J-POWER Group

SUSTAINABILITY REPORT 2013

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," the J-POWER Group aims to harmonize our energy supply and the environment in our various business activities.

Editorial Policies

- The 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 will introduce the J-POWER Group's measures for the stable supply of electric power.
- A questionnaire survey was conducted in order to gauge the opinions of readers concerning the FY 2012 Report. (A summary can be found on p. 75)
- To ensure objective credibility, this report has been independently assured by Ernst & Young Shin-Nihon Sustainability Institute Co., Ltd.(For details, see p. 76)
- The opinions of experts outside the company have been sought regarding issues and expectations in relation to the J-POWER group. (See p. 77)

Period covered:
April 2012 - March 2013
(January - December 2012 for those companies with a January – December fiscal year. Also, some articles may include content from April 2013 or thereafter.)

Scope:
J-POWER and the 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*1 Ver3.0

Report issued since: 1998

Published in: September 2013

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 the J-POWER's website as "J-POWER Group Sustainability Report 2013."

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

Reference

*1 Sustainability Reporting Guidelines
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.

Contents

With the aim of "harmonizing energy supply with the environment" by putting the corporate philosophy into practice, we constantly take up the challenge of developing new technologies and aim for sustained growth as a global electric power company that contributes to a sustainable society.

President 北村雅良

Masayoshi Kitamura

Nuclear power stations in Japan have been on extended shutdown since the Great East Japan Earthquake of March 2011, and electric power supply and demand have continued in uncertainty as energy costs continue to rise. Under these circumstances, the climate facing Japan's electricity business is extremely harsh.

An additional factor is that government energy policy itself is undergoing a major transition. New regulatory standards for nuclear power stations have been decided, the Cabinet has approved reform policies regarding the electric power system, reconstruction work has begun on the Basic Energy Plan, to include revision of global warming countermeasures, and so on.

Under these circumstances, we of the J-POWER Group will press ahead vigorously to put into practice our corporate philosophy of "meeting people's needs for energy without fail, and playing 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 the J-POWER Group is to help provide a stable supply of electric power. Under tight power

supply and demand conditions, we will fully mobilize all of the J-POWER Group's hydroelectric power and coal-fired power plants throughout Japan, together with the functionality of our backbone transmission lines and other electric power facilities, to fulfill our responsibility as an electric utility.

In doing so, we will pursue all possibilities for adding new coal-fired power facilities or expanding existing facilities, to include replacement of the Takehara Thermal Power Station. Our purpose is to reinforce the supply capacity of Japan's electric power generation business in order to secure the country's power supply capacity over the medium term.

With regard to construction work on Ohma Nuclear Power Station, which recommenced in October 2012, we are making every possible effort to bring this facility into conformance with new regulatory standards. We intend to complete and operate the power station with the assurance of safety and the trust of people in the local community.

We also aim to develop our business on a global scale and with a long-term perspective. We are therefore promoting an overseas power generation business that provides developing countries with the highly efficient coal-fired power and other energy they seek, with the aim of achieving global growth. We will also continue to 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, the 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.

The J-POWER Group will also continue to engage with these challenges in 2013 in order to carry out the mission we declare in our corporate philosophy.

We thank everyone sincerely for their continuing support.

July 2013

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 Corporate Conduct Rules (Established January 1, 2001)

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

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

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

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

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

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

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

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

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

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

The 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 Measures to Protect Aquatic Environments 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	The 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	

- 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
- The J-POWER Group's environmental management visions are set out on pp. 47-52 of this report.

WEB http://www.jpower.co.jp/annual_rep/ann20000.html

Special Feature

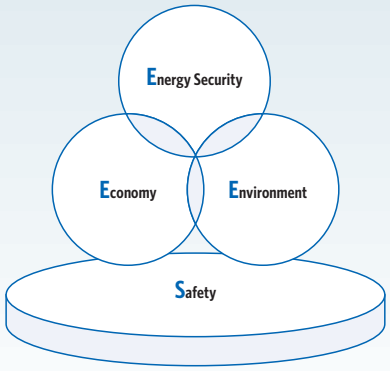
Measures to Provide a Stable Supply

Harmonizing Energy Supply and the Environment

Electric power is a critical aspect of the infrastructure that supports people's lives and industry. The stable supply of power is crucial.

The energy policy of Japan therefore affirms the importance of "S+3E." This refers to "energy security," "economic efficiency," and "environmental suitability," together with "safety."

Conceptual Image of S+3E



The J-POWER Group affirms the principle of "Harmonizing Energy Supply with the Environment" and we are pressing forward with measures such as Coal-Fired Power, Hydroelectric power and Renewable Energy, and the Ohma Nuclear Power Station from the S+3E perspective.

- Measures for Coal-Fired Power
  - Coal-Fired Power Facility Replacement and New or Expanded Construction
  - Measures to Heighten Coal-Fired Power Efficiency
- Measures for Hydroelectric power and Renewable Energy
  - Maintaining Hydroelectric power Stations in Stable Operation and Enhancing Their Value
  - Promoting and Developing a Framework for the Wind Power Business
- Measures for the Ohma Nuclear Power Station

Measures for Coal-Fired Power

Coal-Fired Power Facility Replacement and New or Expanded Construction

See pp. 57-58

The use of coal-fired power as an economically efficient and stable baseload power source is important for achieving the best mix of energy for Japan.

The J-POWER Group is pursuing possibilities for the replacement and new or expanded construction of older coal-fired power facilities that have low thermal efficiency. We will press forward with coal-fired power with efficiency at the highest world level while taking all care to be environmentally responsible.

Isogo Thermal Power Station

Takehara Thermal Power Station

Measures to Heighten the Efficiency of Coal-Fired Power

At the J-POWER Group, we are applying ultra super-critical (USC) technology with the most advanced thermal efficiency in the world to achieve both improvement in thermal efficiency and reduction in CO_2 emissions. We are also working on the development of the next generation of technology that will succeed to USC, with oxygen-blown integrated coal gasification combined-cycle (IGCC) generation and integrated coal gasification fuel cell combined-cycle (IGFC) technologies as well as CO_2 separation and capture technology.

Osaki CoolGen Project (conceptual drawing of completed project)

# of Power and Reduce CO_2 Emissions:

Measures for Hydroelectric power and Renewable Energy

See next page

Hydroelectric power and other such renewable energy sources are a valuable, entirely domestic energy resource. As CO_2-free power sources, they are also important in terms of countermeasures against global warming. The J-POWER Group is working toward the stability of the electric power supply and reduction in CO_2 emissions by promoting the expanded use of hydroelectric power, wind power, geothermal power, and other such renewable sources of energy. As of the end of March 2013, the capacity of the J-POWER Group renewable energy facilities amounted to approximately 8.92 GW, or half of the total, and the amount of power they generated exceeded 10,000 GWh. (Actual fiscal 2012 results)

From among these renewable energy sources, the special feature this year will introduce our hydroelectric power and wind power generation measures. Please see p. 63 regarding other forms of renewable energy (geothermal, solar, etc.).

Maintaining Hydroelectric power Stations in Stable Operation and Enhancing Their Value

Hydroelectric power is the form of renewable energy with the greatest facility output, and it is a key element in the combination of power sources that provide stable supply. The J-POWER Group owns many hydroelectric power facilities throughout Japan, and we are engaged in the ongoing day-to-day effort to maintain stable operation while working also to increase the value of the facilities.

Promoting and Developing of Wind Power Business

Wind power generation is a renewable energy source that shows particularly great development potential for the future. It is anticipated to undergo further widespread adoption and expansion.

The J-POWER Group was among the early participants in the wind power generation business. We are building up a consistent system for everything from business promotion to maintenance.

Sakuma Power Station

Tagokura Power Station

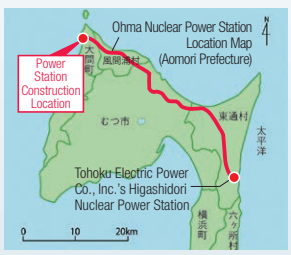
Aso-Nishihara Wind Farm

Onikobe Geothermal Power Station

Measures for the Ohma Nuclear Power Station

See p. 15

For a country like Japan, which has few natural resources, nuclear power is an energy source of essential importance from the perspective of the stable supply of power. The J-POWER Group is steadily implementing safety and other such measures while working to build power plants that are trusted by residents of local communities.



Ohma Nuclear Power Station Location Map
(Aomori Prefecture)

Panoramic view of construction work on Ohma Nuclear Power Station

Development of Hydroelectric power and Wind Power Generation Measures for Renewable Energy

From the time of its founding, the J-POWER Group has promoted the development of large-scale hydroelectric power stations to meet the high energy demand of postwar Japan. In the course of its history, the company has come to possess hydroelectric power facilities of 8.00 GW or more. Based upon the principle of harmonizing energy supply with the environment, we were also among the first to take measures expanding the use of CO_2-free power sources other than hydroelectric power. In the area of wind power generation, in particular, our facilities make up the second-largest share in Japan.

From the 1950s on
Development of large-scale hydroelectric power stations

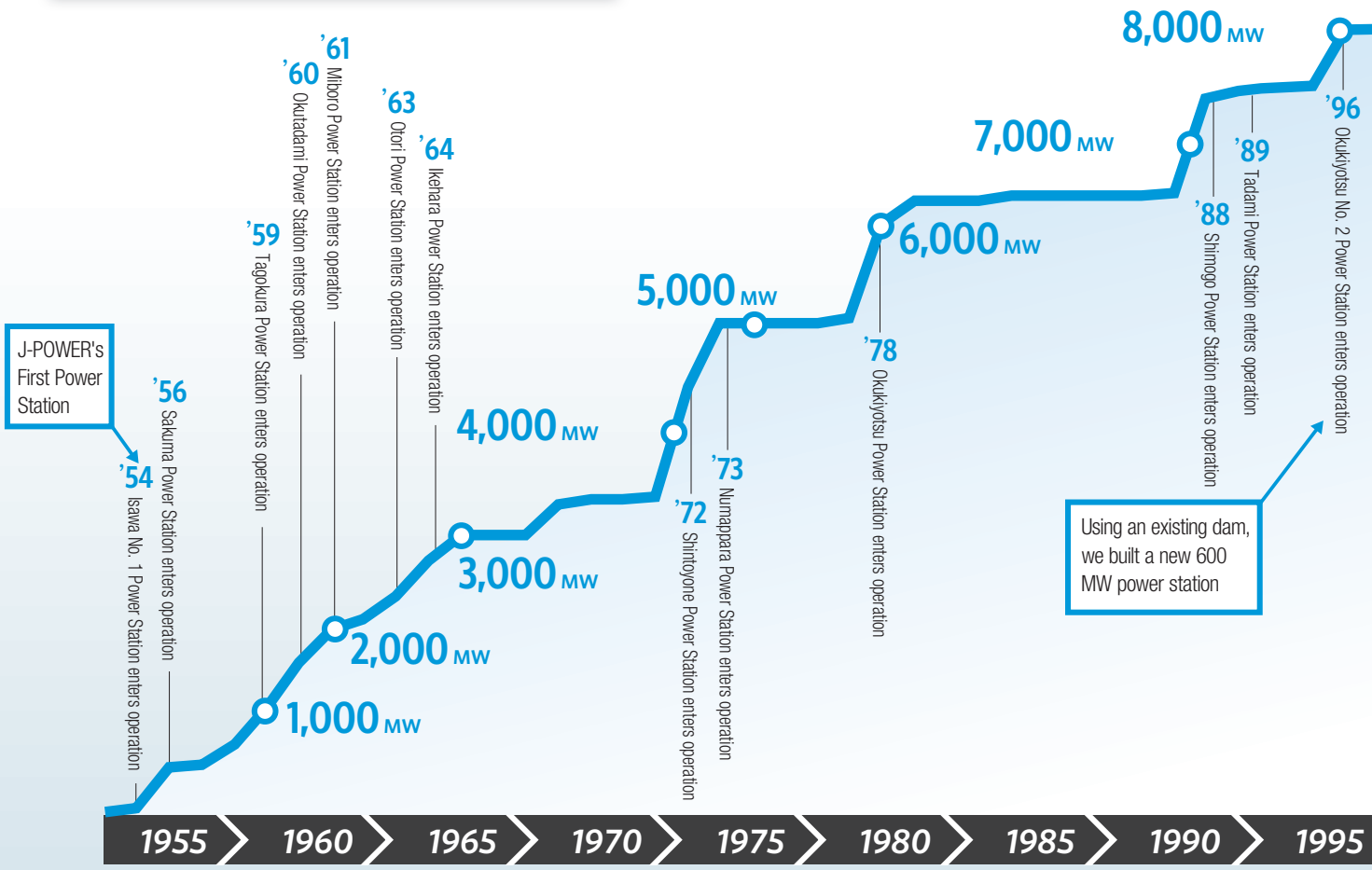
Sakuma Dam

Since the founding of the J-POWER Group in 1952, we have worked to resolve the nationwide power shortages in postwar Japan by developing large-scale hydroelectric power locations that had been considered technically difficult to manage. We built large dams and hydroelectric power stations at Sakuma, Tagokura, Okutadami, Miboro, and other such locations, and these contributed to the postwar recovery of Japan. We conducted development that made use of the newest technology, or conducted technical development while going forward with construction.

From the 1970s on
Development of Large-Scale Pumped-Storage Power Stations

Numappara Dam (upper reservoir) and Miyama Dam (lower reservoir)

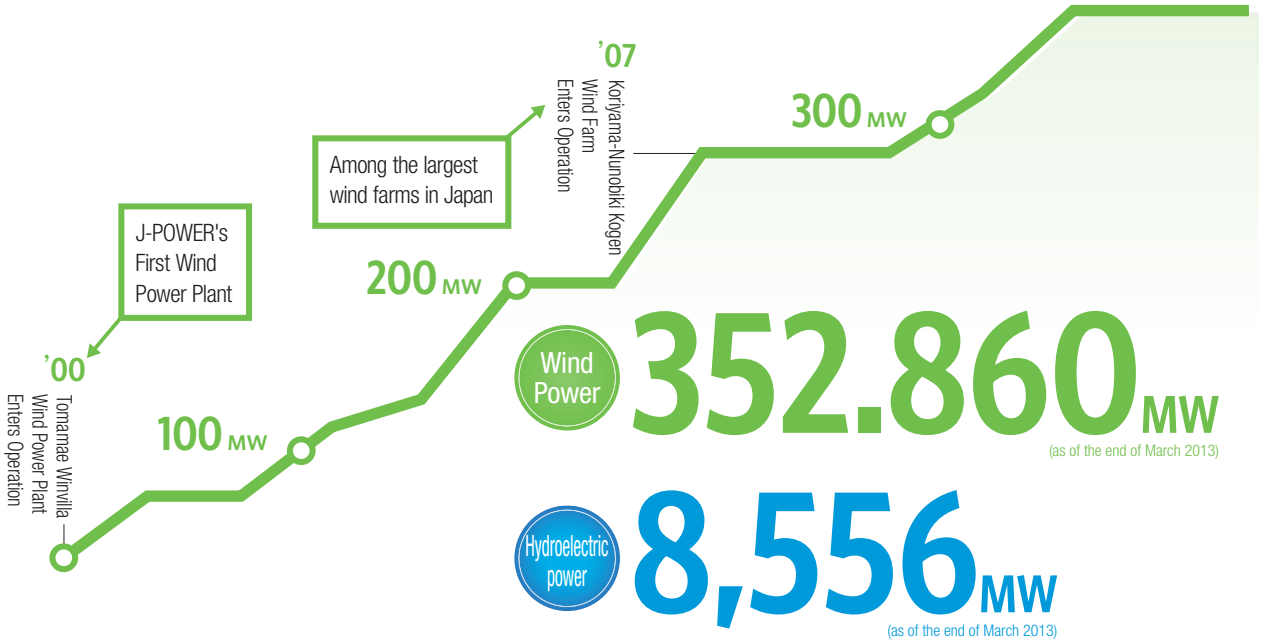
Japan's growth proceeded at a rapid rate, and we began development of large-scale pumped-storage power stations to handle peaking power demand by using power at night to pump water up to a reservoir and then using it to generate power during the day, when demand was high. Making advantageous use of our abundant track record in hydroelectric power, we have engaged in the construction of pumped-storage power stations throughout Japan.

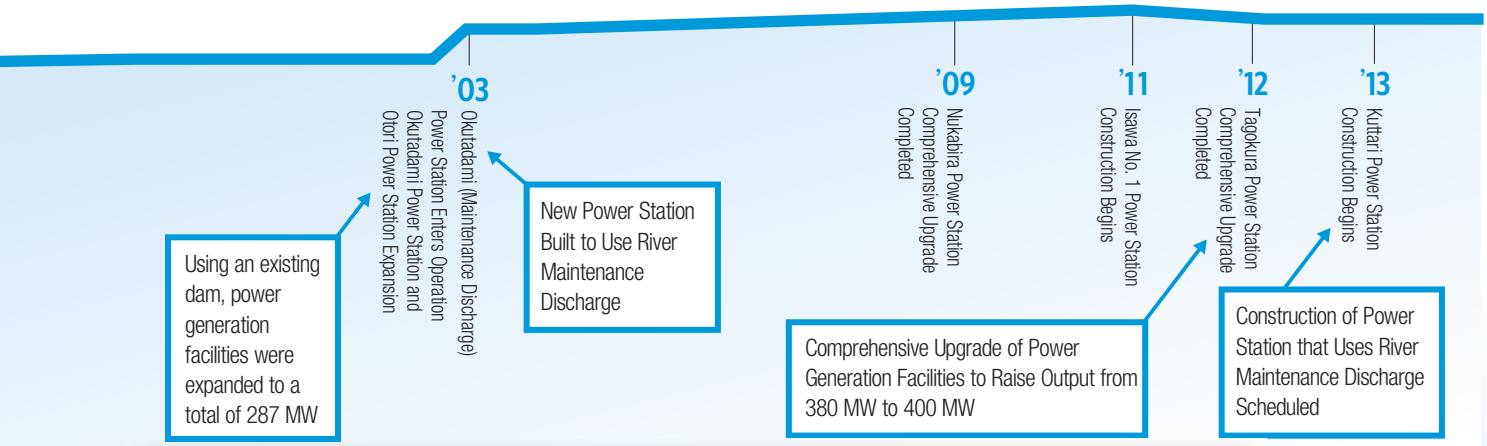


From the 2000s on
Development of Wind Power Plants


Tomamae Winvilla Power Plant

The history of wind power generation in Japan started during the oil crises of the 1970s. Since then, adoption has been growing as frameworks have been put in place. The J-POWER Group took up the wind power generation business early on, and the establishment of the Tomamae Winvilla Power Plant in the town of Tomamae, Hokkaido, in 2000, marked the start of our development of numerous wind power plants. We presently have the second-largest share of these facilities in Japan.





From the 2000s on
Increasing the Value of Existing Power Stations


Nukabira Power Station Unit No. 2 stator being lifted in

We are using the existing hydroelectric power facilities to achieve further heightened reliability and efficiency as well as increased output. In addition to taking steps to enhance power generation efficiency by carrying out comprehensive upgrades of obsolescent electrical equipment in power stations, we are also continuing our efforts to put hydroelectric power resources to still more effective use, such as by building power stations that make use of the maintenance discharge from existing but unused dams.

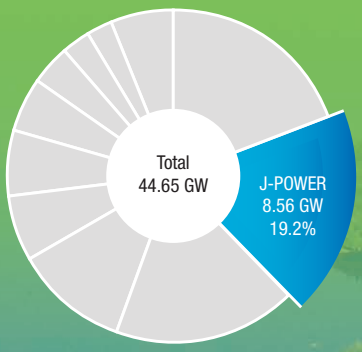
2000 2005 2010 2013

Maintaining Hydroelectric power Stations in Stable Operation and Enhancing Their Value

Measures for Hydroelectric power

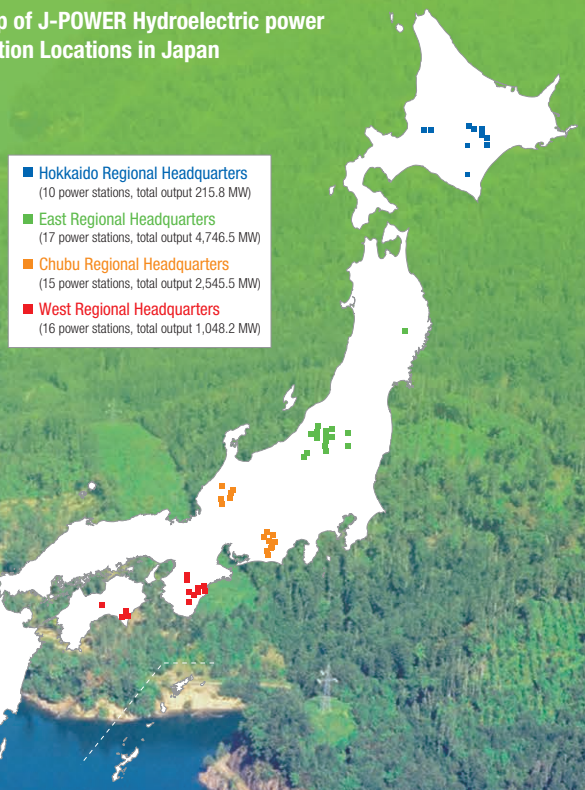
Hydroelectric power has facilities on a larger scale than any of the J-POWER Group's other renewable energy sources. It is a central element in terms of both the stable supply of electric power and of reducing CO_2 emissions. We are committed to pursuing our efforts for the safe operation, maintenance, and reinforcement of existing power stations as well as our measures for the further utilization of facilities and resources.

J-POWER Share of Japan's Hydroelectric power Facilities (as of March 2013)



* Excludes in-house power generation facilities.
Source: Agency for Natural Resources and Energy, "Electric Power Statistics"

Map of J-POWER Hydroelectric power Station Locations in Japan



Nukabira Dam (Hokkaido)

Stable Operation and Reinforced Maintenance of Hydroelectric power Facilities

The J-POWER Group has 107 water turbine generators at 58 hydroelectric power station locations throughout Japan, operated under monitoring and control from three regional control centers that cover the country on a 24-hour basis. Each worksite is engaged in day-to-day inspection work for early detection of any abnormality in facilities and prevention of facility accidents before they can occur, so that J-POWER can provide a stable supply of power to the entire country. In the event of abnormalities, we rush maintenance personnel to the scene and strive to quickly restore facilities to operation. We will continue to implement facility maintenance measures suited to the needs of disaster and environmental countermeasures so as to enhance the reliability of our facilities.

East Regional Control Center (Saitama Prefecture)

Inspection patrol of generator facility (Sakuma Power Station, Shizuoka Prefecture)

Measures for New Hydroelectric power Facilities

Enhancing the Value of Existing Facilities

The J-POWER Group implements a variety of measures to enhance the reliability and efficiency of existing hydroelectric power facilities.

One such measure we are pursuing is to conduct comprehensive upgrades of key electrical equipment in hydroelectric power stations that are becoming obsolescent. We completed a comprehensive upgrade of Tagokura Power Station in 2012, and the introduction of optimal designs using the most up-to-date technology has increased the output of the power station as a whole from the former 380 MW to 400 MW.

Another example is the Isawa No. 1 Power Station, which entered operation in 1954. We are proceeding with construction of a new power station that makes use of the Isawa Dam, which is being built by the Ministry of Land, Infrastructure, Transport and Tourism. Located directly under the dam, this power station is scheduled to enter operation in July 2014. (See p. 63)

Utilization of Unused Hydroelectric power Resources

In resource-poor Japan, hydroelectric power is a precious, entirely domestic energy source. The J-POWER Group is examining the utilization of unused hydroelectric power resources and proceeding with their development so as to maximize the use of these precious resources.

One example is the new hydroelectric power stations we are building downstream from existing dams to make use of the river maintenance discharge that is released to maintain the river environment. The Okutadami river maintenance discharge power station began operation in 2003. In addition, we are now proceeding with preparations for construction of a micro hydroelectric power station that uses the river maintenance discharge from Kuttari Dam, and we are conducting studies for the development of other new micro hydroelectric power facilities.

The J-POWER Group is therefore engaged in efforts to expand hydroelectric power and make effective use of water resources, and we are taking measures for the stable supply of electric power.

Generator cover decorated with handprints of local elementary school children
(Tagokura Power Station, Fukushima Prefecture)

Flow of river maintenance discharge at Kuttari Dam (Hokkaido)

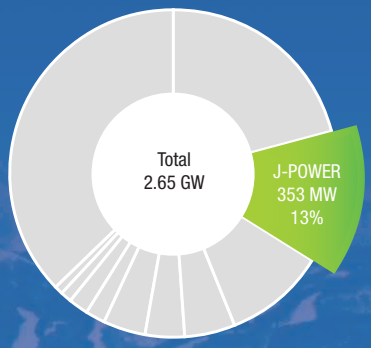
Promoting and Developing of Wind Power Business

Measures for Wind Power Generation

The J-POWER Group became involved in the wind power generation business at an early stage. The start was marked by the Tomamae Winvilla Wind Farm, which started operation in December 2000, and since then we have been promoting wind power development. We now have facilities at 18 locations (352.86 MW) in Japan, giving us a share of approximately 13% of domestic wind power generation facilities (the second largest share in Japan). Construction is presently underway at Kaminokuni Wind Farm (Kaminokuni-cho, Hokkaido), Minami Ehime Wind Power Plant (Uwajima City, Ehime Prefecture), and other locations under development. When these become operational, our domestic facilities will exceed 400 MW.

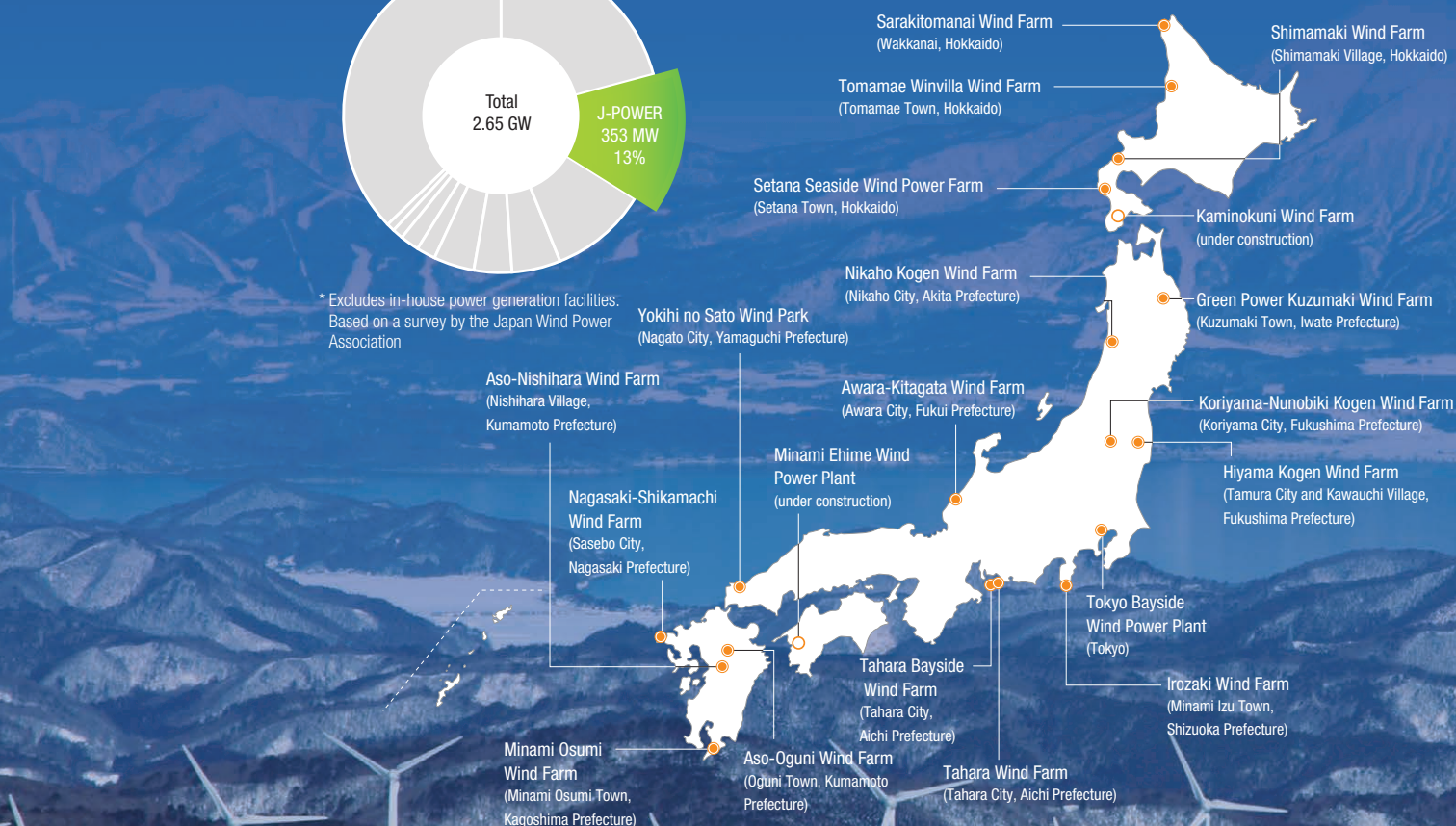
At the J-POWER Group, we are making full use of the know-how and technology we have been cultivating over many years with the construction, operation, maintenance, and so on of hydroelectric power and thermal power stations and of power transmission and substation facilities. We are equipped with complete implementation capabilities, from initial studies of wind conditions to planning, construction, operation and maintenance. We intend to make good use of these strengths in further promoting the wind power business.

Share of Domestic Wind Power Facilities (as of the end of March 2013)



* Excludes in-house power generation facilities. Based on a survey by the Japan Wind Power Association

Locations of J-POWER Wind Power Facilities



Koriyama-Nunobiki Kogen Wind Farm

Seeking Further Winds

Proving Trials of Offshore Wind Power Generation System

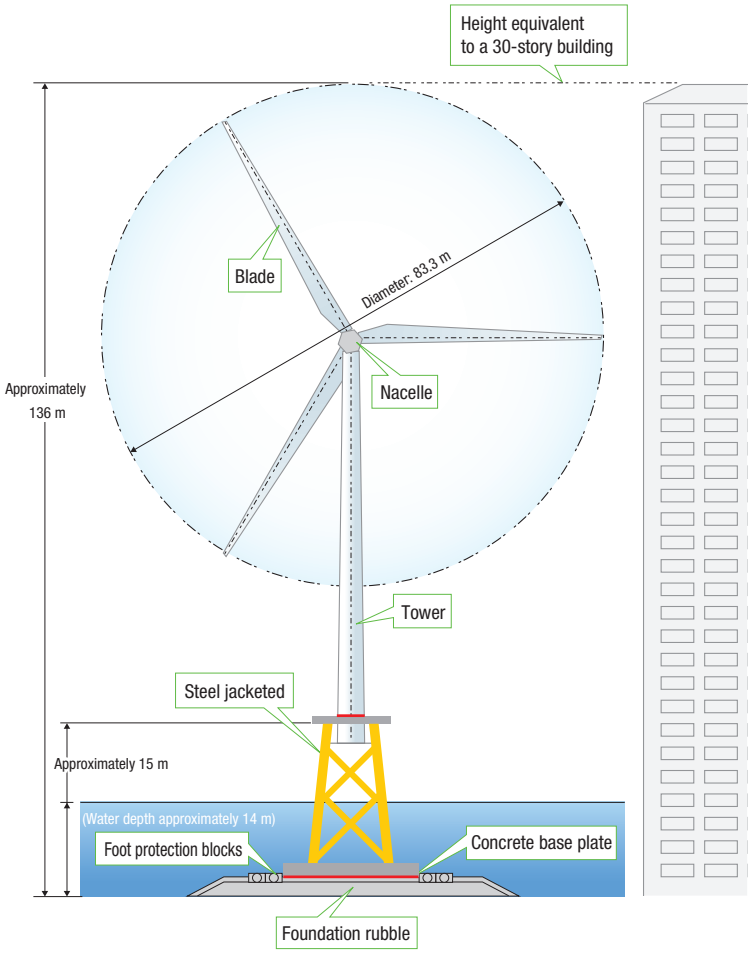
Offshore wind power is considered to have great potential, and it is attracting attention for the possibility that it could greatly extend the amount of renewable energy.

Starting in fiscal 2009, the J-POWER Group has been conducting a demonstration project of offshore wind condition measurement for New Energy and Industrial Technology Development Organization (NEDO). Starting in fiscal 2011, we have also been conducting an embedded-type offshore wind power generation system as a joint research project. This research is underway in waters off Kitakyushu City in Fukuoka Prefecture.

The installation of equipment on-site has already been completed. Campaign of meteorological and maritime data is underway, and offshore wind power generation has begun. We are moving ahead steadily with these demonstration projects and will deepen our technical knowledge regarding offshore wind power generation.

