY 2011 and future initiatives	Further Information	
• Improvement of Environmental Management Level	Continuous improvement of EMSs (FY 2008 and each FY thereafter)	Consistent use of PDCA cycle	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.	P78	Environmental Action Guidelines (P52)

FY 2012 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.
  - Take the initiative in energy conservation in the offices throughout the Group in view of the current state of the power supply and demand situation.
    - 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.
  - 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 energy and 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
  - Recognizing that the blessings of the natural environment support a rich and secure lifestyle, conduct surveys, measurements and assessments as necessary 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 the planning, design, construction and operation of power stations.
- 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.

Business Activities and the Environment (FY 2011)

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)	20.97 million tons
Heavy oil	44,000 kl
Light oil	26,000 kl
Natural gas	142.1 million Nm³
Biomass	15,000 tons
Industrial-use water	8.51 million m³

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 ($CaCO_3$)	255,000 tons
Ammonia (NH_3)	15,000 tons

Hydropower Generation

Power for pumped storage	1,300 GWh

Geothermal Power Generation

Steam	0.48 million tons
Hot water	2.65 million tons

Internal Use at Business Sites and Offices

Electricity (purchased)

Business sites	59.32 GWh
Offices	15.33 GWh

Fuel (gasoline equivalent)

Business sites	11,286 kl
Offices	1,301 kl

Drinking water

Business sites	110,000 m³
Offices	320,000 m³

Copy paper (A4 equivalent)	59 million sheets

Business Activities

Electric Power Generated

Thermal
58,500 GWh

Hydroelectric
11,600 GWh

Geothermal/Wind
600 GWh

Auxiliary power for operation and transmission loss: 4,100 GWh

Volume of electric power sold: 65,700 GWh

Pumped storage hydroelectric power output: 900 GWh

Total **66,600** GWh

Supply

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

Major Resources Recycled

Percentages indicate recycling rate.

Coal ash	1.93 million tons (98.5%)
Sludge (excluding gypsum)	15,000 tons (62.0%)
Gypsum (desulfurization byproduct)	360,000 tons (99.8%)
Sulfuric acid (desulfurization byproduct)	23,000 tons (100%)
Other industrial waste	17,000 tons (71.2%)
Waste paper	387 tons (94.2%)
Driftwood from dam reservoirs	23,000 m³ (93.4%)

The electricity generated at our power stations is supplied through regional power companies to end users throughout Japan. The 66,600 GWh of wholesale electric power we sold last year is equivalent to approximately 8% of total electric power sold by regional power companies.*

* Total electric power sold in FY 2011 was 859,800 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	46.77 million t-CO_2
SOx	12,000 tons
NOx	29,000 tons
Soot and dust	1,000 tons

Emissions into Bodies of Water

Waste water	3.66 million m³
Waste water COD	15 tons

Geothermal Power Station

Hot water	2.80 million tons

CO_2 Emissions from Business-Site and Office Activities

Business sites	46,000 t-CO_2
Offices	8,000 t-CO_2

Waste

Industrial waste

Coal ash	29,000 tons
Other	17,000 tons

Specially controlled industrial waste

Specially controlled industrial waste	1,600 tons

Non-industrial waste

Waste paper	24 tons
Driftwood from dam reservoirs	1,700 m³

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. 91, Reference Data.

Environmental Accounting

To calculate the costs and benefits of J-POWER Group's environmental conservation activities in FY 2011 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 2011 were approximately 51.7 billion yen, with pollution control costs for preventing contamination of the air, water, etc., accounting for about 40% 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 9.3 billion yen.

■ **Economic Benefits**

(Unit: billion yen)

Category	Details	Benefit
Revenue	Sales of marketable commodities from coal ash, gypsum, and sulfuric acid	0.4
Cost reduction	Reduction in fuel costs due to improved coal-fired thermal efficiency (introduction of USC)	3.7
	Reduction in disposal costs due to coal ash, gypsum, and sulfuric acid recycling	5.2
Total		9.3

■ **Conservation Costs and Benefits**

Category	Major measures and efforts	Cost (billion yen)	Environmental conservation benefit	FY 2011
Pollution control	Air pollution control (desulfurization/denitrification, soot and dust treatment), water pollution control (waste-water treatment), etc.	20.8	SOx emissions intensity (g/kWh)	0.21
			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)	2.7	CO_2 emissions intensity (kg-CO_2/kWh)	0.67
			Average coal-fired thermal efficiency (%)	40.6
Resource recycling	Waste reduction through reuse and recycling, treatment and disposal of waste	17.8	Coal ash recycling rate (%)	99.0
			Industrial waste recycling rate (%)	98
			Gypsum recycling rate (%)	99.8
			Volume of driftwood recycled (1,000 m³)	23
Other	Research and development, social activities, etc.	10.4		
Total		51.7		

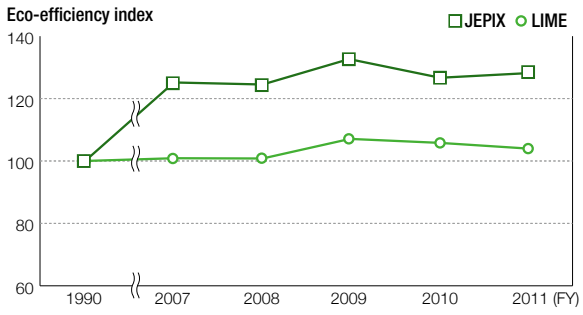
Note: For detailed data regarding each category, see p. 87–88, Environment-Related Fiscal Year Data, in the Reference Data section.

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 individual environmental loads (coal, CO_2, SOx, NOx, and coal ash), they indicate an overall trend of increasing eco-efficiency since FY 1990.

The index of eco-efficiency that we calculate uses the integrated index for FY 1990 (electric power sold per environmental load) as 100; the higher the figure, the lower the level of environmental loads arising from the generation of power.

■ **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 (Japan Environmental Policy Index)
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.

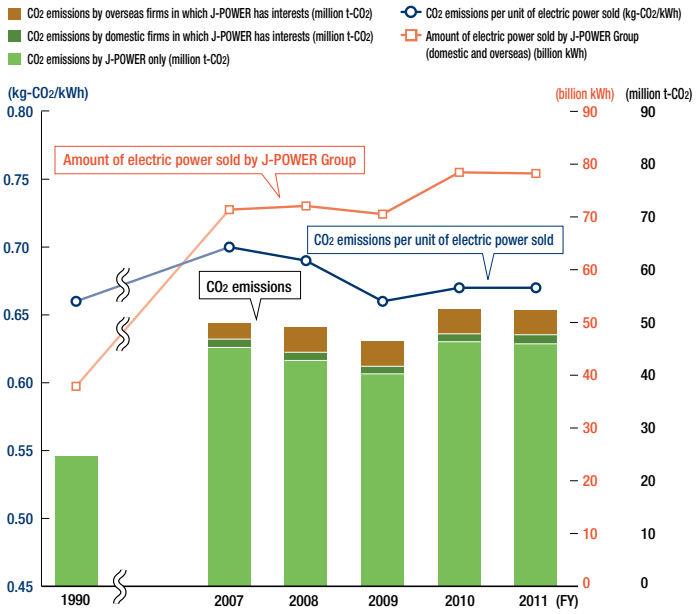
CO_2 Emissions in FY 2011

In FY 2011, J-POWER Group*1 sold approximately 78,400 GWh of electric power, an increase of about 1% against the previous year. CO_2 emissions over the same period were 52.24 million t-CO_2, representing and decrease of approximately 1%. Because the volume of coal-fired and hydroelectric power sold remained the same as the previous fiscal year, CO_2 emissions per unit of electric power sold were 0.67kg-CO_2/kWh, similar to the figure for FY 2010.

In the future, in addition to directing our most intense efforts towards ensuring the stable supply of energy, we will work consistently to reduce carbon emissions both in Japan and overseas, contributing to the reduction of CO_2 emissions on a global scale.

*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.

■ **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 21 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.

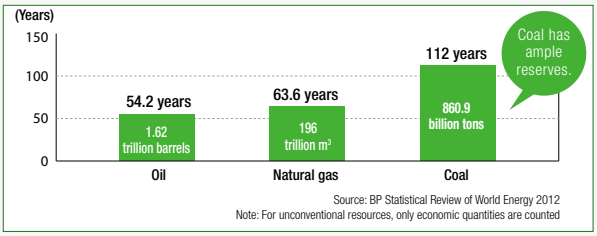
The Significance of Effective Coal Use in Today's World

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.

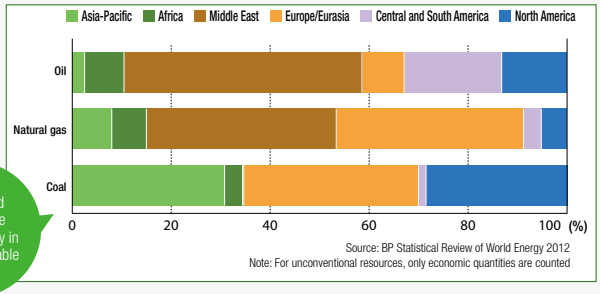
At the same time, when coal and other fossil fuels are burned they generate CO_2, a greenhouse gas. As demand for energy increases, the world faces the issue of how to reduce emissions of CO_2 and other greenhouse gases. Against this background, J-POWER is working to reduce CO_2 emissions from coal-fired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

■ Fossil Fuel Energy Resource Reserves



Source: BP Statistical Review of World Energy 2012
Note: For unconventional resources, only economic quantities are counted

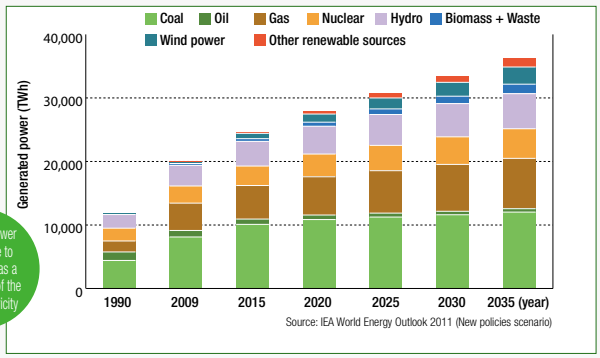
■ Regional Distribution of Fossil Fuel Resources



Widely distributed all over the world, mainly in politically stable countries

Source: BP Statistical Review of World Energy 2012
Note: For unconventional resources, only economic quantities are counted

■ Global Power Generation Trends and Outlook by Energy Source



Coal-fired power will continue to be essential as a main source of the world's electricity

Source: IEA World Energy Outlook 2011 (New policies scenario)

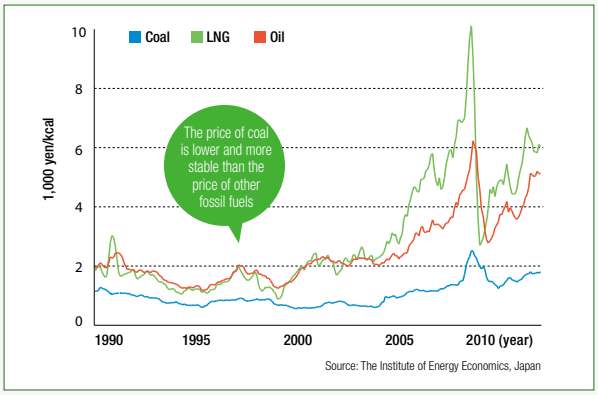
The Significance of Improving Coal-Fired Power Generation Efficiency

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 Fuel Prices



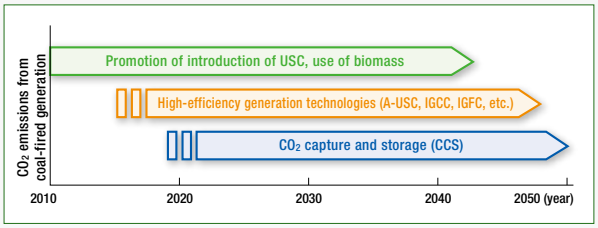
Source: The Institute of Energy Economics, Japan

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. 62), 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. 62).

■ Future Technological Development 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)

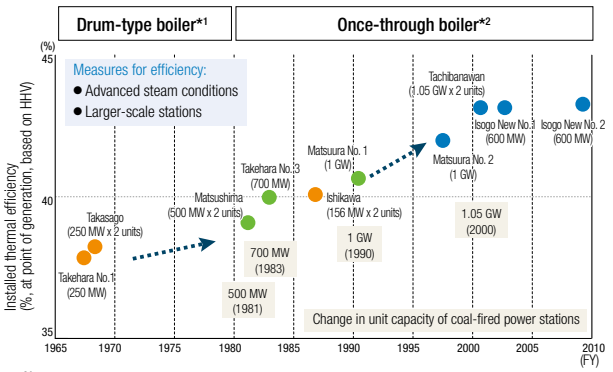
The Isogo Thermal Power Station new Unit No. 2 (capacity: 600 MW), under construction since October 2005, began operating commercially in July 2009. With the new Unit No. 1 also in operation, this marks the completion of the replacement of all the generating equipment in Isogo Thermal Power Station. Isogo Thermal Power Station brings together the best of J-POWER's clean coal technologies to realize the world's cleanest coal-fired generation. We have dramatically increased the station's thermal efficiency through the introduction of ultra-supercritical (USC) technology, the world's most advanced coal-fired generation technology (Main steam pressure: 25 MPa; Main steam temperature: 600°C). In addition, in the new Unit No. 2 the reheated steam temperature has been increased by another 10°C to 620°C, in an effort to further increase thermal efficiency and reduce CO_2 emissions.

The installation of the latest environmental pollution control equipment 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. (See p. 72)

■ **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
Removal of sulfur oxides	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%
Removal of nitrogen oxides	———	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%
Removal of dust and soot	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%
Proportion of greenification to total area	15%	20%

■ **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 566°C
- Ultra super critical: Steam pressure at least 22.1 MPa and steam temperatures exceeding 566°C

*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

Replacement of Aging Generation Facilities with State-of-the-art Equipment to Reduce Our Environmental Impact

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 45 years have passed since Unit No. 1 began operation in July 1967, and more than 38 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.