Proving trial equipment: (Left) Offshore wind condition observation equipment (Right) Embedded-type offshore wind power generation equipment

Hybrid Embedded-type Offshore Wind Power Turbine



Renewable Energy and Harmony with the Environment

Working with a Pioneering Spirit to Maximize Utilization of Hydroelectric power Energy

Hydroelectric power is an purely domestic source of energy and, at the same time, the core form of renewable energy that allows for stable operation as a source of electric power. The J-POWER Group has been engaging in the development of hydroelectric power since the Isawa No. 1 Power Station entered operation in 1954. Aiming always to lead the world, we have been introducing new technologies and construction methods since that time. We are now operating hydroelectric power stations with a total of 8.56 GW of capacity at 58 locations throughout the country, giving us a 19% share of Japan's hydroelectric power facilities. We are contributing to the stable supply of electric power in every region of Japan.

Since entering the 2000s, we have initiated new measures aimed at raising efficiency and increasing output. These include development of micro and medium-sized hydroelectric power facilities that utilize river maintenance discharge and other unused water resources, and comprehensive upgrades of obsolescent water turbines and generators to the most up-to-date facilities. Moving forward, J-POWER is committed to the ongoing effort to maximize the use of water resources in that same vital pioneering spirit.

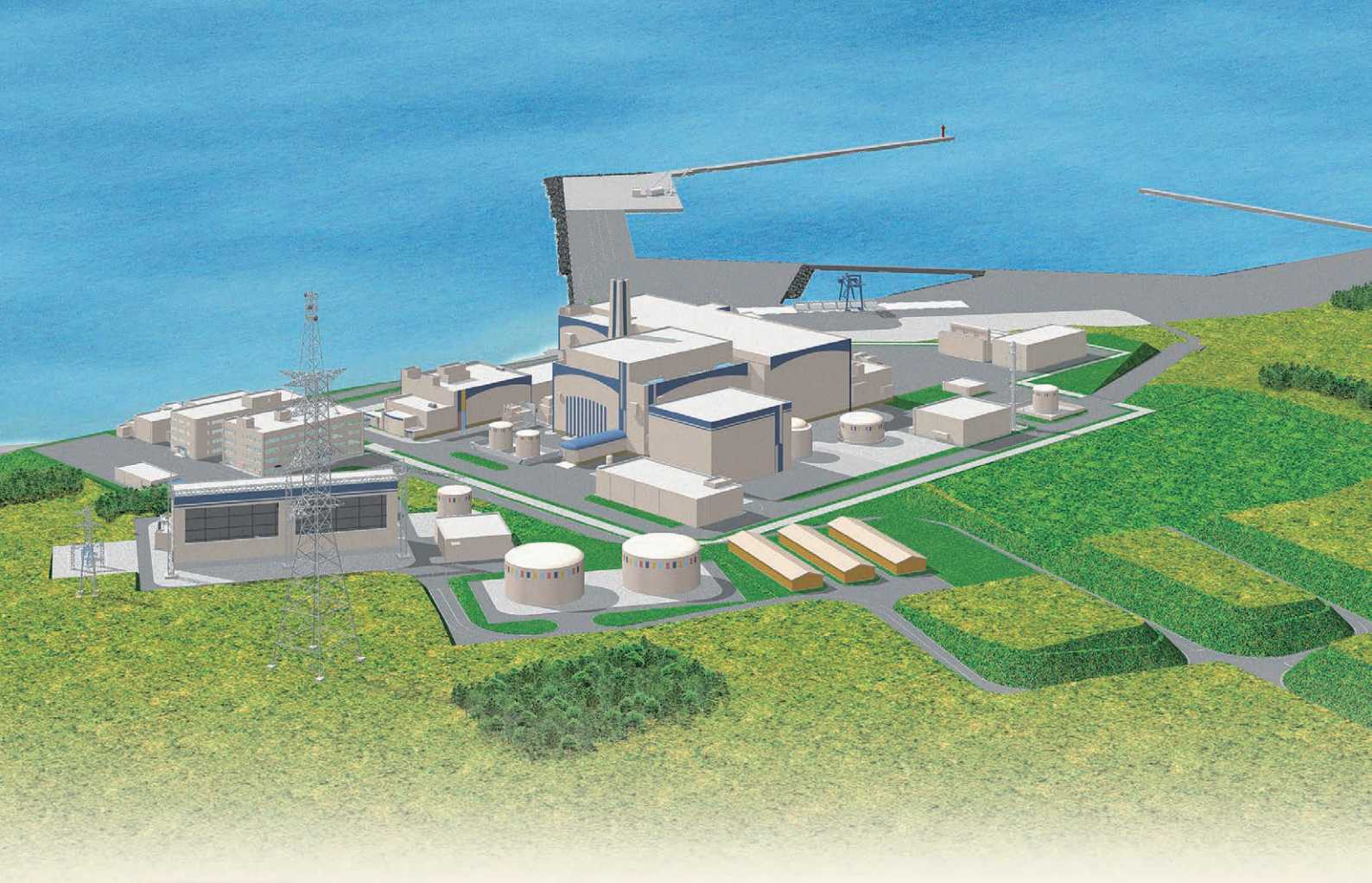
Executive Managing Officer
Shiro Otsuka

Using the Energy of Nature's Winds

The adoption of renewable energy sources is expanding on a global scale. In that context, Japan has also been taking measures for the adoption and promotion of renewable energy, such as the feed-in tariff program introduced in July 2012. There are high expectations for wind power generation, which has a lower generation cost and higher capacity factor. In 2000, we developed a power generation facility in Tomamae Town, Hokkaido, that was a precursor of the wind farm system, and now we are the second largest wind power operator in Japan.

We are also proceeding with demonstration of offshore wind power generation, which has large potential and yields a high and stable wind power. The J-POWER Group intends to take advantage of this track record, and of the human resources, know-how, and construction and maintenance technology cultivated in hydro and thermal power generation business through long years. As a leading player in this field, we will promote further development of wind power in our effort toward "Harmonizing Energy Supply with the Environment."

Executive Managing Director
Kuniharu Takemata



Report

The Ohma Nuclear Power Station

Introduction

The J-POWER Group is engaged in construction of the Ohma Nuclear Power Station in Ohma-machi, Shimokita-gun, Aomori Prefecture.

From the perspective of steady energy supply, nuclear power is an essential and indispensable source of energy for our island country with poor natural resources. It is also a source of energy that provides an effective countermeasure to global warming.

We consider it is necessary for nuclear power to continue fulfilling a constant role in Japan's electric power supply because nuclear power can be an effective source of energy with adequate safety management measures, needless to say, should be taken.

We have proceeded with the project of Ohma Nuclear Power Station in accordance with national government policy, with the understanding and cooperation of Aomori Prefecture and the local residents of Ohma-machi, Kazamaura-mura, and Sai-mura, and with the necessary permits and approvals in hand. It is a key power station with high safety and reliability achieved by leading-edge technology, and it will perform a crucial role both in the provision of a stable supply of electric power and in the provision of nuclear fuel cycle.

The J-POWER Group has taken the lessons of the accident at Fukushima Daiichi Nuclear Power Station to heart. We will proceed with steady implementation of safety measures and practices in light of the new regulatory standards of the Nuclear Regulation Authority, making the fullest use of the experiences and the latest technical findings. In this way, we will build power station that earns the trust of local and regional communities.

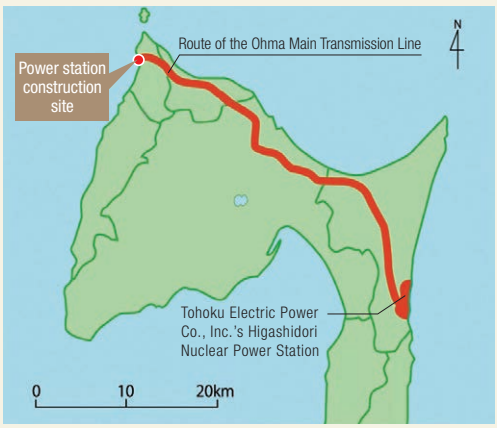


Diagram of Ohma Nuclear Power Station position (Aomori Prefecture)

Panoramic view of construction work on Ohma Nuclear Power Station

Aiming for Enhanced Reliability

The J-POWER Group has examined counter-tsunami measures, securing of power sources, securing of heat removal functionality, measures for response to severe accidents, and other measures to enhance safety at the Ohma Nuclear Power Station. Going forward, we will also take the new regulatory standards of the Nuclear Regulation Authority into account as we examine and implement measures to further enhance safety.

We are autonomously taking steps to improve our data on geology and tectonics in light of recent trends. Ever since we obtained permission to build this nuclear reactor in April 2008, therefore, we have been using the latest technology and methods as needed to conduct geological surveys of the site, marine terrace surface surveys*1, airborne gravity surveys*2, marine sonic prospecting, studies of tsunami deposits, and three-dimensional subsurface structure surveys.

We will continue to acquire information relating to earthquake resistance and tsunami safety at Ohma Nuclear Power Station. As necessary, we will also take steps to improve our data by surveys and other such activities using the most up-to-date technology and methods in our ongoing efforts to further enhance reliability.

Construction Activities

Construction work on Ohma Nuclear Power Station began in May 2008. With the occurrence of the Great East Japan Earthquake in March 2011, however, construction of the main structures was suspended, with the exception of necessary quality maintenance and related work.

Since that time, debate has been ongoing regarding Japan's energy policy, including nuclear power. Given that the handling of nuclear power stations that are under construction was clarified in September 2012, we resumed construction on this facility in October of that year.

Since the resumption of this work, we have been proceeding cautiously to be compliant with the new regulatory standards. To date, we have been engaged in lifting steel liner plate of the reactor containment vessel into the prescribed position and other such work.

Plan Overview

Location		Ohma-machi, Shimokita-gun, Aomori Prefecture
Construction begins		May 2008
Commercial operation begins		To be determined
Output		1.383 GW
Reactor	Type	Advanced boiling water reactor (ABWR)
	Fuel: Type	Enriched uranium and uranium-plutonium mixed oxide (MOX)
	Fuel assembly	872 elements

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.

For example, since fiscal 2000, the J-POWER Group has been supporting energy education courses for the first-year students at Aomori Prefectural Ohma High School.

In fiscal 2012, we held these activities: (1) Lecture meeting on energy with a group quiz; (2) a field trip to the Ohma Nuclear Power Station construction site; and (3) a field trip to Japan Nuclear Fuel Limited's nuclear fuel cycle facility.

Comments from the participants indicated that they had gained an understanding of the importance of energy, the mechanisms of nuclear power generation, and the units of radiation measurement that they hear about so much in the news. They also indicated concern about the accident in Fukushima and safety measures.

We intend to continue engaging in various measures like these activities, treating our ties to local residents as a matter of great importance.

Local high school students on a field trip to the Ohma Nuclear Power Station construction site

Reference

*1 Marine Terrace Surface Survey:
Study of the altitude distribution of the surface of marine terraces and the year in which it was formed, with the purpose of ascertaining such matters as the amount of upheaval that has occurred since that time.

*2 Airborne Gravity Survey:
One method of geophysical survey that uses a helicopter to make measurements of gravity. The measurement results are then used to extrapolate subsurface density distribution.

Measures to Reinforce Safety for Ohma Nuclear Power Station (Overview)

For the Ohma Nuclear Power Plant, in addition to previous safety enhancement measures, we are complying with the New Safety Standard for Nuclear Power Stations (effective July 8, 2013), and implementing further safety enhancement measures to further improve safety of the power plant.

We are reviewing active implementation of superior safety technologies and will appropriately incorporate necessary measures towards building a safe power plant.

1. Tsunami Assessment and Emergency Power Supply

(1) Tsunami Assessment

Based on historical records and hypothetical tsunami generating mechanisms, it is estimated that the maximum, height of a potential tsunami is T.P. +4.4 m (according to application document for establishment permission in 2008), and the facilities necessary for cooling the nuclear reactor are to be installed in major structure (reactor building, turbine building, etc.) built on site with an elevation of T.P. +12 m.

(2) Emergency Power Supply

Three emergency diesel engine generators are to be installed the reactor building at a site with an elevation of T.P. +12 m. In addition, there are two 500 kV lines and a 66 kV line capable of supplying electric power to emergency facilities.

2. Safety Enhancement Measures

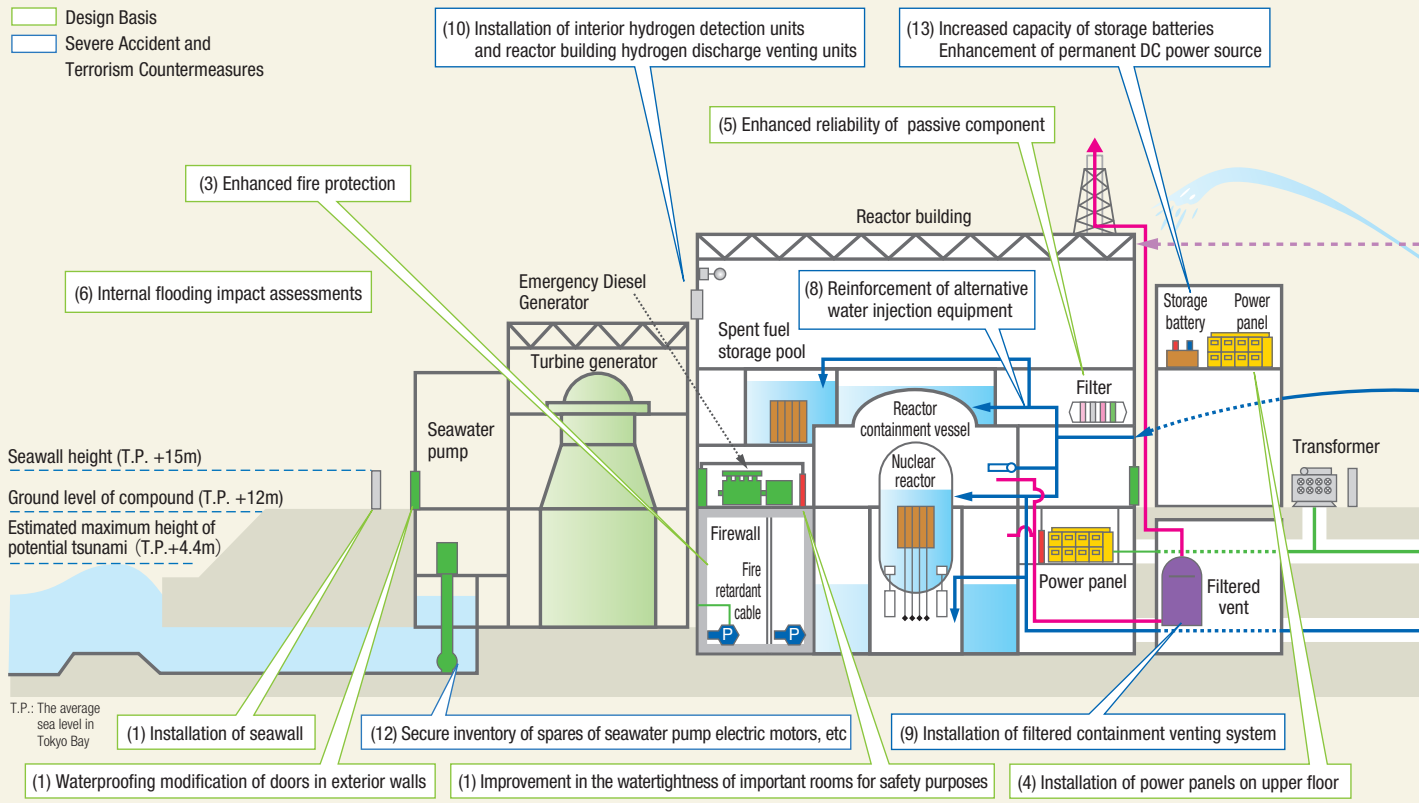
In addition to the plan in 1, above, the following measures will be implemented during construction.

- Design Basis

The following countermeasures are to be implemented to increase reliability of the nuclear power plant while ensuring functionality of the safety systems against external phenomena such as tornados, volcanic eruptions and fires as well as tsunamis and earthquakes.

(1) Facility protection in the case of a tsunami (installation of seawall, waterproofing modification of doors in exterior walls, height extension of oil fences and improvement in the watertightness of important rooms for safety purposes)
(2) Implementation of impact assessments of tornadoes and other natural phenomena on the nuclear power plant
(3) Enhanced fire protection measures (use of fire retardant cables, installation of firewalls, and other measures)
(4) Installation of power panels on upper floor for locational dispersion
(5) Enhanced reliability of passive component (such as ventilation filters) that are crucial to safety

Image of Measures to Reinforce Safety, etc. at Ohma Nuclear Power Station



(6) Implementation of impact assessments of internal flooding on the safety system

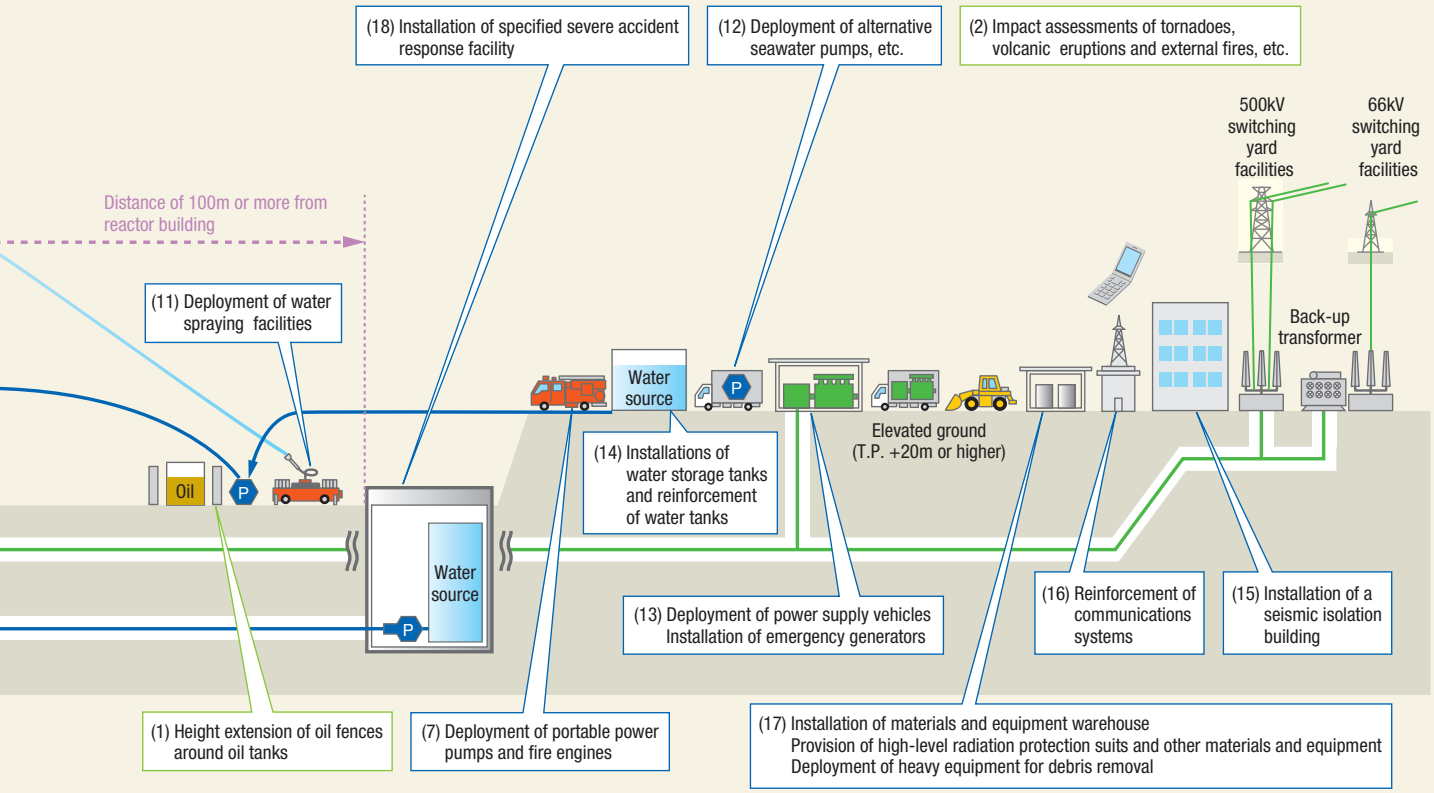
- Severe Accident and Terrorism Countermeasures

The following countermeasures are to be implemented to enable rapid response even in the case of a severe accident.

(7) Deployment of portable power pumps and fire engines for cooling the reactor, containment vessel and spent fuel storage pool
(8) Reinforcement of alternative water injection equipment for cooling the reactor, containment vessel and spent fuel storage pool
(9) Installation of filtered containment venting system*1 to prevent overpressurization on the containment vessel
(10) Installation of hydrogen detection units and hydrogen discharge venting units*2 to prevent hydrogen explosion at the reactor building
(11) Deployment of water spraying facilities to spray water on the reactor building and other facilities
(12) Secure inventory of spares of seawater pump electric motors, etc. and deployment of alternative seawater pumps and other equipments to ensure heat removal functionality for the reactor and containment vessel
(13) Deployment of power supply vehicles, installation of emergency power generators (fuel tanks and power cables), increased capacity of storage batteries and enhancement of permanent DC power source to secure power supply
(14) Installation of water storage tanks and reinforcement of water tanks to secure water source
(15) Installation of a seismic isolation building which houses the emergency response office to respond as necessary in an emergency
(16) Reinforcement of communications systems for making contact within and outside of the power plant in the event of an emergency
(17) Installation of materials and equipment warehouse, provision of high-level radiation protection suits and other materials and equipment, and deployment of heavy equipment for debris removal
(18) Installation of specified severe accident response facility to respond to intentional crash of aircrafts and other such events

Aside from the above measures, we will be reinforcing links and collaboration between businesses operating in Aomori prefecture* to further ensure disaster prevention.

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



Reference

*1 Filtered containment venting system:
In the event that an excessive pressure increase occurs in the nuclear reactor containment vessel due to a major accident, this system expels the air in the containment vessel to the atmosphere in order to prevent damage to the containment vessel, and it passes the air through a filter to limit the amount of radioactive material released.

*2 Hydrogen discharge venting units:
In the event of reactor core damage or other such damage that causes hydrogen to leak inside the nuclear reactor building, this equipment prevents the explosion of hydrogen inside the building by quickly and reliably expelling the leaked and accumulated hydrogen outside the building.

Governance

Initiatives for Enhancing Corporate Value

Based on the J-POWER Group corporate philosophy, the J-POWER Group adopted a management direction in accordance with its corporate philosophy and builds and operates the structures and systems necessary for supporting higher corporate value.

2013 Management Direction and Near-Term Managerial Policy

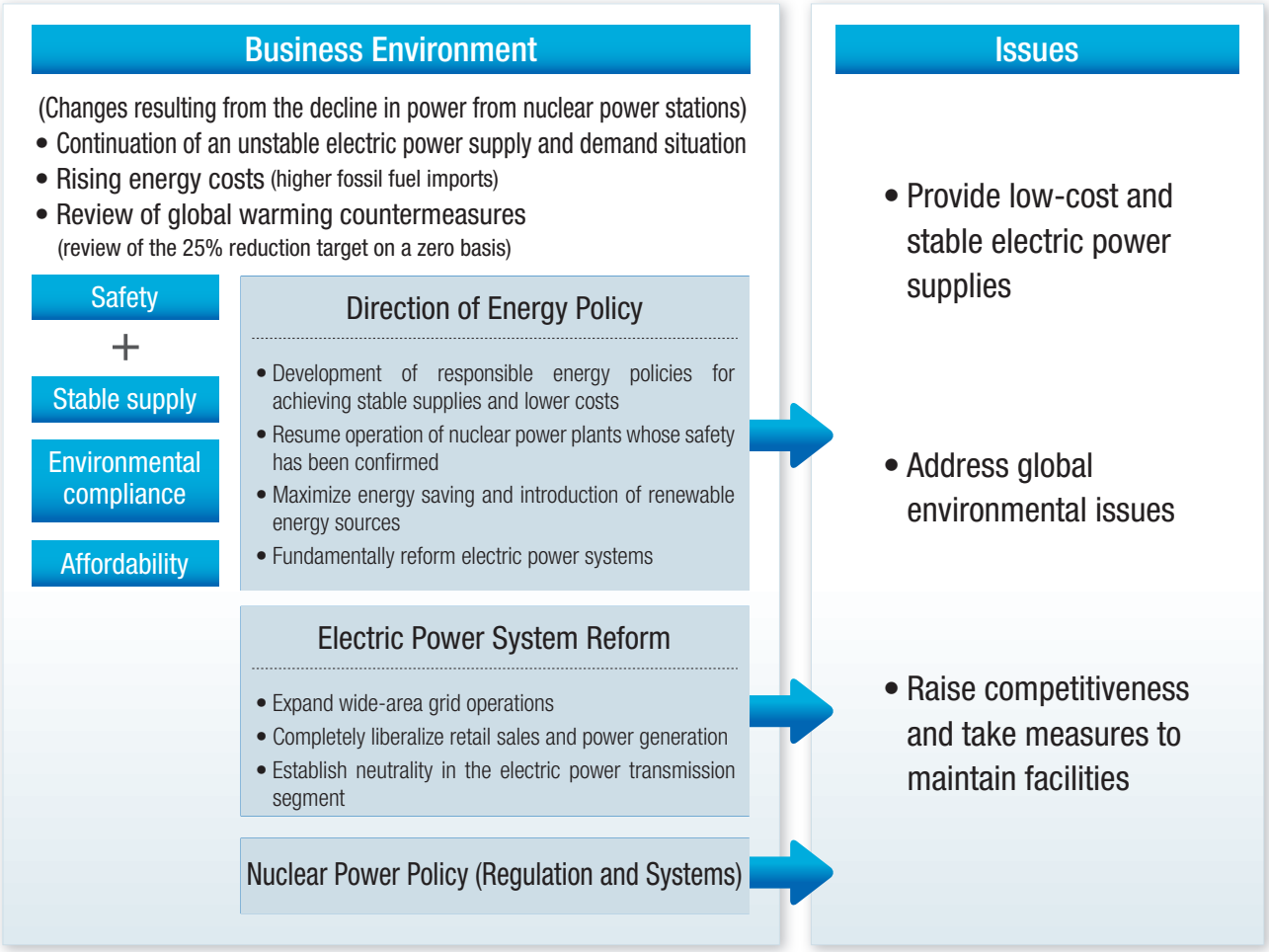
Japan's electric power business continues to face unstable electric power supplies and energy costs continue to rise, presenting an extremely adverse business environment. In addition, we are at a major turning point for government energy policies including the re-verification and redevelopment of various policies.

In response to these circumstances, the J-POWER Group is addressing the changes in its business environment as well as business issues deriving from those changes by adopting the Direction of Management and Near-Term Managerial Policy with the aim of raising corporate value.

Changes in the Business Environment

The J-POWER Group Direction of Management and Near-Term Managerial Policy is made up of changes in the business environment and the direction of management.

The diagram below shows various changes in the business environment that have an impact on the J-POWER Group's management as well as business issues deriving from those changes.



Relationship Between the Direction of Management and this Report

The J-POWER Group Direction of Management and Near-Term Managerial Policy is made up of growth strategies and reinforcement of business foundations to achieve sustainable growth in corporate value.

The diagram below shows the relationship between the initiatives in the Direction of Management and Near-Term Managerial Policy and the initiatives presented in this Sustainability Report.

The environment section of this report (pp. 47– 74) fulfills the role of disclosing environmental information in accordance with the J-POWER Group Environmental Action Guidelines.

Provide low-cost and stable electric power supplies

Address global environmental issues

Raise Competitiveness, Reinforce Maintenance Measures, and Disaster Preparedness Systems

Growth strategies

Increase coal-fired power supply capacity as an economical base power source

- Cutting carbon in coal-fired power generation ➡pp. 57-59

Develop technology to raise the efficiency of coal-fired power generation

- R&D on next-generation low-carbon technologies ➡pp. 61-62

Promote steady construction of Ohma Nuclear Power Station with safety as the overriding operational principle

- Ohma Nuclear Power Station ➡pp. 15-18

(Global business development) Conduct overseas IPP development projects to raise earnings capacity

- Initiatives for stable power supply around the world ➡p. 32
- Measures for overseas transfers and spread of technology ➡p. 60

Reinforcement of foundations

Maintain coal-fired power station efficiency and reinforce safety measures; take measures concerning the value chain

- Measures to ensure stable electric power supplies (thermal power generation facilities) ➡pp. 29-30
- Coal value chain ➡p. 31
- Maintain efficient operations ➡p. 59

Reinforced foundations for hydroelectric power, renewable energy, and network facilities

- Hydroelectric power and wind power initiatives (special feature) ➡pp. 9-14
- Measures to ensure stable electric power supplies (hydroelectric power facilities) ➡p. 27
- Measures to ensure stable electric power supplies (power transmission, substation, and communication facilities) ➡p. 28
- Supporting biomass mixed combustion ➡pp. 59-60

Reinforcement of Financial Standing, Human Resource Foundations, and Disaster Preparedness

- Corporate governance and compliance ➡pp. 21-22
- Risk management ➡p. 23
- Information security ➡p. 24
- Human resource development and creation of dynamic workplaces ➡pp. 43-46

Achieve both reinforcement of business foundations that can respond to change and growth strategies

Corporate Governance and Compliance

The J-POWER Group is taking steady action to establish the systems necessary to enhance corporate governance and create a corporate culture of compliance so that we can respond to social change and meet the expectations of our various stakeholders.

Corporate Governance Framework

Governance and Executive Officer System

At J-POWER, directors have supervisory functions and the representative director, who has business administrative authority under the Companies Act, performs executive functions with the managing officers and executive officers. This allows for precise and rapid decision-making and efficient corporate operations. In addition, an independent director with extensive experience and good judgment participates in management decision-making from an independent perspective based on specialized knowledge and experience.

Management Council System

In addition to the Board of Directors, in which all directors and corporate auditors including independent directors and corporate auditors participate, management functions have also been allocated to the Executive Committee, which deliberates on matters that are of importance to the company as a whole, and the Management Executing Committee, which handles important matters relating to specific aspects of business execution.

System of Audits and Supervision

J-POWER's Board of Corporate Auditors comprises five auditors, of which three are outside auditors and one is a full-time standing auditor, enhancing the oversight functions of the Board of Corporate Auditors. To ensure the effectiveness of audits conducted by the corporate auditors, the directors have created an environment in which corporate auditors attend and state their opinions at management committee meetings and conduct internal audits and audits of key subsidiaries.

Separate from the audits conducted by the corporate auditors, the Internal Audit Department, which is independent from J-POWER's other internal organizations, conducts internal audits, and individual organizations also perform periodic voluntary audits.

Group Internal Controls

To comply with the Internal Control Reporting System on Financial Reporting specified in Article 24-4-4 and Article 193-2 of the Financial Instruments and Exchange Act, the J-POWER Group adopted internal regulations and operates an internal control system to ensure the reliability of financial reporting.

In the 2012 fiscal year, the J-POWER Group confirmed the establishment and operational status of internal control systems in accordance with the execution standards specified by the Financial Services Agency, determined those systems to be operating effectively, and submitted the results to the office of the Prime Minister in the form of an internal control report.

Information Disclosures

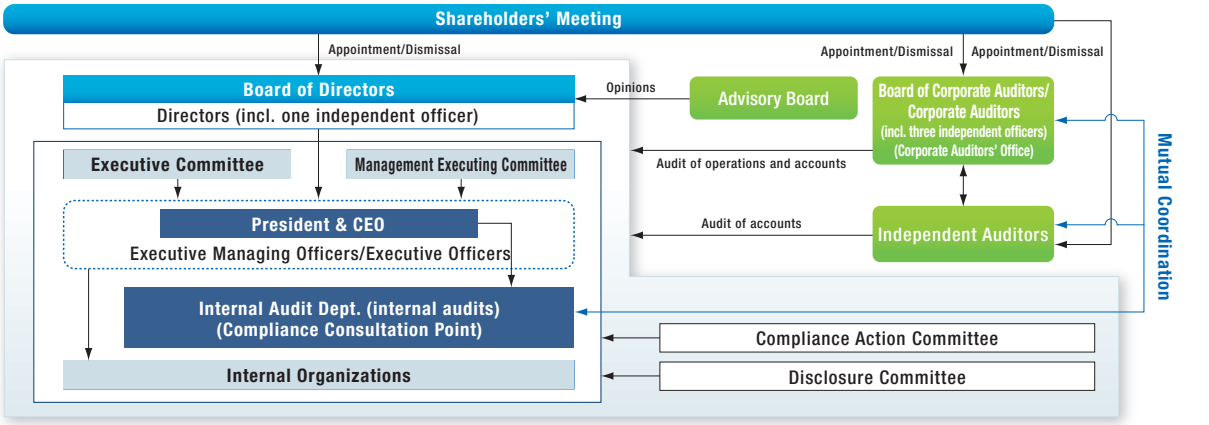
With regard to the outside disclosure of information, the Disclosure Committee chaired by the president makes active, fair, and transparent disclosures of corporate information.
The J-POWER Advisory Board was established in September 2008 to receive advice and proposals concerning corporate management from outside experts in a wide range of fields.