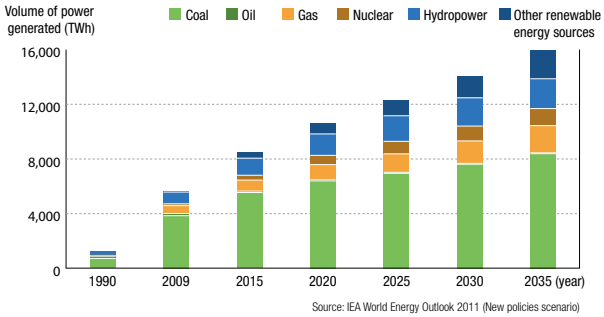
Takehara Thermal Power Station (Hiroshima Prefecture)

Overseas Transfer and Diffusion of Technologies

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 threefold by 2035 (IEA). Given limitations on energy resources and the need to reduce CO_2 emissions, we are seeing the beginning of a full-fl edged 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.

■ **Power generation trends and outlook in Asian developing nations**



Source: IEA World Energy Outlook 2011 (New policies scenario)

Central Java Project

Planning and Implementation of Environmentally Friendly High-efficiency Power Generation Project in Indonesia

Together with ITOCHU Corporation and PT Adaro Power, J-POWER established the company PT Bhimasena Power Indonesia*1 in Indonesia in July 2011. In October 2011, PT Bhimasena Power Indonesia signed a long-term power sales contract with Perusahaan Listrik Negara (PLN), Indonesia's state-owned power utility.

■ **Indonesia (Java)**

This will be not only Indonesia's but Asia's largest-scale IPP*1 project, involving the construction and operation of a coal-fired power station with a total output of 2 GW (1 GW×2*2) in Central Java, and the supply of power to PLN over a 25-year period. It will also be the first project in Indonesia to employ ultra-supercritical generation technologies, and will reduce CO_2 emissions and function as a model case for high-efficiency, environmentally friendly power generation. Making use of high-efficiency coal-fired power generation technologies we have fostered over a long period in Japan, J-POWER's comprehensive efforts in the construction, operation and maintenance of Indonesia's largest and most advanced coal-fired power station will contribute to the provision of a stable supply of power in Indonesia, the reduction of environmental impact, and the transfer and diffusion of advanced technologies.

*1 Capital contribution ratio: J-POWER: 34%; Adaro Power: 34%; ITOCHU Corporation: 32%.
*2 The output of each boiler (1 GW) will be Indonesia's highest.

■ **Image of completed power station**

References

*1 IPP
Independent power producer

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**

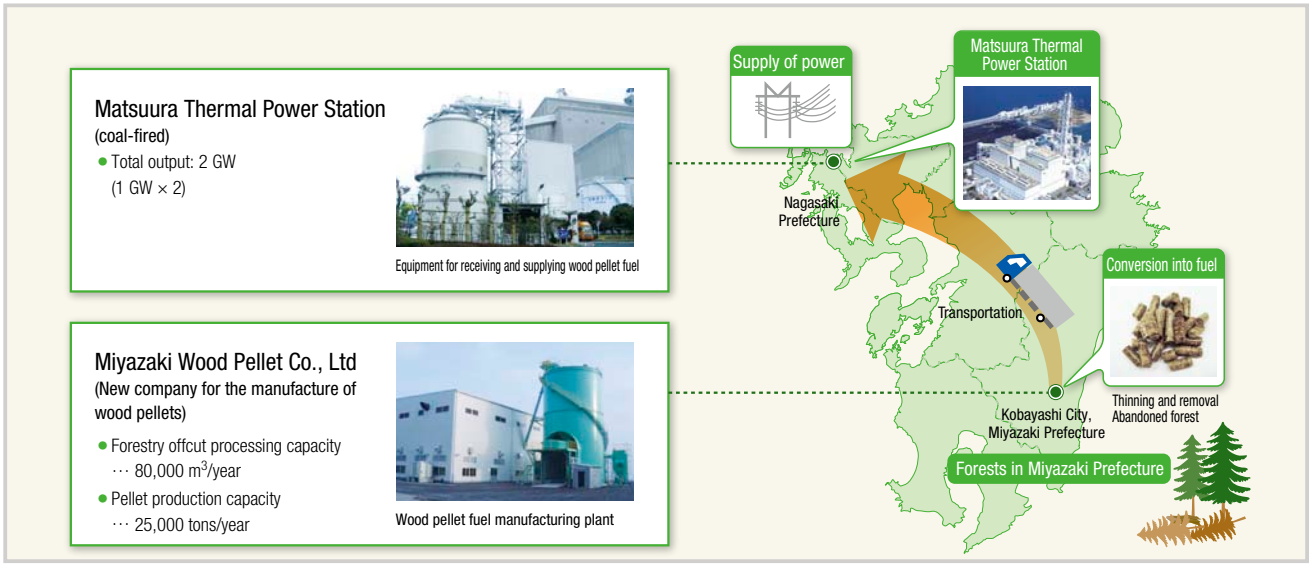
Biomass resources	Wood		Sewage sludge		Carbonization of ordinary waste
	Chips	Pellets	Low-temperature carbonization	Oil desiccation	
Examples of biomass fuels					
Characteristics of biomass fuels	Scrap construction timber is chipped and used. It has about half the calorific value of coal.	Forest offcuts 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 company's factory for the manufacture of wood pellet fuel was completed and commenced operation in March 2011, and is one of Japan's largest-scale manufacturers, producing 25,000 t of fuel per year. The wood pellets are being burnt in mixed combustion with coal in the Matsuura Thermal Power Station (Nagasaki Prefecture) as part of proving trials aiming towards the reduction of CO_2 emissions from coal-fired power stations.

■ **Proving trials of mixed combustion of forestry offcut biomass with coal**



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 are utilizing 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 is being used in coal-fired power stations operated by J-POWER. This initiative, which commenced 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.

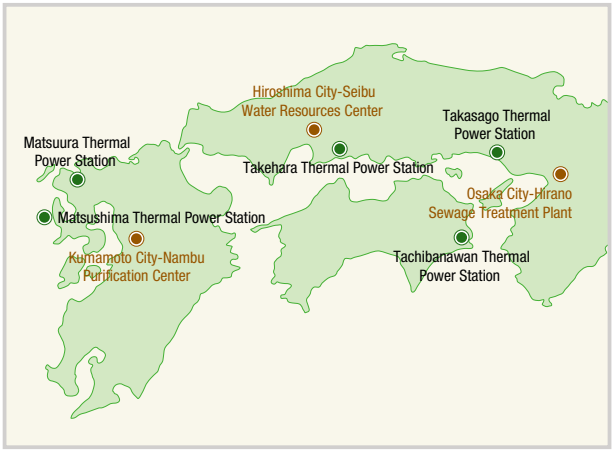
Sewage sludge fuel manufacturing initiative in Kumamoto City

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.

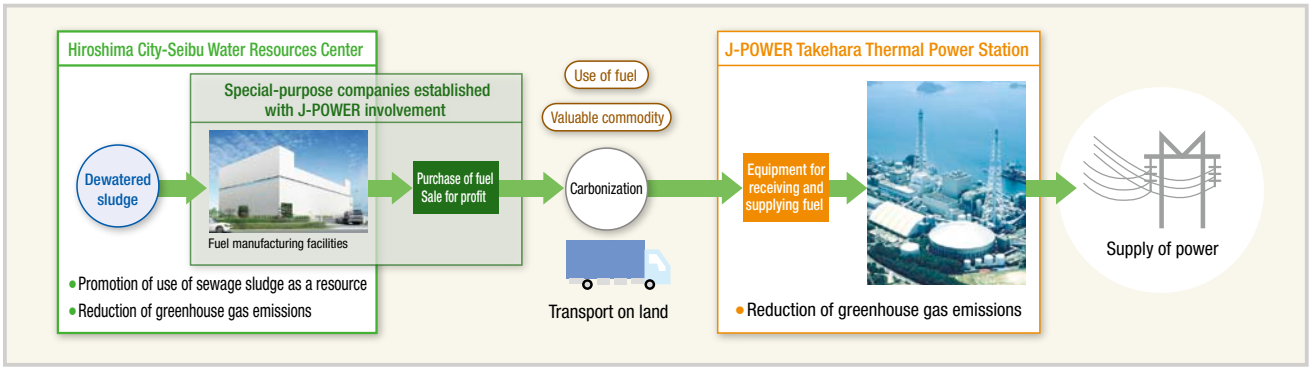
Sewage sludge fuel manufacturing initiative in Osaka City

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			
① Sewage treatment plants	Approx. 8,700 t-CO_2	Approx. 2,900 t-CO_2	Approx. 1,500 t-CO_2
② Thermal power stations	Approx. 6,400 t-CO_2	Approx. 3,400 t-CO_2	Approx. 10,000 t-CO_2
③ 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, etc.	J-POWER Matsuura Thermal Power Station Kyushu Electric Power Co., Inc. Matsuura Power Station	J-POWER coal-fired power stations (Takehara, 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

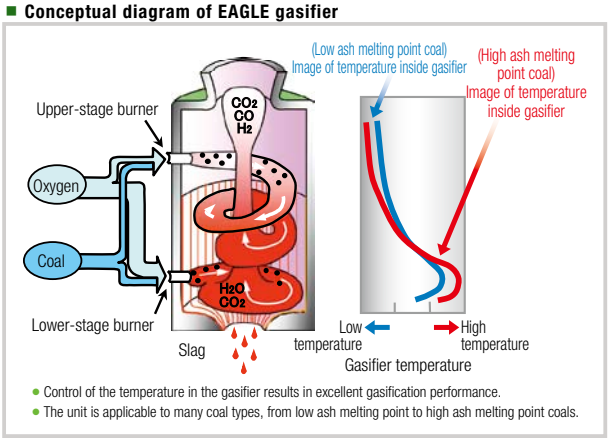
External view of EAGLE Pilot Plant test facility (Kitakyushu City)

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.

Since FY 2002, J-POWER has vigorously pursued the EAGLE Project, looking towards high-efficiency use of coal and the realization of zero CO_2 emissions, in its Wakamatsu Research Institute Research & Development Department, located in Kitakyushu City. 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 integrated coal gasification generation system through the application of a physical absorption method.

■ **Conceptual diagram of EAGLE gasifier**



■ **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	1,500 – 1,600°C	
Capture method for CO_2 separation and capture unit	Chemical absorption	Physical absorption
• Volume of gas produced	1,000 m^3N/h	1,000 m^3N/h
• CO_2 capture performance	Approx. 24 tons/day	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

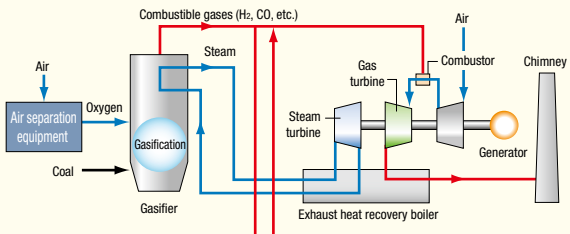
In 2009, Chugoku Electric Power Co., Inc. and J-POWER jointly established a new company, Osaki CoolGen Corporation, in order to conduct largescale proving trials based on the outcomes of the EAGLE Project and the findings it has produced, looking towards the commercial use of IGCC and CO_2 capture technologies.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

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

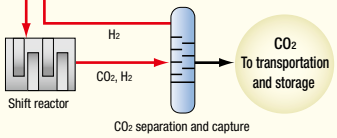
Technologies for CO_2 separation and capture

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

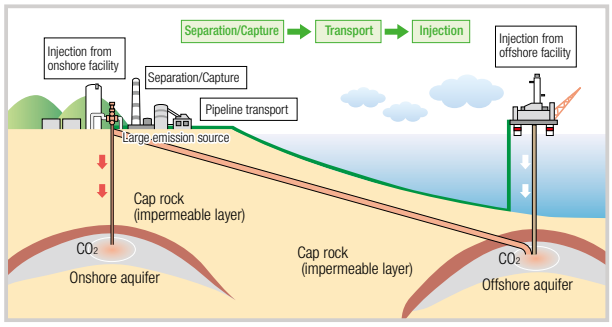
*1 EAGLE
Coal Energy Application for Gas Liquid & Electricity
Development of multi-purpose coal gasification technology

*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.

efficiency, and operability of a 170 MW oxygen-blown IGCC system and to verify, through testing, the feasibility of the latest CO_2 separation and capture technology (scheduled to commence operation in 2020). 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

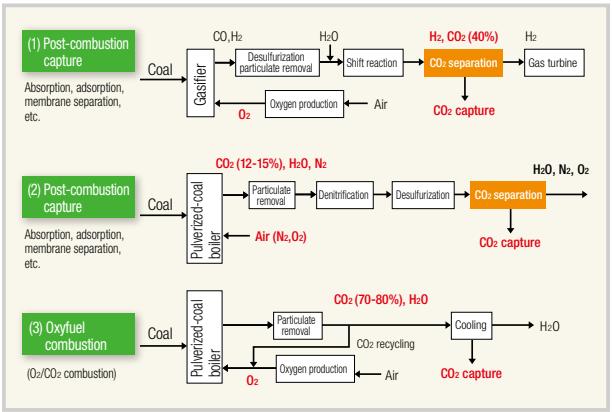
■ **CCS Concept**



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.

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 was completed in March 2012, and the plant commenced the world's first oxyfuel combustion at a power station (test operation). Test operation for the liquefaction and capture of CO_2 is scheduled to commence in August 2012 (CO_2 storage is presently under examination).

Callide A Power Station (Following completion of 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 making preparations including obtaining the necessary permissions and establishing 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 .

Image of offshore wind turbine

References

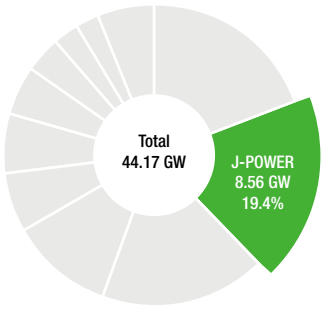
*1 Cool Gen Project
The Cool Gen Project is a plan proposed in June 2009 by the Clean Coal Subcommittee of the Mining Committee of the Advisory Committee for Natural Resources and Energy of the Ministry of Economy, Trade and Industry. The project seeks to promote research towards the realization of "zero-emission 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 pp. 15-17), 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 March, 2012)



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

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. 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.