Compliance Initiatives

Compliance Promotion Systems

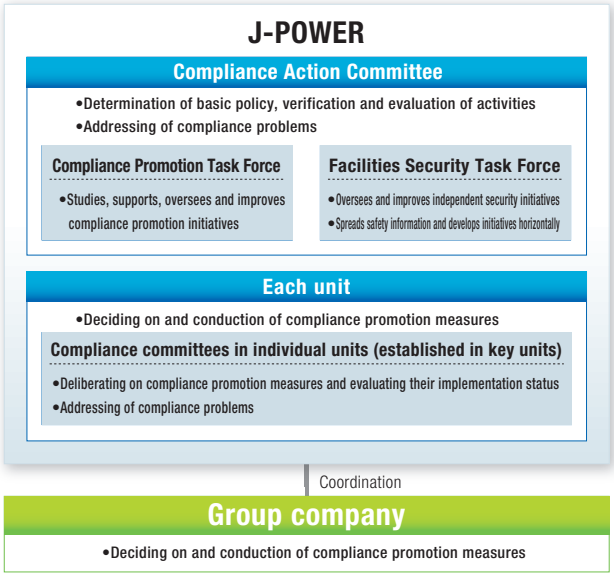
In accordance with its corporate philosophy, J-POWER adopted Corporate Conduct Rules and a Compliance Code to specify standards for business activities relating to compliance with laws, regulations, and corporate ethics. The Compliance Action Committee, headed up by the J-POWER chairman, is a company-wide body that assesses the adoption and implementation of policy intended to ensure compliance. Beneath the Compliance Action

J-POWER Group's Corporate Governance Framework (as of March 31, 2013)



Committee are the Compliance Promotion Task Force, which works on compliance at the Group-wide level, and the Facilities Security Task Force, which oversees independent security initiatives based on safety regulations (both bodies are chaired by the relevant vice presidents). In addition, major organizations such as branches and thermal power stations have established their own compliance committees. Group companies also participate in these organizations, and Group-wide measures are taken to ensure that compliance becomes firmly rooted in our corporate culture.

J-POWER Group Compliance Promotion Structures



Raising Employee Awareness of Compliance

J-POWER distributes its Compliance Pledge to employees and encourages them to carry it at all times to raise awareness of compliance. In addition, we conduct training and lectures on compliance, create opportunities for executives and unit site employees to exchange views as necessary, and take other measures to raise awareness of compliance. We also conduct compliance questionnaire surveys to provide opportunities for J-POWER Group employees to reconfirm their awareness of compliance, determine the state of compliance awareness among employees, and use the results in subsequent compliance promotions.

Compliance Consultation Hotlines

The J-POWER Group established Compliance Consultation Hotlines within the Internal Audit Department and at an outside law firm to provide consultation opportunities to employees confronted with compliance-related issues so we can prevent and rapidly identify conduct that is in violation of laws and regulations and contrary to corporate ethics. The consultation hotlines protect the privacy of consulting employees to ensure that they do not suffer any consequences as a result of their consultations, and the Company has strictly forbidden harassment of and retribution against employees who make reports.

Fiscal 2012 Measures

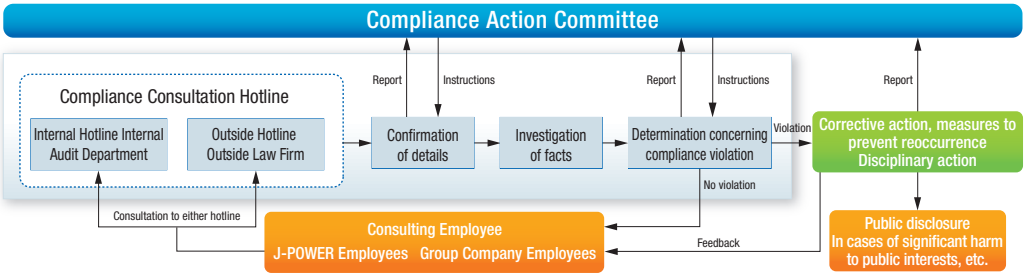
J-POWER compliance promotion is based on day-to-day operational programs. October was designated as compliance month for the entire company, and priority was placed on taking measures to raise awareness of compliance. In fiscal 2012, individual offices disseminated information concerning the chairman's message by hanging posters, and we conducted e-learning to present information on case studies of compliance-related issues that are likely to arise with suppliers. We also held regional meetings of Group personnel responsible for undertaking compliance-related measures to facilitate the exchange of opinions and information.

Report Discovery of Improper Manipulation of Water Level Data at the Taki Dam in 2004

There have been incidents at the J-POWER Group involving improper compliance with respect to water usage at power generation facilities and from rivers, and the Group has taken measures since 2007 to raise employee awareness concerning compliance with laws and regulations to ensure full compliance, but an incident of improper compliance that occurred in July 2004 was discovered in the 2012 fiscal year despite these efforts.

The incident involved manipulation of water level gauges to obtain inaccurate data at the Taki Dam (located on the Tadami River in Fukushima Prefecture) when the water level exceeded the specified dam operational level in conjunction with a sudden increase in the inflow of water from the river to the dam. As a result of the discovery, the river administrator and involved individuals submitted formal apologies and reports, and J-POWER disclosed the information in September 2012. In November of that year, measures to prevent any reoccurrences were formulated and reported to the river administrator. In response to this incident, the J-POWER Group inspected all of its dams nationwide and confirmed that no other similar incidents have occurred since 2007.

J-POWER Group Consultation Hotline Procedures



Emergency Management

In preparation for complex and varied potential emergencies, the J-POWER Group has established the following systems and takes the following measures with the aims of accurately forecasting and preventing emergencies and properly managing any emergencies that occur.

Emergency Management Systems and Measures

Emergency Management Systems

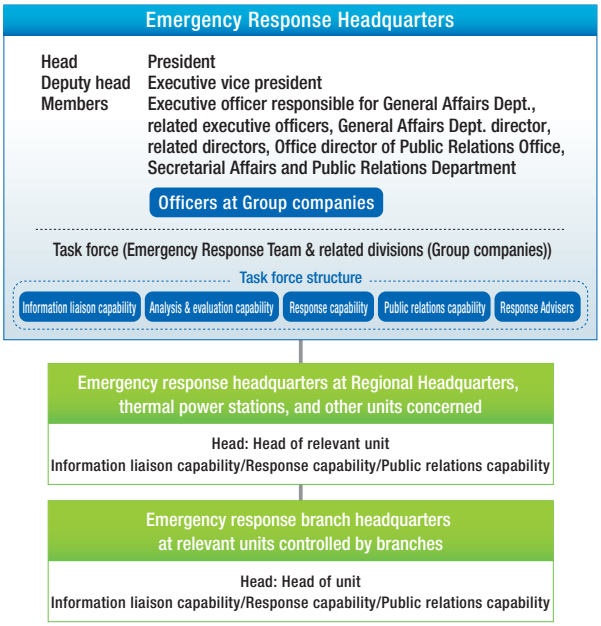
(1) Emergency Response Team
A permanent organization at the J-POWER Headquarters. The Team oversees immediate responses and emergency management operations in the event that an emergency occurs.

(2) Emergency managers and emergency duty personnel
Emergency managers and personnel are appointed at each head office division and local unit to take first-response action and report information.

(3) Emergency Response Headquarters and branches
When an emergency is predicted to occur or occurs and the seriousness warrants emergency countermeasures, the Emergency Response Headquarters (and branches) are established.

(4) Overseas Emergency Response Task Force
The Overseas Emergency Response Task Force works under the Emergency Response Team to gather information concerning overseas emergencies.

Emergency Countermeasures (after establishing Emergency Response Headquarters)



What Emergencies Mean to J-POWER Group

The J-POWER Group recognizes a variety of events as emergencies, and as an electricity wholesaler, the greatest emergency would be an impairment to the production and distribution of electricity, our product, that prevented the supply of electric power.

We take the following measures to prevent such an occurrence.

(1) Installation of appropriate facilities and development of disaster recovery systems in preparation for natural disasters including earthquakes, typhoons, lightning strikes, and tsunami.
(2) Enhanced security to prevent malicious and violent conduct (excluding situations that cannot be addressed by a single company, such as war and terrorism).
(3) Ongoing enhancement of facility inspections to prevent major impediments to electric power supply and appropriate repairs and upgrades in response to deterioration, decline of function, and breakdowns.
(4) Preparation of action plans for responding to pandemics and other events that could have a major impact on business operations.

Disaster Prevention Measures

Disaster Prevention Measures

As an electric power supplier with responsibility for vital lifelines, J-POWER has been designated a designated public institution under the Disaster Countermeasures Basic Act.

Accordingly, J-POWER has adopted the Emergency Countermeasures and Civil Protection Measures Regulations and formulated disaster response manuals, and the Headquarters and local units have established systematic emergency preparedness structures so that the Group can take appropriate and effective response measures in the event of an emergency. In addition, the J-POWER Group proactively implements physical and non-physical countermeasures and works to reinforce its disaster preparedness systems so that company functions can be maintained even in the case where damage exceeds expectations.

Business Continuity and Cooperation with Local Communities

Facility countermeasures in preparation for a major disaster are, of course, necessary for business continuity, and establishing emergency systems that can be immediately mobilized without confusion during an emergency and implementing effective emergency recovery measures are particularly important.

J-POWER continuously takes measures for maintaining business at the minimum necessary level during an emergency and confirms the effectiveness of manuals and so on through emergency drills and training. In addition, supplies are regularly restocked to ensure that there are no shortages. The Headquarters has increased its emergency food stocks based on a municipal ordinance in anticipation of a major earthquake in the Tokyo region and is currently investigating measures to accommodate personnel who would find it difficult to return to their homes in the event of such an earthquake.

J-POWER will continue to enhance its disaster preparedness measures, and as a member of the local community, will consider what forms of community-based cooperation it can undertake.

Information Security

As companies become increasingly information-oriented and make ever-greater use of information technology, information security is becoming more important than ever. At the same time, incidents of cyber terrorism and attacks targeting specific companies are increasing. As an operator of vital infrastructure that is responsible for building nuclear power stations and ensuring stable electric power supplies, the J-POWER Group proactively undertakes a range of measures including Group-wide training and instruction to maintain information security at high levels.

Information Security Activities

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 the J-POWER Group.

WEB **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.

❶ 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

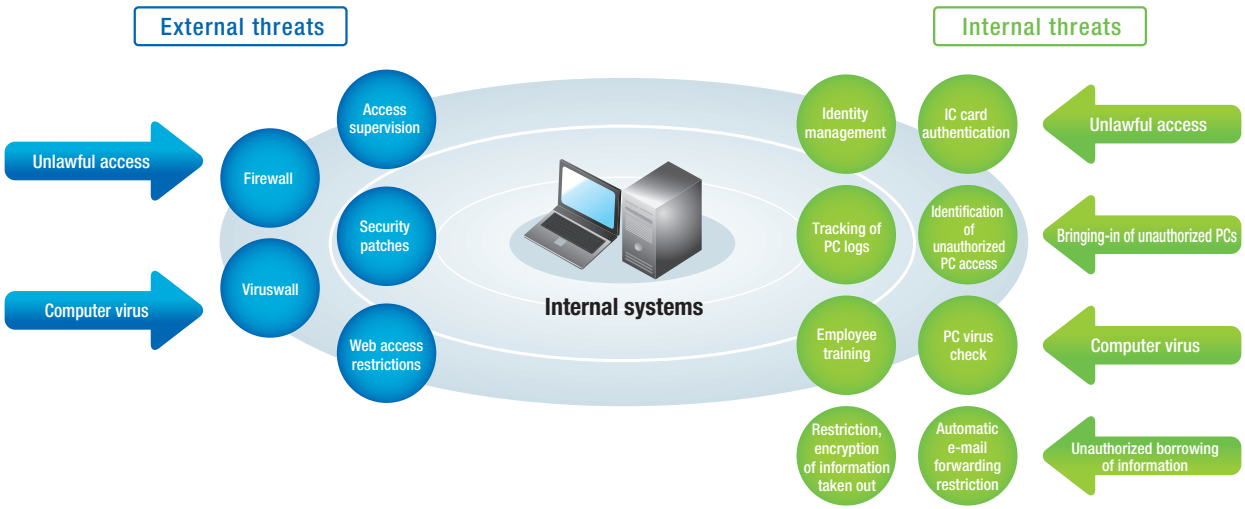
❷ Personal measures

With cooperation from JP Business Service Corporation, a Group company that is responsible for information system operations, the J-POWER Group is taking the following measures for training and instruction relating to information security at Group companies.
- Instruction and training including e-learning and seminars is conducted for all Group employees
- Periodic reports concerning the state of information security are prepared and concerned personnel are informed and instructed about information security each quarter
- Information security patrols are conducted at power stations and awareness-raising programs are conducted for maintenance personnel
- Training is conducted based on scenarios involving the occurrence of information security incidents

❸ 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

❹ 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
- Collection and analysis of various operating logs and creation of reports

J-POWER Group Information Security Countermeasures



Social Responsibilities Part 1

Measures for a Stable Supply of Electricity

The 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.

Outlook for Electric Power Industry in Japan

J-POWER operates the power stations that it owns throughout Japan, and it engages in the wholesale power supply business of providing electric power to the power companies in every region of the country (general electric utilities, etc.) over the long term. We also use our own power transmission and substation facilities to conduct a wheeling business, and further engage in other enterprises, including the wind power generation business, acting as independent power producers (IPP), and supplying wholesale power-to-power producers and suppliers (PPSs).

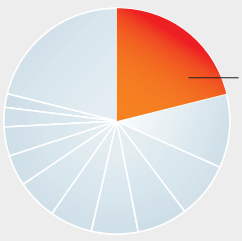
Wholesale Power Supply Business and Wheeling Business

• Thermal Power

Our Business Mainstay is Specialized in Coal-Fired Power

Our seven locations throughout Japan have a total output of 8.41 GW, making our share of coal-fired power facilities the largest in the country. One special feature of coal-fired power is the lower cost of coal compared with crude oil, LNG, and other fossil fuels. Also, the fact that these facilities are used principally to meet base demand means that they have high load factors, and they can be considered outstanding power sources in terms of economic effectiveness.

J-POWER Share of Output from Japan's Coal-Fired Power Facilities (as of the end of March 2013)



J-POWER **21.2%**

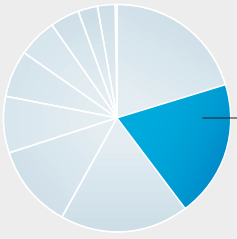
Source: Based on Agency for Natural Resources and Energy, "Outline of Electric Power Development" and "Electric Power Statistics"
(as of the end of March 2013)

• Hydroelectric power

Essential Power Source for Meeting Peak Demand

With 58 locations throughout Japan and a total output of 8.56 GW, we have the second-largest share of hydroelectric power facilities in the country. We have developed many large-scale hydroelectric power stations since the founding of our company. Since hydroelectric power features the ability to respond quickly to fluctuations in electric power demand, these facilities are being used primarily in daytime hours when demand is higher.

J-POWER Share of Output from Japan's Hydroelectric power Facilities (as of the end of March 2013)



J-POWER **19.2%**

Source: Agency for Natural Resources and Energy, "Electric Power Statistics"
(as of the end of March 2013)

• Power Transmission, Substation, and Communications (Wheeling)

Key Infrastructure Supporting Japan's Electric Power Grid

J-POWER owns backbone transmission lines with a total length of approximately 2,400 km, including trunk lines that connect Honshu with Hokkaido, Shikoku, and Kyushu. We also own a frequency converter station that links eastern and western Japan, which operate on different frequencies, as well as substations that supply power to the country's major urban areas. Our electric power security communication facilities include microwave radio circuits throughout Japan that extend over a total distance of approximately 5,900 km. This is infrastructure of crucial importance to the overall operation of Japan's electric power system as a whole.

Other Electric Power Business

Developing Power Generation Businesses that Respond to Industry Liberalization and Support Low-Carbon Society Needs

J-POWER has three IPP facilities with a total capacity of 520 MW engaging in wholesale power supply business throughout Japan and three facilities with a total capacity of 320 MW engaging in wholesale power supply business with PPSs throughout Japan. We own 18 wind farms throughout Japan with a total capacity of 350 MW, giving us the number-two share of wind power generation capacity in Japan. All these businesses are operated through J-POWER subsidiaries or affiliates.

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

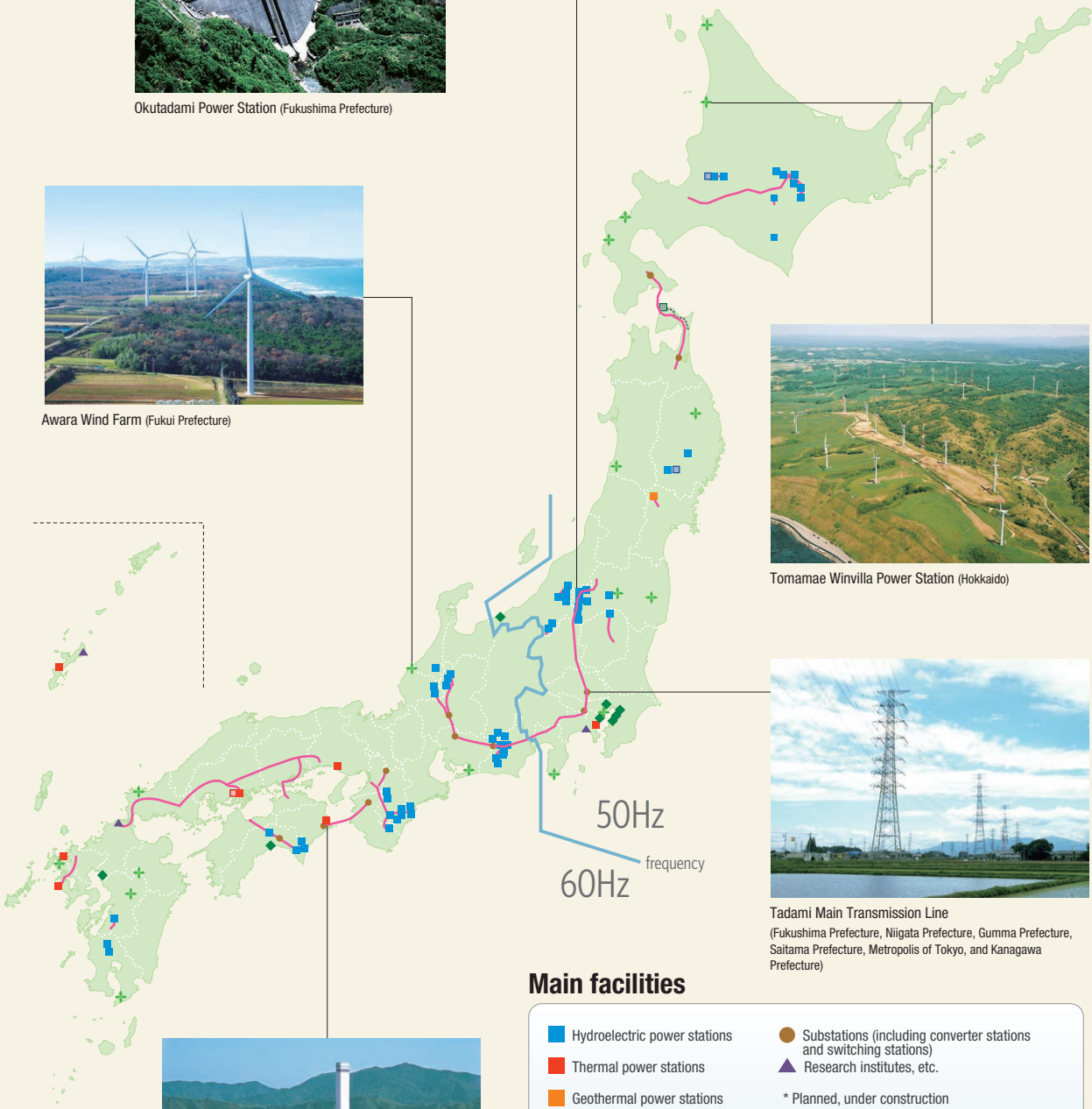
Okutadami Power Station (Fukushima Prefecture)

Awara Wind Farm (Fukui Prefecture)

Tomamae Winvilla Power Station (Hokkaido)

Tadami Main Transmission Line
(Fukushima Prefecture, Niigata Prefecture, Gumma Prefecture, Saitama Prefecture, Metropolis of Tokyo, and Kanagawa Prefecture)

Tachibanawan Thermal Power Station (Tokushima Prefecture)



Main facilities

- Hydroelectric power stations
- Thermal power stations
- Geothermal power stations
- Wind farms
- Recycle power, 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

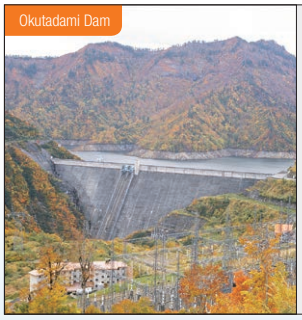
- Hydroelectric power stations
- Thermal power stations
- Nuclear power stations
- Transmission lines

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

Measures for a Stable Supply of Electricity

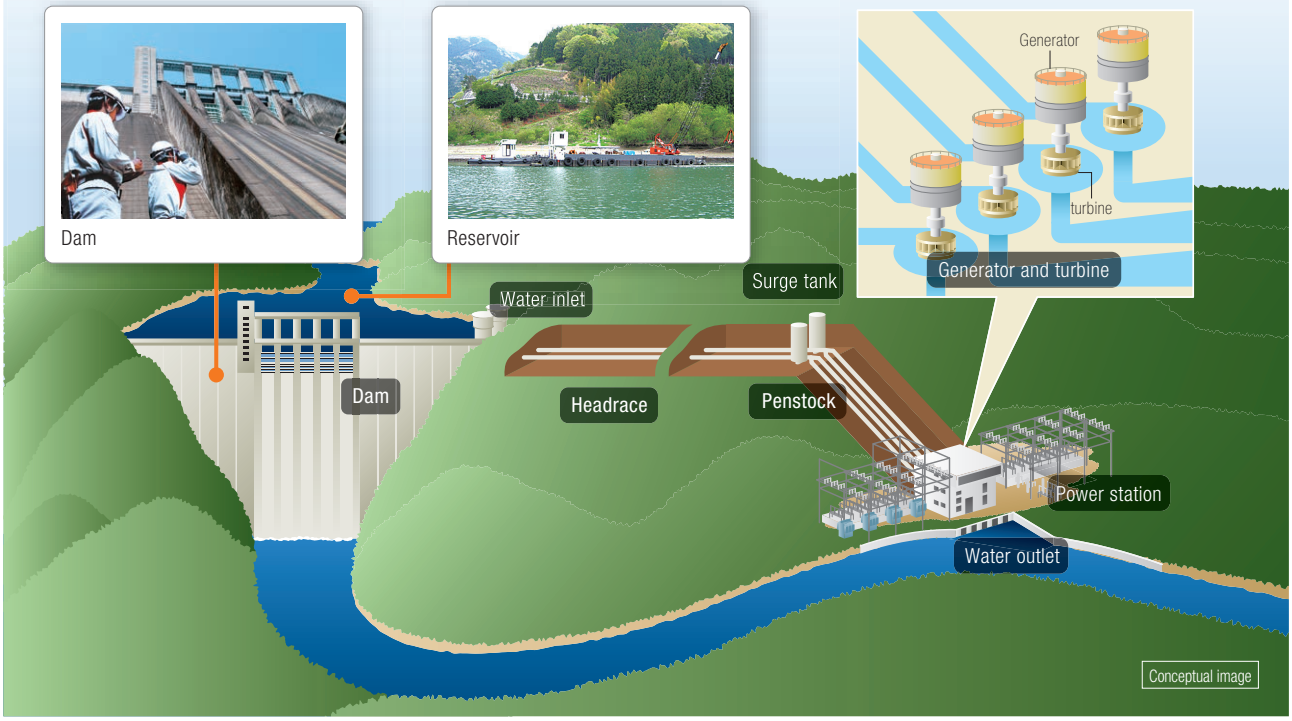
The power generating facilities of the J-POWER Group constitute a stable supply capacity, while the company's transmission, substation, and communications equipment bear a portion of the load for the nationwide system of power companies. The company also contributes to the stable supply of electricity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

Hydroelectric Power Facilities



Overview of Hydroelectric power Station

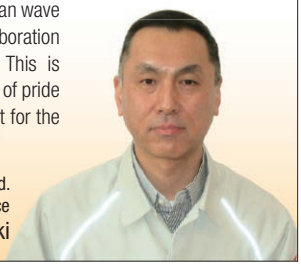
Hydroelectric power makes use of the energy of water flowing from a high place to a lower place to turn a hydrogenerator and generate electricity. Features of hydroelectric power include the fact that it is a precious, entirely domestic energy source and that it is a renewable energy source that does not generate CO_2 in the process of generating electricity. The J-POWER Group owns hydroelectric power stations at 58 locations throughout Japan operated under centralized control from regional control centers at three locations that cover the country on a 24-hour basis. At our worksites, we engage in day-to-day inspection and maintenance of facilities to enhance their reliability.



A World of Whiteouts and Temperatures 30 Degrees Celsius Below Freezing

Where I work in Kamishihoro Town is at the northernmost end of the Tokachi Plain. As a basin surrounded by mountains, it experiences great differences in temperature, with a minimum that drops down below -30°C while the maximum rises above 30°C.

There are eight hydroelectric power stations in our area of responsibility, and I work on inspecting, maintaining, and upgrading their facilities. The power station locations are scattered widely, and some of them can take as long as two hours to travel to during the winter. Getting to them can be a struggle, too. During the coldest part of the winter, some of the flumes freeze up so that water intake becomes blocked. Then sometimes we will employ human wave tactics to remove the ice, in collaboration with the power station personnel. This is unglamorous work, but I feel a sense of pride in providing this kind of quiet support for the stable supply of electric power.



Hokkaido Business Unit, JPHYTEC Co., Ltd.
Deputy Manager, Kamishihoro Office
Yoshinori Suzuki

Aiming to Improve Dam Operation Technology

As on-site civil engineering employees, we are mainly involved in inspection and maintenance of civil engineering facilities such as dams and conduits, and in upgrading obsolescent facilities. Another important part of our duties is to discharge water from the dam in the event of heavy rains from typhoons and so on.

Dam discharge operation requires us to watch rain cloud movements, rainfall, and other meteorological information, so that we can forecast the amount of water that runs into the dam reservoirs. For this purpose, we keep track of weather forecasts on a daily basis, and we use the dam simulator at the Chigasaki Research Institute and other such methods to keep improving our dam operation techniques.

Chubu Regional Headquarters, J-POWER
Hydroelectric power Department Sakuma Power Administration Office (assigned to Hiari, Hamamatsu City) (Presently Civil Engineering Laboratory, Chigasaki Research Institute, Research and Development Department)
Yukiko Shoji

Power Transmission, Substation, and Communications Facilities


Honshi Interconnecting line

Overview of Power Transmission, Substation, and Communications Facilities

J-POWER owns and operates transmission lines with a total length of approximately 2,400 km as well as a frequency converter and substations at eight locations. These facilities perform a major role in the overall operation of Japan's electric power grid by providing links within the areas supplied by the regional electric power companies as well as links between different regional power companies. These are essential facilities that support power interchange over wide areas in Japan. Of particular importance are the extra-high-voltage transmission lines that connect Japan's main island of Honshu with the other main islands of Hokkaido, Shikoku, and Kyushu, and the Sakuma Frequency Converter Station, the first facility in Japan to enable the transmission of electricity between the differing frequencies of Eastern Japan (50 Hz) and Western Japan (60 Hz). At the same time, the stable operation of this kind of grid is supported by remote monitoring and operations that utilize the latest in information technology. We make use of our microwave radio circuits, which extend over a total distance of approximately 5,900 km, together with optical fiber and other components of our highly reliable information and telecommunications network to conduct high-precision grid operation.

Work on Telecommunications Equipment in Radio Relay Stations

Our radio communication circuits and optical communication circuits are used to transfer information for the safe operation of substations and other such facilities. These circuits are configured by relay stations that are located in many different places, from urban areas to mountains. When we work on the equipment in a relay station located on a mountaintop where there are no roads for vehicles, we may have to transport the equipment by our own power. So we carry it one step at a time, watching out for our safety as we go. This J-POWER telecommunications equipment is jointly maintained and operated with the cooperation of KEC Corporation.

J-POWER West Regional Headquarters
Deputy Director, West Japan
Telecommunication Engineering Center
Yoichi Kuwamura

Achieving a Balance Between Environmental Protection and Assuring the Security of Transmission Facilities

One unavoidable aspect of the maintenance and operation of overhead transmission lines is the cutting of trees that grow close to transmission lines. Tree cutting also takes place in urban areas, not just in the mountains, Just the other day, tree cutting was carried out under transmission lines in the Tokyo Metropolitan Hachikokuyama Park. This park is traversed by the Tadami Main Transmission Line, a facility that is managed by the East Japan Transmission Line Maintenance Center. Hachikokuyama is famous as the model for Shichikokuyama in the movie "My Neighbor Totoro" produced by Studio Ghibli. It is also a hilly area rich in greenery that is home to the Pyrolaceae, a plant on the Tokyo Metropolitan Red List*3, among other plants and animals. We therefore take all possible precautions for environmental protection when working in such areas. For example, we put up markers to keep us from trampling rare organisms underfoot before cutting the underbrush, and we use tree cutting methods that can be expected to lead to coppicing*4.

J-POWER East Regional Headquarters
Deputy Director, East Japan Transmission
Line Maintenance Center
Masami Shimoo

Environmental Consideration in Upgrading Substation Facilities

It has now been 54 years since the Minami-Kawagoe Substation entered operation, and the appropriate remedy for obsolescent equipment has become an issue. This year we performed upgrade work on shunt reactors, which are phase modifying equipment*1. However, there were trace amounts of PCBs*2 in the insulating oil in the removed equipment. We therefore consulted with the departments concerned, in accordance with company guidelines to "carry out appropriate management, storage, and other handling of waste materials containing trace amounts of PCBs until disposal schemes are decided." The conclusion was that, since there was a large amount of insulating oil and there would therefore be a risk of leakage during storage, it would be effective to dispose of the oil. We therefore coordinated closely and repeatedly with the relevant authorities and with contractors who would subject the contaminated insulating oil to detoxification treatment, carried out the appropriate detoxification treatment, and completed the upgrade work safely while taking the greatest care in handling the contaminated material. We are making every effort to enhance the reliability of our equipment while paying attention to environmental protection.

J-POWER East Regional Headquarters
Manager, Kawagoe Power Administration Office
(Presently Kitahon Interconnection Power Administration Office, Hokkaido Regional Headquarters)
Tadashi Sugimoto

TOPICS Hokkaido-Honshu Electric Power Interconnection Facility About Initiating the Use of Newly Installed Cable

The Hokkaido-Honshu Electric Power Interconnection Facility is an interconnection line between regions that connects the islands of Hokkaido and Honshu by a ±250 kV bipolar single circuit DC transmission (triple cable). It is an important interconnection facility that contributes to wide-area interchange, emergency interchange during times of abnormal operation, and other such functions. As a measure to enhance the reliability of this facility, we laid one new cable in the submarine cable section of the Tsugaru Straits portion of the facility. Use of this cable was initiated on December 10, 2012. Now, even if a malfunction were to occur in one of the four cables, the three sound cables could be used to assure the 600 MW interconnection.


Laying submarine cable in the Tsugaru Straits

Reference

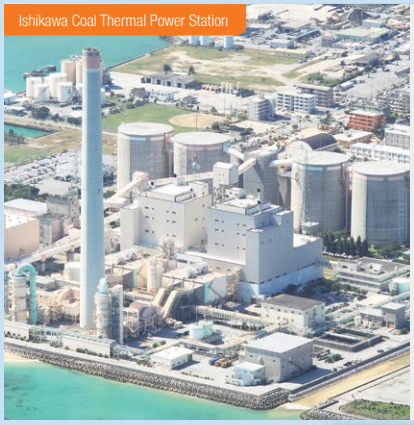
*1 Phase Modifying Equipment: Equipment that supplies and consumes reactive power in order to maintain the substation bus voltage at a certain value.

*2 Trace Amounts of PCBs: A minute quantity of PCBs found in insulating oils that do not use PCBs.

*3 Tokyo Metropolitan Red List: List of species of plants and animals found in the wild that are designated by the Metropolis of Tokyo for protection.

*4 Coppicing: A method of regenerating forest by anticipating the growth of dormant buds in the stumps of felled trees.