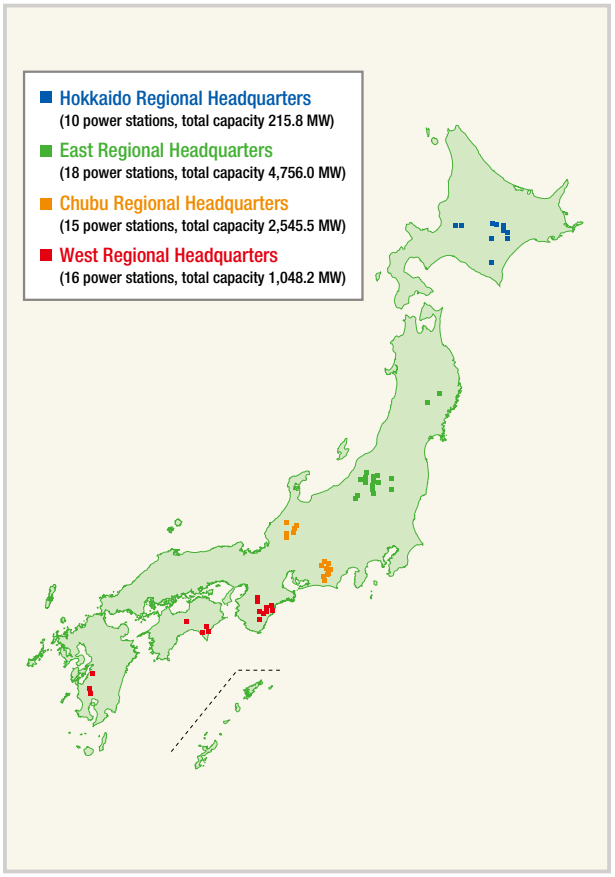
Power output can easily be adjusted to match demand by altering the amount of water used; when no electricity is needed, the turbine is stopped and the water is stored up in the dam reservoir. In this way, water is converted to electricity with a minimum of waste. This ability to adjust output is a major feature of hydroelectric power.

J-POWER currently operates 59 hydropower stations across the country with a combined capacity of 8.56 GW, consisting of almost 20% of the total installed capacity of Japan's hydropower facilities. In FY 2011, we sold 10,300 GWh of electricity through hydropower facilities, representing a reduction in CO_2 emissions of approximately 3.61 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.

In addition, we are striving to make effective use of hydroelectric power, a renewable energy, by working to increase the efficiency and reliability of aging hydroelectric power stations through replacement of their main electrical equipment with the latest technologies (see p. 65), rebuilding existing stations, and similar initiatives.

■ Location of J-POWER Hydropower Stations (Japan)



Hydroelectric Power Developments Presently Underway

J-POWER is presently engaged in the construction of the Isawa No. 1 Power Station (maximum output: 14.2 MW), which will make use of the Isawa Dam, a Specified Multipurpose Dam*2 presently being constructed by the Ministry of Land, Infrastructure, Transport and Tourism in Oshu City, Iwate Prefecture (see p. 64).

The Hokkaido Development Bureau is regrading the existing Katsurazawa Dam (a Specified Multipurpose Dam) in Mikasa City, Hokkaido Prefecture, as part of the Ikushunbetsu River Comprehensive Development Project. J-POWER is making plans for participation 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. In this way, J-POWER is working to expand and make effective use of hydropower resources, seeking to maintain a stable supply of electricity.

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.

Construction Work for the New Isawa No. 1 Power Station

Given the facts that hydroelectric power emits no CO_2 during the power generation process and is a clean and renewable power source, the J-POWER Group is working actively to develop new hydroelectric power facilities.

We are constructing the New Isawa No. 1 Power Station (Oshu City, Iwate Prefecture; Maximum output: 14.2 MW) as part of the Ministry of Land, Infrastructure, Transport and Tourism's Isawa Dam project. The Isawa Dam is a Specified Multipurpose Dam*2 scheduled to be completed in FY 2013; the New Isawa No. 1 Power Station presently under construction is situated directly below the dam, on the right bank of the Isawa River. We are also jointly involved in the construction of the Isawa No. 3 Power Station with the Iwate Prefectural Enterprise Bureau. Construction commenced in February 2011, and the station is scheduled to commence operation in July 2014. In order to transmit the power generated by these facilities, a transmission line of approximately 3.0 km in length, with 10 towers, will be newly constructed and connected directly to a transmission line owned by Tohoku Electric Power Co., Inc. The new transmission line will be co-owned by the Iwate Prefectural Enterprise Bureau and J-POWER.

The construction work being carried out for the New Isawa No. 1 Power Station considers the surrounding flora and fauna, and also adopts the environmental considerations described below.

1 Prevention of pollution of rivers and bodies of water and contamination of soil

We conduct detailed inspections of construction equipment in order to prevent water or soil pollution arising from oil leaks or similar problems.

In addition, we treat the wastewater produced by construction work in turbid water treatment plants and reuse it to the greatest extent possible. In conducting this turbid water treatment, we set and observe benchmark values for hydrogen ion concentration (pH) and suspended solids (SS) based on the various relevant laws and regulations.

2 Prevention of noise and vibration

To the greatest extent possible, we use low-noise and low-vibration construction equipment, and we set and observe benchmark values for the noise and vibration level (dB) based on the various relevant laws and regulations.

3 Appropriate management of construction by-products

In addition to working to separate, aggregate, and, to the greatest possible extent, recycle the by-products of our construction work, we observe the stipulations of the relevant laws and regulations and appropriately treat any by-products classified as industrial waste.

4 Preservation of scenery and cultural assets

Our construction site is adjacent to the site of a historic tunnel aqueduct that is an important local Buried Cultural Asset, and construction is proceeding with consideration of its preservation. With regard to the local scenery, we are studying possibilities for harmonizing the power station with the surrounding area.

Status of Installation of Hydraulic Pipes (Taken October 2011)

Status of Pouring of Foundation Concrete for Power Station (Taken May 2012)

Voice

Aiming towards More Reliable Renewable Energy Developments

By means of this construction project, the Isawa No. 1 Power Station, J-POWER's first power plant, will be reborn after almost 60 years in operation. In addition to improving the reliability of the plant, this can be expected to further contribute to the stable supply of entirely domestically produced renewable energy. By making the most efficient possible use of water while also considering harmony with nature, we seek to coexist with the people of the region from the perspectives of both flood control and water for agricultural use.

In a construction project of this type, it is natural to aim towards the smooth construction of an environmentally friendly, high-quality, economical power station. However, we believe that another important consideration is the fostering of engineers, personnel able to carry on the promotion of hydroelectric developments and to coordinate their activities with individuals and organizations in diverse fields, with diverse perspectives. Such personnel will be capable of contributing to clean hydroelectric developments in Japan and around the world.

Yoshihiro Goda
Director,
Isawa Hydro Project Construction Office

References

*2 Specified Multipurpose Dam
A dam constructed by the Minister of Land, Infrastructure, Transport and Tourism for multiple purposes including flood control, irrigation, and power generation, based on the Specified Multipurpose Dam Act enacted in 1957.

Comprehensive Upgrades of Hydroelectric Facilities

J-POWER is upgrading all of the main equipment at its aging hydroelectric power facilities. By means of these comprehensive equipment upgrades, we have not merely extended the lives of the facilities and increased the reliability of equipment. Through the application of optimized designs based on the very latest technologies, we have also increased hydroelectric generation efficiency. The realization of increased maximum output and volume of power generation through these efforts ensures the effective exploitation of this precious, entirely domestic, and renewable energy source.

At the Tagokura Power Station in Fukushima Prefecture, we have been proceeding with a plan for successive upgrades of the main electrical equipment in each of the facility's four units in the eight-year period between 2004 and 2012. In May 2012, we completed the refurbishing of Unit No. 1, the final unit. The comprehensive upgrading of these four units was completed without incident, and commercial operation of the units was commenced. The application of the latest technologies in this refurbishing project has increased maximum output for each unit by 5 MW with no change in the volume of water used, increasing the total output of the Tagokura facility from 380 MW to 400 MW.

The covers of the generating equipment in the four units are each painted a variety of colors – green (spring), blue (summer), orange (fall) and white (winter) – based on an image of the different seasons visiting the rich local environment. The covers are further decorated with images such as snowflakes, autumn leaves, and crabs, created using the handprints of local elementary school children, to provide images of the respective seasons. By means of these efforts, the Tagokura Power Station has been reborn as a facility that will linger in the memory of local people.

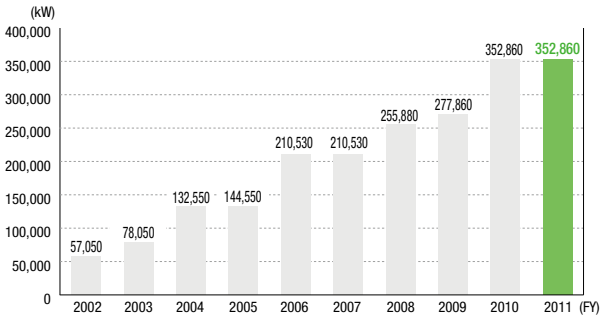
A generator cover decorated with the handprints of local elementary school children (Winter)
(Tagokura Power Station/Fukushima Prefecture)

Wind Power Development

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. Seeking to concentrate the technologies, expertise and human resources cultivated within J-POWER Group to date in our operation and maintenance of wind power facilities in one place and thus increase our collective capability, in January 2012 we founded the specialized subsidiary J-Wind Service Co., Ltd.

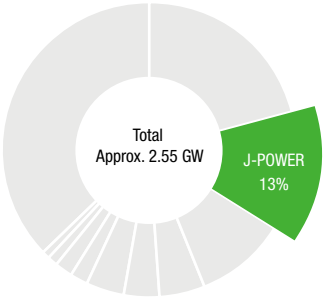
In February 2011, we commenced commercial operation of the Awara Wind Farm (10 generators, 20 MW) and the Hiyama Kogen Wind Farm (14 generators, 28 MW), giving us a total of 18 wind farms nationwide (208 generators, 352.86 MW), representing a share of approximately 13% of Japan's total installed wind power capacity (prorated according to ownership share). In FY 2011, we sold approximately 600 GWh of wind power, for an emissions reduction of approximately 210 kt-CO_2. Overseas, operation of the Zajaczkowo Windfarm in Poland (24 generators, 48 MW) is proceeding smoothly.

■ **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 2012)



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

Geothermal Power

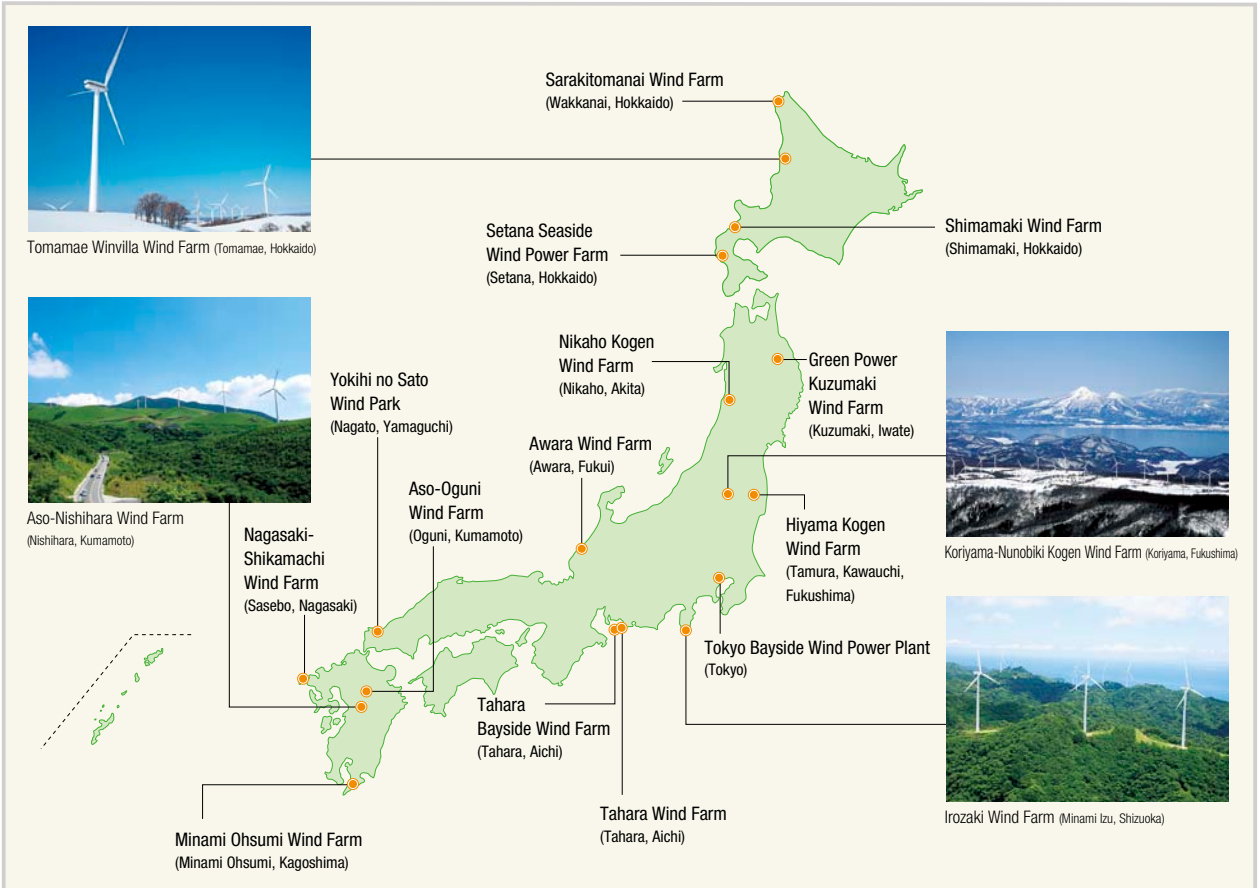
Geothermal energy is a renewable and entirely domestically produced energy, and one that produces virtually no emissions of CO_2. In addition to this, power generation using this resource is not affected by the weather, and is able to provide a stable supply of energy throughout the year. These benefits have produced high expectations for the development of geothermal power in Japan.