Thermal Power Facilities

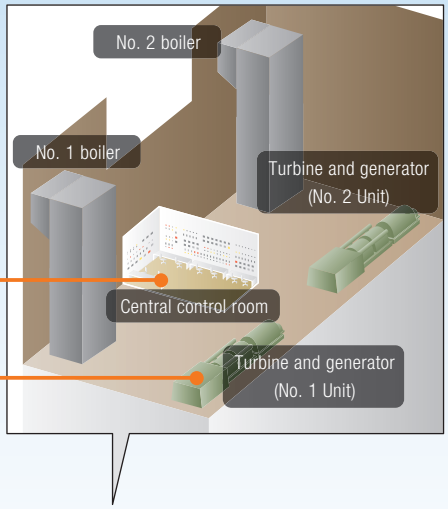

Ishikawa Coal Thermal Power Station

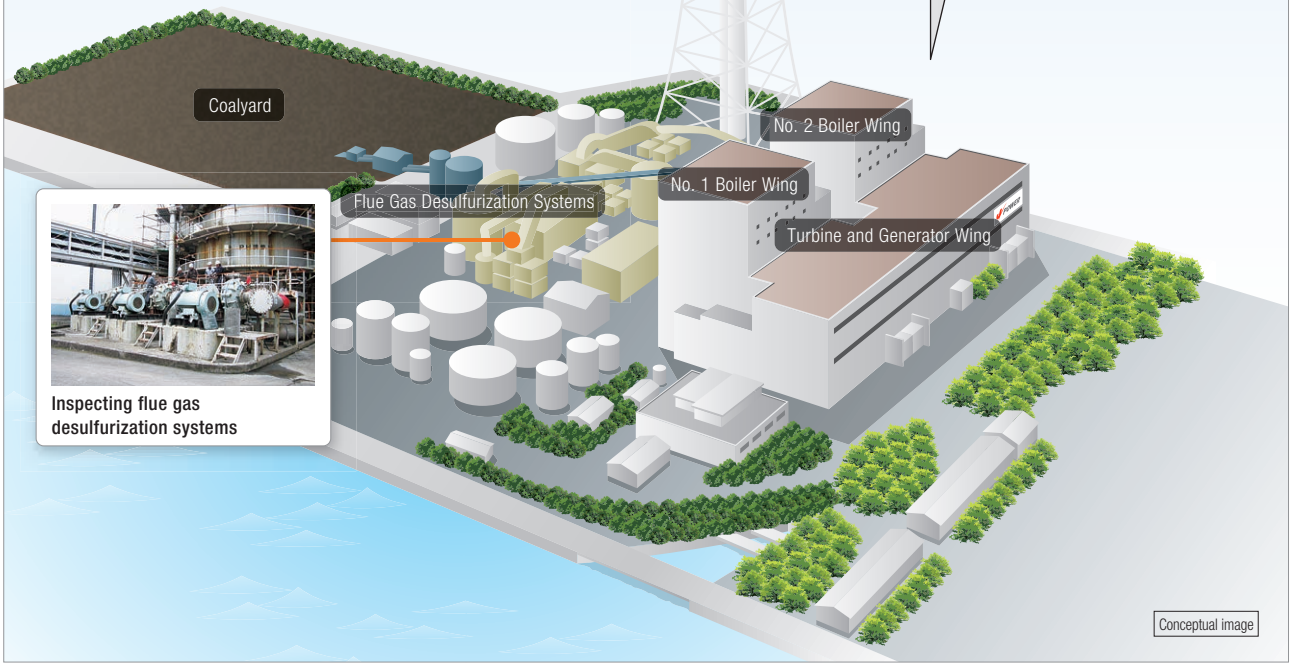
Thermal Power Station Overview

J-POWER's thermal power generation is primarily run by coal-fired power. The arrangement at coal-fired power stations is to first burn the coal in boilers to make steam. The energy of the steam is used to turn turbines so that the generators attached to them will generate electricity. The coal used as fuel is less expensive than oil, natural gas, and other such fuels, and there are also more abundant reserves of coal, which are widely distributed around the world. J-POWER presently has power generating facilities at seven locations throughout Japan, with a total output of 8.41 GW. At these sites, we are making every effort to perform appropriate maintenance of power generation facilities in order to limit the occurrence of equipment problems and the reduction in thermal efficiency that occurs over time as well as to maintain and improve the reliability of the facilities.


Monitoring underway in the central control room


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





Inspecting flue gas desulfurization systems

Optimization of Facility Maintenance at Thermal Power Stations

Thermal power stations require us to perform the optimal facility maintenance with a view to the short term, medium term, and long term, in order to fulfill our mission of providing a stable supply of electric power. For that purpose, and also on the constant advice of my superiors, I make every effort not to become over-attached to past ways of doing things, but instead to look at matters critically from the start. Taking this approach, I do my best to think about what can be done to improve quality even to the slightest extent, with the focus on reducing the cost of overall operations and maintenance. At the same time, I also think it is important to improve myself by accumulating experience and refining my practical, experiential knowledge.

Taking all this into consideration, I am working to hold a variety of perspectives, including the adoption of the most up-to-date technologies, to be flexible in taking in the views of people concerned, whether they are from inside or outside the Group, and to engage in appropriate dialogue with them. These are the measures I take so that this power station I am so fond of will be able to continue providing a stable supply of electricity long into the future.

J-POWER Thermal Power Department
Technology Group, Ishikawa Coal Thermal Power Station
Koji Murai

Operation and Maintenance of Environmental Equipment in Okinawa

The environmental measures we have in place at coal-fired power stations include electrostatic precipitators*1, flue gas desulfurization systems*2, and wastewater treatment systems. While we perform maintenance on these facilities, we also conduct appropriate processing of waste gases, wastewater, and other waste generated in the course of power station operation, and observe the environmental protection agreements we have with local governments where the power stations are located. These are important functions for operation and maintenance.

I work at the Ishikawa Coal Thermal Power Station, which is located in Okinawa. That location means we have frequent opportunities to deal with intense rainstorms. When such rainstorms hit, there is some risk that the wastewater in drainage tanks will flow out to the exterior, as well as the risk of unanticipated damage to the facilities. We therefore take care to implement advance countermeasures, track conditions properly after typhoons have passed, and deal with the results. Given the proper management, this power station has entered its 27th year since it began operating. We are committed to keeping it in operation so that it may continue to provide a stable supply of electric power with consideration for the environment of Okinawa we see spread out before us with its beautiful seas.

JPec Co., Ltd.
Operating Group, Ishikawa Company
Teruaki Morikawa

Inspection and Maintenance of Coal Unloading and Transport Facilities

The Matsushima Thermal Power Station has entered its 30th year since commencing operation, and it is now scheduled to undergo major facility upgrades and renovation work. Everyone involved is working in close cooperation to carry on day-to-day facility maintenance in order to provide a stable supply of electric power.

The coal unloading and transport facilities that I am in charge of take the coal that is the power station's fuel and transport it to the boilers. These include four unloading and transport units, a total of four kilometers of conveyor belts, a coal yard, and four yard machines. If any one of these pieces of equipment malfunctions, the facility will become unable to transport the coal. We are therefore engaged in a day-to-day effort of inspection and maintenance so that we can detect equipment abnormalities early on, deal with them promptly, and keep the power station in stable operation.

The survey of coal unloading and transport equipment recommended facility upgrades and regularly scheduled inspections. A facility inspection was therefore conducted last year, and the results indicated there were defects in some main structural elements, so we carried out emergency repairs and are presently implementing major repairs of the facilities, as well. Going forward, I will do everything I can within my power to contribute to the stable operation of the power station while I continue improving my own technical capabilities with regard to the stable supply of electric power.

JPec Co., Ltd.
Maintenance Group, Matsushima Company
Koji Tokuda

Fulfilling the Mission of Baseload Power Source

Since the Great East Japan Earthquake, the demand for coal-fired power stations as baseload power sources has become even greater than before. In that context, the Matsuura Thermal Power Station in Nagasaki Prefecture has been providing 2.00 GW of maximum output as a wide-area power source supplying electric power to western Japan. As station personnel, we have been striving together for the stable operation of the power station.

Our mission is to provide a stable supply of electric power. During our periodic inspections,* therefore, we make repairs to equipment that is becoming obsolescent in order to provide for subsequent long-term operation. During normal operation, we perform patrols day and night looking for abnormalities, and if there are any small problems, we fix them. A power station continues to provide electricity because of the support from large numbers of people, and I pursue my day-to-day duties as one of those people.

*Thermal power stations are shut down for major inspection and overhaul every two years.

J-POWER Matsuura Thermal Power Station
Technology Group
Yukiko Furusawa

Reference

*1 Electrostatic Precipitator:
A device that uses electricity to remove the soot and dust that are generated in the combustion of coal.

*2 Flue Gas Desulfurization System:
A device that removes the sulfur oxides found in exhaust gases produced in the combustion of coal. Sulfur oxides are toxic substances that can cause air pollution and acid rain.

The Coal Value Chain

The J-POWER Group is involved in the entire value chain for coal, including procurement, transport, and receiving of the coal. We are building a global system that enables stable and low-cost procurement of the coal we use in our coal-fired power stations.

Procurement

Coal Mine Project in Australia

The J-POWER Group began its participation in the Blair Athol Coal Mine, in the state of Queensland, in 1982. We have been investing in coal mining interests since that time, and as of the end of fiscal 2012, we own coal mining interests in the states of Queensland and New South Wales, Australia.

For the future, we will aim for continuing diversification of our coal procurement sources and acquisition of revenues at the upstream end of the coal business. To that end, we will be scrutinizing trends in coal supply-and-demand balance and among competing companies as we examine new, cost-competitive projects, and as we pursue participation in new coal mine projects.

Clermont Coal Mine (Australia)

Transport

Stable Transport of Coal

The J-POWER Group uses approximately 21 million tons of coal per year. Transporting this coal to the various power stations requires 200 or more ship voyages per year. We will introduce dedicated vessels*1 and so on for this purpose as part of our measures to provide stability in the transport of coal.

JP CORAL

Receiving

Management of Coal at Power Stations

On-site at the power stations, the coal that has been received needs to be managed according to its particular characteristics. In order to control coal temperatures in the coal yard, we use infrared cameras and install water sprinkler systems in addition to enacting 24-hour systems of control.

Matsushima Thermal Power Station coal yard

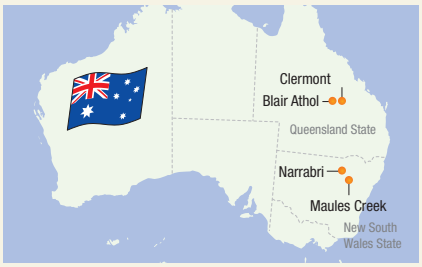
VOICE Working for Stable Everyday Operation of Power Stations

Operating Group, J-POWER Matsuura Thermal Power Station **Sauman Chow**

The responsibility for power station fuel mainly includes proper control over the operations of receiving and unloading the coal procured from overseas and of processing the coal ash that is generated in the process of burning coal as fuel. These operations are essential to the continuing operation of the power station, and they require repeated, close consultation and coordination with power station sites as well as with head office departments. When there are changes in operating conditions, there is also a need for prompt responses that incorporate the views and wishes of others in the station. It is a great challenge to try to coordinate matters to be agreeable to everyone, and sometimes it puts us under great pressure, but being involved in maintaining the stable day-to-day operation of the power station gives me a great sense of satisfaction and accomplishment.

TOPICS Acquisition of Interest in Maules Creek Coal Mine

In September 2011, J-POWER, acting through its local affiliate, J-POWER Australia Pty. Ltd., reached an agreement with Aston Resources Limited to acquire a 10% interest in the Maules Creek Coal Mine. This is a mine that Aston has been developing in New South Wales with the aim of starting production in 2014. At the same time, we also concluded a long-term agreement for the purchase of steam coal*2 from this coal mine. The mine is slated to produce steam coal and coking coal*3.



Reference

*1 Dedicated Vessel:
A ship that is built and owned by a shipping company for the special purpose of carrying cargo exclusively under a long-term contract.

*2 Steam Coal:
Coal that is used primarily as fuel for power generation.

*3 Coking Coal:
Coal that is used primarily as a raw material in manufacturing iron.

Measures for the Stable World Supply of Electric Power

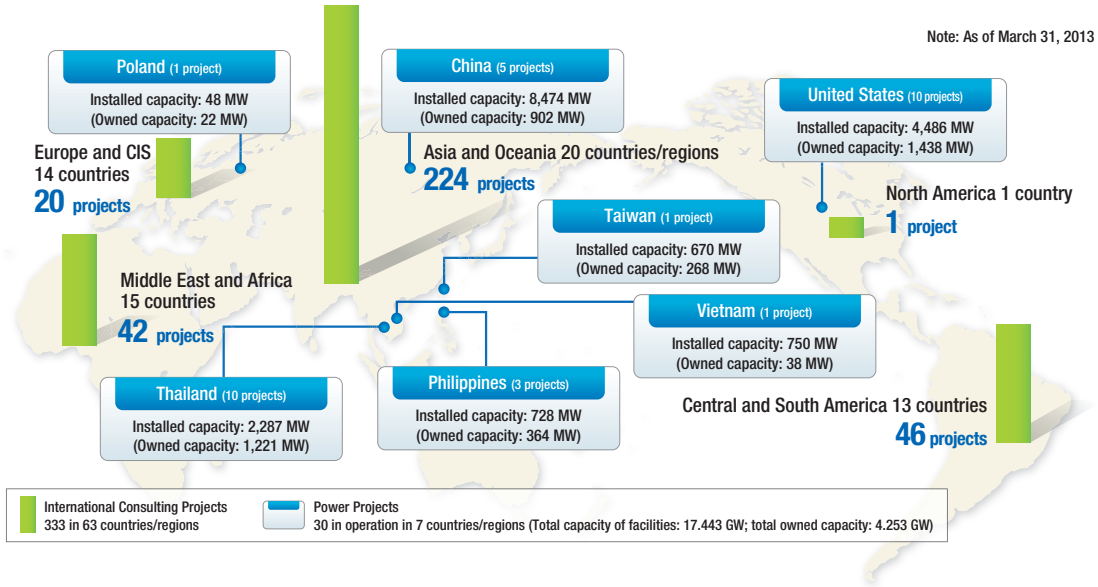
The J-POWER Group's corporate philosophy calls on us to "play our part for the sustainable development of Japan and the rest of the world." Taking this as our basic approach, and leveraging the accomplishments and know-how we have acquired through a half-century of overseas operations, we are engaging 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.

From the Second Pillar of Management to Two Pillars

The purpose of J-POWER's overseas consulting business is "to provide cooperation on electric power generation technology to developing countries and so contribute to the international community." Since implementing our first project in 1962, we have been involved in 333 projects in 63 countries (as of the end of March 2013). In the overseas power generation business, we have 30 electric power generation facilities in seven countries and regions with a total output of 17.443 GW. Our owned share of this output amounts to 4.253 GW (as of the end of March 2013).

We are reinforcing our efforts to change this overseas business from a "second pillar" into one of "two pillars" side by side with our electric power generation business in Japan. In terms of the environment, we will aim to use the clean coal technology we have in Japan to simultaneously achieve a contribution to growth in Asia and to reduction of environmental burden.

International Consulting Projects and Overseas Power Generation Projects



TOPICS

Planning Study of Optimal Power Generation for Peak Demand in Sri Lanka

Because of the beauty of its nature and the shape of the island, Sri Lanka has been called both the pearl of the Indian Ocean and the teardrop of the Indian Ocean. Given the solid economic conditions that have been prevailing of late, demand for electric power is growing, and the improvement in electrification has been accompanied by increasingly pronounced peaking in energy demand.

J-POWER was commissioned by the Japan International Cooperation Agency (JICA) to perform a development study of pumped-storage power stations to serve as electric power sources to meet peak energy demand in Sri Lanka, which has abundant water resources that could be used effectively for this purpose. We are presently conducting the study, and we expect it to make a major contribution to the stable supply of electric power in that country.

Field study in Sri Lanka

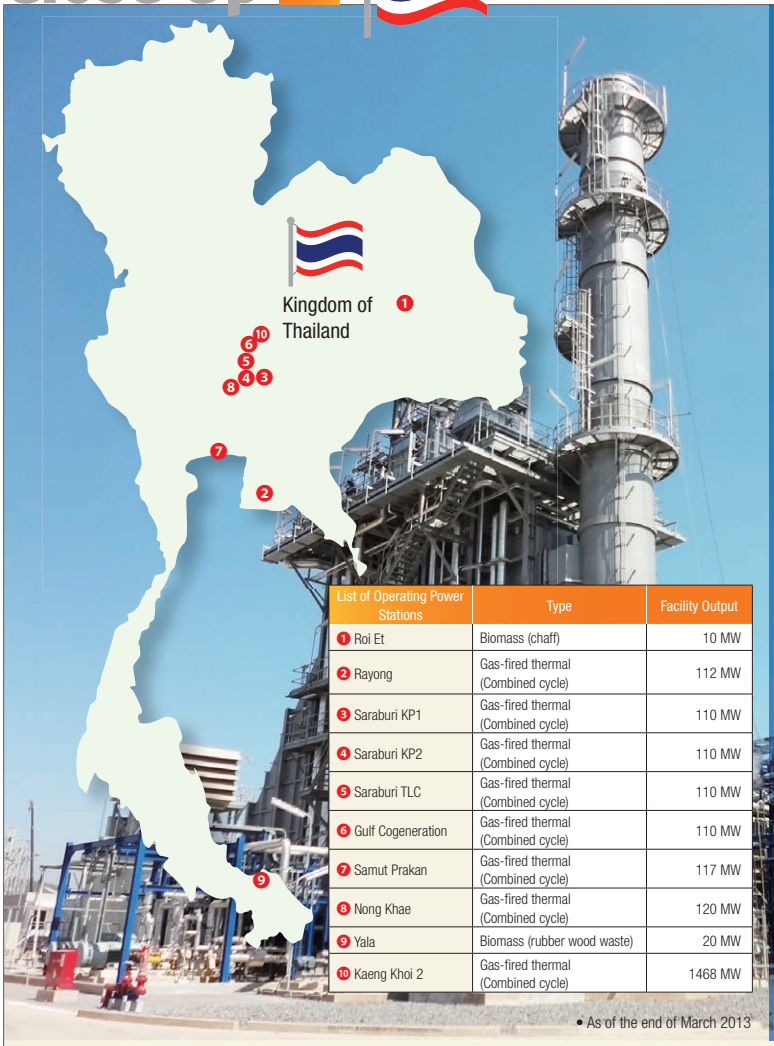
Business Participation Underway in China Bears Fruit as Hezhou Coal-Fired Thermal Power Station Enters Commercial Operation

J-POWER is presently participating in the Hezhou Power Station Project to build a new ultra super critical (USC) coal-fired power station (two units of 1.045 GW each) in the Guangxi Zhuang Autonomous Region of China. Unit No. 1 and Unit No. 2 of this power station entered commercial operation in 2012, and they are presently continuing in operation without incident.

This project effectively brings to bear our wealth of knowledge from the construction and operation of coal-fired power stations to date and the experience we have cultivated through our electric power generation business and consulting business in China. The project will contribute to the stable supply of electric power in China's Huanan region, a locus of conspicuous economic growth, as well as to energy conservation and environmental improvement.

Hezhou Power Station (China)

Close Up 1 J-POWER Electric Power Generation



List of Operating Power Stations	Type	Facility Output
1 Roi Et	Biomass (chaff)	10 MW
2 Rayong	Gas-fired thermal (Combined cycle)	112 MW
3 Saraburi KP1	Gas-fired thermal (Combined cycle)	110 MW
4 Saraburi KP2	Gas-fired thermal (Combined cycle)	110 MW
5 Saraburi TLC	Gas-fired thermal (Combined cycle)	110 MW
6 Gulf Cogeneration	Gas-fired thermal (Combined cycle)	110 MW
7 Samut Prakan	Gas-fired thermal (Combined cycle)	117 MW
8 Nong Khae	Gas-fired thermal (Combined cycle)	120 MW
9 Yala	Biomass (rubber wood waste)	20 MW
10 Kaeng Khoi 2	Gas-fired thermal (Combined cycle)	1468 MW

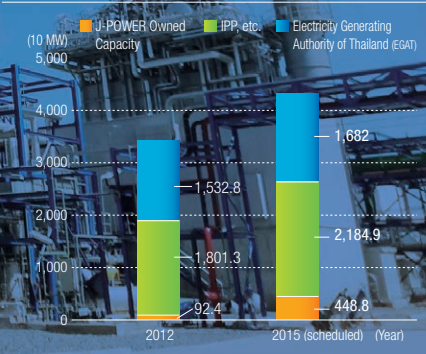
• As of the end of March 2013

Our electric power generation business in Thailand started in 2000 with our capital participation in two power generation projects. There are two IPP*1 projects (Nong Saeng and U-Thai) presently under construction, and seven SPP*2 projects, all scheduled to start operation between 2013 and 2015. When all the power stations have entered operation, J-POWER's owned capacity in Thailand will amount to approximately 4.5 GW. Thailand's power development plan calls for the country's total output to become approximately 43 GW at the end of 2015, which means that J-POWER will be responsible for approximately one-tenth of Thailand's supply of electric power.

*1 IPP:
Independent power producer

*2 SPP (Small Power Producers):
A system to promote energy-efficient facilities, such as those using cogeneration, under a buyback program with small-scale power producers.

J-POWER Owned Capacity in Thailand



Doing Everything in Our Power for the Mission of Providing a Stable Supply of Power While Obtaining the Understanding of Local Residents

Kaeng Khoi 2 Power Station has the motto, "a power station that takes the same viewpoint as local and regional communities in treating both the environment and people with consideration." Therefore, we cooperate with local activities and welcome field trips to our power station. It is not just local people who come on field trips to the power station. We have about 2,000 visitors from within Thailand every year, and we are very grateful for it.

There are some difficulties associated with receiving such large numbers of people, but we hope to continue with this steady effort to have people understand our business. We also want to learn about J-POWER's measures in Japan for harmonious coexistence with local communities, and make good use of them in our activities here. We are committed to the continuing effort to do everything we can toward the mission of providing a stable supply of electric power while we work to gain the understanding of local residents.

Kaeng Khoi 2 Power Station
General Manager
Peerapan Srisukho

Striving for Long-Term Stability of Power Station Operation While Placing Great Value on Communication with Thai Staff Members

Working from the perspective of an investor in the power stations that are in operation, including Kaeng Khoi 2, I am in charge of their operating conditions and budget management.

In communicating with Thai members of the staff, I take care to remember the differences in culture and customs, and respect the Thai way of working. I do not push my own views on them. On the other hand, when I am asked for advice, I introduce the technology and knowledge that we have built up in Japan, and leave it to them to decide whether or not to make use of it.

A power station is not finished when the construction has been completed. It has to function stably. As someone involved in the electric power industry, I am committed to the effort, by means of this project, to be of some use to the people of Thailand.

J-POWER Generation (Thailand) Co., Ltd.
Takeshi Shingaki

Business in Thailand

Looking Forward to Working with Local Staff in Making Steady Progress as the Project Approaches Full Operation

I have been engaged in the Nong Saeng Power Station project continuously since I was assigned to Thailand in 2008. My work has involved checking the overall status of progress in construction, managing the project budget, managing the safety aspects of the project, and other such duties.

The foundation work is about to get into full swing now, and the amount of work related to checking detailed designs of equipment is increasing. We have to make very certain that equipment is designed according to the specifications, because it can't be redone at a later point, so this is very important work.

The way it is in Thailand, I have overall involvement in everything from preparing to start construction to starting operation of the plant. I get to learn about jobs outside my specialty, as well, so this is very good experience for me. I look forward to making further steady progress on the Nong Saeng project with the GulfJP (GJP) staff members and local people.

J-POWER Generation (Thailand) Co., Ltd. Masafumi Okawa

A Project in Thailand, the Land of Smiles

At present I am working as construction supervisor of an SPP project. The project owners, contractors, and owners' engineers are people from Japan, from Thailand, and from Europe and America, and we are all working together to move the project forward here, supported by the warm climate and sunny landscape of Thailand, the open-hearted way that the Thai people accept strangers, and the smiling faces of the people of Thailand, the land of smiles. There are many women among the engineers and workers at the worksite, and the Thai people in particular are very kind to women, so the environment makes work easy.

J-POWER Generation (Thailand) Co., Ltd. Kayoko Kurisaki

The Overseas Worksite Offers Precious Opportunities to Acquire Varied Experiences

In the power stations that are operating in Thailand, I take part in operations in the capacity of an investor, and the actual operation is carried on by the Thai people who are local partners of the business company that J-POWER has invested in. We employees of JPGT make regular rounds to each power station in turn, check the status of operations, and make a point of communicating with the members of the power station staff. In the JPGT company offices, Japanese staff members and Thai staff members work together. In this place, we are the foreigners, so I respect the culture of our counterparts and approach it with appreciation. This attitude seems to be diffused among the other Japanese members of the staff, so I feel that we are able to do our work in a very good atmosphere.

The overseas power generation business, including in Thailand, is growing to become one of two pillars of the company, together with our business in Japan. Whether in Japan or in another country, on-site experience is a precious resource. Overseas, there are some sites that are still under construction, so I think that giving as many employees as possible the experience of working overseas is likely to contribute to the further development of the J-POWER Group.

J-POWER Generation (Thailand) Co., Ltd. Akihiko Sakurai

Social Responsibilities Part 2

Coexistence with the Community and Society

The J-POWER Group rolls out business based on harmonious coexistence with local communities and society as an electric power company with power generation and power transmission and substation facilities throughout Japan and overseas. Going forward, we will perform business that centers on "Communication with society" and "Contribution to society" as advocated in the J-POWER Corporate Conduct Rules as a means to drive advancement in local communities and society.

Communication with Society

The J-POWER Group implements fair and transparent public relations (PR) activities and information disclosure in order to secure good lines of communication with many stakeholders in different communities and in society. We are committed to making pinpoint response when it comes to PR in light of the characteristics of the stakeholders and our relationship with them, including local residents, shareholders, investors and society at large. We also promote stakeholder dialog, cognizant of the importance of two-way communication. In terms of information disclosure, we distribute information through our PR activities and respond to inquiries while also disclosing IR information via the Disclosure Committee.

PR and IR Activities

PR Activities

PR activities aim to enhance awareness of J-POWER as widely as possible, beginning with people in local communities. With this in mind, our basic policy is to distribute corporate information accurately and in a timely manner through all of our business activities and respond to inquiries concerning J-POWER sincerely and respectfully.

With regard to reporting, we strive to distribute appropriate information at appropriate timing, including through press releases and notifications. We also utilize TV commercials and magazines for advertising and do our best to gain broad understanding of our business.

J-POWER provides the opportunity for face-to-face contact with stakeholders as well as through events that include tours of power stations by each business unit, so that stakeholders can track our business activities with peace of mind.

In addition, we make efforts in two-way communication mainly through our website while also enhancing communication tools such as Navi-Map and cards for the J-POWER Group dams. In essence, we make sure our advertising is easy to understand and familiar.

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.

Navi-Map

J-POWER business activities are introduced using a friendly character.

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.

IR Activities for Investors and Individual Shareholders

For institutional investors, we hold presentation briefings related to management plans and financial results around twice a year and actively convene meetings in Japan and overseas as the need arises. For individual investors, we hold corporate presentation briefings several times a year and provide opportunities for them to talk directly with J-POWER members, including management.

For individual shareholders, we issue a biannual shareholder newsletter (Kabunushi Tsushin) and actively disclose information on management activities and the overall condition of the company by giving tours of our power stations and other facilities twice a year.

Information Disclosure

J-POWER endeavors to disseminate appropriate information on its PR and IR activities in a timely manner to stakeholders through press releases and notifications on its website.

In particular, we comply with all pertinent laws and regulations such as the Financial Instruments and Exchange Act and securities listing regulations for information related to the J-POWER Group business, operations or results that may have a significant impact on the investment decision of stakeholders. We also formulated internal disclosure regulations for IR information and instituted a basic policy to actively disclose information in a fair and transparent manner.

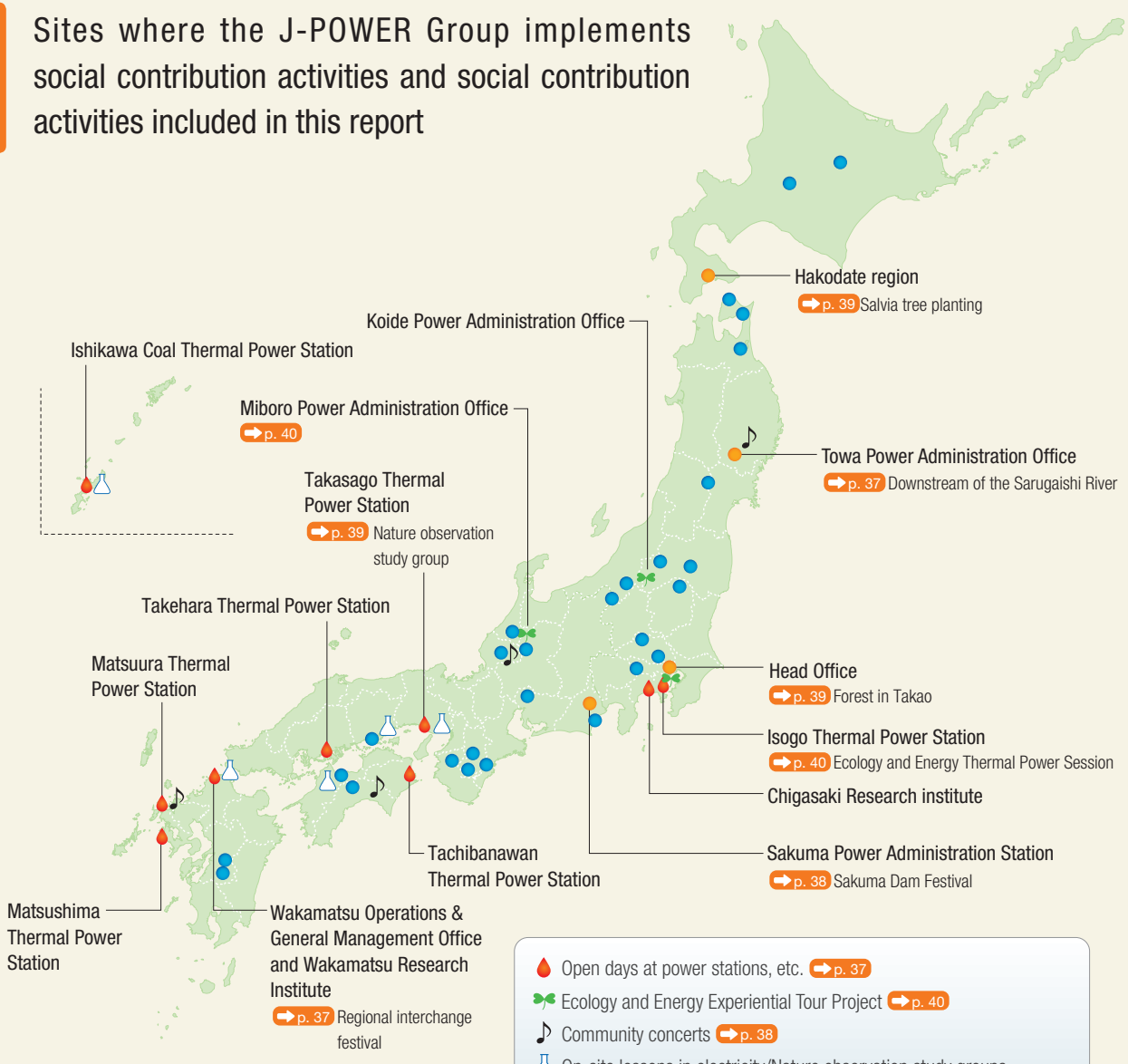
J-POWER established the Disclosure Committee, chaired by the president, to investigate and set up a system for disclosing IR information and also to examine and make judgments on information that ought to be disclosed with the aim of establishing a reputation in the market and gaining the trust of society.

Contribution to the Community 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, the 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.

Sites where the J-POWER Group implements social contribution activities and social contribution activities included in this report



Community Involvement

The 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.

Iwate Prefecture

Adventure race on the Sarugaishi River

An adventure race in rubber boats is held every year along the Sarugaishi River downstream from the Towa Power Administration Office (Hanamaki, Iwate Pref.) with participants competing on time. The Towa Power Administration Office is a member of the executive committee for the event. In addition to cooperating by adjusting the amount of water used for power generation, staff head out in several boats and interact with local citizens. Participants paddled hard toward the goal, getting sprayed with water along the way amid cheers of support from the many people who came to watch from on top of the bridge.

Participants in one of the boats (Towa Power Administration Office, Iwate pref.)

VOICE Creating opportunities to interact with the community

JPHYTEC Co., Ltd. Towa Office Yasuhiro Otaki

I recruited participants for the event from the office and was in charge of coordinating the advance preparations as well as making the schedule for the day. Since we are in the middle of constructing the Isawa No. 1 Plant, I had a really tough time making adjustments to the work and to the schedules of the participants when I was handling the advance preparations. Although the advance preparations were difficult, the event gave me the chance to interact with others in the office and people from the community, which was an extremely good experience. You'll understand once you take part, but it's great fun riding down the river. I definitely want to participate again next year.

Open days at power stations, etc.

In order to express its appreciation to local communities living near its power stations for their daily support, the J-POWER Group creates opportunities for people to visit its power stations and various other facilities throughout Japan. The program for open day events includes a tour of the facility with an explanation from staff so that visitors get to see where electricity is actually made. Employees happily guide visitors through the facility in the hope that the local citizens will get to know the employees of the J-POWER Group a little better.

In addition, as with the open day at the Wakamatsu Operations & General Management Office, some facilities hold local interchange events based on cooperation with local citizens.

Local interchange event "Iki iki Wakamatsu" (lit. "Lively Wakamatsu") (Wakamatsu Operations & General Management Office, Fukuoka Pref.)

[Facilities holding open days]
Matsuura, Matsushima, Ishikawa, Takasago, Isogo, Tachibanawan, Takehara, Wakamatsu, Chigasaki

[Facility tours]
Kitahon, Nishi-Tokyo, Numappara, Shimogo, Towa, Sakuma, Kuzuryu, Shizuoka substation, Miboro, Kitayamagawa, Kochi, etc.

VOICE Aiming to deepen bonds with the community through ongoing activities

Director, J-POWER Wakamatsu Operations & General Management Office Bunya Nakajima

Open day at the Wakamatsu Operations & General Management Office is known as "Local Interchange Festival: Iki Iki Wakamatsu." We hope to create an opportunity for adults and children alike to learn about electricity first-hand in the hope that they become more interested in science. In addition to the open day, local elementary school children come to experience making a rice field on the rooftop as part of greening efforts and to cultivate rice. The facility has also been included in the tour course for the Kitakyushu Next-Generation Energy Park and we are receiving many visitors, not only local residents but also people from around and outside the prefecture as well as from overseas.

Shizuoka Prefecture

Sakuma Dam Festival

The Sakuma Dam Festival is a traditional festival that has taken place for over 50 years. The festival begins on the last Sunday of October and attracts a large number of people that share a history with the area along with the dam, not only from the local area but also from cities along the Pacific side. The biggest highlight is the dance of the dragon god to pray for prosperity and comfort the spirit of the guardian of the dam. J-POWER Sakuma Power Administration Office helps to make the festival exciting with a stall that people can visit and by holding tours inside the dam.

Guardian dragon god of Sakuma Dam (Sakuma Power Administration Office, Shizuoka Pref.)

VOICE

Contributing to regional development based on over 50 years of ongoing interaction

Director, J-POWER Sakuma Power Administration Office (currently Assistant General Manager, JPHYTEC Co., Ltd. West Japan Company) Fujiharu Kishita

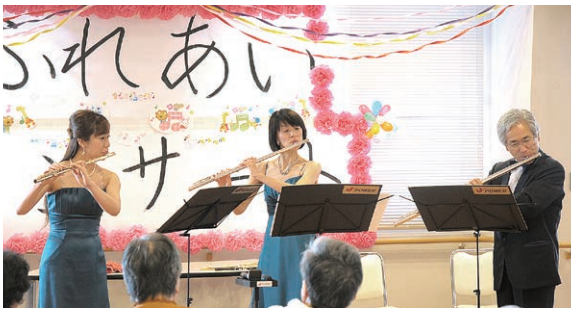
In the beginning, the festival was started to comfort the spirits of those who had died during the construction of the Sakuma Dam and to pray for its prosperity, but after that, it developed into the Sakuma Dam Festival through the support of local residents and others who love the facility. The festival in 2012 was the 55th on record. The dam is one of the businesses that J-POWER has been working on since its earliest days. That's how long we have had a close relationship with the local people and going forward we intend to continue contributing to the development of the region as a company rooted in the local community.

Kochi Prefecture

Community concerts

Community concerts have been staged since 1992 when the first one was held to celebrate 40 years in business, and since have been used as opportunities to show appreciation to the local people living near the power station. In the 20 years since it first began, we have seen 102 community concerts that have attracted many people. J-POWER has also held mini community concerts as a variation where performers visit local areas to play in schools, welfare institutions and other local places following the privatization of the company.

In 2012, mini community concerts were staged from Iwate Prefecture in the north to Nagasaki Prefecture in the south.



Mini community concert (Kochi Power Administration Office, Kochi Pref.)

In 2013, we will continue to showcase excellent performances to express our ongoing gratitude to people living near our power stations.

VOICE

Long relationship with the community expressed with "Denpatsu"

Director, Healthy Care Nahari Tomoko Yoshimoto

The reason we applied to have a mini community concert here was that staff in charge of the event happened to find us. They played music that I had heard before and I really appreciated it. I don't really get the chance to listen to live music so it was a really precious opportunity. When local people hear the word "Denpatsu" (abbreviation for Electric Power Development Co., Ltd.), many of them fondly remember the old days. The company has grown with us over a long period and we hope the relationship continues into the future.

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 / Tokyo

Protecting Forests and the Local Environment

The J-POWER Group participates in creating local environments and village forests in different regions.

The J-POWER Group in the Hakodate region of Hokkaido plants young salvia seedlings together with local people from the Togeshita area along the state road. This and other activities are undertaken to protect the local environment.

In addition, J-POWER Forest Club, made up of volunteer employees from the J-POWER Group head office, take part in activities by the Society for Naturalization of Takao's Forests. These activities to maintain the abundant forests and plant trees in the Kogesawa (Ura-Takao) area north of Mt. Takao have continued for over 10 years, with more than 200 individuals and 20 local organizations and companies lending a hand. This is a perfect chance for the J-POWER Group employees to understand first-hand the real importance of forest protection in addition to working with hydroelectric power generation.

Salvia tree-planting (Hakodate region/Hokkaido)

Tree-planting activity (Ura-Takao Kogesawa area, Tokyo)

Hyogo Prefecture

Holding Classes on Electricity and Nature Observation Study Groups

The J-POWER Group provides lessons on electricity off-site and tours of its facilities for elementary schools in each region.

The Takasago Thermal Power Station takes part in an eco-education support guide project as part of environmental learning for elementary and junior high school students in Takasago City, Hyogo Prefecture. Activities can be divided into: experiential learning of power generation using natural energy to deepen knowledge of energy in general via a hands-on method; and a nature observation study group that consists of a water-retention experiment for soil and observing vegetation. Staff members have acquired qualification as nature observation instructors*1 and help create opportunities for children to learn through experience and by using their five senses outside school grounds. Besides this, classes on electricity that use ingenious methods and interesting content are held at each power station in line with the characteristics and features of the facility.

Nature observation study group (Takasago Thermal Power Station, Hyogo Pref.)

VOICE

Participated in Takasago nature observation study group

In charge of group 1, 3rd-year students at Iho Elementary School **Reiko Morimoto**

I think it's really good to be able to go out into the community and learn through direct experience rather than merely studying in a classroom all the time. I'm also very grateful for the opportunity to listen to technical talk about electricity from employees in the J-POWER Group. By studying outside school, the students also have the chance to touch, observe and generally use their five senses, which is a different style of learning from normal.

Reference

*1 Nature observation instructor:
A volunteer leader who holds nature observation sessions rooted in the local community, while aiming to protect nature him- or herself and also forming a group of people to achieve the same objective.

Close Up 2 Ecology and Energy Experiential Learning Tour Project

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.

J-POWER is implementing an Ecology and Energy Experiential Learning Tour Project in cooperation with people aiming to create a sustainable society and has conducted Hydroelectric power Session Tours since 2007 and Thermal Power Session Tours since 2012.

Ecology and Energy Experiential Learning Tours (number of times)

	FY	2006	2007	2008	2009	2010	2011	2012	Total
Okutadami elementary school students	No. of times		2	4	3	2	1	2	14
	No. of people		53	86	74	56	18	54	341
Okutadami university students	No. of times	1	1	1	1	1	1	1	7
	No. of people	12	15	13	16	29	17	24	126
Miboro elementary school students	No. of times					2	2	2	6
	No. of people					58	60	58	176
Total	No. of times	1	3	5	4	5	4	5	27
	No. of people	12	68	99	90	143	95	136	643

*A demonstration tour was held in 2006 for university students ahead of project implementation.

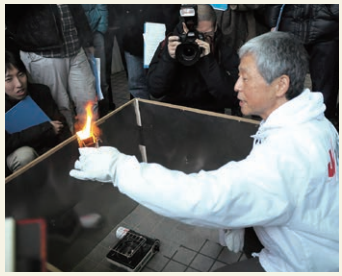
Ecology and Energy Experiential Learning Tour Project Thermal Power Session

Isogo Thermal Power Station University Student Tour

As part of the Thermal Power Session Tour, participants get to see the properties of coal at work via an open coal fire experiment since coal is not often seen these days. Participants also have the chance to see how J-POWER's DNA has been passed down to the current Isogo Thermal Power Station, particularly with the introduction of Japan's first wet-type desulfurization system and conclusion of a pollution control agreement* with the local Yokohama City. The visiting group is divided into three courses: "coal," "water" and "air," so they can experience and enjoy the different environmental facilities.

"Electrical power supporting everyday life and industry must not harm people's physical health." This philosophy has been passed down since the time the former Isogo thermal power station was constructed. We hope that university students who are the leaders of the next generation gain an insight into this concept as well as the best technology used to make it a reality.

Going forward, we will work to improve the quality of the program in light of all the feedback we receive and look into starting a similar program for junior and senior high school students as well.



Open coal fire experiment (Ecology and Energy Experiential Learning Tour Project, Thermal Power Station)

*Became the precursor to pollution prevention administration known as the "Yokohama Method."

VOICE

Opinions of Participants in the Thermal Power Session

- I thought coal-fired power was bad for the environment, so I was surprised to see how clean it was due to the different types of equipment when I took the tour of the Isogo Thermal Power Station and my image completely changed. (3rd-year university student, female)
- I knew from a textbook about how to eliminate emissions, but I deepened my understanding by actually seeing the equipment up close. I hope to make use of the experience when I choose my major from the third year of university. (2nd-year university student, male)
- I realized how hard people work on-site to continue generating clean energy and that gave me a real sense of appreciation. (1st-year university student, female)

Students who participated in the tour (Ecology and Energy Experiential Learning Tour Project, Thermal Power Session)

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.

It is a place to deepen mutual learning through dialog and has been well received by all participants, with the event being held 12 times in January 2013.

Going forward, we will work to meet the needs of all participants even better in terms of guests and timing of implementation.

WEB Eco goo
http://eco.goo.ne.jp/education/j-power/ecoenecafe/

*Content from past events can be viewed from the above URL.

For Society in Broader Terms

Initiatives aimed at "Coexistence with the community and society" being undertaken by the J-POWER Group are expanding worldwide along with business growth and due to the large number of people in disaster-affected areas and in the next generation.

Promoting and Supporting Volunteer Activities

Counting Stamps as Volunteer Action

The J-POWER Group has been cooperating for around five years with the "counting postage stamps" volunteer program of Hunger Free World (HFW), a specified non-profit organization.

Employees use their free time after work to do what they can, and the ease of sorting stamps according to their value and attaching them to pieces of paper has been popular among participants. The work is done by employees from different Group companies, which offers the opportunity to deepen interaction.

Since 2011, not only J-POWER head office but also Group companies have been involved and the number of new employees participating is on the rise. The volunteer work takes place after new recruits finish their training, providing the platform for interaction among the new employees and with senior colleagues. This has been the case since 2012.

Through these activities, we hope to foster a volunteer mentality among employees.

Volunteers counting stamps (Tokyo)

WEB HFW
http://www.hungerfree.net/

Activities in Support of Disaster-Affected Areas Using Compost

In line with the idea of wanting to implement unique J-POWER support activities based on a philosophy of "harmonious coexistence with the community," the J-POWER Group has teamed up with the NPO Tono-Econet to conduct support activities for disaster-affected areas using a Takakura Composting Technique that was devised by Operations Facilitator Takaoka of JPec Co., Ltd.

The compost comes from separating raw food waste in the home, and Takakura composting has been highly evaluated worldwide. The technique is being put to use in Ofunato, Otsuchi and Kamaishi in Iwate Prefecture, and has played a part in boosting communication between people inside temporary housing establishments, where forming communities has proven to be a challenge.

Workshop in Otsuchi Town, Iwate Pref.

Support for the Next Generation

Implementing Internships

Three companies of the 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 2012, 37 interns from all areas of Japan took up the challenge of practical training in the maintenance and operation of electric power facilities.

Internship training

VOICE

Participating in the Creation of a Laos-Japan Friendship Forest

Forest creation course

The second Laos-Japan Friendship Forest tree-planting event was held on June 25, 2012 in Laos, with a total of 110 people participating from Japan and Laos. I participated in the first event in 2011 as well by making use of our company's paid volunteer leave system.

As part of International Year of the Forest in 2011, the Society for Naturalization of Takao's Forests, based on an appeal from the National Land Afforestation Promotion Organization, agreed to cooperate with a tree-planting project overseas and signed an agreement with the Agroforestry Training Center in Laos, thereby launching a forest creation project as a sign of friendship between the two countries. On the day, a total of 1,000 trees consisting of 13 different species including Burma padauk and teak, which normally grow wild, were planted with the cooperation of local junior and senior high school students and residents.

After the tree planting, there was a course called "forest action and Japanese forest creation," in which the junior and senior high school students that took part commented on how glad they were to learn about the importance of forests and nature.

J-POWER Siting & Environment Department, Siting Office Takahiro Baba

Raw Garbage Composting Technology Goes Worldwide

JPec Co., Ltd. provided cooperation with a raw garbage composting technology upon a request from Kitakyushu and Kitakyushu International Techno-cooperative Association in 2004 in order to resolve the garbage problem facing Surabaya City in Indonesia. The technology has been systemized so that local people can continue to implement it easily and has provided various results such as over a 30% reduction in waste amount and an improvement in the hygienic environment as well as putting a smile on the faces of local people during the activity, which was very impressive. Technology that can be localized like this is rated highly and at present JICA and the Institute for Global Environmental Strategies (IGES) are collaborating to expand the use of the technology, particularly in developing nations.

Containers for composting and local participants (Philippines)

Local residents listen intently to the explanation (Malaysia)

Technical Training on Composting for Developing Nations – With Passion

JPec Co., Ltd. conducts technical training on composting for JICA trainees overseas and Japan Overseas Cooperation Volunteers. Technology that was cultivated in Indonesia has been well received worldwide as an effective method for resolving the problem of waste that is common to developing countries, and now over 35 countries receive training. The training consists of coursework mixed with practical work for easy-to-understand and fun learning. In addition to providing knowledge and know-how so that activities can be effectively implemented locally, the information is conveyed in such a passionate way that it motivates people.

Cultivating fermentation micro-organisms

Providing know-how on composting

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 (conventional hydroelectric power, 22.6 MW), Botocan (conventional hydroelectric power, 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 regional contribution. It has public education assistances such as a scholarship system for students and a skill development for teachers. In addition, it has a public health assistance program for areas where government support is inadequate. Also, it provides job training and other such support to help realize increased employment opportunities for local residents.

VOICE

Guest Professor at a University in China

I have been a guest professor at Shaanxi Normal University in Xi'an, Shaanxi Province, China.

I have prelected eight times per year on "environment and communication" in fiscal 2012 and "management theory" in fiscal 2013 to students learning Japanese language. The lectures emphasize dialog rather than one-way instruction on knowledge.

In my class, instructors from JICA and environmental NPOs that operate in China are invited to teach within a series of lecture topics from a broad angle in line with themes. Through these lectures, young people, who will lead the next generation in China, learn new concepts and it is expected that awareness toward environmental protection will increase upon realizing the importance of Global Thinking Local Action for environmental problems.

President of Xi'an branch office, J-POWER Consulting (CHINA) Co., Ltd. Takaomi Tobase

A classroom lecture (I am at front left)

A walk with students to Xi'an castle wall (I am at the center in the back row)

Social Responsibilities Part 3

Developing Human Resources and Creating a Dynamic Workplace

The 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

The J-POWER Group positions human resource recruitment and development as crucial policy measures for the company's sustainable growth. We are reinforcing the foundation for career development, with a focus on CDP programs*1, 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

The J-POWER Group's Conceptual Approach to Human Resource Recruitment

The J-POWER Group approach is to conduct stable hiring in the interest of sustainable growth, and also to seek human resources from people in a wide range of fields and age groups to whom we provide opportunities to take an active part.

With regard to personnel hiring and utilization, the J-POWER Compliance Code stipulates respect for individuality and human rights and prohibits discrimination. We are also conducting awareness-raising on these matters in human rights training. 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 2011	FY 2012	FY 2013
Men	69	72	67
Women	8	6	9
Total	77	78	76

Measures to Promote Diversity

As a measure to further increase the hiring of elderly people, we have reviewed the continuing employment system, which is a system for employment of people who have reached retirement age, to bring it in line with the amendment of the Law for the Stabilization of Employment of the Aged in April 2013. 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, 2013, 44 employees (J-POWER) had taken advantage of the continuing employment system and related programs.

Our employment ratio for people with disabilities was 1.79% as of June 1, 2013. 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.

VOICE

Aiming to Build a Workplace Where Diverse Human Resources Can Take Continuously Active Parts

The J-POWER Group operates in a changing business environment, and the arrival of a society of declining birthrates and an increasing elderly population has brought increasing demand from society for corporations to achieve longer sustained employment for people. We face a need to allocate a wide range of different job assignments to a diversity of human resources, regardless of their sex or age, while responding to changes in the business environment and social environment. The J-POWER Group will endeavor to build a workplace in which a diversity of human resources can continue playing active parts by taking such measures as revising the continuing employment system and promoting the development and use of childcare and family elder care support systems.

Human Resource Development Office,
Personnel and Employee Relations Department
Shiho Mase

Reference

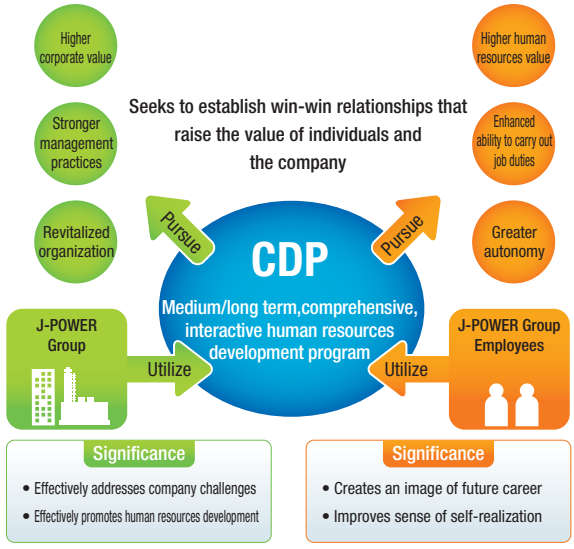
*1 CDP: Career Development Program
CDP refers to programs for developing human resources and specific skills through career development. CDP programs seek to effectively promote human resources development by combining skill development based on knowledge and experience accumulated in performing daily 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

Human Resource Development Programs

Our aim in the J-POWER Group is to develop all our employees into independent, talented, professional human resources who contribute to the organization with a multiplicity of specialized knowledge and a broad perspective. We are adopting the Career Development Program (CDP) as a measure to achieve that aim. In this way, we are combining on-the-job training (OJT) and off-the-job-training (Off-JT) to promote effective human resource development that enhances the value both of employees and of the company.

CDP Overview



Evaluation and Assessment System

The 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

The J-POWER Group is conducting various kinds of training as Off-JT, including level-specific training, career training, objective-specific training, and divisional training. These programs are conducted to develop human resources in line with CDP.

We have also established training facilities for the technical divisions (civil engineering and architectural engineering divisions; hydroelectric power, transmission and substation, and telecommunications divisions; and thermal power divisions). Systematic development for engineers is conducted at these facilities.

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

	FY 2010	FY 2011	FY 2012
Level-Specific Training	122	138	334
Career Training	153	163	248
Objective-Specific Training	188	216	235
Total	463	517	817

Helping Employees Voluntarily Develop Their Careers and Abilities

J-POWER is introducing a self-assessment system for employees to convey their career planning hopes and intentions to the company once a year and discuss them with their immediate superiors. We are also introducing a voluntary training incentive program and an academic training program to support employees developing their abilities on their own initiative.

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

	FY 2010	FY 2011	FY 2012
School attendance	58	42	36
Correspondence	63	59	62

Improving the Workplace to Achieve Invigoration

Toward Realization of a Work-Life Balance

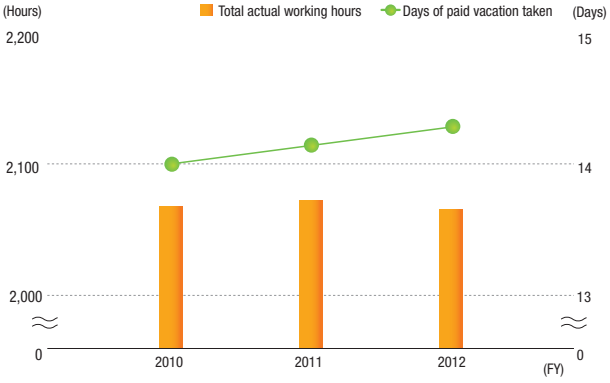
The J-POWER Group believes that a better work-life balance can help ensure labor productivity and lead to improved efficiency. We are actively developing working environments and cultures that enable every employee to autonomously enhance their work and personal life and focus on highly creative work.

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.

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



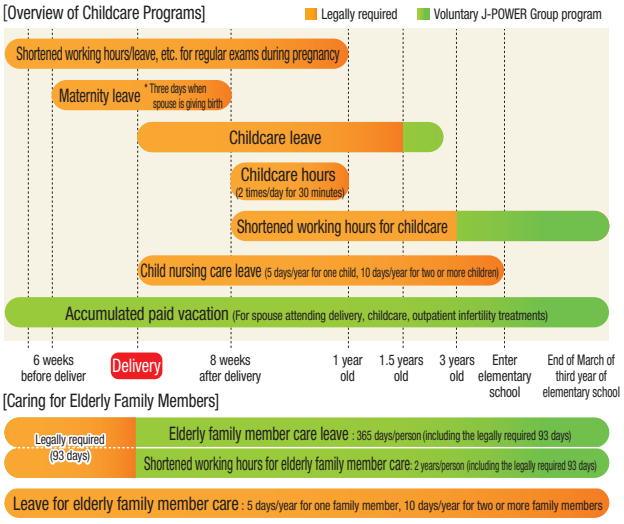
* Figures for past fiscal years have also been compiled under the same conditions as the range of data available for compilation has expanded.

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. (See Voice on p. 41)

Overview of Childcare and Elderly Family Member Care Support Systems



FY 2012 Results for Main Use of Childcare and Family Elder Care Support Systems (J-POWER Group)

System	Number of Users	
	Women	Men
Maternity Leave	13	124
Childcare Leave	24	17
Shortened Working Hours for Childcare	28	0
Nursing Care Leave (Child)	43	76
Elderly Family Member Care Leave	0	1
Leave for Elderly Family Member Care	8	26

"Kurumin" Mark of Next-Generation Certification

J-POWER was certified in fiscal 2010 as a corporation that actively provides support measures for rearing the next generation pursuant to the Act for Measures to Support the Development of the Next Generation, and we were authorized to display the Kurumin certification mark. Our next steps will be to heighten the flexibility of programs related to childcare, develop a workplace environment that facilitates the use of such programs, and promote measures aimed at working as a member of the local community to contribute to the development of the upcoming younger generation.

"Kurumin"

VOICE — We are Using the Family Elder Care Support System

My parents had been living on their own for a long time, just the two of them back in our old hometown, but my father suddenly fell ill and had to be hospitalized just before the Great East Japan Earthquake the year before last.

My mother had collapsed with a cerebral hemorrhage some years earlier, and she was in a condition requiring long-term care. She was receiving long-term care support, and that was how they were carrying on their lives, so when my father went in the hospital, my own support became essential. At that point, I had accepted the possibility that I would have to take a long-term leave from my job. Fortunately, however, I learned that there was a special long-term care leave program, and with the sympathetic understanding of everyone in my workplace, I was able to somehow make it through that emergency situation. It was a great help.

I am also taking long-term care leave now when I go to see my parents from my job at the Ohma Nuclear Power Station Construction Office, where I was assigned last summer.

Ohma Nuclear Power Station Construction Office,
J-POWER Ohma General Management Department
Hirobumi Arai

VOICE — We are Using the Childcare Support System

After receiving maternity leave and childcare leave, I returned to my job with shortened working hours when my firstborn son was one year and four months old. When rearing a child, I heard about what people call "the myth of the child's first three years," and I had the vague sense that a child should receive its mother's care as much as possible during infancy, and that returning to work would lessen the time spent with the child. When I went back to work, what I sensed most of all was that turning my attention to something else, outside the home, allowed me to clear my mind and feelings, and that I was less on edge about minor elements of my child's behavior. When I would get home, I could spend the first three hours fully occupied with household chores and childcare with a smile on my face, and I think this made my child just as happy as it made me. Another thing is that, since my time was limited both at work and at home, I thought more about how to get things done and make things more efficient. This will be my third year of using the system for shortened working hours. The constraints on my working time also means that the kind of work I can do is limited, but I am receiving sympathetic understanding and support from my superiors and my colleagues, and I am grateful.

Area Business Department,
JP Business Service Corporation
Facility Operations Group
Tae Namatsu

Consultation Desk

We are working to build a work-friendly environment in the workplace by establishing a consultation desk where employees can discuss working hours, the workplace environment, sexual harassment, and power harassment.

We have also developed in-house regulations, manuals, and other such resources related to harassment, 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.

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.

Safety and Health Management

As set forth in our Corporate Conduct Rules (see p. 6), 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 operations," and to that end we operate occupational safety and health management systems within the Group, and promote overall safety management. By raising the level of these activities, we are working to prevent workplace accidents and to maintain or improve the health of our employees.

Plans and Measures Based on Mutual Cooperation

The J-POWER Group has compiled a Group Occupational Safety and Health Plan that organizes common issues that need to be addressed. Based on this overall plan, each Group company formulates its own plan for occupational safety and health and promotes occupational safety and health programs.

J-POWER checks and confirms that comprehensive safety and health management is being conducted appropriately from the perspective of facilities owners and suppliers. At the same time, the J-POWER Group companies engage autonomously in safety and health management and programs as principal contractors, taking the perspective of implementing organizations that have direct responsibility for maintenance and other such operations.

J-POWER Group Occupational Safety and Health Initiatives

The J-POWER Group has established the following priorities regarding common issues in safety and health activities in the Group Occupational Safety and Health Plan, and the Group is working cooperatively to address these issues.

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

Initiatives for the Prevention of Workplace Accidents

The majority of accidents in recent fiscal years have been workplace accidents involving partners and contractors connected with construction and other such work. In order to prevent occupational accidents, it is essential that we engage in unified activities and collaboration that also include our partner companies in our workplaces and construction sites. To this end, we are working to achieve more active communication between the places where work is being done and the people involved. We are also implementing safety patrols, safety training, and other safety programs at every business location so that our workplaces as a whole will be permeated by the awareness of safety. With the cooperation of the parties involved, we are engaging in ongoing efforts to prevent repetitive-pattern accidents*1 and traffic accidents.

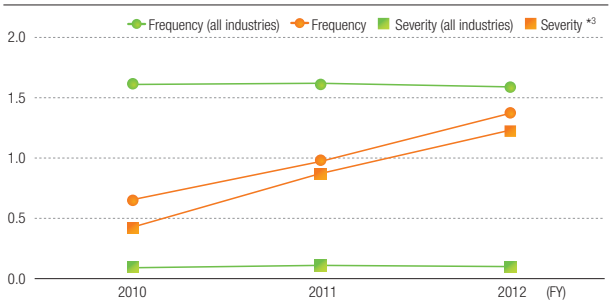
During fiscal 2012, three fatal accidents occurred during regular work and ordinary operations. We take this very seriously, and we are investigating the causes of accidents here and in Group companies. We are working to obtain an organized view of the situation as well as of preventive measures. It is our commitment to work jointly with the Group companies concerned to study and verify the current situation in each organization, their organizational factors and issues, and their improvement measures. Together we will act to make improvements regarding the issues that are isolated, and we will take steps to reinforce our safety management. In addition, we will examine predictions and monitoring of those sources of danger addressed to date, together with the safety measures undertaken. We will further continue implementing measures that take notice of safety confirmation and safety management at work, and we will reinforce our activities to promote communication in this regard.

Workplace accident simulation workshop

Incidence of workplace accidents*3

	FY 2010	FY 2011	FY 2012
Deaths	1	2	3
Serious Injury	6	6	13
Minor Injury	6	9	8

Accident Frequency*1 and Severity*2



*1 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.)
*2 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.)
*3
Accidents involving J-POWER employees and accidents involving contractors (principal contractors and subcontractors) doing construction and other work ordered by J-POWER

Maintaining the Health of Employees and Their Families

The 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 are also very serious about the prevention of metabolic syndrome (a lifestyle disease) and mental health disorders, which have become major social issues. Since fiscal 2008, we have been conducting special health checks and designated health guidance as institutional activities, as well as THP activities*2 to promote physical and mental health.

Reference

*1 Repetitive-pattern accidents
Industrial accidents categorized by patterns such as falling from heights, falling over, being caught by and being pulled into machinery, 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

The J-POWER Group believes that energy production and the environment can coexist in harmony. In light of this corporate philosophy, our environmental management aims to 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, which orient the initiatives to be implemented each fiscal year. The J-POWER Group is working as a whole to realize environmental management in accordance with these targets and guidelines.

Basic Policy (revised on July 1, 2011)

J-POWER Group adheres to the following Basic Policy.

Basic Stance

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

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

We will contribute to sustainable development in Japan and the rest of the world as a whole by minimizing the environmental impact of our business activities, reducing environmental risks such as global warming, and improving eco-efficiency by achieving higher productivity with lower environmental load, thus promoting greater environmental responsibility while enhancing economic value.

Efforts Relating to Global Environmental Issues

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

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

Efforts Relating to Local Environmental Issues

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

Ensuring Transparency and Reliability

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

Action Program

Corporate Targets (revised on April 1, 2013)

1 Efforts Relating to Global Environmental Issues

Item	Target
• Reducing CO_2 Emissions from Power Generation and Promoting Technological Development	As an electric utility, in addition to continuing to contribute to the Environmental Action Plan by the Japanese Electric Utility Industry*1, 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 power 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 using J-POWER's advanced, high-efficiency power 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 hydroelectric power 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 power sites in Japan.
• Maintain/improve thermal efficiency of thermal power stations [HHV (higher heating value)]	Maintain current level [about 40%] (FY 2008 and each FY thereafter)
• Reduce SF_6 emissions; increase recovery rate during inspection and retirement of equipment	Inspection: at least 97%; Retirement: at least 99% (FY 2008 and each FY thereafter)

2 Efforts Relating to Local Environmental Issues

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

3 Ensuring Transparency and Reliability

Item	Target
• Improvement of Environmental Management Level	Continuous improvement of EMSs (FY 2008 and each FY thereafter)

Reference

*1 Environmental Action Plan by the Japanese Electric Utility Industry
Plans 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.

Fiscal 2012 Results

The Action Programs for the J-POWER Group Environmental Management Vision define Corporate Targets*, which are mid-term targets that the Group as a whole is expected to work towards. As shown below, all of the items included in the Corporate Targets for fiscal 2012 were achieved.

* In addition to Group-wide Corporate Targets, business divisions and affiliates formulate their own targets tailored to their operations.