In March 1975, J-POWER commenced operation of the Onikobe Geothermal Power Station in Osaki City, Miyagi Prefecture, and the station has been in continuous operation ever since. In April 2010, we established Yuzawa Geothermal Co. Ltd. together with Mitsubishi Materials Corporation and Mitsubishi Gas Chemical Company, Inc., and we have conducted surveys towards new geothermal developments in the Wasabizawa and Akinomiya areas of Yuzawa City, Akita Prefecture. Based on the results obtained from these surveys to date, we have formulated plans for the construction of geothermal power stations, and in November 2011, we commenced procedures towards environmental impact assessments based on the Environmental Impact Assessment Act and the Electricity Business Act. These assessments will study, measure and evaluate the impact of the construction of geothermal power facilities on the surrounding environment, enabling us to study and assess our conformity with considerations of environmental protection and environmental protection measures based on environmental standards, regulatory standards for environmental protection, and other standards.

Seeking to contribute to the reduction of CO_2 emissions through the effective use of geothermal resources, J-POWER Group will proceed steadily while seeking to obtain the understanding of residents of the Wasabizawa and Akinomiya areas concerning our geothermal power station construction plans, and at the same time will continue to advance the cause of geothermal power, for example by ensuring that we consider biological diversity when developing a new area.

Location for the geothermal power plan

■ **Locations of J-POWER Wind Power Facilities (Japan)**



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*1 type, each measuring 1.29 by 0.99 m. By means of the field tests, we have collected a variety of actual-load operating data to enable evaluation of a new type of control system using a high-capacity power conditioner. In FY 2011, the facility generated approximately 1,100 MWh of electricity, contributing to a reduction in CO_2 emissions of approximately 390 t-CO_2. In FY 2012, we plan to install a concentration and tracking*2 photovoltaic system with an output of 161 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 refusederived 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

References

*1 Polycrystal silicon
Polycrystal silicon is a substance with crystal grain diameters of the order of several millimeters even in solar cells. Polycrystal silicon displays poorer conversion efficiency than monocrystalline silicon (high-purity silicon crystals), which has a long history of use in solar cells, but its ability to be manufactured at a low cost has recently seen solar cells using polycrystal silicon become the main type in use.

*2 Concentration and tracking
A power generation system using lenses or mirrors to concentrate natural sunlight between 100× and 800× and direct it onto solar cells with a small area. This is a high-efficiency method of solar generation, but it is necessary to follow the changes in the sun's position, and tracking equipment is therefore also employed as part of the system.

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 energy-saving policies as turning lights off during lunch break, reducing the 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, for example, we upgrade office equipment or lease company vehicles.

In addition, we have put the following measures in place as summer energy-conservation measures in response to the Great East Japan Earthquake: 1) Using higher settings for air conditioning systems; 2) Reducing lighting; and 3) Using energy-saving settings for PCs and other office equipment. 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.

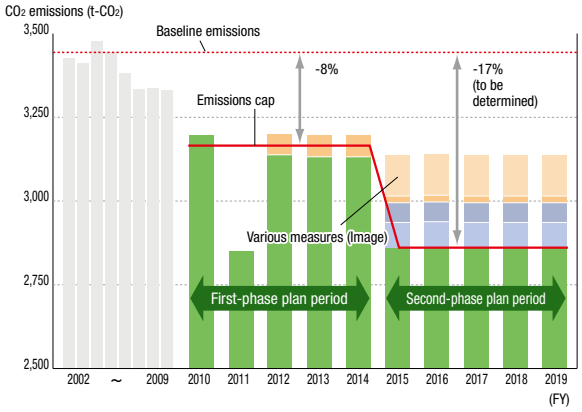
At J-POWER's Headquarters in Tokyo's Chuo Ward, we have been restricting the use of electricity in accordance with Article 27 of the Electricity Business Act (seeking to reduce maximum power consumption by 15% against last fiscal year), and the measures that we have adopted have seen us exceed government targets to achieve a reduction of approximately 40%.

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). We have been working to conserve energy in our Headquarters, and as a result of initiatives including changing air conditioning temperature settings, making effective use of heat storage tanks, and reducing use of lighting, together with pushing ahead with equipment-based measures including making the transition to lighting using high-efficiency reflector plates and LED lights, in FY 2011 we succeeded in reducing CO_2 emissions by approximately 350 t-CO_2.

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 measures to curb global emissions of greenhouse gases, 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 2011, 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, conducted training programs and workshops, and provided other forms of support for energy conservation to the governments of Indonesia, seven Central American and Caribbean countries, Turkey and Sri Lanka. 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 energy conservation training in Japan for representatives of Central American and Caribbean countries

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. 92) 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 1/320 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 2011, 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 2011, emissions totaled approximately 1,660 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 FY 2011, 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 2011).

Protecting the Ozone Layer

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. 88)

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 2011 (tons)		Use
	Stock	Consumption	
Specified chlorofluorocarbons	1.0	0.0	Refrigerant
Halons	4.6	0.0	Fire extinguishers
Other chlorofluorocarbons, etc.	11.4	0.2	Refrigerant
Total	17.0	0.2	
Alternative chlorofluorocarbons (HFCs)	12.0	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.

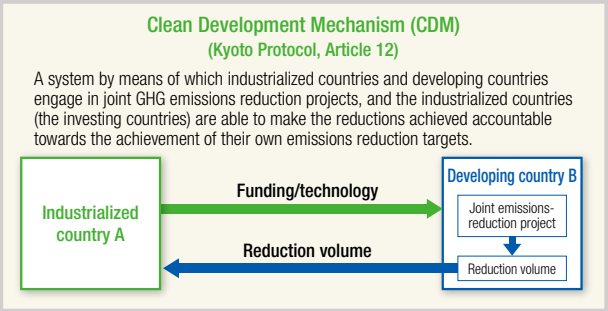
Utilization of the Kyoto Mechanisms and Other Measures

Overview of CDM Project Development

CDM projects are one of the Kyoto Mechanisms that enable industrial nations to achieve the numerical reduction targets they have been set by the Kyoto Protocol in an economically rational manner while providing technical and financial support for the reduction of greenhouse gas emissions in developing countries. JI*1 enables advanced nations to cooperate in projects for the reduction of greenhouse gas emissions.

As of the end of March 2012, 15 projects are registered as CDM projects, and one as a JI project.

■ **Outline of Clean Development Mechanism**



■ **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 (Change of fuel from coal to natural gas)
		Metrogas Watt's Alimentos Package Cogeneration Project (Increased efficiency of energy use)
	Colombia	La Vuelta and La Herradura Hydroelectric Project (Use of renewable energy)
	Brazil	Aquarius Hydroelectric Project (Use of renewable energy)
		Reduction of Methane Gas Originating in Landfill (Biogas reduction)
	China	Hydroelectric power: Sichuan Province, Xinjiang Uighur Autonomous Region (2 projects each), Shanxi Province, Yunnan Province (1 project each) (Use of renewable energy)
		Recovery of waste heat from Jiangsu cement plant (Power generation by recovery of waste heat)
		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 (Recovery and use of unutilized energy sources)

Major Activity in FY 2011

Participation in CDM/JI Projects

In FY 2011, one hydroelectric power project in Xinjiang Uighur Autonomous Region has been registered as a CDM project (in September 2011). In addition, we are conducting periodic inspection and verification procedures in order to obtain credits from already registered projects such as a hydropower project in Brazil and a project for the recovery of waste heat from a cement factory in China.

Aquarius Hydroelectric Project (Brazil)

Low-pressure gas recovery project at an oil refinery in Changyi, Shandong Province (China)

Measures to Obtain Domestic Carbon Credits

Japan's domestic credits system commenced operation in October 2008 as a system under which the greenhouse gas 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 as credits, and are able to be used for the achievement of the emissions reduction targets for larger companies, as established in voluntary action plans and trial reductions trading schemes. J-POWER is contributing to the reduction of greenhouse gas emissions in Japan by means of two projects registered as domestic credits projects: An energy-saving project involving the change of boiler fuel and the rationalization of the method of heating water at Shofuku no Yu, a bathing facility operated by Tsuchiya Corporation; and replacement of fuel oil-fired steam boilers with gas-fired boilers at a linen factory operated by United Linen Supply Co., Ltd.

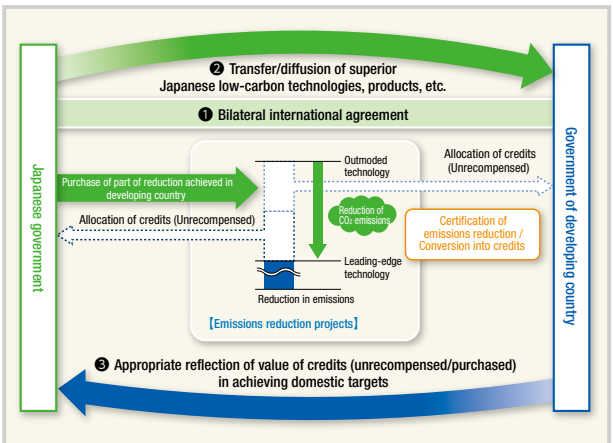
Bilateral Offset Mechanism

The bilateral offset mechanism is a mechanism proposed by the Japanese government, by means of which Japan's world-leading greenhouse gas-reducing technologies, infrastructure and products are supplied to developing nations and the greenhouse gas reductions achieved in joint projects can be converted to emissions reductions in Japan.

The Japanese government is currently attempting to deepen understanding of this mechanism through initiatives including consultations with developing nations and the implementation of feasibility studies, and to achieve its further realization through the formulation of agreements with these nations on the basis of this deeper understanding.

Based on the outcomes of these efforts and the problems of current CDM projects, the development of a system that offers benefits to many developing nations and that will promote the reduction of greenhouse gas emissions is currently moving ahead.

■ **Bilateral Offset Mechanism**



References

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

Environment Part 3

Efforts Relating to Local Environmental Issues

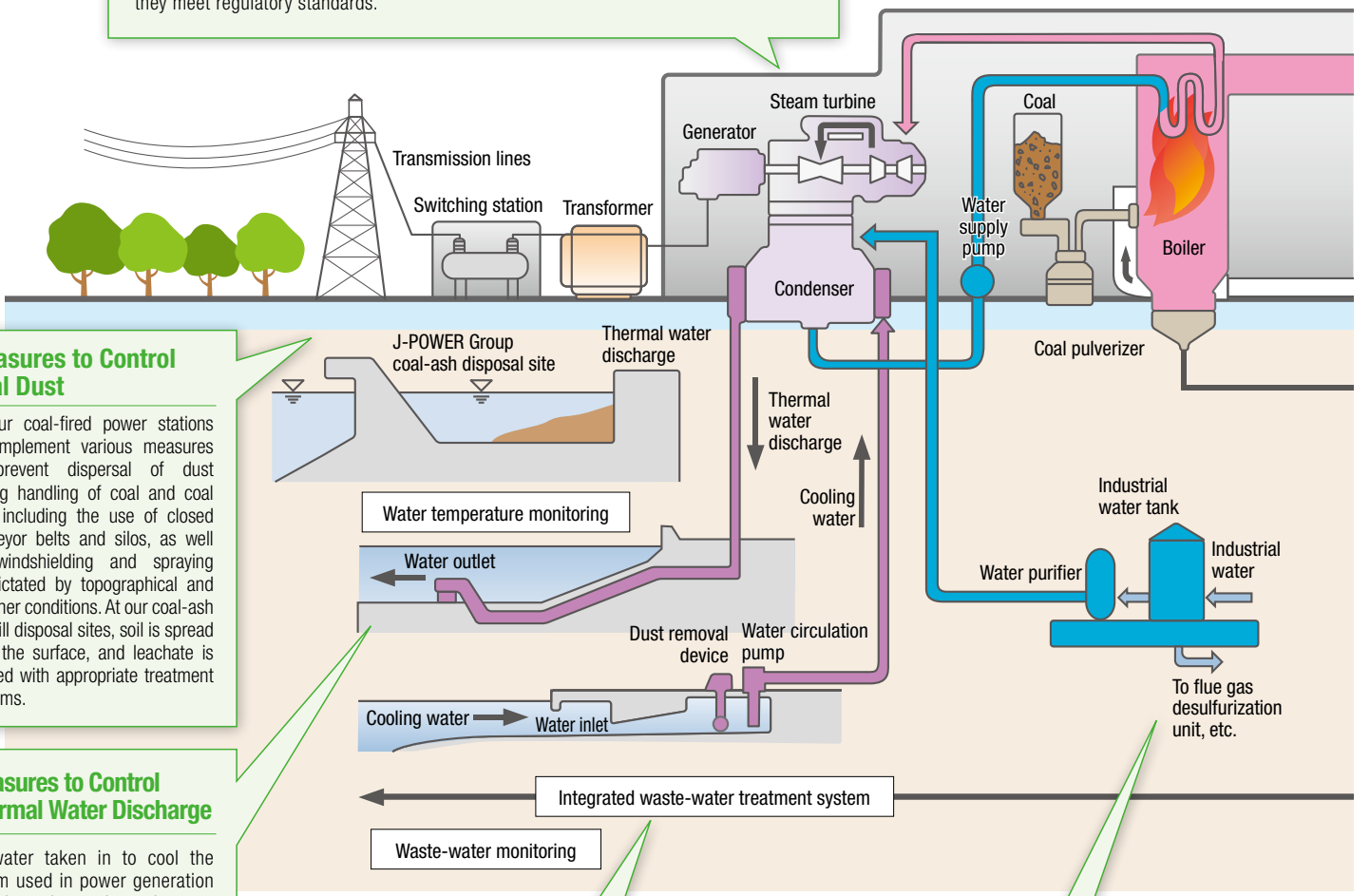
J-POWER Group recognizes that protecting the local environment, including maintaining biodiversity, and ensuring the safety and preserving the living environment of local residents forms the foundation for harmony with local communities, and therefore strives to function in harmony with the local environment, 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.

Measures to Control Noise and Vibration

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.