	Item	Target			
Part 2 Efforts Relating to Global Environmental Issues	Reducing CO_2 Emissions from Power Generation and Promoting Technological Development	• 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 power 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 using J-POWER's advanced, high-efficiency power 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 hydroelectric power 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 power sites in Japan.			
		Target	Target base-year performance, etc.	FY 2011 performance	
	• Maintain/improve thermal efficiency of thermal power stations [HHV (higher heating value)]	Maintain current level [about 40%] (FY 2008 and each FY thereafter)	FY 2008 40.1% (Reference: LHV*1=41.1%)	40.6% (Reference: LHV = 41.7%)	
	• Reduce SF_6 emissions; increase recovery rate during inspection and retirement of equipment	Inspection: at least 97%; Retirement: at least 99% (FY 2008 and each FY thereafter)	FY 2008 Inspection: 99% Retirement: 99%	Inspection: 99% Retirement: 99%	
Part 3 Efforts Relating to Local Environmental Issues	• Reduce SOx emissions per unit of electric power generated (point of generation, thermal power stations)	Maintain current level [about 0.2 g/kWh] (FY 2008 and each FY thereafter)	FY 2008 0.20g/kWh	0.21 g/kWh	
	• Reduce NOx emissions per unit of electric power generated (point of generation, thermal power stations)	Maintain current level [about 0.5 g/kWh] (FY 2008 and each FY thereafter)	FY 2008 0.50g/kWh	0.48 g/kWh	
	• Increase recycling rate for industrial waste	Maintain current level [about 97%] (FY 2011 and each FY thereafter)	—	98%	
	• Protect biological diversity	Consider the protection of biological diversity in relation to business activities	—	Efforts to Preserve Biodiversity	
Part 4 Ensuring Transparency and Reliability	• Improvement of Environmental Management Level	Continuous improvement of EMSs (FY 2008 and each FY thereafter)	—	Consistent use of PDCA cycle	

Main results for FY 2012

- 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)
- Measures for mixed combustion of biomass fuels in coal-fired power stations were implemented at Matsuura Thermal Power Station and Takehara Thermal Power Station, geared to the type of fuel used. (See pp. 59-60)
- In Indonesia, measures were taken toward construction of the Central Java Project, which will be that country's first USC coal-fired power station. (See p. 60)
- Research and development work on IGCC and CCS technology was implemented as shown below.
  - The EAGLE Project conducted testing of CO_2 separation and capture technology using physical absorption methods and chemical absorption methods. (See p. 61)
  - In the Osaki CoolGen Project, work began on construction of a power station for proving trial. (See p. 62)
  - In the Callide Oxyfuel Project in Australia, tests were conducted of the world's first oxyfuel combustion at a commercial power station. (See p. 61)
- In the Ohma Nuclear Power Station Plan, construction started up again after being suspended following the earthquake. We also proceeded with study of reinforced safety measures and implemented measures to earn the trust and understanding of local residents. (See pp. 15-18)
- In steps to expand the use of hydroelectric power energy, progress was made on construction of the Isawa No. 1 Power Station and comprehensive upgrade work on the Tagokura Power Station. (See p. 63)
- Proving trials of a maritime wind power generation system (in joint research with NEDO) were implemented in waters off Kitakyushu City in order to put maritime wind power generation technology into practical use. (See p. 14)
- Environmental impact assessment procedures were implemented in the Wasabizawa-Akinomiya area as part of the development of new geothermal power sites in Japan. (See p. 63)

Main results for FY 2012	Fiscal 2012 Evaluation and Next Steps	Page Reference
40.5% (Reference: LHV = 41.5%)	• The J-POWER Group met its target, realizing a total thermal efficiency of 40.5% (HHV) for thermal power generation thanks to efforts to maintain high-efficiency operation in existing thermal power stations and to adopt high-efficiency technologies when upgrading facilities. We will continue working to maintain and improve energy efficiency in our thermal power stations.	P74
Inspection: 99% Retirement: 99%	• The FY 2012 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.	P64
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.	P66
0.51 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.	P66
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.	P67
Efforts to Preserve Biodiversity	• We pursued initiatives to harmonize our activities with the aquatic environment, to consider rare animal and plant species, and other such measures. At the same time, we also provided all Group employees with explanations of awareness of the protection of biodiversity in business operations, improving their understanding.	P69
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.	P71

*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).

FY 2013 J-POWER Group Environmental Action Guidelines

1 Efforts Relating to Global Environmental Issues

Reducing CO_2 Emissions from Coal-fired Power

- Maintain high-efficiency operation at existing thermal power stations
- Promote biomass mixed combustion 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 power 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 power using J-POWER's advanced, high-efficiency power 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
  - We will promote proving trials of maritime wind power generation systems (in joint research with NEDO) in waters off Kitakyushu City.

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 recycle power stations.
  - Increase efficiency through upgrades of existing hydroelectric power 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.
  - 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.
- Utilization and promotion of the offset credit mechanism
- 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 the 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 the J-POWER Group's Basic Policy concerning Asbestos, while systematically removing asbestos and replacing it with alternative substances.

Measures to Protect the Natural Environment

• 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 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.

• In operating power generation facilities that are involved with rivers, we will steadily promote measures for protection of the river environment. These include the implementation of sedimentation control measures according to the conditions at each location and measures to mitigate long-term persistence of turbidity.
- In operating power generation facilities that adjoin the ocean, we will implement precise control over the discharge of wastewater in compliance with environmental protection agreements and other such arrangements.

• Showing Consideration for Biodiversity
- We will show consideration for the protection of ecosystems and the diversity of species in conducting our business activities, and we will strive to protect rare animal and plant species and their habitats.

• Implement forest conservation initiatives
- Institute appropriate protections for company-owned forests based on the 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 environmentally 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 the 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 taking into consideration such social requirements 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 2012)

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

Note: The scope of applicability will include J-POWER and its 21 consolidated domestic subsidiaries, such as electric power businesses and ancillary businesses related to electric power. The amounts attributed to consolidated subsidiaries are based on percentages corresponding to J-POWER's equity share.

INPUT

Thermal Power Generation

Fuel

Coal (wet)	21.19 million tons
Heavy oil	49,000 kl
Light oil	22,000 kl
Natural gas	148.0 million Nm³
Biomass	18,000 tons

Industrial-use water 10.20 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 power 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 ($CaCO_3$)	227,000 tons
Ammonia (NH_3)	14,000 tons

Hydroelectric power

Power for pumped storage 1,500 GWh

Geothermal Power

Steam 0.37 million tons
Hot water 2.19 million tons

Internal Use at Business Sites and Offices

Electricity (purchased)

Business sites	72.30 GWh
Offices	15.43 GWh

Fuel (gasoline equivalent)

Business sites	24,620 kl
Offices	1,290 kl

Drinking water

Business sites	180,000 m³
Offices	280,000 m³

Copy paper (A4 equivalent) 62 million sheets

Business Activities

Electric Power Generated

Thermal	Hydroelectric	Geothermal/Wind
59,300 GWh	10,300 GWh	600 GWh



Auxiliary power for operation and transmission loss 5,000 GWh

Volume of electric power sold
Total 65,200 GWh

Note: Sums of figures may not equal totals in some cases due to rounding.

Supply

The electricity generated at our power stations is supplied through regional power companies to end users throughout Japan. The 65,200 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 2012 was 851,600 GWh, according to confirmed figures on electricity demand published by the Federation of Electric Power Companies of Japan.

Major Resources Recycled

Percentages indicate recycling rate.

Coal ash	1.88 million tons (99.0%)
Sludge (excluding gypsum)	8,000 tons (43.3%)
Gypsum (desulfurization byproduct)	350,000 tons (99.9%)
Sulfuric acid (desulfurization byproduct)	23,000 tons (100%)
Other industrial waste	14,000 tons (61.0%)
Waste paper	492 tons (95.5%)
Driftwood from dam reservoirs	28,000 m³ (74.3%)

Effective Utilization (cement plants, etc.)

OUTPUT

Thermal Power Stations

Emissions into the Atmosphere

CO_2	47.56 million t-CO_2
SOx	12,000 tons
NOx	30,000 tons
Soot and dust	1,000 tons

Emissions into Bodies of Water

Waste water	3.72 million m³
Waste water COD*1	14 tons

Geothermal Power Station

Hot water 2.30 million tons

CO_2 Emissions from Business-Site and Office Activities

Business sites 101,000 t-CO_2

Offices 10,000 t-CO_2

Waste*2

Industrial waste

Coal ash	18,000 tons
Other	20,000 tons

Specially controlled industrial waste

Specially controlled industrial waste 400 tons

Non-industrial waste

Waste paper	23 tons
Driftwood from dam reservoirs	9,600 m³

Reference

*1 Waste water COD
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.

*2 Waste:
The Waste Management and Public Cleansing Act defines the waste generated in conjunction with business activity as industrial waste and other waste as non-industrial waste. Industrial waste that is characterized by explosive, toxic, or infectious properties is defined as specially controlled industrial waste.

Environmental Accounting*1 and Eco-Efficiency*2

By continuing to publicly announce our environmental accounting, we seek to increase our reliability. Improving eco-efficiency 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.

Environmental Accounting

To calculate the costs and benefits of the J-POWER Group's environmental conservation activities in FY 2012 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

(unit: billion yen)

Category	Main measures and efforts	Cost
Pollution control	Air pollution control (desulfurization/denitrification, soot and dust treatment), water pollution control (wastewater treatment), etc.	18.6
Global environmental conservation	Measures to reduce greenhouse gas emissions (maintaining high-efficiency operation of coal-fired power stations, developing renewable and unutilized energy sources, maintenance costs for energy-saving equipment, emission control of greenhouse gases other than CO_2)	3.0
Resource recycling	Waste reduction through reuse and recycling; treatment and disposal of waste	18.7
Management activities	Monitoring and measurement of environmental load, labor costs for environmental conservation organizations, costs for environmental education, etc.	1.8
Research and development	High-efficiency power generation, use of fuel cells, CO_2 capture and fixation, recycling of coal ash and gypsum, etc.	2.3
Social activities	Tree-planting, environmental advertising, environmental beautification, membership in environmental groups, preparation of sustainability report, etc.	2.3
International projects	Overseas cooperation projects for environmental conservation technologies	0.9
Other	Pollution load levy	2.2
Total		49.9

Note: Sums of figures may not equal totals in some cases due to rounding.

Environmental conservation benefit

Environmental conservation benefit	FY 2012
SOx emissions intensity (g/kWh)	0.21
NOx emissions intensity (g/kWh)	0.51
Soot and dust emissions intensity (g/kWh)	0.01
CO_2 emissions intensity (kg-CO_2/kWh)	0.67
Average coal-fired power efficiency (%)	40.5
Coal ash recycling rate (%)	99.0
Industrial waste recycling rate (%)	98
Gypsum recycling rate (%)	99.9
Volume of driftwood recycled (1,000 m³)	28
Employees completing internal environmental auditor training	111
Sustainability report (copies published)	21,000
Environmental pamphlet (copies published)	7,500
Overseas consulting projects (cumulative total)	333

Note: For detailed data on each category, see pp. 73–74, Environment-Related Fiscal Year Data, in the Reference Data section.

Environmental Conservation Cost and Benefit

Total costs for FY 2012 were approximately 49.9 billion yen, with pollution control costs for preventing contamination of the air, water, etc., accounting for about 37% 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 8.9 billion yen.

Economic Benefits

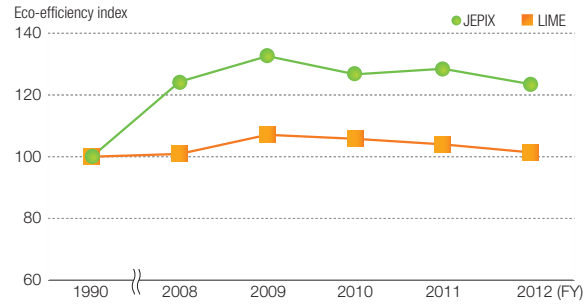
(unit: billion yen)

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 power efficiency (introduction of USC)	3.5
	Reduction in disposal costs due to coal ash, gypsum, and sulfuric acid recycling	5.0
Total		8.9

Eco-Efficiency

J-POWER initiatives to date have been evaluated by the JEPIX*1 and LIME*2 methods. These two approaches assign different coefficients to environmental loads (coal, CO_2, SOx, NOx, coal ash), and the resulting recent trends in eco-efficiency are as shown in the graph below.

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).

*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.

Reference

*1 Environmental accounting
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.

*2 Eco-efficiency
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.

Environment Part 2

Efforts Relating to Global Environmental Issues

The J-POWER Group has supported the people of Japan in their daily lives by producing electric power at hydroelectric, coal-fired and wind power stations throughout the country and transmitting that power through our power transmission and substation facilities. With our highly reliable technical capabilities, we will continue to supply electric power in a stable and efficient manner, and so bring peace of mind to people's daily lives.

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, 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

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 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

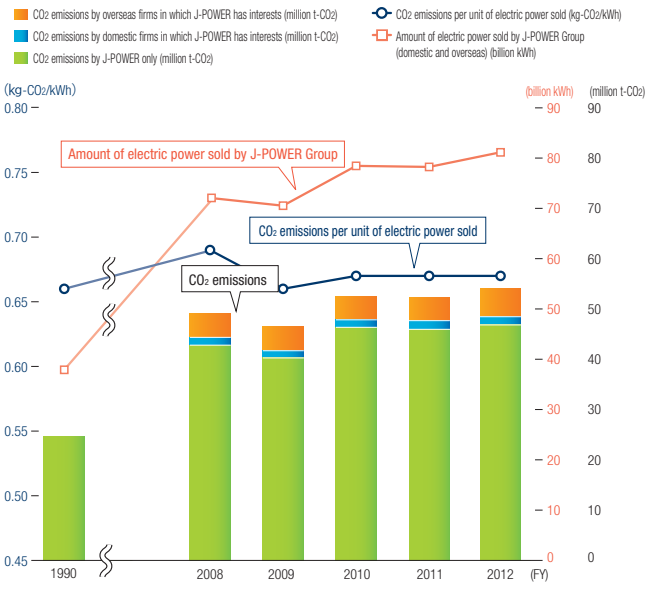
While sparing no efforts in continuing to develop nuclear power stations, with safety as our top priority and with the understanding of the local communities in the areas in which the facilities are located, we will also work to expand our use of hydroelectric, wind power, and geothermal generation.

CO_2 Emissions in FY 2012

In fiscal 2012, the J-POWER Group*1 sold approximately 80,500 GWh of electric power. Given the full operation in Japan of coal-fired power stations since the Great East Japan Earthquake, and in other countries, the high rate of operation of large thermal power stations in Thailand and the United States, and the start-up of a new coal-fired power station in China, this is a year-on-year increase of approximately 2.6% (approximately 2,100 GWh). The volume of CO_2 emissions also increased, in conjunction with this increase in operation of coal-fired power stations, to approximately 54.09 million t-CO_2, which is a year-on-year increase of approximately 3.5% (approximately 1.85 million t-CO_2). CO_2 emissions per unit of electric power sold remained similar to the previous year's figure, at 0.67 kg-CO_2/kWh.

*1 These figures include J-POWER and consolidated subsidiaries, such as electric power businesses, electric power-related businesses, and overseas businesses, as well as equity method affiliates (12 companies in Japan and 25 companies in other countries). The portions attributed to consolidated subsidiaries and equity method affiliates are based on the percentage of J-POWER's equity share.

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

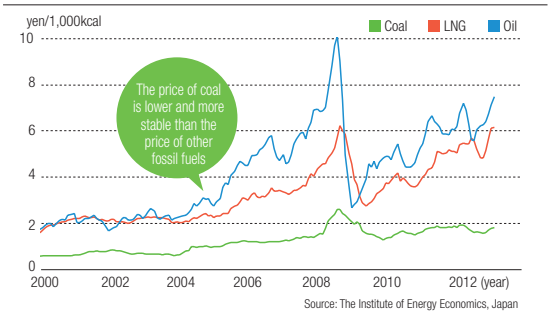


Close Up 3 Coal-Fired Power and Countermeasures Against Global Warming

The 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.

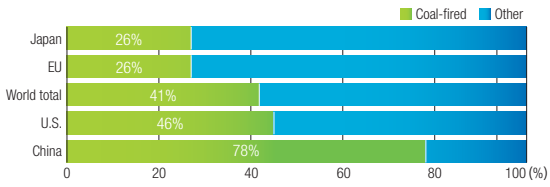
Compared to oil and natural gas, which are also fossil fuels, coal is (1) lower in cost and economically more efficient (see Fig. 1); (2) has more abundant reserves; and (3) is distributed widely around the world, so that it is also superior in terms of energy security*1. This is why 40% or more of the world's power supply comes from coal-fired power (see Fig. 2). In Japan, too, it serves as a baseload power source that has a high rate of utilization for power generation, and as such it supports the stable supply of electric power.

Figure 1: Trends in Fuel Prices



Source: The Institute of Energy Economics, Japan

Figure 2: Ratio of coal-fired generation in total power generation (2010)

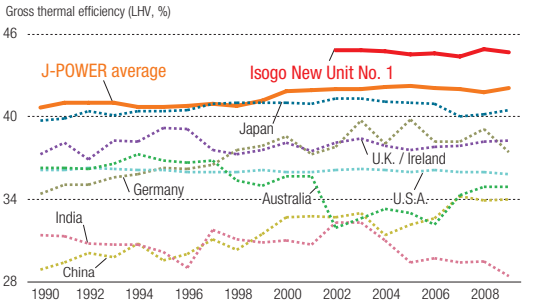


*1 Source: IEA World Energy Outlook 2012

Used widely throughout the world, coal is like other fossil fuels in that its combustion generates carbon dioxide (CO_2), which is a greenhouse gas. In China, India, and other parts of Asia in particular, where power demand is expected to remain strong, coal-fired power accounts for over half of the supply capacity, and the reduction of CO_2 emissions and coal consumption have become international issues.

Coal-fired power in Japan has achieved the highest power generation efficiency in the world through the use of ultra super-critical (USC) technology, which raises steam pressure and temperature to extreme limits (see Fig. 3). This approach is cutting back on fuel consumption while limiting CO_2 emissions per unit of generated electric power. Hypothetically speaking, if the highest level of power generation efficiency in Japan (the power generation efficiency of Isogo Thermal Power Station) were to be applied to all the coal-fired power in China, India, and the United States, it has been estimated that the CO_2 reduction impact would amount to approximately 1.47 billion t-CO_2 per year, which is equal to or greater than Japan's total emissions.

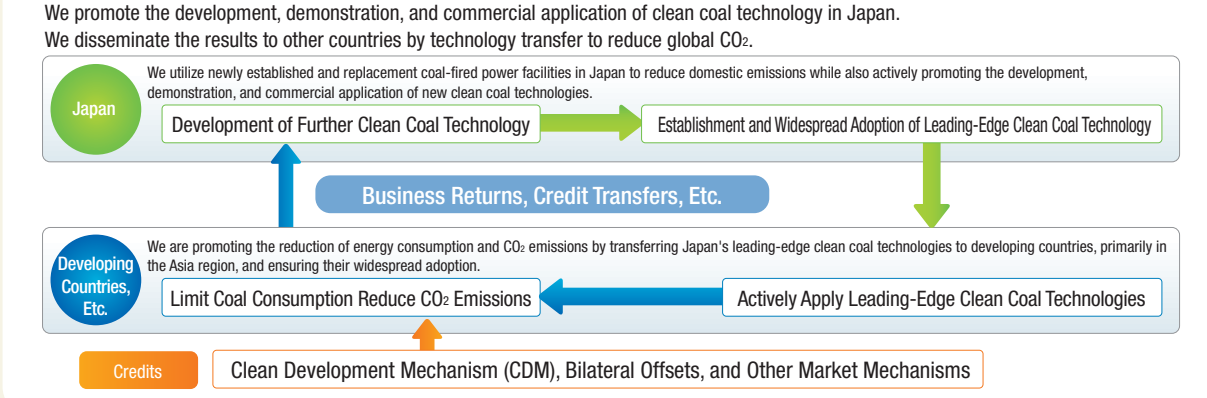
Figure 3: Comparison of thermal efficiency of coal-fired power around the world



Source: Compiled from Ecofys International Comparison Fossil Power Efficiency 2012

The J-POWER Group is pursuing measures in Japan and in other countries to promote the reduction of CO_2 emissions and energy consumption on a global scale. We are approaching this by transferring the USC and other high-efficiency coal-fired power generation (clean coal) technologies that have been developed and commercialized by the J-POWER Group in Japan to developing countries, primarily in Asia, and working for their widespread adoption there. (See Fig. 4.)

Figure 4: Global CO_2 reduction cycle achieved by high-efficiency coal-fired power generation (clean coal) technology



Reference

*1 Energy security
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.

Reducing CO_2 Emissions from Coal-Fired Power

The energy use efficiency of the 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. Going forward, we will continue making every effort to manage operations appropriately, while also moving ahead with replacement of facilities and biomass mixed combustion. In this way, we will promote the increase of efficiency and reduction of carbon in coal-fired power facilities.

Isogo Thermal Power Station –The Cleanest Coal-Fired Power Continues to Meet the Needs of the Times–

Pursuing "Harmonization of Energy Supply with the Environment" from the Initial Start of Operation

Isogo Thermal Power Station entered operation in 1967, to meet a demand for electric power that was increasing rapidly in the middle of Japan's period of high economic growth. Society had already become aware of pollution as a problem, and the J-POWER Group addressed the issue by concluding Japan's first pollution control agreement with the City of Yokohama. We were also among the first to install flue gas desulfurization equipment. Thus, from the very start, the J-POWER Group took measures to pursue its declared goal of "Harmonizing Energy Supply with the Environment."

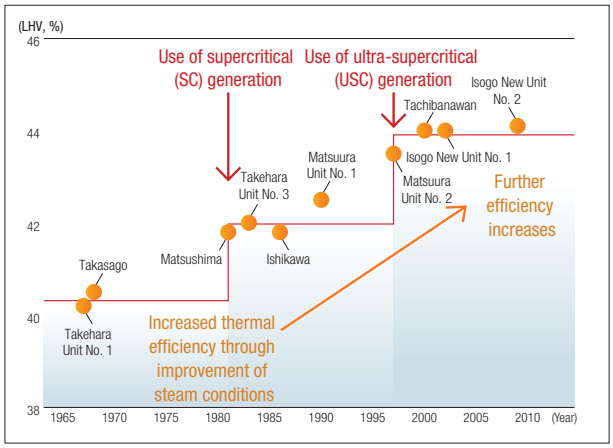
Replacement Raises Coal-Fired Power Stations to the World's Highest Level

More than 30 years having passed since it entered operation, Isogo Thermal Power Station's facilities are aging. In order to make still further contributions to providing a stable supply of electric power, as well as more conscientious environmental protection, we have implemented replacement work to upgrade to the most up-to-date power generation facilities and environmental pollution control equipment.

The introduction of USC electric power generation technology has not only achieved the highest level of power generation efficiency in the world, it has also upgraded our power generation output from 530 MW to 1,200 MW. Upgrading to leading-edge environmental pollution control equipment has reduced our SOx and NOx emissions to an order of magnitude lower than that of the major industrial countries. This reduction brings these emissions to levels on a par with gas-fired thermal power. We have also taken care to give the power station an appearance that suits the sea and cityscape of Yokohama, and this has become the world's cleanest coal-fired power station.

The old Isogo Thermal Power Station before replacement work was done

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



Isogo Thermal Power Station after completion of replacement work (Yokohama City)

Takehara Thermal Power Station Replacement Project –Replacement with Leading-Edge Coal-Fired Power Facilities–

Approximately 40 years has passed since the Takehara Thermal Power Station Unit No. 1 (output 250 MW) and Unit No. 2 (output 350 MW) entered operation. The J-POWER Group is proceeding with a replacement plan that will upgrade these units to a New Unit No. 1 (output 600 MW) that is scheduled to commence operation in 2020. At present, the environmental impact evaluation (environmental assessment) procedures are being implemented.

This replacement plan also adopts a build-and-scrap method of construction. The process from building New Unit No. 1 to starting operation will be carried out before present Units No. 1 and No. 2 are decommissioned. In this way, we will make every effort to shorten as much as possible the period when power generation is suspended, thereby contributing to the provision of a stable supply of electric power.

Rendering of completed Takehara Thermal Power Station Replacement Project

COLUMN

Isogo Thermal Power Station is a Focus of Attention by Japan and the World

Japan is now in the position of turning its mind again to the goal of "Harmonizing Energy Supply with the Environment." Therefore many visitors from Japan and other countries come to observe the Isogo Thermal Power Station, which is a coal-fired power station at the highest world level, and in fiscal 2012 there were more than 5,000 visitors. Some of these visitors remarked that their image of coal had changed, and that Japan's technology was truly remarkable.

As a showplace for the world's highest-level and most up-to-date clean coal technology built up by the J-POWER Group, the Isogo Thermal Power Station attracts attention from inside and outside Japan.

Interior of the ISOGO Energy Plaza

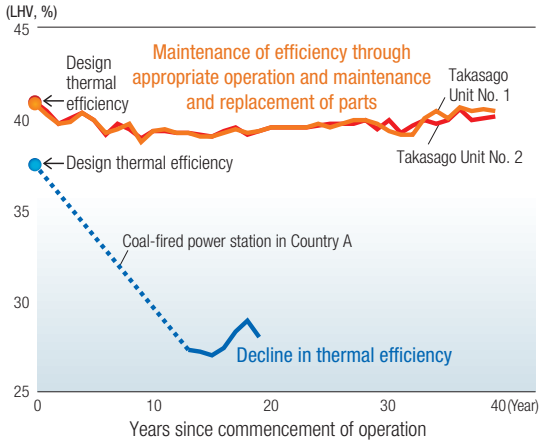
A visitor looks inside a boiler, where the temperature rises above 1,300°C

Maintaining High-Efficiency Operation

Coal-fired power stations are better able to reduce the amount of coal they use and the amount of CO_2 they emit when they have higher thermal efficiency, which is the ratio between the calorific value of the fuel supplied to the power generation facilities and the amount of electric power they generate. The J-POWER Group has achieved greater efficiency at every new power station it establishes by enhancing thermal efficiency in developing and introducing new technologies and by reducing the internal consumption rate (the electric power consumed within the power station).

On the other hand, the thermal efficiency of power generation facilities deteriorates over time. As the efficiency diminishes year by year, the implementation of appropriate operation management and facility upgrades enables continuing operation of the facilities with high efficiency rates. The J-POWER Group's Takasago Thermal Power Station has been in operation for over 40 years, but it is still able to continue in operation with thermal efficiency that is virtually unchanged from when it first entered operation.

Changes in thermal efficiency of Takasago Thermal Power Station



Promoting the Biomass Mixed Combustion

The amount of CO_2 absorbed during their lifecycle by forestry offcuts and sewage sludge is the same as the amount they emit. They are, therefore, a carbon neutral*1 biomass energy source, which means that the amount of CO_2 they generate during combustion is not counted as part of CO_2 emissions. In Japan, many of these resources still remain untapped. The most effective way of using these untapped resources is to process them into biomass fuel and use them in mixed combustion at coal-fired power stations (burning them in the boilers together with coal).

The J-POWER Group aims to reduce carbon at its coal-fired power stations by making use of untapped domestic biomass energy sources. We are engaging various issues as part of this effort while we promote the manufacture of diverse biomass fuels together with mixed combustion at 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*	① Hiroshima City, Hiroshima Prefecture* ② Osaka City, Osaka Prefecture* ③ Kumamoto City, Kumamoto Prefecture*	Fukuoka City, Fukuoka Prefecture	Saikai City, Nagasaki Prefecture*
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	Scheduled for J-POWER's Takehara Thermal Power Station and Kyushu Electric Power's Matsuura Thermal 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.

① Hiroshima Prefecture: Implementation is underway at J-POWER Takehara Thermal Power Station.
② Osaka Prefecture: Scheduled at J-POWER Takasago Thermal Power Station and other locations.
③ Kumamoto Prefecture: Implementation is underway at J-POWER Matsuura Thermal Power Station and Kyushu Electric Power Company's Matsuura Power Station.

Reference

*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.

Sewage Sludge Fuel Manufacturing Business Initiative

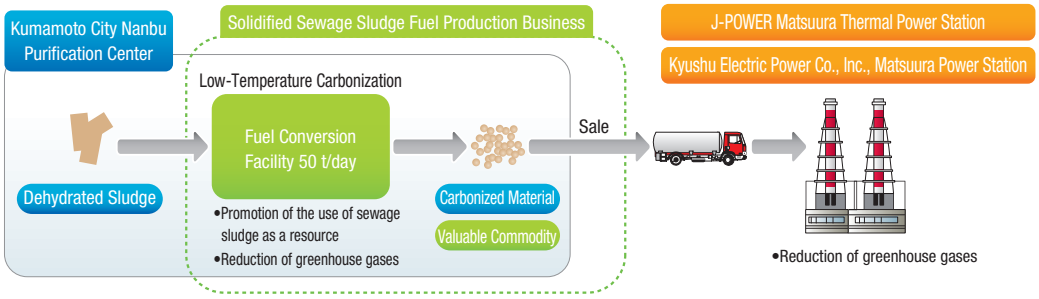
Sewage Sludge Fuel Manufacturing Business Initiative

As part of the J-POWER Group's promotion of biomass mixed combustion, we are also engaged in the business of manufacturing fuel from sewage sludge and other sources.

It used to be that almost all sewage sludge was effectively disposed of, and conversion to fuel will contribute to the effective utilization of untapped resources within Japan. The biomass mixed combustion also reduces the CO_2, which is a greenhouse gas, from coal-fired power stations. At the same time, the conversion of sewage sludge to fuel contributes to the reduction of greenhouse gases by reducing the release of N_2O (nitrous oxide).

The conversion of sewage sludge to fuel involves receiving sewage sludge from the purification center operated by local government bodies and other such organizations. That material is solidified and then sold to coal-fired power stations. This is the pattern on which we engage in the entire biomass fuel process from manufacture to mixed combustion.

Overall Flow of the Solidified Sewage Sludge Fuel Production Business



List of J-POWER sewage sludge fuel manufacturing initiatives

Classification	Hiroshima	Kumamoto	Osaka
Location	Hiroshima City-Seibu Water Resources Center	Kumamoto City-Nanbu Purification Center	Osaka City-Hirano Sewage Treatment Plant
Fuel manufacturing method	Low-temperature carbonization	Low-temperature carbonization	Low-temperature carbonization
Planned processing capacity (Dewatered sludge)	Approx. 28,000 t/year	Approx. 16,000 t/year	Approx. 49,000 t/year
Scheduled period of operation	20 years from April 2012	20 years from April 2013	20 years from April 2014
Reduction of greenhouse gas emissions ❶ Sewage treatment plants	Approx. 8,700 t-CO_2	Approx. 2,900 t-CO_2	Approx. 1,500 t-CO_2
❷ Thermal power stations	Approx. 6,400 t-CO_2	Approx. 3,400 t-CO_2	Approx. 10,000 t-CO_2
❸ Total	Approx. 15,100 t-CO_2 (Corresponding to approx. 3,000 ordinary households)	Approx. 6,300 t-CO_2 (Corresponding to approx. 1,300 ordinary households)	Approx. 11,500 t-CO_2 (Corresponding to approx. 2,300 ordinary households)
Mixed combustion in coal-fired power stations	J-POWER Takehara Thermal Power Station	J-POWER Matsuura Thermal Power Station Kyushu Electric Power Co., Inc. Matsuura Power Station	J-POWER Takasago Thermal Power Station, etc.

Measures for Technology Transfer and Widespread Adoption in Other Countries

The transfer and widespread adoption of clean coal technologies, which have been established and widely adopted in Japan, to China, India, and other Asian regions where electric power demand has increased conspicuously in conjunction with economic growth, could be anticipated to contribute simultaneously both to the growth of Asia and to limitations on CO_2. The J-POWER Group is promoting technical cooperation for the adoption of ultra super-critical (USC) technology and other such high-efficiency power generation as well as for the development of large-scale IPP projects. These activities are focused mainly on Asia.

J-POWER is working jointly with ITOCHU Corporation and PT Adaro Power on a project to construct and operate a coal-fired power station (two 1-GW units) in Central Java State in Indonesia. This is an IPP project that is planned to provide electric power to Indonesia's state-owned electricity company for 25 years. This project, which is on the largest scale of such projects in Asia, is slated to adopt ultra super-critical (USC) technology for the first time in Indonesia, and it will be a model case for environmentally friendly high-efficiency power generation.

The J-POWER Group will make good use of experience acquired in Japan to pursue a comprehensive engagement in this project. Our engagement will thereby contribute to the stable supply of electric power in Indonesia, to the reduction of the burden on the environment there, and to the transfer and widespread adoption of cutting-edge technology.

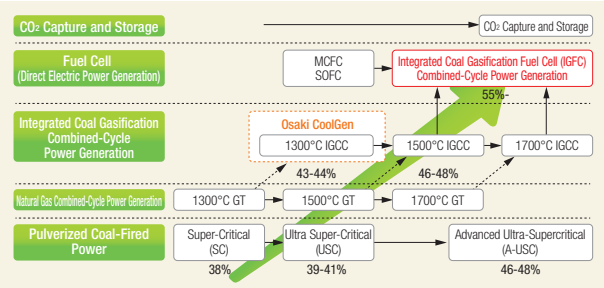
Conducting Research and Development of Next-Generation Low-Carbon Technologies

The J-POWER Group is actively pursuing technical development to achieve lower-carbon power generation. This research and development extends to IGCC, IGFC, and other such further enhanced high-efficiency coal-fired power generation technology, CO_2 capture and storage (CCS) technology, maritime wind power generation technology (p. 14), and other such next-generation renewable energy generation technology. Not stopping there, however, we are actively engaging in development of next-generation technology to achieve still further reduction in carbon emissions.

Next-Generation Low-Carbon Technology for Coal-Fired Power

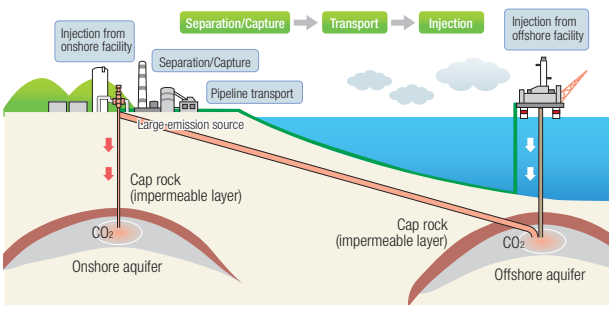
The J-POWER Group is engaged in development of advanced ultra-supercritical (A-USC) technology. This further enhances the steam conditions to achieve still greater improvement in thermal efficiency over the current state of ultra super-critical (USC) technology, which achieves the world's highest level of thermal efficiency. We are also working on integrated coal gasification combined-cycle (IGCC) power generation, which converts fuel coal into flammable gas to drive gas turbine generators in combination with steam turbine generators that use the resulting waste heat. Now we are also pursuing research and development of technology that combines IGCC with fuel cells in the triple-combined cycle of integrated coal gasification fuel cell (IGFC) combined-cycle power generation.