Measures to Prevent Water Pollution

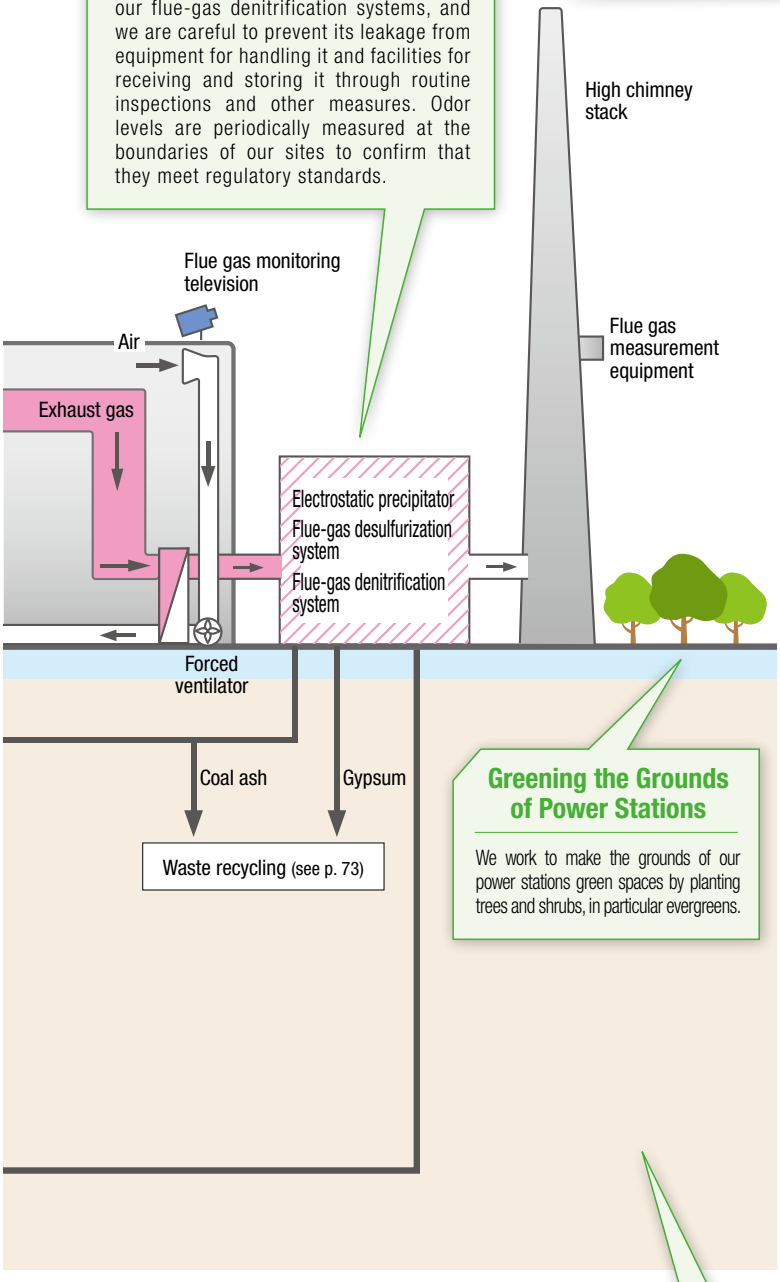
Waste water from such facilities as desulfurization units and offices is appropriately treated in integrated waste-water treatment systems, through coagulation, precipitation, filtration, and so forth. Treated water is routinely monitored by automatic measuring equipment and analyzed periodically to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

Cutting Back on Industrial Water Use

Industrial water is used in such equipment as boilers, cooling systems, and wet-type desulfurization systems. Part of this water is released into the atmosphere as steam. We are working to reduce our consumption of industrial water through the recovery and reuse, as far as possible, of wastewater that is not released into the atmosphere.

Measures to Control Odors

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.



Greening the Grounds of Power Stations

We work to make the grounds of our power stations green spaces by planting trees and shrubs, in particular evergreens.

Measures to Prevent Air Pollution

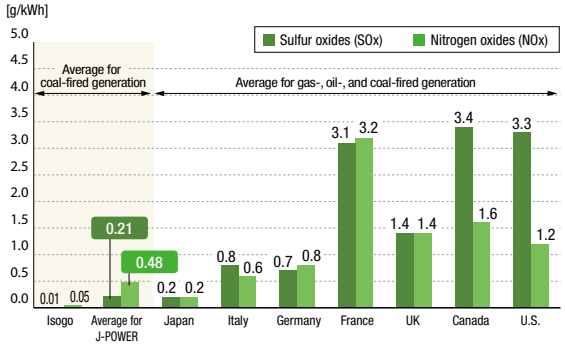
Combustion of coal and other fuels can generate sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust. To reduce these emissions we have improved our combustion methods and installed such flue-gas treatment equipment as desulfurization and denitrification systems and electrostatic precipitators. 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 measurement devices that continuously monitor the content of flue gas. In addition, human operators monitor the equipment 24 hours a day and are able to mount a swift response in the event of any malfunction, ensuring that our emissions do not exceed the benchmark figures specified by the Air Pollution Control Act and environmental protection agreements.

■ Flue-gas Emissions, FY 2011

Substance	Equipment efficiency (removal efficiency)	Emissions	Emissions intensity
SOx	65-99%	12,100 tons	0.21g/kWh
NOx	72-92%	28,500 tons	0.48g/kWh
Soot and dust	99%(as designed)	700 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



*Source: Overseas (Results for 2005) = Emissions volume: OECD Environmental Data Compendium 2006/2007
Volume of power generated: IEA Energy Balances of OECD Countries 2008 EDITION

Japan (Results for 2010) = Materials published by The Federation of Electric Power Companies of Japan
Figures for Isogo and J-POWER are formulated from results for 2011

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 ensure that no soil pollution occurs.

Establishing a Sound Material-Cycle Society

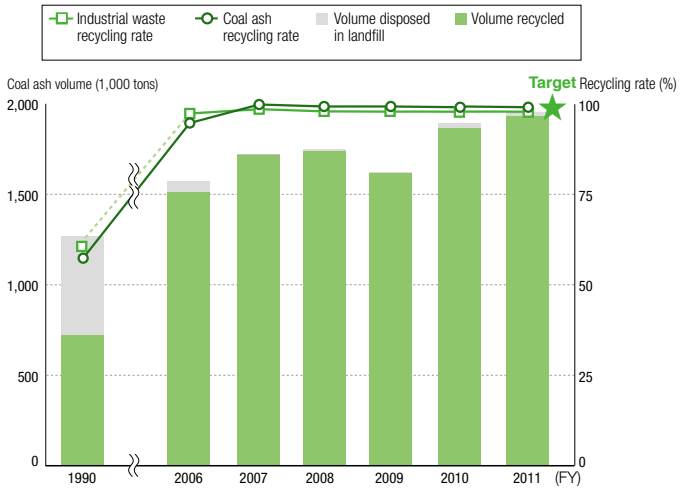
To help establish a sound material-cycle society, J-POWER Group is working hard to reduce the waste we generate and to properly treat and recycle the waste we do produce. We are also pursuing business undertakings that build on these practices.

Recycling and Reduction of Waste

In FY 2011, J-POWER Group produced 2.38 million tons of industrial waste, while recycling or reusing resources totaling 2.33 million tons, thus achieving our target with an effective use rate of 98%.

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 2012 onwards, with the goal of achieving zero emissions of industrial waste *1 (see p. 50, 88).

■ **Industrial Waste and Coal Ash Recycling Rates**

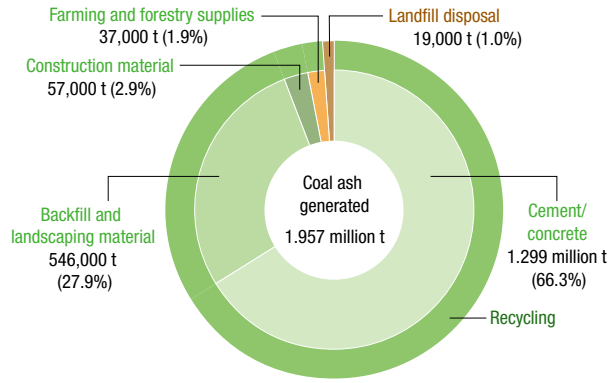


Beneficial Use of Coal Ash and Gypsum

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. 90). All of the gypsum and sulfuric acid generated by our flue-gas desulfurization systems is recycled.

Surface lining of industrial waste landfill site using fly ash mortar*2
(J-POWER Hibikinada Waste Disposal Site No. 3, Kita-Kyushu)

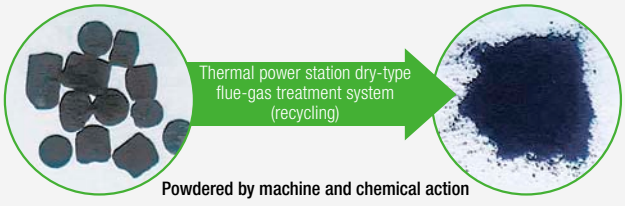
■ **Breakdown of Coal Ash Recycling**



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.



References

*1 Zero emissions of industrial waste
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

Wood chips used as ground cover (Nanairo Power Station, Wakayama Prefecture)

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.

Receptacles for separating waste in each office (J-POWER Headquarters)

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.

●The J-POWER Group Green Purchasing Guidelines

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.

Activities to Promote the 3Rs

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 areas around Okutadami Dam and Otori Dam (Fukushima Prefecture / Niigata Prefecture) are one of habitat to the Japanese Golden Eagle, a protected species classified as "Endangered IB" in the Environment Ministry's Red Data Book. J-POWER Group is helping to protect the eagles by measures including avoiding outdoor work around 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 fledgling

Voice

Experience-based Environmental Education using Rooftop Green Space

The rooftop biotope (green space) of J-POWER's Wakamatsu Operations & General Management Office is a small-scale biotope covering a total area of about 160 m^2, but has been developed to provide opportunities for environmental education, with an area offering experience of harvesting crops from paddies and fields (dietary education), an area for the observation of nature, centering on a pond, and an area for learning about natural energy, incorporating solar generation equipment.

Here, we offer hands-on learning in areas such as rice cultivation for 5th grade students of the local Kitakyushu Municipal Hanafusa Elementary School. The program teaches the children about the many processes that are necessary before the grains on the rice plants are eaten as white rice at the table, enabling them to understand the importance of food. The children also observe the creatures that make their home in the biotope, so that they are able to understand the relationship between rice cultivation and living creatures (specifically insects).

The biotope uses an artificial light soil around 20 cm thick. The trees are flourishing, and the number of plant species is increasing as they are carried in by the wind and birds, so the children get a sense of the diversification of living creatures with the passage of time. We want to continue to properly manage and maintain the biotope (through water management, fertilization, weeding, etc.), in order to make an even greater contribution to the promotion of experience-based environmental education.

Sayaka Yaoya,
JPec Co., Ltd. Wakamatsu
Environment Research Institute

Rice planting: Hold on so you don't fall over!
(Wakamatsu Operations & General Management Office, Kitakyushu City)

Seasonal flowers in the rooftop biotope

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 (Nanairo Dam, Mie and Wakayama Prefectures)

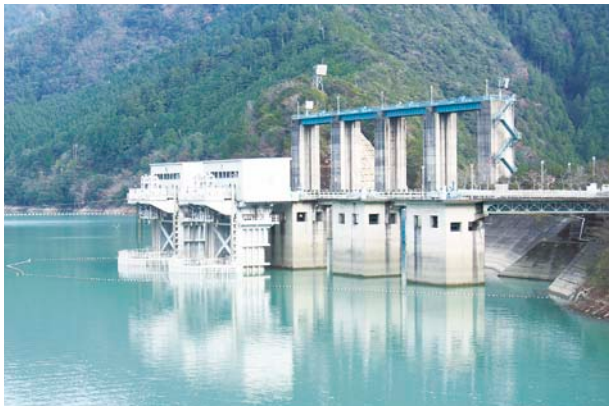
Restoration of Wetlands

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 paid 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, and 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.

Conducting observations in the Hassaki wetland, downstream from Okutadami Dam (Niigata Prefecture)

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, making it necessary to take measures to prevent the loss of water storage in the reservoir, and also to prevent the submergence around the reservoir or upstream when it rains heavy. J-POWER Group therefore controls sediment by dredging and removing it or transporting it to another part of the reservoir.

Responding to sediment
(Futatsuno Regulating Reservoir, Nara Prefecture)

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 that seeks to enhance voluntary controls on chemical substances by businesses and to prevent environmental damage by requiring businesses to monitor the volume of hazardous chemical substances they release into the environment and transport outside their facilities as waste, and to report this data to the government for compilation and publication via the governor of the prefecture or similar administrative unit in which they are located. The legislation was enacted in 1999, and went into operation 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.

■ **PRTR Substance Release and Transfer Volumes (FY 2011)**

Substance	Use	Volume handled	Volume released	Volume transferred as waste
53 : Ethyl benzene	Coating for machinery	1.31 t/y	1,306 kg/y	—
71 : Ferric chloride	Wastewater treatment agents	17.10 t/y	—	17,100 kg/y
80 : Xylene	Coating for machinery	10.99 t/y	2,234 kg/y	—
240 : Styrene	Coating for machinery	1.09 t/y	—	—
333 : Hydrazine	Boiler water treatment agents	2.49 t/y	0.09 kg/y	—
405 : Boron compounds	Manure additives	12.19 t/y	0.15 kg/y	—

Note:
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.

Measures to Reduce Dioxins

J-POWER Group possesses incinerators for purposes including the carbonization of driftwood (designated as "specified facilities" under the Act on Special Measures against Dioxins) at two of our hydroelectric power stations. A variety of requirements are placed on specified facilities, such as the removal of any inappropriate materials prior to incineration and the maintenance of stable combustion temperatures, and at present we have suspended operation of our incinerators and are working to appropriately manage and maintain the equipment in accord with the stipulations of the Act on Special Measures against Dioxins.

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. Asbestos containing 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

Because of their excellent heat resistance, insulation properties, and chemical stability, polychlorinated biphenyls (PCBs) were once widely used as insulating oils for transformers and other electrical devices. However, their persistence and their harmful effect on health and the living environment came to be recognized as problems, and in 1974 their production and import were banned, and any entity possessing PCBs was required to apply stringent storage and management measures. In July 2001, the Act on Special Measures against PCB Waste was enacted in order to promote the effective and appropriate disposal of PCB waste. The new law obliged businesses to report the status of storage and disposal of PCB waste to the governor of their region every fiscal year.