Thermal Efficiency Improvement by Technical Development



One technology for significantly limiting CO_2 emissions from coal-fired power is CCS technology, which separates and captures CO_2, and after transporting it, stores the CO_2 as deep as 1,000 m or more underground. Since the separation and capture of CO_2 reduces the thermal efficiency of coal-fired power, proceeding with actual application requires technology that is more efficient as well as more economical. The J-POWER Group is engaging in research and development across the full range of CCS technology with pre-combustion capture methods for CO_2 separation and capture technology in the EAGLE Project and the Osaki CoolGen Project, and the oxyfuel combustion method in the Callide Oxyfuel Combustion Project.

CCS Concept



EAGLE*1 Project

The EAGLE Project that began in fiscal 2002 as a joint research project with the New Energy and Industrial Technology Development Organization (NEDO) has implemented trial operation of oxygen-blown integrated coal gasification combined-cycle (IGCC) pilot plant facilities together with research and development of CO_2 separation and capture technology.

The results and findings developed by the EAGLE Project include coal gasification enhancement by means of a coal gasifier that can be used with a wide range of coal types and the world's highest level of cold gas efficiency*2, as well as improved efficiency in CO_2 separation and capture. These will be utilized to good effect in the Osaki CoolGen Project (next page).

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

Callide Oxyfuel Combustion Project Starts Proving Trials

Establishment of the CCS technology that is crucial to achievement of zero emission*3 coal-fired power will require research and development of storage technology together with the separation and capture technology. The J-POWER Group is participating in the Callide Oxyfuel Combustion Project as a joint Japanese-Australian public- and private-sector initiative being conducted at the Callide A coal-fired power station in Queensland, Australia. With the addition of CO_2 separation and capture testing and CO_2 underground storage testing (currently under examination) at Callide A, CCS technology will be subjected to demonstration as an integrated end-to-end system.

CO_2 liquefaction and capture proving trials, which began in December 2012, constitute the first time in the world that this oxyfuel technology devised in Japan will be put into practice at a power station that is in commercial operation. Instead of air, this oxyfuel technology supplies oxygen to the boiler for combustion, raising the concentration of CO_2 in the exhaust gas and thus reducing the energy consumed in CO_2 capture. This is a milestone in the process of demonstrating an integrated end-to-end CCS process.

Exhaust gases containing high concentrations of CO_2 are condensed and cooled to capture liquid CO_2 of a high degree of purity

Reference

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

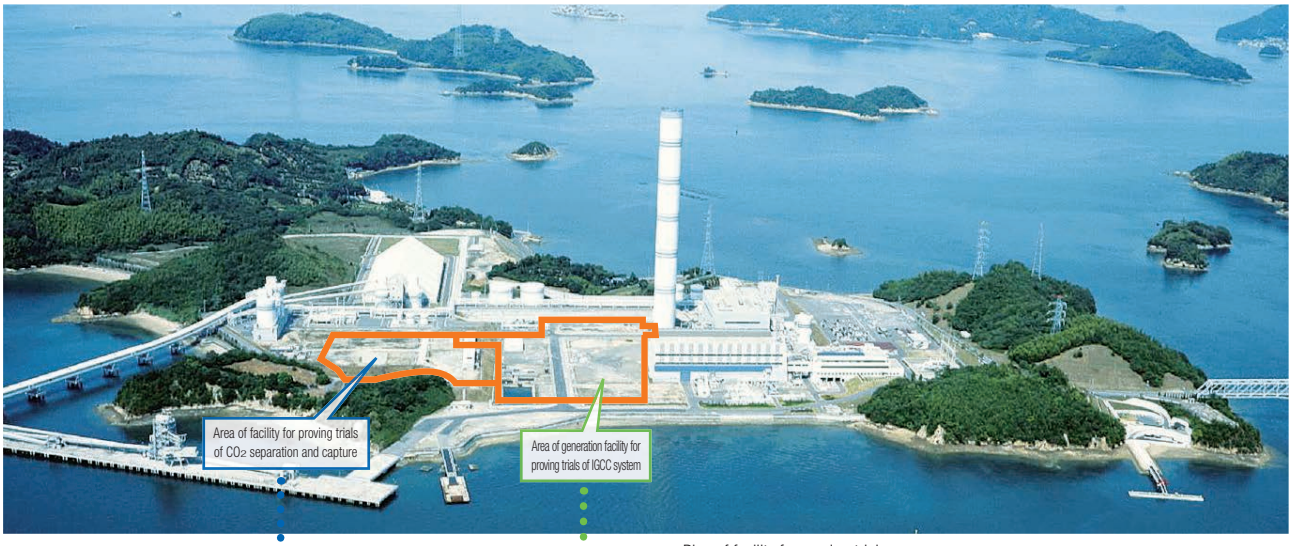
*2 Cold gas efficiency
Cold gas efficiency refers to the ratio of the calorific value of the syngas to the calorific value of the coal supplied to the gasifier. Used as an indicator of energy conversion efficiency, it is a representative value that expresses the rate of carbon conversion and coal gasification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

"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. Construction work on this large-scale proving trial power station began in March 2013. The plan is to verify the reliability, economic efficiency, and operability of this oxygen-blown coal gasification technology with 166 MW output. Tests of the latest CO_2 separation and capture technology will also be carried out to verify its applicability. 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"*4 proposed in a report made by a government deliberative committee.

Osaki CoolGen Project Schedule (Fiscal Year)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Phase 1 Oxygen-blown IGCC demonstration	Design, manufacture, installation					Proving trials				
Phase 2 CO_2 separation and capture type IGCC demonstration					Design, manufacture, installation		Proving trials			
Phase 3 CO_2 separation and capture type IGFC demonstration							Design, manufacture, installation		Proving trials	

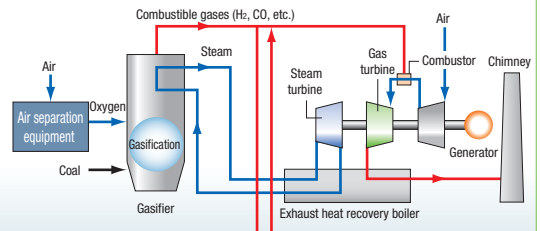


Plan of facility for proving trials (Located in the compound of Chugoku Electric Power Co., Inc's Osaki Power Station in Hiroshima Prefecture)

Integrated coal gasification combined cycle (IGCC*)

*IGCC: Integrated Coal Gasification Combined Cycle

- 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.



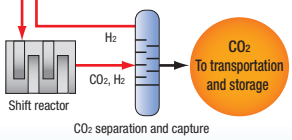
Technologies for CO_2 separation and capture

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.



TOPICS

Osaki CoolGen Corporation Starts Construction Work on IGCC Proving Trial Power Station

Osaki CoolGen Corporation started construction work on the IGCC Proving Trial Power Station on the grounds of Chugoku Electric Power Company's Osaki Power Station (Osaki Kamijima Town, Hiroshima Prefecture) on March 1, 2013. At the ceremony for safety held before construction started, the three presidents of Osaki CoolGen Corporation, J-POWER, and Chugoku Electric Power Co., Inc. performed the ritual ground-breaking together, joining as one in their commitment to construction safety.

The cornerstone-laying ceremony was attended by approximately 130 people representing the government and local communities. Invited dignitaries who gave celebratory remarks were a Senior Vice Minister of the Cabinet Office; the Director of the Coal Division, Ministry of Economy, Trade and Industry; the Governor of Hiroshima Prefecture; and the Mayor of Osaki Kamijima Town. The feeling expressed in their remarks gave renewed awareness of the great expectations for this project at the national and local levels.

The ground-breaking ceremony

Reference

*3 Zero Emissions:
The state of a power station whereby carbon dioxide and sulfur oxides, nitrogen oxides, dust, and other atmospheric pollutants are not emitted.

*4 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 power" through the combination of IGCC, IGFC (which aims towards the ultimate form of coal-fired power), and CO_2 capture and storage (CCS).

Expanding CO_2-Free Power Generation Facilities

Placing the highest priority on safety, the J-POWER Group is working on the Ohma Nuclear Power Station Plan both as a power source that does not emit CO_2 and for nuclear power generation. At the same time, we are pursuing the expanded utilization of entirely domestic renewable energy sources that do not emit CO_2 in the process of generating electric power, such as hydroelectric power and wind power (see pp. 11-14) as well as geothermal power. We are taking steps in this way to curb CO_2 emissions.

Geothermal Power

Geothermal power is not only an entirely domestic energy source that emits practically no CO_2, but is also capable of providing a stable supply of electricity throughout the year without being affected by weather. There are, therefore, high expectations for the development of this power source 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 joined with Mitsubishi Materials Corporation and Mitsubishi Gas Chemical Company, Inc. to establish the Yuzawa Geothermal Co. Ltd. We are moving ahead with the procedures for an environmental impact survey for the establishment of a new geothermal power station in the Wasabizawa and Akinomiya areas of Yuzawa City, Akita Prefecture.

The J-POWER Group seeks to contribute to the reduction of CO_2 emissions through the effective use of geothermal energy. To that end, we will proceed with promotion of geothermal power while working to gain the understanding of local residents and showing consideration for biodiversity.

Steam jet test (Wasabizawa and Akinomiya areas)

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).

The largest-scale concentration and tracking photovoltaic system in Japan, with an output of 161 kW, was established and entered operation in January 2013. A concentration and tracking system uses lenses or mirrors to collect the natural sunlight and concentrate it to an intensity of from 100 to 800 times greater. This light is then directed onto solar cells with a smaller area to generate electric power. This is a highly efficient system, but it has to follow the movement of the sunlight, and so it is used together with devices for tracking the sun.

The annual electric power production of the Hibikinada Solar Power Station reached approximately 1200 MWh in the last fiscal year. This contributed to the reduction of CO_2 emissions by approximately 570 t-CO_2.

Concentration and tracking photovoltaic system (Kitakyushu City)

TOPICS Construction of Isawa No. 1 Power Station

In order to expand hydroelectric power, which is a CO_2-free source of power, the J-POWER Group is upgrading the facilities at existing power stations to improve their efficiency while also engaging in new development. At present, we are engaged in construction of Isawa No. 1 Power Station (Oshu City, Iwate Prefecture; maximum output of 14.2 MW). This work is part of the Isawa Dam Project (dam completion scheduled in fiscal 2013) of the Ministry of Land, Infrastructure, Transport and Tourism, and it is constructing a new power station to replace the old Isawa No. 1 Power Station, which has been in operation for approximately 60 years.

Construction commenced in February 2011, aimed at the start of operation in July 2014. We are proceeding with this work while also devising environmentally friendly measures of the kind listed here.

1. Prevention of pollution of rivers and bodies of water and contamination of soil
2. Prevention of noise and vibration
3. Appropriate management of construction by-products
4. Preservation of scenery and cultural assets
5. Protection of plant and animal life in surrounding areas

Isawa No. 1 Power Station under construction (photographed in June 2013)

Efforts to Conserve Energy and Other Measures

The J-POWER Group is promoting energy conservation initiatives at business sites throughout Japan as a further extension of measures to address the global warming problem. In order to contribute to the reduction of CO_2 emissions on a global scale, we are also working to use the offset credit mechanism, and are also making efforts to limit emissions of greenhouse gases other than CO_2, as well as of ozone-depleting substances and so on, by implementing proper controls.

Promotion of Energy Saving

The J-POWER Group is promoting energy-saving programs at business sites throughout Japan. These include the operation of facilities so as to reduce their internal consumption rate, conscientious efforts to turn off lights at lunchtime and reduce standby power consumption, implementing environmentally friendly driving, and actively adopting equipment with energy-saving specifications when upgrading office equipment and vehicle leases.

In addition to energy-saving programs, we are supporting energy conservation at our business sites throughout Japan with measures such as (1) adjusting the air conditioner temperature settings (higher in summer and lower in winter) and (2) reducing lighting. We are also calling for energy saving in company dormitories, housing, and other company accommodations.

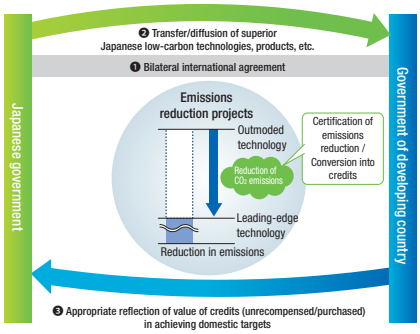
The J-POWER headquarters building in Chuo-ku, Tokyo, has been designated an Office Building for the Implementation of Special Measures to Combat Global Warming as specified in the Tokyo Metropolitan Environment Security Ordinance. We intend to satisfy the obligations set out in the First-Phase Plan period (fiscal 2010-2014) with our energy-saving activities at the headquarters building in combination with Tokyo small- and medium-sized office credits that we will acquire from the energy-saving measures put in place by the J-POWER Group companies.

Utilization of the Offset Credit Mechanism

Our measures to address the global warming problem include the J-POWER Group's promotion and development of carbon reduction technology as well as expanded use of CO_2-free electric power sources. From the perspective of CO_2 emissions reduction on a global scale, we are also working to utilize the offset credit mechanism.

We are promoting the reduction of CO_2 emissions in developing countries by means of Clean Development Mechanism/Joint Implementation (CDM/JI)*1 projects that operate using the Kyoto Mechanisms*1. In future, we also intend to participate in the Bilateral Offset Credit Mechanism*2 proposed by the Japanese government.

Bilateral Offset Mechanism



Measures to Curb Emissions of Greenhouse Gases, Etc., Other than CO_2

The Kyoto Protocol covers six greenhouse gases other than CO_2. The impact of these gases on global warming is smaller than that of CO_2, but the J-POWER Group is striving to curb emissions of these substances.

The specified chlorofluorocarbons and halons are ozone layer-depleting substances. We are taking measures such as keeping regular track of stocks and consumption to maintain proper control and limit emissions of these substances.

Stocks and consumption of specified chlorofluorocarbons and halons

Category	End of FY 2012 (tons)		Use
	Stock	Consumption	
Specified chlorofluorocarbons	1.0	0	Refrigerant
Halons	4.6	0	Fire extinguishers
Other chlorofluorocarbons, etc.	10.8	0.1	Refrigerant
Total	16.4	0.1	
Alternative chlorofluorocarbons (HFCs)	12.9	0.2	Refrigerant

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. The J-POWER Group works to reduce emissions through rigorous recovery and reuse during inspection and disposal. In FY 2012, 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 the Law Concerning the Protection of the Ozone Layer. The 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 the 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 2012, emissions totaled approximately 1,362 t.)
Methane (CH_4)	As CH_4 concentrations in flue gases from thermal power stations are below average atmospheric concentrations, emissions are effectively zero.
Nitrogen Trifluoride (NF_3)	NF_3 is used in the course of manufacturing of semiconductors, liquid crystal displays, and other such products. The J-POWER Group does not use this substance.

Reference

*1 Kyoto Mechanisms and CDM/JI:
Kyoto Mechanisms are arrangements approved in the Kyoto Protocol for the use of market mechanisms to make up for shortfalls in meeting greenhouse gas emission reduction targets by supplementary reduction activities carried out domestically. There are three of these mechanisms: Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emission Trading (IET).

*2 Bilateral Offset Credit Mechanism:
A system for quantitatively evaluating Japan's contribution to actual greenhouse gas emissions reduction and absorption by means of countermeasures and the widespread adoption in developing countries of greenhouse gas reduction technologies, products, systems, services, infrastructure, and so on, and applying that contribution to Japan's credit for reduction targets achieved.

Environment Part 3

Efforts Relating to Local Environmental Issues

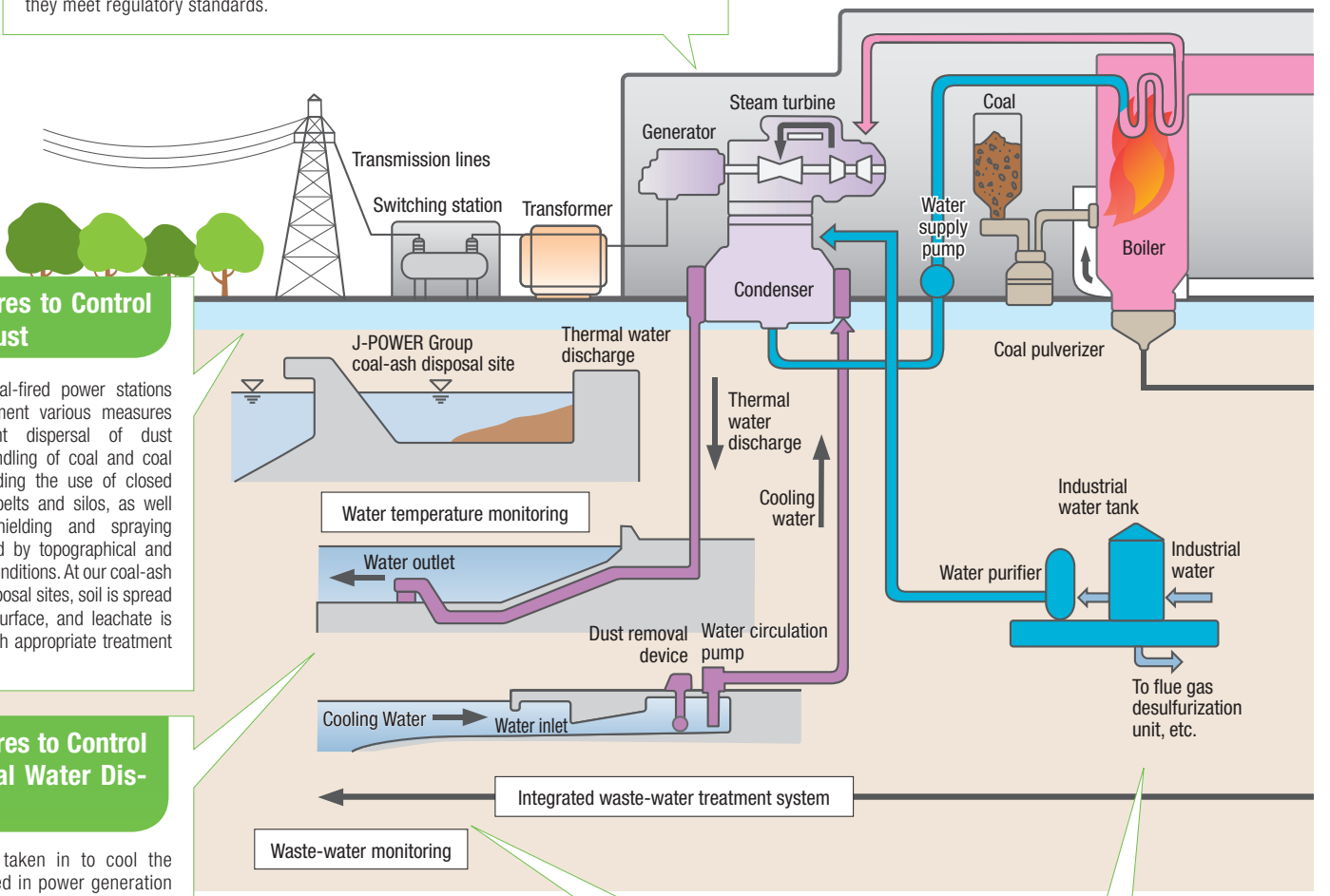
The J-POWER Group recognizes that the foundation for harmonious coexistence with local communities and regions is in protection of the natural environment and ensuring the safety and preserving the living environment of local residents. We are, therefore, taking steps to address local and regional environmental problems, including measures to reduce the impact on the environment that accompanies business activities.

Environmental Measures at Coal-Fired Power Stations

Seeking to minimize impact on the local environment from the operation of our coal-fired power stations, the 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*1. We control intake and discharge properly to reduce their impact on marine life in the vicinity, and monitor the temperature of thermal water discharge on a 24-hour basis to ensure that it remains at or below the reference values 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

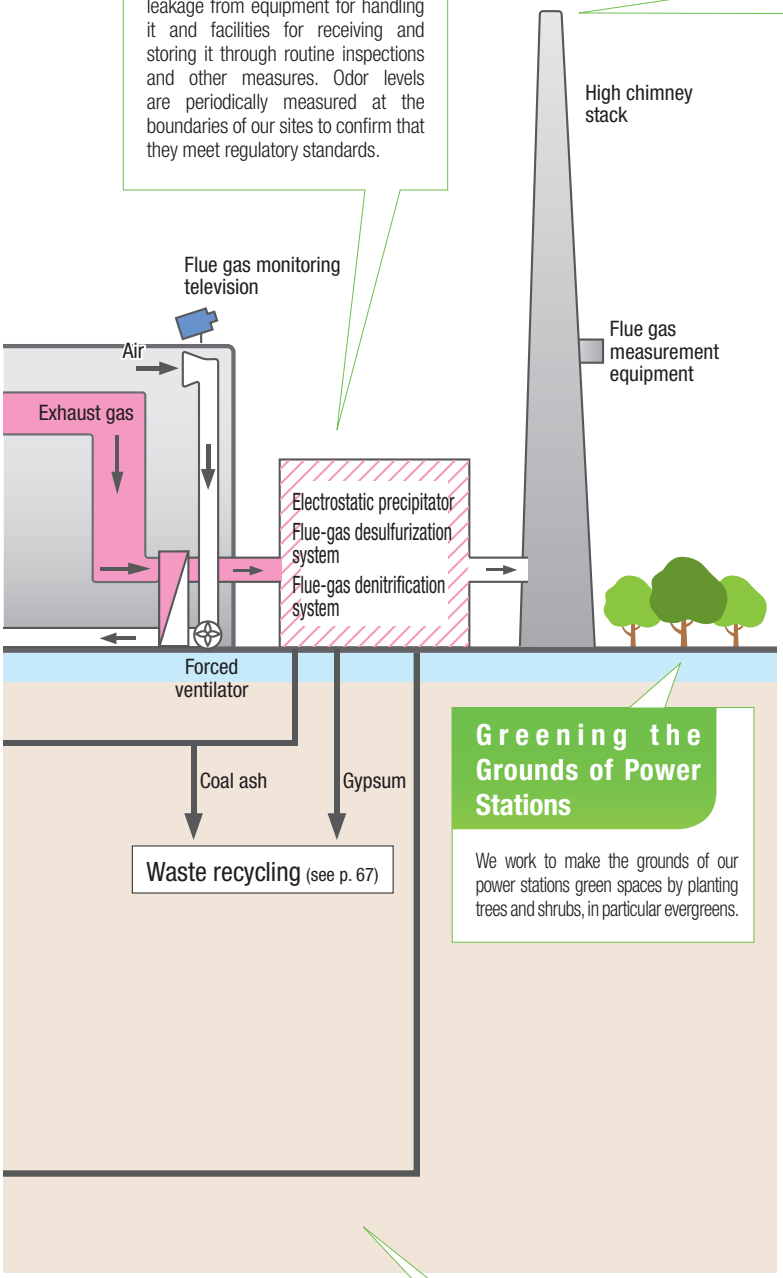
Industrial water is used in such equipment as boilers, cooling systems, and wet-type desulfurization systems. Part of this water is released into the atmosphere as steam. We are working to reduce our consumption of industrial water through the recovery and reuse, as far as possible, of wastewater that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

Reference

*1 Thermal water discharge
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.

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.



Measures to Prevent Air Pollution

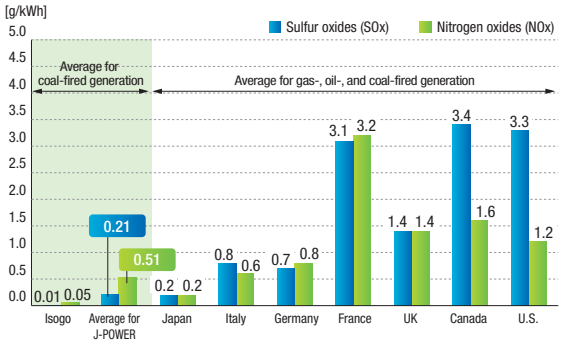
Combustion of coal and other fuels can generate sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust. To reduce these emissions we have improved our combustion methods and installed such flue-gas treatment equipment as desulfurization and denitrification systems and electrostatic precipitators. 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 2012

Substance	Equipment efficiency (removal efficiency)	Emissions	Emissions intensity
SOx	68-99%	12,300 tons	0.21g/kWh
NOx	67-93%	30,300 tons	0.51g/kWh
Soot and dust	99% (as designed)	800 tons	0.01g/kWh

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

International Comparison of SOx and NOx Emissions Intensity for Thermal Generation



*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 2012

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 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.

Measures to Prevent Oil Leaks

We implement various measures to prevent the leakage and dispersion of fuel oil, lubricating oil, and other such substances within power station grounds, to include keeping adsorbent materials constantly ready in our power stations.

Establishing a Sound Material-Cycle Society

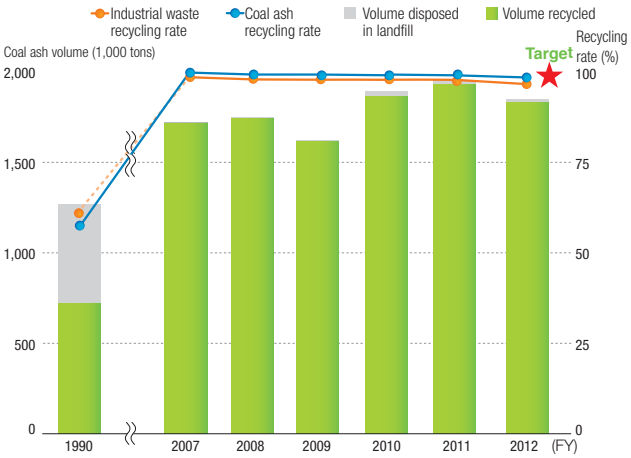
In order to help move toward achievement of a material-cycle society, the J-POWER Group will aim for zero emissions of industrial waste by curbing the generation of waste in conjunction with business activities, by utilizing resources effectively, by treating waste properly, and so on.

Reduce, Reuse, Recycle: 3R Measures

Reduction and Effective Utilization of Waste

Aiming to achieve zero emissions of industrial waste*1, the J-POWER Group has set the industrial waste recycle rate of 97% as a Corporate Target. The total amount of industrial waste we generated in fiscal 2012 was 2.3 million tons, and we achieved a recycle rate of 98%.

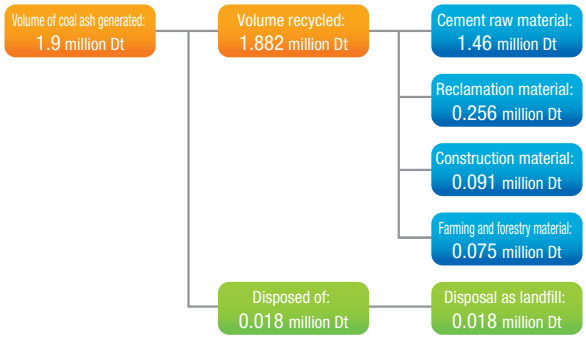
Industrial Waste and Coal Ash Recycling Rates



Making Effective Use of Coal Ash and Gypsum

The J-POWER Group's industrial waste consists of 98.0% coal ash and gypsum from coal-fired power stations. Coal ash, which is produced from the combustion of coal, is used primarily as a raw material for cement and as a land reclamation material, and 99.0% of it is put to effective use. Gypsum is produced in the process of flue gas desulfurization, and 99.9% is put to use, while 100% of the sulfuric acid is put to effective use.

Breakdown of the Coal Ash Recycle (displacement tons)



COLUMN

Utilizing Coal Ash to Contribute to Agriculture

Kaihatuhiryou Co., Ltd. is working on the effective utilization of coal ash, and it developed the world's first slow-release potassium silicate fertilizer using coal ash from coal-fired power stations. Since 1980, this has been sold to farmers throughout Japan as "Potassium Silicate Fertilizer" through the ZEN-NOH (JA-Group) cooperatives. We are committed to making a contribution to Japanese agriculture by continuing to provide superior fertilizer that is environmentally friendly.

Reduce, Reuse, Recycle: The 3R*2 in the Workplace

Every J-POWER Group business location is engaged in 3R (Reduce, Reuse, Recycle) activities. We are cutting back on chemicals, lubricating oil, photocopy paper, and other office materials and products in order to Reduce the production of waste, and we are separating and recovering paper, bottles, cans, plastics, and so on, in order to Reuse and Recycle waste materials.

Promotion of Green Purchasing

The J-POWER Group has enacted Green Purchasing*3 Guidelines and we are promoting the active procurement of environmentally friendly products. The Guidelines cover the entire range of products and services purchased by the J-POWER Group, and we are also encouraging our suppliers and subcontractors to follow environmentally friendly practices by such measures as stipulating specifications for active environmentally friendly implementation that must be built into construction and other contracts. We are also pressing for the use of low-pollution vehicles that emit less nitrogen oxides, particulate matter, and other such atmospheric pollutants for both company-owned and leased vehicles.

WEB The J-POWER Group Green Purchasing Guidelines (Japanese only)
http://www.jpower.co.jp/company_info/environment/kankyo04gl.html

Maintenance and Management of Landfill Sites

Following the amendment of laws relating to waste disposal and public cleaning, it has been obligatory since April 1, 2011 to publish maintenance and management information regarding waste disposal sites.

On the J-POWER website, we have published landfill maintenance and management plans, water quality information regarding groundwater and discharge water, information on inspections and related measures, information on industrial waste placed in landfill, and the remaining amount of landfill at disposal sites.

Reference

*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 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

*3 Green purchasing
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.

Management of Chemical Substances

The J-POWER Group is committed to thoroughgoing compliance with laws and regulations regarding chemicals and other such substances, and we conscientiously store and manage such substances.

Management of Chemical Substances

Appropriate Administration of the Pollutant Release and Transfer Register (PRTR) Law

The J-POWER Group practices appropriate management of chemical substances used in painting and coating, treatment of intake water at thermal power stations, and other such purposes. This includes our monitoring of the quantities purchased and used, and notifying the national government.

PRTR Substance Release and Transfer Volumes (FY 2012)

Substance	Use	Volume handled	Volume released	Volume transferred as waste
33: Asbestos	Insulation for equipment	4.75t/y	—	4,750kg/y
53 : Ethyl benzene	Coating for machinery	1.41t/y	1,412kg/y	—
71 : Ferric chloride	Wastewater treatment agents	16.28t/y	—	16,280kg/y
80 : Xylene	Coating for machinery	3.28t/y	2,940 kg/y	—
240 : Styrene	Coating for machinery	1.03t/y	1,032 kg/y	—
300: Toluene	Fuel for power generation (coal)	17.64t/y	17,583 kg/y	
333 : Hydrazine	Boiler water treatment agents	2.16t/y	0kg/y	—
405 : Boron compounds	Manure additives	19.11t/y	1kg/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

The J-POWER Group has incinerators at two hydroelectric power station locations to use for the carbonization of driftwood and other such purposes. We have suspended their use at present, and we are working to provide appropriate maintenance and management of the facilities in accordance with the Act on Special Measures Against Dioxins.

Management and Treatment of PCB Waste

The J-POWER Group has acted in accordance with the national government's regional treatment plan and processed 591 transformers, condensers, and other such devices (as of the end of March 2013) that contain high concentrations of PCBs in the insulating oil. We have devices such as transformers and condensers and small electrical devices such as ballasts that contain high concentrations of PCBs, as well as drums containing approximately 6 kL of insulating oil with high concentrations of PCBs, and we are storing and disposing of these appropriately.

Status of Disposal of Waste Products Containing High Concentrations of PCBs (As of the end of March 2013)

	Transformers and condensers
Units to be disposed of	887
Cumulative total of units disposed of to date	591

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. The 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.

Measures to Reduce the Quantity of Toxic Chemical Substances Handled

In addition to our measures to reduce the quantity of toxic chemical substances we handle, the J-POWER Group is making every effort to manage them properly, for example by adhering to set procedures for their use.

Appropriate Responses to Asbestos Problems

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

When it is confirmed that an item containing asbestos is in use, we systematically remove the asbestos or switch to an alternative item while managing the process appropriately to prevent dispersal. Items containing asbestos that have been removed are disposed of appropriately in accordance with the Waste Management and Public Cleansing Act.

Measures to Protect the Natural Environment

The J-POWER Group strives to harmonize energy concerns with the environment by protecting the environment at every stage of business. We promote environmental protection measures at each power station according to its environment, making efforts to show concern for biodiversity in light of the characteristics, rarity, and other aspects of the species concerned. With regard to protection of the aquatic environment, as appropriate for rivers and for oceans, this has been newly included in our Corporate Targets starting in fiscal 2013, and we are also making efforts for forest conservation and other such concerns.