J-POWER Group commenced disposing of PCB waste in February 2005, based on a regional treatment plan formulated by the government. As of the end of March 2012, we have disposed of 548 transformers and condensers using insulating oil containing high concentrations of PCBs. We still possess 370 transformers and condensers containing high concentrations of PCBs and approximately 6 kl of high-PCB insulating oil stored in drums and other containers, and we will continue in the future to appropriately store and progressively dispose of these remaining PCBs.

■ **Status of Disposal of Waste Products Containing High Concentrations of PCBs (As of the end of March 2012)**

	Transformers and condensers
Units to be disposed of	918
Cumulative total of units disposed of to date	548

Trace PCB Contamination

The detection of extremely low levels of PCBs in transformers, condensers and other electrical equipment in which they should not be present – it is believed as a result of inadvertent mixing – has raised concerns. J-POWER Group is analyzing the composition of insulating oils used in electrical equipment as necessary, applying stringent management procedures to any equipment using insulating oil in which traces of PCBs are found, and submitting all the paperwork required by the relevant laws and regulations. We are also appropriately storing and managing any waste products (cloths, tools, etc.) produced by our operations to which PCBs are adhering.

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. We are also proceeding with the introduction of EMS at J-POWER consolidated subsidiaries and J-POWER business sites established since 2005, striving for continuous improvement in our environmental protection activities.

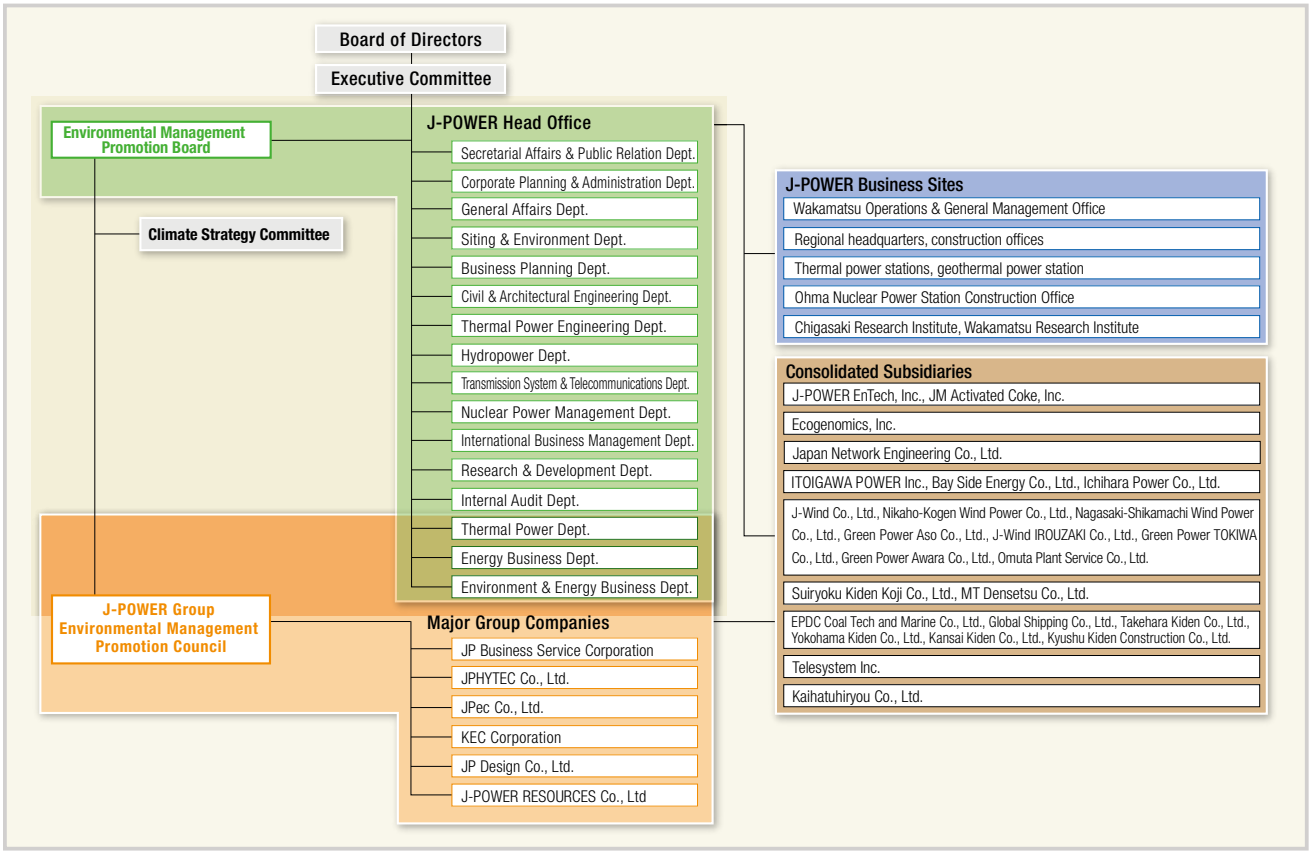
Promotion of Environmental Management

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. 51-52), 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. 86). 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 2012)



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 view of the fact that the protection of biological diversity was added to our corporate targets in FY 2011, following on from FY 2010 we conducted an e-learning program concerning biological diversity in order to promote greater understanding of the subject. Tadashi Kawashima, a Senior Advisor of KEEP, Inc., was also invited to offer a lecture on the theme "Thinking about Environmental Communication" as part of the J-POWER Headquarters environmental lecture series in order to raise the level of environmental awareness among employees.

Environmental lecture at J-POWER Headquarters

■ **In-House Environmental Training, FY 2011**

Level	Category	Course/activity	Participation	Coverage of environmental statutes, compliance, etc.
General	Environmental management (general)	Environmental briefings	Approx. 900 participants	J-POWER Group's efforts
		Lecture presentations on the environment	Approx. 100 participants	Thinking about Environmental Communication
	E-learning	J-POWER Group Sustainability Report (Summary)	87%	Overview of Sustainability Report
		Biological Diversity Part.2	87%	Protection of Biological Diversity
Technical	EMS implementation	Training for internal environmental auditors	40 trainees	Requirements of ISO 14001, internal environmental audit methods
		Follow-up training for internal environmental auditors	38 trainees	Practice in identifying noncompliance, etc.
	Environmental laws and regulations	Skills upgrade for waste management duties	81 trainees	Understanding of the Waste Management Law, application of guidelines for selecting contractors, etc.
		Waste management risk assessment	5 sites	Verification of legal requirements for contracts, manifestos, etc.
		Environmental law courses by level	152 trainees	Explanation of environmental statutes, etc.
	E-learning	EMS course (advanced)	Continuing implementation	Requirements of ISO 14001, audit methods, etc.

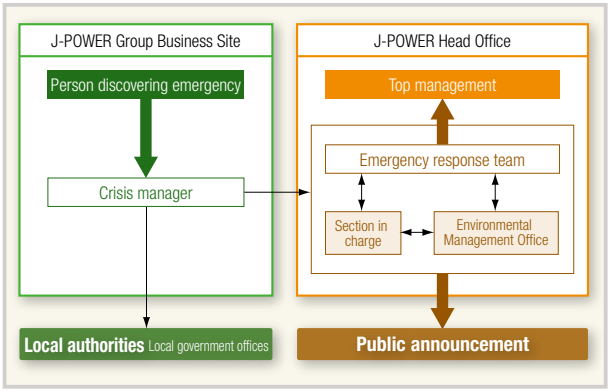
Response in the Event of an Environmental Emergency

In the event of an environmental emergency within the J-POWER 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

Of the incidents impacting the environment that occurred within J-POWER Group in FY 2011, two incidents were reported by the mass media. One of these incidents infringed an environmental protection agreement. We are working to prevent such incidents from reoccurring by means of measures including the enhancement of management procedures.

Location	Situation/response
Ishikawa Coal Thermal Power Station (Okinawa Prefecture)	On August 15, 2011, cleaning balls were washed out into the ocean during the cleaning of the Unit No. 2 condenser tubes. The action of large amounts of refuse washed in during Typhoon No. 9 had widened the gaps in the screens used in the ball collector vessel, and the balls were washed out through one of these gaps. This incident has already been reported to the relevant administrative authorities and other entities, and divers have recovered the cleaning balls. In response to this incident we are working to prevent a reoccurrence through measures including modifying the ball collector vessels and revising operational procedures following typhoons and storms.
Tachibanawan Thermal Power Station (Tokushima Prefecture)	On November 19, 2011, during preparatory operations prior to the cleaning of the air preheaters in Tachibanawan Thermal Power Station Unit No. 1, the nitrogen oxide (NOx) concentration in flue gas was found to have reached 46 ppm during the one-hour period between 1:00 and 2:00 AM. NOx concentration had therefore temporarily exceeded the level of 45 ppm specified in J-POWER's environmental protection agreements with Tokushima Prefecture and Anan City. The appropriate administrative entities have already been informed of this incident, and we are working to prevent a reoccurrence by revising operating manuals and training operators, in addition to measures including the modification of control circuits.

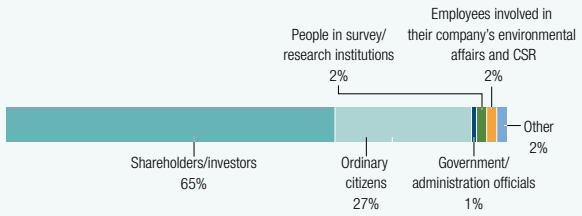
External Evaluation and Outside Opinions

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.

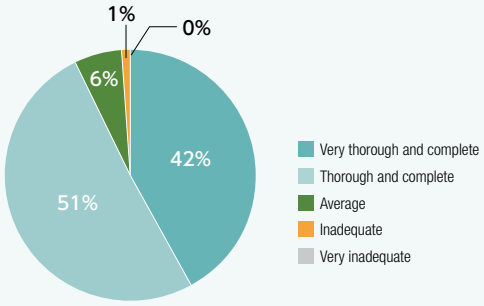
Readers' Opinions

We received many comments from readers in response to the J-POWER Group Sustainability Report 2011 (published September 2011) (614 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.

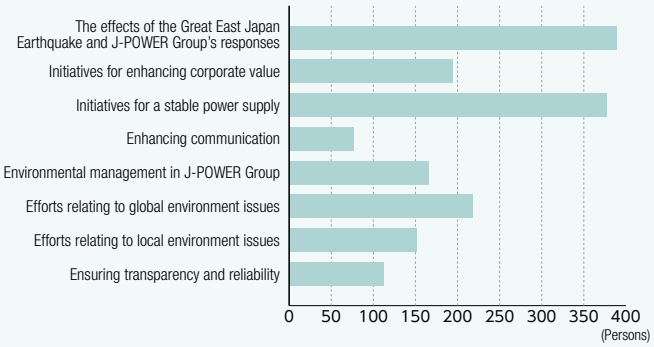
■ **Breakdown of survey respondents**



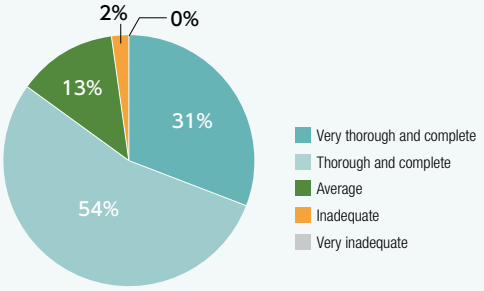
■ **Quantity and quality of information in the report**



■ **Items of particular interest (multiple answers)**



■ **Design and layout of report**



■ **Expectations for J-POWER Group**

Typical comments	Typical comments
I feel uneasy about your supply capacity. I hope you will do more to ensure a stable supply of electric power.	The J-POWER Group will continue to use its highly reliable technical expertise to provide electric power stably and efficiently in keeping with our corporate philosophy that "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." [See p. 26, "Helping Ensure the Stable Supply of Electricity" in this report.]
Even if Ohma gets permission to proceed, I hope you will still take every precaution.	In light of the Fukushima Daiichi Nuclear Power Station accidents, we are taking steps to increase safety at the Ohma Nuclear Power Station. The Group will continue to work together to build a safe power station, and as we do so we will constantly incorporate the necessary measures in light of national policies, etc. [See pp. 15-17, "The Ohma Nuclear Power Station" in this report.]
I hope you will use more renewable energy.	The J-POWER Group is working to curb CO_2 emissions by expanding the use of renewable energy such as hydroelectric, wind and geothermal power. These emit no CO_2 during power generation. We have a total of 18 wind power facilities in Japan, accounting for about 13% of all such facilities here. We are also newly developing geothermal power and taking initiatives with solar power. [See pp. 63-67, "Expanding CO_2-Free Power Generation Facilities" in this report.]
I think you are prudent to actively expand your overseas business.	Our basic stance is that we will "play our part for the sustainable development of Japan and the rest of the world." Accordingly, we are using our roughly 50 years of experience and know-how outside Japan to run our overseas consulting projects (concerning technical cooperation for power source development and environmental protection) and overseas power generation projects (in which we participate by providing capital and technology). [See pp. 33-34, "Overseas Operations" in this report.]
I hope you will work actively to increase your capacity to exchange power between the Eastern and Western Japan networks.	The J-POWER Group's Sakuma Frequency Converter Station (facility capacity 300 MW) was built in 1965 as Japan's first frequency converter facility. This essential facility made it possible to transmit electricity between the differing frequencies of Eastern Japan (50 Hz) and Western Japan (60 Hz) and support power transmission over a wide area. [See p. 26, "Helping Ensure the Stable Supply of Electricity" in this report.]

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)

Third-Party Opinion

We amended the J-POWER Group Environmental Management Vision and Corporate Targets in FY 2011 (listed on pp. 49-50). To help us meet society's expectations and play our part for the sustainable development of Japan and the rest of the world, we asked outside experts who specialize in energy, the environment and corporate social responsibility to give us their opinions on the J-POWER Group's environmental management in May 2012.

A Bridge to a New Era with Greater Awareness of Relationships with Society

Ryuta Uozumi
CEO/Certified Environmental Measurer and Certified Public Accountant,
KPMG AZSA Sustainability Co., Ltd.

Looking at world energy trends, shale gas, a non-traditional natural gas resource, is getting plenty of attention in the US and elsewhere, but at the same time it is raising concerns about the environmental problems associated with its extraction. Thus, there has been a push for stronger regulation, and the possibility of using this resource will have to be ascertained.

Nuclear power needs to be critically scrutinized. In terms of economy, for example, there is not only the cost of building, operating and properly dismantling power stations. We must also consider the cost of processing high-level radioactive waste over the very long term. (In Finland they have begun developing a 100,000-year permanent underground disposal facility for such waste.) The Japanese public also needs to have a discussion of the ethics of leaving it to future generations to store our high-level radioactive waste for such a long time.

Even if we assume a time is coming when renewable energy will support both the world economy and society, when we consider the energy sources for the period of transition until then, it is clear that fossil fuels are the bridge to that new era, and it is important to use coal, which has relative merits among fossil fuels, for high-efficiency thermal power.

Aside from high efficiency, another hopeful aspect of thermal power is the prospect of carbon capture and storage (CCS). This technology may not be so necessary right now, but over the medium to long term, emissions restrictions are going to become stricter, and practical, cost-effective CCS will be needed in some situations.

Today's enterprises are only going to be able to operate sustainably in society if they have proper relationships with their varied stakeholders. My hope is that J-POWER, now that it has so many stakeholders of so many types, will be proactive in communicating with them.

From a Timeline Viewpoint to Global Initiatives

Gento Mogi
Associate Professor and Doctor of Engineering, Graduate Course of Technology Management for Innovation, School of Engineering, The University of Tokyo

Looking ahead, over a span of time measured in centuries, humans ultimately will likely make a soft landing with renewables as their energy source, but to make the transition as smooth as possible, it is important to ensure we have many options to choose from.

Thinking about the diffusion of fuel cells, it would be meaningful to set aside gas resources, which could be used as a source of hydrogen in future. Coal can also play a key role in the soft landing if its usage (including power generation) is made ever more efficient all over the world.

We need to think of the global warming problem literally on a global scale. Looking overseas, in Saudi Arabia for example there is a solar energy project unfolding at a scale and speed unimaginable in Japan. To solve the global warming problem efficiently, it is critical to think flexibly and work globally to explore the feasibility of measures against the problem. The industrial world should see this as a business opportunity, and an international mechanism should be put in place to recognize initiatives by enterprises and others.

And thinking about energy security over time, it is essential that we have a balance of a long-term view, which enhances the usage efficiency of each resource and asks how to use it effectively to achieve a soft landing, and a short-term view, which asks how to manage risks, such as uncertainties about resource reserves and prices.

In terms of the timeline, it is extremely important that as J-POWER promotes nuclear power, it secures the human resources to undertake its projects, so that there is a steady supply of members of sufficient quality and quantity throughout project life.

For World and Regional Sustainability

Izumi Washitani

Professor and Doctor of Science, Department of Ecosystem Studies, Graduate School of Agricultural and Life Sciences, The University of Tokyo

As we figure out our best possible energy source options, we should not think about the limiting conditions inflexibly. It is important to make sure of the trends in technology and the worldwide discussion. Then, from the viewpoint of sustainability, we need to think about future generations as well as our own and make sure we do not limit the options that future generations have.

As for the global warming problem, we should not try to solve it with a single technology or just solve it in Japan. We need to solve it by reducing emissions worldwide.

In future, countries in Asia and elsewhere will want to use energy to grow their economies even as resources get harder and harder to obtain, so it is vital that they have clean ways to use energy sources like lignite that are easy to acquire and use in those areas.

J-POWER can be a great help by advancing the technology of using coal efficiently while significantly curbing the environmental burden that comes from burning it. Developing technology so we can better use biomass would also make a difference. The next step would be to expand those technologies to Asian nations and help make coal usage more efficient on a global scale.

Also, as you develop geothermal and other power, for example in Japan's natural parks, you must be aware that such development could have serious local impacts on the biota including rare and endemic species, which necessitates careful pre-evaluations and countermeasures.

J-POWER's Role at a Regional and Social Turning Point

Yuko Sakita

Journalist, Environmental Counselor

Now that it has grown harder to depend on nuclear power, shifting to natural gas as a thermal power fuel is one possible way of reducing carbon dioxide emissions in Japan, since emissions are relatively low from natural gas. Many issues have to be overcome to achieve this, however, including the investment in transitional equipment. Therefore it is highly desirable that coal-fired thermal power becomes more efficient and that we accomplish carbon capture and storage (CCS) soon.

In your quest to develop renewable energy, it is important that you develop the resources best suited to local conditions, focusing on "locally based energy," whether it be wind, solar or geothermal. It is also vital that the energy sources so developed create a means for fostering major industries in the areas where they are located and produce benefits for those areas.

Although the Great East Japan Earthquake appears to have raised the average citizen's concern for energy problems, it may be that we do not yet have enough of the basic awareness that is the "threshold to discussion." As an energy provider, J-POWER has endeavored to ensure a stable supply and diversify its energy sources, but going forward it will be crucial to go beyond this and play the role of providing information. This is a time of great change, when we Japanese should be prepared to think about the type of energy and type of society we want to have in the future. I hope that J-POWER will respond by providing well-balanced, understandable information to the citizenry so they can seriously consider their relationship with energy.

Response to Opinions

The coexistence of energy production and the environment is at the heart of J-POWER's management, so we recognize initiatives to reduce CO_2 emissions as one of the profoundest management issues facing the Group. During this major transition into a low-carbon society, we will provide a stable supply of energy and contribute to a reduction in CO_2 emissions at the global scale by further bolstering our initiatives in Japan and abroad with our existing strengths: high-efficiency coal-fired thermal power and hydroelectric, wind, solar, geothermal and other forms of power.

We intend to be guided by these experts' opinions as we tackle the various issues, elevating each J-POWER Group member's awareness of energy and the environment and of our relationship to local communities and society.

Shinichiro Ota

Executive Vice President and Chairman of J-POWER Group Environmental Management Promotion Board

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 2012, 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

6 July 2012

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 2012, that were reported in "J-POWER Group Sustainability Report 2012 (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 2012 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 2012 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 Sustainability Co., Ltd.

[1] The scope of material sustainability information is stipulated in the 2012 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 2012 Environmental Reporting Guidelines of Japan's Ministry of the Environment, the 2006 Sustainability Reporting Guidelines of the Global Reporting Initiative, and the 2012 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 2012

Document review (Ishikawa Coal Thermal Power Station, Okinawa Prefecture)

Site inspection (Wakamatsu Operations & General Management Office, Kitakyushu City)

Document review (J-POWER head office)

Reference Data

Nagoya Substation (Aichi Prefecture)

J-POWER: Main Business Sites (as of March 2012)

In Japan	Name	Location
Head Office		Chuo-ku, Tokyo
Hydropower 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
	Isawa Hydro Project Construction Office	Oshu-shi, Iwate
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
Transmission System & Telecommunications Department.	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

In Japan	Name	Location
Ohma General Management Department	Ohma Nuclear Power Construction Office	Ohma-machi, Shimokitagun, Aomori
	Aomori Branch Office	Aomori-shi, Aomori
Business Planning Department	Wakamatsu Operations & General Management Office	Kitakyushu-shi, Fukuoka
Corporate Planning & Administration Department	Hokuriku Office	Toyama-shi, Toyama
	Chugoku Office	Hiroshima-shi, Hiroshima
	Tohoku Office	Sendai-shi, Miyagi
	Shikoku Office	Takamatsu-shi, Kagawa
	Kyushu Office	Fukuoka-shi, Fukuoka
Research & Development Department	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 2012)

Company	Percentage ownership (%)	Main business	Location
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
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
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 EnTech, Inc.	100	Engineering relating to equipment for removal of atmospheric and water pollutants	Minato-ku, Tokyo
Bay Side Energy Co., Ltd.	100	Electric power supply	Chuo-ku, Tokyo
Ichihara Power Co., Ltd.	60	Electric power supply	Ichihara-shi, Chiba
ITOIGAWA POWER Inc.	80	Electric power supply	Itoigawa-shi, Niigata Prefecture
J-WIND Co., Ltd.	100	Construction and operation of wind power stations	Chuo-ku, Tokyo
J-Wind IROUZAKI Co., Ltd.	100	Construction and operation of wind power stations	Minami-Izu-cho, Kamo-gun, Shizuoka Prefecture
Green Power TOKIWA Co., Ltd.	100	Construction and operation of wind power stations	Chuo-ku, Tokyo
Green Power Awara Co., Ltd.	100	Construction and operation of wind power stations	Awara-shi, Fukui Prefecture
Green Power Aso Co., Ltd.	88	Construction and operation of wind power stations	Nishihara-mura, Aso-gun, Kumamoto Prefecture
Nagasaki-Shikamachi Wind Power Co., Ltd.	70	Construction and operation of wind power stations	Shikamachi, Kitamatsuura-gun, Nagasaki Prefecture
Nikaho-Kogen Wind Power Co., Ltd.	67	Construction and operation of wind power stations	Nikaho-shi, Akita Prefecture
Omuta Plant Service Co., Ltd.	100	Operation and maintenance of waste-fueled power stations	Omuta City, Fukuoka Prefecture
Miyazaki Wood Pellet Co., Ltd.	98	Manufacture of wood pellet fuel	Kobayashi-shi, Miyazaki 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 USA Generation GP LLC	100	Management of 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 Consulting (CHINA) Co., Ltd.	100	Overseas investment management, research, development, etc.	China

Compliance Code (enforcement January 1, 2010)

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 2012)

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 2012.

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 & Architectural Engineering Dept.
J-POWER Environment & Energy Business Dept. (Water Service Business & Infrastructure Engineering Office)
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 2007	FY 2008	FY 2009	FY 2010	FY 2011
Hydroelectric	GW	**7.09**	8.56	8.56	8.56	8.56	**8.56**
Thermal	GW	**4.65**	8.18	8.18	8.79	8.79	**8.79**
Coal-fired	GW	**4.64**	7.95	7.95	8.55	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	0.02	0.02	**0.02**
Wind power	GW		0.21	0.25	0.27	0.35	**0.35**
Total	GW	**11.74**	16.94	16.99	17.61	17.69	**17.69**

■ Electricity Output

	Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Hydroelectric	GWh	**12,451**	10,428	9,470	10,004	11,301	**11,557**
Thermal	GWh	**29,551**	57,050	53,648	50,742	58,511	**58,522**
Coal-fired	GWh	**29,452**	56,260	52,979	50,224	58,084	**57,624**
Natural gas	GWh		686	589	415	355	**862**
Geothermal	GWh	**99**	104	80	103	72	**36**
Wind power	GWh		321	322	393	458	**590**
Total	GWh	**42,002**	67,799	63,439	61,140	70,271	**70,669**

■ Electric Power Sold

	Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Hydroelectric (excluding pumped storage)	GWh	**10,046**	8,287	8,384	9,214	10,267	**10,318**
Thermal	GWh	**27,293**	53,576	50,122	47,364	54,786	**54,777**
Coal-fired	GWh	**27,206**	52,842	49,505	46,887	54,388	**53,946**
Natural gas	GWh		640	547	383	327	**803**
Geothermal	GWh	**87**	94	70	94	71	**28**
Wind power	GWh		307	310	379	442	**562**
Total	GWh	**37,338**	62,170	58,816	56,957	65,495	**65,657**

■ Fuel Consumption

	Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Coal (dry coal 28 MJ/kg equivalent)	million t	**9.56**	17.91	16.97	16.09	18.51	**18.04**
Use intensity (coal-fired thermal)	t/GWh	**351**	339	343	343	340	**338**
Natural gas	million m^3N		115	99	71	60	**142**
Heavy oil	million kl	**0.10**	0.05	0.04	0.04	0.04	**0.04**
Diesel	million kl	**0.01**	0.03	0.03	0.05	0.03	**0.03**

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

■ Greenhouse Gas Emissions

	Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
CO_2 emissions (domestic and overseas power generation)*1	million t-CO_2	**24.67**	49.86	49.07	46.52	52.54	**52.24**
Intensity	kg-CO_2/kWh	**0.66**	0.70	0.69	0.66	0.67	**0.67**
(domestic power generation)*2	million t-CO_2	**24.67**	46.84	44.35	41.70	47.84	**47.67**
Intensity	kg-CO_2/kWh	**0.66**	0.74	0.74	0.72	0.72	**0.71**
SF_6 emissions	t	–	0.0	0.1	0.0	0.1	**0.1**
Handled	t	–	4.4	7.9	5.9	12.0	**11.1**
Recovery rate	%	–	99	99	99	99	**99**
HFC emissions	t	–	0.1	0.1	0.2	0.1	**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).

Note: Denominators for emission intensity represent electric power sold.

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

	Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Average thermal efficiency (at generation point)	%	**39.0**	40.3	40.1	40.3	40.5	**40.6**

■ Usage of Specified CFCs

		Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Specified CFCs	Stocked	t	**3.6**	1.8	1.7	1.0	1.0	**1.0**
	Consumed	t	**0.7**	0.0	0.0	0.0	0.0	**0.0**
Halons	Stocked	t	**4.7**	4.6	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**	9.5	9.2	12.6	11.9	**11.4**
	Consumed	t	**0.0**	0.3	0.3	0.1	0.2	**0.2**
HFCs (CFC alternatives)	Stocked	t	–	5.9	10.8	11.3	12.0	**12.0**
	Consumed	t	–	0.1	0.1	0.2	0.1	**0.1**

■ SOx, NOx, and Soot and Dust Emissions

	Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
SOx emissions	1,000 t	**9.9**	11.3	10.6	8.1	10.1	**12.1**
Intensity (thermal)	g/kWh	**0.34**	0.20	0.20	0.16	0.17	**0.21**
NOx emissions	1,000 t	**26.4**	28.5	26.7	22.3	28.0	**28.5**
Intensity (thermal)	g/kWh	**0.90**	0.50	0.50	0.44	0.48	**0.48**
Soot and dust emissions	1,000 t	**1.0**	1.0	0.8	0.6	0.8	**0.7**
Intensity (thermal)	g/kWh	**0.03**	0.02	0.02	0.01	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 2007	FY 2008	FY 2009	FY 2010	FY 2011
Volume generated	million t	–	2.18	2.14	2.00	2.34	**2.38**
Volume recycled	million t	–	2.15	2.10	1.96	2.26	**2.33**
Recycle rate	%	–	98	98	98	97	**98**

■ Coal-Ash and Gypsum Recycling

	Unit	FY 1990	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Coal-ash created	1,000 t	**1,257**	1,714	1,747	1,669	1,936	**1,957**
Recycled	1,000 t	**719**	1,711	1,736	1,660	1,900	**1,939**
Recycle rate	%	**57.2**	99.8	99.4	99.4	98.1	**99.0**
Gypsum created	1,000 t	–	360	330	263	320	**362**
Recycle rate	%	**100**	100	100	100	100	**99.8**

Note: For details on coal-ash recycling rate, see p. 73.

■ Office Power Consumption

	Unit	–	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Power consumed by offices (company total)	GWh	–	22.23	21.86	21.07	21.40	**19.41**
Head office* power consumption	GWh	–	8.61	8.61	8.53	8.22	**7.31**
Lighting/power sockets	GWh	–	1.80	1.72	1.71	1.65	**1.25**

* 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 2007	FY 2008	FY 2009	FY 2010	FY 2011
Consumption	kl	–	1,339	1,310	1,348	1,292	1,301

■ Rate of procurement of recycled copy paper

	Unit	–	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Copy paper* purchased	million sheets	–	57.84	56.05	57.17	56.77	**58.77**
Recycled copy paper* purchased	million sheets	–	54.87	55.18	56.79	56.38	**58.14**
Recycled copy paper* purchase rate	%	–	95	98	99	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.

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.

Flue gas treatment system for Wakayama Steel Works, Sumitomo Metal Industries, Ltd.

Dry-Type Desulfurization-Denitrification facility for J-POWER Isogo Thermal Power Station

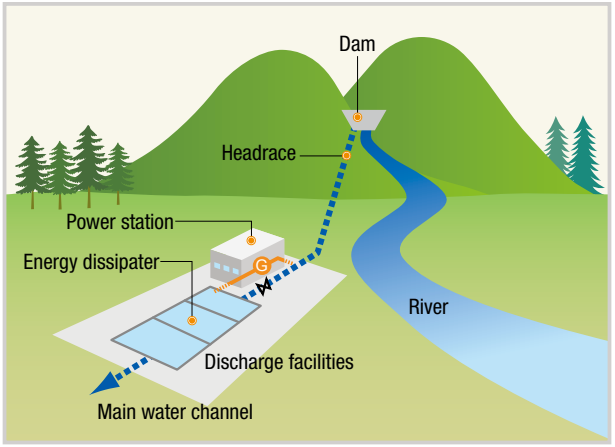
Contributing to a Low-Carbon, Recycling Society by Promoting the Implementation of Small-Scale Hydropower Stations

JP Design Co., Ltd.

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

As a J-POWER Group company, JP Design Co., Ltd. provides engineering services in the fields of civil engineering and construction. As society's demand for renewable energy has grown in recent years, hydropower is expected to play a major role. Under a design contract with the Japan Water Agency, JP Design in FY 2011 performed the execution design of a hydropower station using the service water discharge facilities at Mie Canal's Nakazato Dam. This project can yield an output of up to 140 kW by generating power that would be lost with existing pressure reducing valves. Using hydropower technology it has fostered with J-POWER, JP Design will contribute to energy and the environment for local communities by taking part in the development of small-scale hydropower stations as promoted by the national and local governments.

■ Hydropower station using dam's service water discharge facilities



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.

RP-LUCID High-performance Synthetic Lubricant

Planning & Management Office, Thermal Power Engineering Department

RP-LUCID* is a high-performance synthetic lubricant with great oil film strength, long life and excellent water separation thanks to advanced additive technology based on Synerlec, an additive developed by the US firm Royal Purple. RP-LUCID is currently in use in our thermal and wind power stations, as well as other places like cement and paper plants where it has a record of preventing equipment failure, extending intervals between oil changes and otherwise reducing maintenance costs.

The additive Synerlec helps to conserve energy by reducing mechanical loss in sliding parts and cuts total costs (i.e., both maintenance and running costs).

* RP-LUCID: The original name of the lubricant is Royal Purple.

RP-LUCID high-performance lubricant

Environmental Accounting Data

Environmental Conservation Costs

(billion yen)

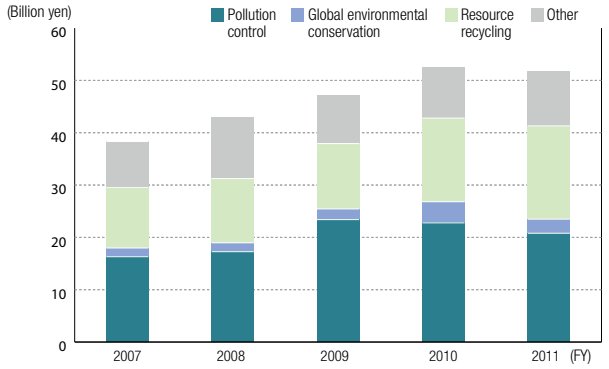
Category	Main measures and efforts	Cost
Pollution control	Air pollution control (desulfurization/ denitrification, soot and dust treatment), water pollution control (waste-water treatment), etc.	20.8
Global environmental conservation	Measures to reduce greenhouse gas emissions (maintaining high-efficiency 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)	2.7
Resource recycling	Waste reduction through reuse and recycling; treatment and disposal of waste	17.8
Management activities	Monitoring and measurement of environmental load, labor costs for environmental conservation organizations, costs for environmental education, etc.	1.9
Research and development	High-efficiency generation, use of fuel cells, CO_2 capture and fixation, recycling of coal ash and gypsum, etc.	2.6
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	1.2
Other	Pollution load levy	2.5
Total		51.7

Environmental Conservation Benefits

Environmental conservation benefit	FY 2011
SOx emissions intensity (g/kWh)	0.21
NOx emissions intensity (g/kWh)	0.48
Soot and dust emissions intensity (g/kWh)	0.01
CO_2 emissions intensity (kg-CO_2/kWh)	0.67
Average thermal efficiency of thermal power generation (%)	40.6
Coal ash recycling rate (%)	99.0
Industrial waste recycling rate (%)	98
Gypsum recycling rate (%)	99.8
Volume of driftwood recycled (1,000 m^3)	23
Employees completing internal environmental auditor training	78
Sustainability report (copies published)	19,700
Environmental pamphlet (copies published)	7,400
Overseas consulting projects (cumulative total)	333

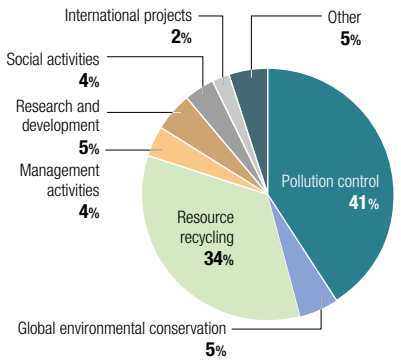
Note: For detailed data on each category, see pp. 87–88, Environment-Related Fiscal Year Data, in the Reference Data section.

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, 2011, to March 31, 2012
- 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 195 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 2011)

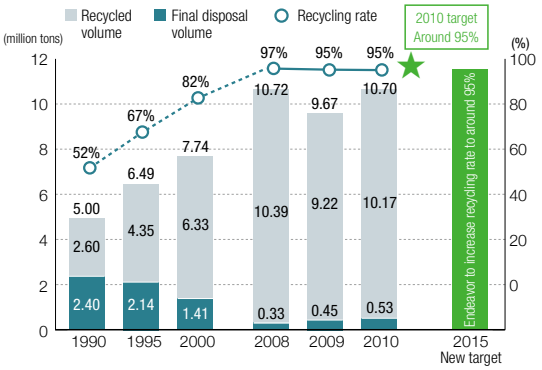
The Environmental Action Plan by the Japanese Electric Utility Industry lays out the electric industry's policy and plan for dealing with global warming and other environmental issues. Each year the plan is reviewed in relation to the industry's progress toward its goals and domestic and international 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 2015, 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 government.

■ Trends in Recycling of Major Wastes and By-products (Unit: million tons)

	Type		FY 1990	FY 2008	FY 2009	FY 2010
Waste	Combustion residue, dust and soot (coal ash)	Volume generated	3.47	7.80	7.02	7.96
		Recycled volume (Recycling rate)	1.37 (39%)	7.58 (97%)	6.80 (97%)	7.59 (95%)
	Construction waste material	Volume generated	0.40	0.38	0.38	0.40
		Recycled volume (Recycling rate)	0.21 (53%)	0.37 (97%)	0.37 (96%)	0.39 (97%)
	Scrap metal	Volume generated	0.14	0.34	0.23	0.23
		Recycled volume (Recycling rate)	0.13 (93%)	0.34 (100%)	0.23 (99%)	0.23 (99%)
Byproducts	Gypsum from desulfurization process	Volume generated	0.85	1.85	1.57	1.76
		Recycled volume (Recycling rate)	0.85 (100%)	1.85 (100%)	1.57 (100%)	1.76 (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

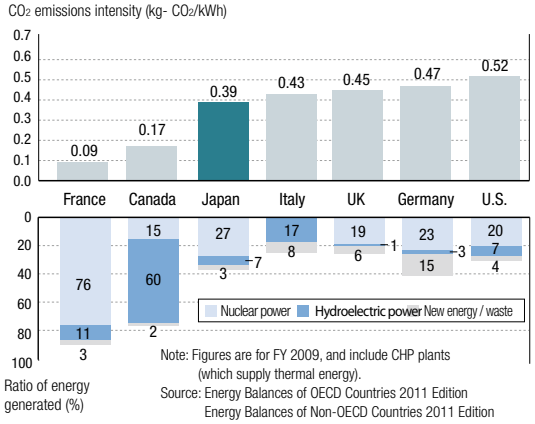
CO_2 emissions ($kg\text{-}CO_2$) = Electric power consumption (electric energy) (kWh) × CO_2 emissions intensity (CO_2 emissions per unit of electric power consumed) ($kg\text{-}CO_2$/kWh)

■ Electric Utility Industry's CO_2 Emissions

Item \ Fiscal year	FY 1990 (results)	FY 2008 (results)	FY 2009 (results)	FY 2010 (results)
Electric power consumption (billion kWh)	659	889	859	906
CO_2 emissions (million t- CO_2)	275	332	301	317
CO_2 emissions intensity of user-end electricity (kg- CO_2/kWh)	0.417	0.373	0.351	0.350

Reference Information

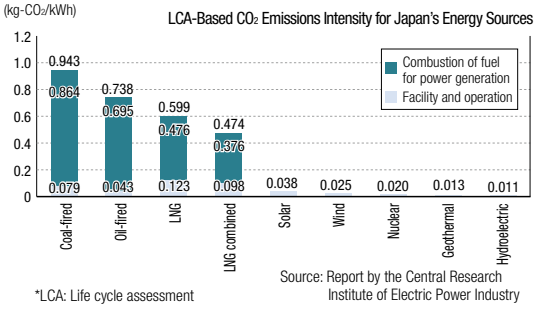
■ Country-by-Country Comparison of CO_2 Emissions Intensity (per unit of energy generated; preliminary calculation by FEPC)



Note: Figures are for FY 2009, and include CHP plants (which supply thermal energy).
Source: Energy Balances of OECD Countries 2011 Edition
Energy Balances of Non-OECD Countries 2011 Edition

■ Comparison of Life Cycle Assessment-Based CO_2 (LCA 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. 70, 92

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. 10, 32, 49, 53, 59, 63, 82

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

Baseload power source
p. 9

Electric power demand typically rises in the daytime and decreases in the evening and at night. Because electric power cannot be stored, the power system has to adjust its supply of electric power according to changing demand. A baseload power source is a power source that provides a set volume of electric power stably both day and night. In Japan, coal-fired thermal power is one of the power sources that serve in this function since there is an excellent supply of the fuel and its price is stable.

C

Carbon dioxide capture and storage (CCS)
pp. 10, 14, 49, 56, 62, 82

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. 53

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. 69, 92

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. 21

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

Dioxin(s)
pp. 73, 77

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. 49, 54

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.

Energy security
p. 10

The state of having systems in place to ensure that there is a stable supply of energy from the resource production site to final consumer without being overly affected by political, economic and social conditions, and minimizing risks to such systems. Also referred to as energy supply stability.

Environmental accounting
p. 54

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. 49, 69, 93

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. 50, 78

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

F

Filtered containment venting system (FCVS)
p. 16

In the event that a major accident causes excessive increase in pressure in a nuclear reactor containment vessel, this system expels the air in the containment vessel to the atmosphere to prevent damage to the vessel, passing the air through a filter to limit the amount of radioactive material released.

G

Green purchasing
p. 74

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.

Gas turbine combined cycle generation
p. 34

A form of power generation which combines gas and steam turbines. The gas turbine is driven by the pressure of exhaust gas produced by burning fuel in compressed air, while the steam turbine is driven by the residual heat of the exhaust gas. The combination of the two realizes high generation efficiency.

H

Hydrofluorocarbons (HFCs)
p. 69

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.

Hydrogen venting equipment
p. 16

In the event of reactor core damage that causes hydrogen to leak into the nuclear reactor building, this equipment quickly and reliably expels the leaked and accumulated hydrogen to the exterior of the building to prevent an internal hydrogen explosion.

I

Independent power producer (IPP)
pp. 3, 4, 25

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

Industrial waste
pp. 50, 53, 64, 73

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. 12, 14, 56, 62

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. 12, 14, 49, 56, 61

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. 20

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

K

Kyoto Mechanisms
Please refer to pp. 70, 92.

Kyoto Protocol
Please refer to p. 92.

L

Lower heating value (LHV)
pp. 10~12, 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. 69

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. 10, 42, 50, 53, 57, 72, 89

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. 69

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. 53, 59

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. 69

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. 77

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. 77

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. 14, 27, 49, 59, 62, 63, 81

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. 63, 76

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. 10, 53, 72, 89

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. 53

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. 50, 69

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. 10, 42, 50, 53, 57, 72, 89

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, 14, 33, 35~38, 42, 49

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. 10~12, 50, 57

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

Thermal water discharge
p. 71

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. 70

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. 10, 12, 28, 32, 34, 49, 56, 57

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. 70

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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