Consideration for Protecting the Natural Environment at Every Stage of Business

The J-POWER Group strives to protect the natural environment at each stage of business, ranging from the planning and design of power generation facilities to construction, operation, and maintenance.

When engaging in the new construction or expansion of power stations, in particular, we conduct environmental impact assessments and take action with appropriate consideration while incorporating the views of local residents and other parties concerned. We also implement full environmental protection measures in light of monitoring results.

Consideration for Biodiversity

The J-POWER Group declared the protection of biodiversity to be one of the Corporate Targets in our Environmental Management Vision in fiscal 2011, and we are striving for the protection of biodiversity in our business activities.

Every business location sets goals for biodiversity as part of the environmental management system, and as appropriate for the environment, characteristics, etc. of the particular business location. They all engage in protection activities accordingly, and they also use e-learning and other such means to deepen their understanding of biodiversity.

We also take care not to affect the breeding of rare animal and plant species. Where there are endangered bird species, such as the Blakiston's fish owl (classified as Critically Endangered IA in the Japanese Environment Ministry's Red Data Book) that breeds in the Tokachi district of Hokkaido, and the Japanese golden eagle (classified as Critically Endangered IB in the Japanese Environment Ministry's Red Data Book) that is found in the vicinity of Okutadami Dam and Otori Dam (Fukushima Prefecture and Niigata Prefecture, respectively), we take care not to affect their breeding, for example by making every effort to avoid outdoor work during their nesting seasons.

Measures for Forest Conservation

The J-POWER Group has approximately 4,600 hectares of company-owned forests in the vicinity of hydroelectric power facilities throughout Japan. Most of that forest is located deep in the mountains. All of our company-owned forests are made up of forested land in very good, natural condition. Their highly natural condition is on a par with Japan's national parks and quasi-national parks. In view of our social responsibility to protect these precious forests that have been nurtured by their long history, the J-POWER Group has formulated Forest Protection Guidelines and is striving to carry on appropriate conservation activity.

Japan's forests also contain large amounts of forestry offcut material, such as branches and leaves, treetops, and other such material discarded after cutting for timber. The forestry offcut material can be used as biomass fuel for mixed combustion with coal at coal-fired power stations. In this way its dual roles, for its carbon neutral characteristic and as a precious, domestically produced sustainable energy source, can be maximized. The J-POWER Group is therefore promoting the conversion of forestry offcut material to fuel and the mixed combustion of that fuel at coal-fired power stations.

COLUMN

Restoration of Wetlands

In conjunction with the construction to expand Okutadami and Otori power generation facilities (implemented from 1999 to 2003), it became necessary to use the rock excavated during construction as landfill on the left bank downstream from Okutadami Dam. Since the scheduled landfill location was home to a mountain ecosystem that depends on a wetland environment, a replacement wetland was established. In this way, both landfill and wetland ecosystem protections were achieved.

Restoration of the wetland involved careful transplantation of plants and allowing the old and new wetlands to exist together for as long as possible to encourage living organisms to migrate naturally. The great care taken by the J-POWER Group in this initiative was recognized by the Japan Society of Civil Engineers Environment Award for 2004. Subsequent monitoring studies confirm that rare dragonfly species continue breeding there, and the harmonious coexistence of environmental and energy concerns continues to present its beautiful vistas.

An observation group in the Hassaki wetland, downstream from Okutadami Dam (Niigata Prefecture)

COLUMN

Forest Development Initiative in Umaji Village, Kochi Prefecture

The West Regional Headquarters of J-POWER's Hydropower Department and Umaji Village in Kochi Prefecture concluded a Yanase Watershed Forest partnership agreement in fiscal 2006 for a "cooperative forest development project with an environmentally advanced corporation." Together we have been continuing activities to protect and nurture forest in the vicinity of Yanase Dam.

The Yanase district of Umaji Village is the home of the Yanase Sugi, a famous variety of Japanese cedar that has also been designated the official tree of Kochi Prefecture. The project involves planting saplings and tree thinning by employees of the J-POWER Group companies and cooperating enterprises together with council members and employees from Kochi Prefecture and Umaji Village as well as Kitagawa Village and Nahari Town, which are municipalities in the Nahari River drainage basin, and other members of local communities, who are participating in project activities.

This program engages us with members of area communities in forest development activities that nurture bountiful forests and clean water. It also offers excellent opportunities to promote exchange with local residents.

The Yanase watershed forest program in action (Kochi Prefecture)

Consideration for Aquatic Environments

J-POWER's Conceptual Approach to Harmony with Aquatic Environments

The J-POWER Group has long pursued measures that took protection of river and ocean environments into consideration as part of our business activities. In light of the importance of such measures, "Protecting the Water Environment" was newly added to the Corporate Targets in the J-POWER Group Environmental Management Vision in fiscal 2013. Furthermore, where our Environmental Action Guidelines already contained an item titled "Consideration for Aquatic Environments," the item was revised to specify the river environment and ocean environment separately, and the item includes more specific measures accordingly.

Measures to Alleviate Long-Term Turbidity in Dam Reservoirs

Because dams have a reservoir function, they can cause the turbidity that occurs during typhoons and rainstorms to be retained in their reservoirs over the long term. The J-POWER Group takes various actions to monitor water quality, including measurement of the turbidity in river and dam reservoir waters. We are also engaged in various measures matched to local circumstances to prevent long-term turbidity. These include dam operation to discharge turbid water from the dam reservoir at an early stage, cooperation with forest improvement programs, 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 and used for power generation.

Surface water intake equipment (Yanase Dam, Kochi Prefecture)

Sedimentation Control Measures

Each year large quantities of earth flow into dam reservoirs from upstream and accumulate there. That earth builds up as sediment in the reservoir, reducing the dam's reservoir capacity, and during periods of heavy runoff (when heavy rains increase the river water volume), this can cause flood damage in areas around the dam reservoir. The J-POWER Group therefore takes measures to control sediment and prevent those kinds of impact, to include surveying the amount of sedimentation in dam reservoirs and removing sediment as necessary.

Dealing with sediment (Setoishi Dam, Kumamoto Prefecture)

Control of Wastewater Discharge into the Ocean

Wastewater discharged from thermal power stations into the nearby ocean needs to be managed in accordance with the Water Pollution Control Law and environmental protection agreements with local government bodies in order to prevent a negative impact on the ocean where it is discharged.

Wastewater may include water that has been used for cooling, so that it becomes thermal water discharge with a higher temperature. For this wastewater, the water temperature near the discharge outlets is monitored on a 24-hour basis to make certain that it stays below a certain reference temperature.

Wastewater from flue gas desulfurization equipment and other such facilities is put through appropriate treatment before discharging it into the ocean. Automatic measurements and regular analysis are carried out to make certain that values stay below reference levels.

Environmental Protection Measures in Overseas Projects

The J-POWER Group also puts the technologies and knowledge regarding environmental consideration that were developed through projects in Japan to effective use on power generation projects in other countries. We work to take environmental concerns into consideration from the project planning and fund-raising stage by implementing environmental impact assessments and other such procedures in accordance with laws and regulations in the project country. We also strive to execute those procedures regularly through the construction and operation stages.

J-POWER Group Overseas Power Generation Projects Implemented Construction in FY 2012

Country	Project	Installed capacity (Owned capacity)
Thailand	IPP projects: 2	Total 3,200 MW (2,880 MW)
	SPP projects: 7	Total 790 MW (684 MW)
China	Hezhou Coal-Fired Thermal Power Station Project	Total 2,090 MW (355 MW)

Implementation of Accurate Environmental Impact Assessments

The J-POWER Group is currently performing the following environmental impact assessments:

Environmental Impact Assessments

Name of Project Designated for Assessment	Name of Operator	Project Implementation Area
Construction plan for oxygen-blown integrated coal gasification combined-cycle generation station for proving trial (IGCC proving trial*)	Osaki CoolGen Corporation	Osaki Kamijima Town, Toyota-gun, Hiroshima Prefecture
Takehara Thermal Power Station New Unit No. 1 Facility Upgrade Plan	J-POWER	Takehara City, Hiroshima Prefecture
Wasabizawa Geothermal Power Station (Provisional Name) Siting Plan	Yuzawa Geothermal Co. Ltd.	Yuzawa City, Akita Prefecture

* Environmental impact assessment procedures for the IGCC proving trial have been completed, and we started construction of the power station on March 1, 2013.

Environment Part 4

Ensuring Transparency and Reliability

The 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.

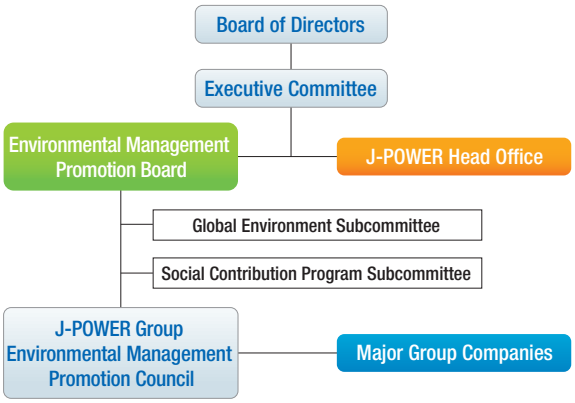
Continual Improvement in Environmental Management

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

Improvement of Environmental Management Level

On the basis of the J-POWER Group Environmental Action Guidelines, reviewed annually by management, each J-POWER Group 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 Environmental Management Organization Chart (as of March 2013)



Business Sites and Companies Receiving ISO 14001 Certification, Etc. (as of March 2013)

Business Sites and Companies Receiving ISO 14001 Certification, Etc.
Facilities managed by J-POWER regional headquarters (Hokkaido, East Japan, Chubu, West Japan): hydroelectric facilities, 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.

Raising Employee Awareness of Environmental Problems

The 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-House Environmental Training, FY 2012

Level	Category	Course/activity	Participation	Coverage of environmental statutes, compliance, etc.
General	Environmental management (general)	J-POWER Group Sustainability Report Briefing	Approx. 780 participants	J-POWER Group's efforts
		Lecture presentations on the environment	Approx. 100 participants	Introduction to status of measures in environmentally advanced corporations
	E-learning	J-POWER Group Sustainability Report (Summary)	88%	Overview of Sustainability Report
		If an oil leak occurred at a business site	89%	Response to environmental problem
Technical	EMS implementation	Training for internal environmental auditors	58 trainees	Requirements of ISO 14001, internal environmental audit methods
		Follow-up training for internal environmental auditors	53 trainees	Practice in identifying noncompliance, etc.
	Environmental laws and regulations	Skills upgrade for waste management duties	68 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	172 trainees	Explanation of environmental statutes, etc.
	E-learning	EMS course (advanced)	Continuing implementation	Requirements of ISO 14001, audit methods, etc.

Utilizing Environmental Accounting and Eco-Efficiency Indicators

We are continuously publishing our environmental accounting and eco-efficiency indicators with the aim of increasing our credibility. Please see p. 54 for our fiscal 2012 environmental conservation cost, its effectiveness, and our eco-efficiency indicators.

Reference

*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.

Business Partners, Contractors, and Suppliers Requested to Cooperate in Environmentally Friendly Activities

We provide guidance on environmental and safety consideration to business partners, contractors, and suppliers when contracting occurs or when site entry training is being provided. We also make consideration for environmental protection an obligation under our basic arrangements with major Group subsidiaries.

Responding to Environmental Problems

We make every effort to prevent environmental problems before they occur. When problems arise that require emergency handling, however, we promptly take whatever measures are required to contain the damage and we notify the local agencies concerned as well as the J-POWER Head Office Emergency Response Team and departments.

The J-POWER Head Office Emergency Response Team promptly notifies top management and, in the interest of information disclosure, provides information on the emergency to the media and other interested parties for publication. We also devise measures to prevent recurrence of the problem.

Full Compliance with Laws, Regulations, Agreements, and other Rules

In order to reduce the impact on the surrounding environment due to business activities, we take appropriate steps to implement the laws, regulations, agreements, and other such rules applicable to our business activities and make them widely known. We are also engaged in ongoing efforts to improve our facilities and operations.

In order to dispose of waste properly, we take measures to maintain and improve the disposal capabilities of waste disposal operators and other personnel involved, and we employ waste disposal consulting firms to directly confirm the status of waste disposal by local organizations.

Environmental Incidents

Of the incidents impacting the environment that occurred within the J-POWER Group in FY 2012, three incidents were reported by the mass media.

Status of Environmental Incidents

Location	Situation and Countermeasures
Tachibanawan Thermal Power Station (Tokushima Prefecture)	On July 2, 2012, light oil leaked from a flange on the emergency diesel generator fuel pipe in the main building at Tachibanawan Thermal Power Station. This occurred because the packing was damaged due to age-related deterioration, and light oil ran out through the resulting gap. For this incident, we immediately implemented emergency measures to stop the leak. We also recovered the oil that had leaked and replaced the packing. The leaked light oil was recovered within the main building. However, we carried out sampling of the groundwater under the station grounds and confirmed that there had been no influx to the ground water. As countermeasures, we changed the specifications for the flange packing as well as the inspection period, and we installed oil leak sensors inside oil fences.
Tachibanawan Thermal Power Station (Tokushima Prefecture)	On July 2, 2012, a leak of approximately 1 m^3 of wastewater occurred from the attachment flange of an agitator attached to the side of a temporary holding tank for cleansing wastewater used in the boiler exhaust heat exchanger and other such equipment at Tachibanawan Thermal Power Station. This occurred because the packing was damaged due to age-related deterioration, and wastewater ran out through the resulting gap. For this incident, we immediately implemented emergency measures to stop the leak. We also transferred the wastewater in the tank to another tank and then replaced the packing. We also conducted a sampling survey of groundwater in the vicinity of the tank and confirmed that there was no impact on the surrounding environment. As countermeasures, packing at similar locations was replaced and a dike was installed around the tank.
Matsuura Thermal Power Station (Nagasaki Prefecture)	During the period from 21:00 on August 11 until 02:00 on August 13, 2012, the average hourly concentration of nitrogen oxide in flue gas reached a maximum of 77 ppm at Matsuura Thermal Power Station Unit No. 1. This exceeded the value of 60 ppm in J-POWER's environmental protection agreements with local government bodies. (The emission standard in the Air Pollution Control Act is 300 ppm.) This occurred because, due to a fault in the oxygen content meter in the flue gas, the nitrogen oxide concentration in the flue gas could not be detected or dealt with properly. In addition, the generator was operating at reduced output that day in order to clean an air preheater, so systems were not operating under normal conditions. A separate instrument was immediately substituted and confirmed that the nitrogen oxide concentration in the flue gas was not exceeding the agreement value under present conditions (with the generator output restored to normal operation). The substitute instrument was also used for monitoring until the oxygen content meter was restored to operation. We also confirmed that other agreement levels, such as the concentration of sulfur oxides in the flue gas, were not being exceeded. As countermeasures we instituted in our effort to prevent recurrence of this problem, we reviewed the flue gas oxygen content meter inspection method, added a low-oxygen concentration alarm, and reinforced monitoring during operation.

Communicating with Society

Publication of Environmental Information

The J-POWER Group issues an annual sustainability report that is compiled and edited from three perspectives on corporate activity: Management, Society, and the Environment. We strive to assure and enhance our transparency and reliability by using Environment Ministry and Global Reporting Initiative (GRI) guidelines as references in deciding the content of the report, and by subjecting the environmental report items to a third-party audit by Ernst & Young Sustainability Co., Ltd.

Increased Engagement in Environmental Communication

Our initiatives for environmental communication extend to (1) public information by such means as our website and publications, (2) public information at public relations facilities oriented to visitors, (3) round-table discussions with experts (third parties), (4) cooperation with external assessments, and (5) cooperation with social contribution activities related to the environment.

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*1. However, fiscal 1990 data is for J-POWER only.

*1 J-POWER and its 21 consolidated domestic subsidiaries, such as electric power businesses and ancillary businesses related to electric power. The amounts attributed to consolidated subsidiaries are based on percentages corresponding to J-POWER's equity share. (However, Power Facilities (Maximum Output) and Usage of Specific CFCs figures were compiled from total amounts for the 21 consolidated subsidiaries.)

Power Facilities (maximum output)

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Hydroelectric	GW	7.09	8.56	8.56	8.56	8.56	8.56
Thermal	GW	4.65	8.18	8.79	8.79	8.79	8.79
Coal-fired	GW	4.64	7.95	8.55	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	0.02	0.02	0.02	0.02
Wind power	GW		0.25	0.27	0.35	0.35	0.35
Total	GW	11.74	16.99	17.61	17.69	17.69	17.69

Electricity Output

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Hydroelectric	GWh	12,451	9,470	10,004	11,301	11,557	10,330
Thermal	GWh	29,551	53,648	50,742	58,511	58,522	59,303
Coal-fired	GWh	29,452	52,979	50,224	58,084	57,624	58,377
Natural gas	GWh		589	415	355	862	898
Geothermal	GWh	99	80	103	72	36	29
Wind power	GWh		322	393	458	590	620
Total	GWh	42,002	63,439	61,140	70,271	70,669	70,253

Electric Power Sold

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Hydroelectric (excluding pumped storage)	GWh	10,046	8,384	9,214	10,267	10,318	9,033
Thermal	GWh	27,293	50,122	47,364	54,786	54,777	55,577
Coal-fired	GWh	27,206	49,505	46,887	54,388	53,946	54,722
Natural gas	GWh		547	383	327	803	836
Geothermal	GWh	87	70	94	71	28	19
Wind power	GWh		310	379	442	562	596
Total	GWh	37,338	58,816	56,957	65,495	65,657	65,206

Fuel Consumption

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Coal (dry coal 28 MJ/kg equivalent)	million t	9.56	16.97	16.09	18.51	18.04	18.49
Use intensity (coal-fired)	t/GWh	351	343	343	340	338	338
Natural gas	million m^3N		99	71	60	142	148
Heavy oil	million kl	0.10	0.04	0.04	0.04	0.04	0.05
Diesel	million kl	0.01	0.03	0.05	0.03	0.03	0.02

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

Greenhouse Gas Emissions

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
CO_2 emissions (domestic and overseas power generation)*2	million t-CO_2	24.67	49.07	46.52	52.54	52.24	54.09
Intensity	kg-CO_2/kWh	0.66	0.69	0.66	0.67	0.67	0.67
(domestic power generation)*3	million t-CO_2	24.67	44.35	41.7	47.84	47.67	48.41
Intensity	kg-CO_2/kWh	0.66	0.74	0.72	0.72	0.71	0.73
SF_6 emissions	t	–	0.1	0.0	0.1	0.1	0.1
Handled	t	–	7.9	5.9	12.0	11.1	6.5
Recovery rate	%	–	99	99	99	99	99
HFC emissions*4	t	–	0.1	0.2	0.1	0.1	0.2

*2: This covers J-POWER and consolidated subsidiaries, such as electric power businesses, electric power-related businesses, and overseas businesses, as well as equity method affiliates (12 companies in Japan and 25 companies in other countries). The portions attributed to consolidated subsidiaries and equity method affiliates are based on the percentage of J-POWER's equity share.

*3: This covers J-POWER and nine consolidated subsidiaries, such as electric power businesses and electric power-related businesses, as well as three equity method affiliates. The portions attributed to consolidated subsidiaries and equity method affiliates are based on the percentage of J-POWER's equity share.

*4: The same tabulation as for Usage of Specific CFCs was used.

Note: Denominators for emission intensity represent electric power sold.

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

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Average thermal efficiency (at generation point)	%	39.0	40.1	40.3	40.5	40.6	40.5

Usage of Specified CFCs

		Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Specified CFCs	Stocked	t	3.6	1.7	1.0	1.0	1.0	1.0
	Consumed	t	0.7	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
Other CFCs	Stocked	t	2.8	9.2	12.6	11.9	11.4	10.8
	Consumed	t	0.0	0.3	0.1	0.2	0.2	0.1
HFCs (CFC alternatives)	Stocked	t	–	10.8	11.3	12.0	12.0	12.9
	Consumed	t	–	0.1	0.2	0.1	0.1	0.2

SOx, NOx, and Soot and Dust Emissions

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
SOx emissions	1,000 t	9.9	10.6	8.1	10.1	12.1	12.3
Intensity (thermal)	g/kWh	0.34	0.20	0.16	0.17	0.21	0.21
NOx emissions	1,000 t	26.4	26.7	22.3	28.0	28.5	30.3
Intensity (thermal)	g/kWh	0.90	0.50	0.44	0.48	0.48	0.51
Soot and dust emissions	1,000 t	1.0	0.8	0.6	0.8	0.7	0.8
Intensity (thermal)	g/kWh	0.03	0.02	0.01	0.01	0.01	0.01

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

Industrial Waste Recycling

	Unit	–	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Volume generated	million t	–	2.14	2.00	2.34	2.38	2.30
Volume recycled	million t	–	2.10	1.96	2.26	2.33	2.26
Recycle rate	%	–	98	98	97	98	98

Coal-Ash and Gypsum Recycling

	Unit	FY 1990	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Coal-ash created	1,000 t	1,257	1,747	1,669	1,936	1,957	1,900
Recycled	1,000 t	719	1,736	1,660	1,900	1,939	1,882
Recycle rate	%	57.2	99.4	99.4	98.1	99.0	99.0
Gypsum created	1,000 t	–	330	263	320	362	352
Recycle rate	%	100	100	100	100	99.8	99.9

* For details on coal-ash recycling rate, see p. 67.

Office Power Consumption

	Unit	–	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Power consumed by offices (company total)	GWh	–	21.24	21.06	21.39	19.40	19.48
Head office*5 power consumption	GWh	–	8.61	8.53	8.22	7.31	6.99
Lighting/power sockets	GWh	–	1.72	1.71	1.65	1.25	1.33

*5: J-POWER head office building
·Figures 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 2008	FY 2009	FY 2010	FY 2011	FY 2012
Consumption	kl	–	1,308	1,345	1,289	1,299	1,290

·Corrected for expansion, contraction, etc. of the range of data available for compilation.

Rate of Procurement of Recycled Copy Paper

	Unit	–	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Copy paper*6 purchased	million sheets	–	56.05	57.17	56.77	58.77	61.50
Recycled copy paper*6 purchased	million sheets	–	55.18	56.79	56.38	58.14	61.25
Recycled copy paper*6 purchase rate	%	–	98	99	99	99	99

*6: A4 paper-size equivalent

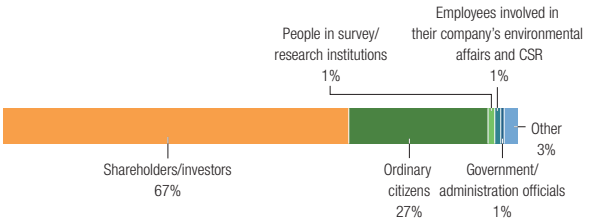
External Evaluation and Outside Opinions

The 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 the J-POWER Group and work to improve our business activities. We also enhance our transparency and reliability by making such comments public.

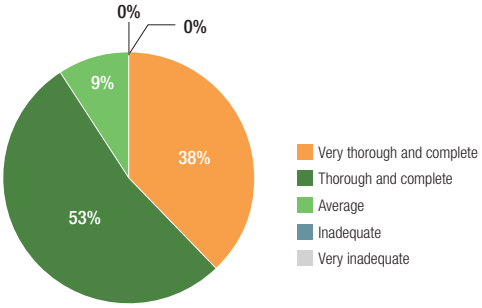
Readers' Opinions

We received many comments from readers in response to the J-POWER Group Sustainability Report 2012 (published July 2012) (1,088 respondents). We consider these valuable comments to be important guidelines for compiling subsequent reports and for the future initiatives of the J-POWER Group, and intend to put their lessons to use in our corporate activities.

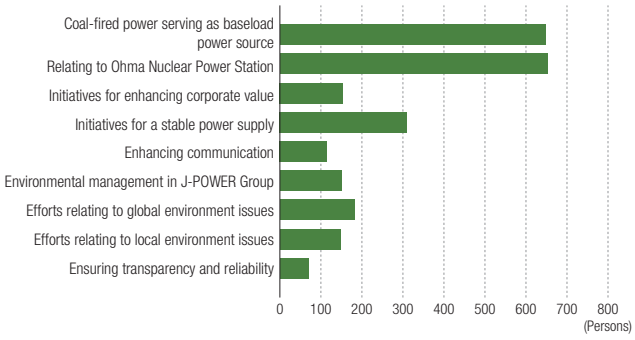
Breakdown of survey respondents



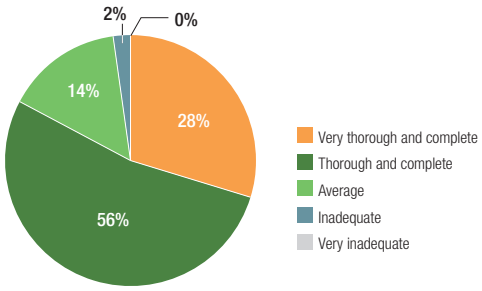
Quantity and quality of information in the report



Items of particular interest (multiple answers)



Design and layout of report



Expectations for J-POWER Group

Typical Comments	Typical Comments
The International Energy Agency is predicting that the use of coal will continue to increase in the future, and I think you should do everything in your power to help achieve a low-carbon society by reducing CO_2 emissions.	The J-POWER Group has the goal of "Harmonizing Energy Supply with the Environment," and the measures we are taking include "Reducing CO_2 Emissions from Coal-Fired Power," "Conducting Research and Development of Next-Generation Low-Carbon Technologies," and "Expanding CO_2-Free Power Generation Facilities." In the mid- and long-term perspectives, we are striving by these measures to realize a stable supply of energy and reduce CO_2 emissions domestically and internationally with technology as our central focus. (Please see "Efforts Relating to Global Environmental Issues" on pp. 55-64 of this report.)
I hope you will take all possible safety measures against earthquakes, tsunami, and other disasters in Ohma Nuclear Power Station Plan.	At Ohma Nuclear Power Station, we view the accident at Fukushima Daiichi Nuclear Power Station with great seriousness, and we are implementing a variety of measures to reinforce safety. Construction started up again in October 2012. As we proceed, the J-POWER Group will also take the new regulatory standards of the Nuclear Regulation Authority into account as we steadily implement safety measures, and in this way we intend to build a power station that people in the area can rely on. (Please see "The Ohma Nuclear Power Station" on pp. 15-18 of this report.)
I hope that you will strengthen your moves toward further development and utilization of renewable energy sources.	Where hydroelectric power, wind power, geothermal power, and other such renewable energy sources are concerned, the J-POWER Group will strive to provide a stable supply of electric power by providing for the stable operation of existing power stations. We are also engaging in development and expansion of CO_2-free electric power sources (electric power sources that do not emit CO_2 when generating power) that are entirely domestically produced. (Please see "Special Feature" on pp. 7-14 and "Expanding CO_2-Free Power Generation Facilities" on p. 63 of this report.)
Please continue your measures to provide a stable supply of electricity and don't ever stop.	In keeping with the J-POWER Group's 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," we will use our highly reliable technical capabilities and unflagging initiatives for operation and maintenance to continue providing a stable and efficient supply of electric power in Japan and other countries. (Please see "Measures for a Stable Supply of Electricity Power" on pp. 25-30 of this report.)
When I found out that you are engaged in projects in various countries in Asia, it struck me that J-POWER is a dependable presence overseas as well as here.	The J-POWER Group's projects in other countries have given us a track record and know-how from a half-century in various different countries of the world together with power generation facilities having approximately 38 GW of capacity (approximately 4 GW of owned capacity). We are reinforcing our efforts to place this overseas business side by side with our electric power generation business in Japan, so these businesses make "two pillars" together. We are also aiming to contribute to the simultaneous achievement of growth in Asia through Japan's clean coal technology and reduction of the burden on the environment. (Please see "Measures for the Stable World Supply of Electric Power" on p. 32 of this report, and "J-POWER Electric Power Generation Business in Thailand" on pp. 33-34.)

Other comments and our responses can be viewed on our website.

WEB http://www.jpower.co.jp/company_info/environment/pdf/er2012pdf/er11/er11-3/pg.html (Japanese Only)

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 2013, 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.

EY
Building a better working world

Translation

The following is an English translation of an independent assurance statement 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

Date: 10 July, 2013

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

Kenji Sawami
Representative Director
Ernst & Young Sustainability Co., Ltd.

1. Scope and Purpose of Assurance Engagement

We, Ernst & Young Sustainability Co., Ltd., have been commissioned by Electric Power Development Co., Ltd. (hereafter the "Company") to provide limited assurance on the "J-POWER Group Sustainability Report 2013 (the "Report") posted on the Company's Web site (hereafter the "Report").

The purpose of our assurance engagement is to perform the limited assurance work to determine whether the Key Sustainability Performance Indicators*1 (hereafter the "Indicators") of the Company and its major subsidiaries for the year ended March 31,2013 included in the Report were measured, calculated and reported in accordance with the Company's Reporting Standards*2 and the Company's policies and standards, and were contained in all material respects and to express a conclusion based on the work performed.

The Company is responsible for the preparation of the Report. Our responsibility is limited to independently express a conclusion on the Indicators.

*1 "Indicators" means the information defined in the Sustainability Reporting Assurance and Registration Criteria (Revised in February 2013 by The Japanese Association of Assurance Organizations for Sustainability Information).

*2 The Reporting Standards refer to the Environmental Reporting Guidelines 2012 (Published in April 2012 by Ministry of the Environment) , Sustainability Reporting Guidelines Version 3.0 (Revised in October 2006 by Global Reporting Initiative), and the important information subject to disclosure are identified in accordance with the Sustainability Reporting Assurance and Registration Criteria.

2. Summary of Assurance Procedures Performed

We performed limited assurance procedures in accordance with the International Standard on Assurance Engagements - Assurance Engagements Other than Audits or Reviews of Historical Financial Information (ISAE 3000), revised in December 2003 by the International Federation of Accountants and the Practical Guidelines for the Assurance of Sustainability Information, revised in December 2012 by the Japanese Association of Assurance Organizations for Sustainability Information. In a limited assurance engagement, assurance procedures are more limited than those of a reasonable assurance engagement conducted in accordance with ISAE3000. Therefore, the level of assurance provided is not as that provided by a reasonable assurance.

The summary of the procedures we performed for our assurance engagement is as follows:

- Reading relevant documents with regard to the Company's Reporting Standards and the Company's policies and standards and inquiring of personal responsible thereof;
- Reading relevant documents with regard to the design of the Company's internal control of the Indicators and inquiring of personal responsible thereof at the headquarters and the sites visited;
- Performing analytical procedures of the Indicators at the headquarters and the sites visited; and
- Agreeing to supporting documents and recalculating with part of the Indicators at the headquarters and the sites visited on a test basis.

3. Conclusion

Based on the assurance procedures performed, nothing has come to our attention that caused us to believe that the Indicators for the year ended March 31, 2013 were not measured, calculated and reported in accordance with the Company's Reporting Standards and the Company's policies and standards and were not contained in all material respect.

4. Independence

We have no conflict of interest relationships with Company that are specified in the Code of Ethics of the Japanese Association of Assurance Organizations for Sustainability Information.

Independent third-party certification of J-POWER Group Sustainability Report 2013

Document review
(Minami Kyushu Power Administration Office, Kumamoto Prefecture)

Site inspection (Tachibanawan Thermal Power Station, Tokushima Prefecture)

Document review (J-POWER head office)

Third-Party Opinion

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 2013.

The Nature of Sustainability Initiatives for the World as a Whole and for the Local Region

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

When we think about energy resources for the earth as a whole, we see that at present, the role played by coal-fired power is quite large. Looking at the mix of power sources, too, we can see that from a global perspective, the mix is dependent on coal-fired power. From the perspective of global environmental problems, the issue faced at the moment is how to assure a stable supply of power while at the same time taking steps to reduce carbon emissions.

J-POWER has the highest level of technology in the world for coal-fired power. In adopting technologies they have established by dealing with issues up to now, and deploying them widely in conjunction with a reduction in carbon emissions, they are also contributing to measures against global warming.

In thermal power, if biomass is used as the fuel to burn, then it may contribute also to renewable energy source technology. I hope that you will take a long-term view, and promote still further reduction in carbon emissions while seeking to improve your technology. In the cities, in particular, where the population is concentrated, I think city trash and sludge and so on should be made into biomass fuel and burned in power stations. There is also plant biomass, which is easier to make use of by region, and I think efforts should be made to expand its scope, as well.

As far as renewable energy sources are concerned, the conceptual approach of building them by region and using them by region has become important today. This should also be positioned as a social contribution that supports measures with social significance, not just as economically efficient.

Meanwhile, there is wind power generation, for which research and development have recently focused on maritime wind power. However, bird strikes are not the only issue, since the effects of erecting structures in the ocean are unknown. As regards the ocean, the main element is fishing industry countermeasures, and the current situation appears to be that biodiversity is not very well understood. As development proceeds in the future, the impact on biodiversity will need to be taken fully into consideration, solid surveys and assessments will have to be performed, and measures will have to be devised to deal with the issues.

Engaging in Appropriate Information Disclosure as a Trusted Corporation

Director and Certified Public Accountant PricewaterhouseCoopers Sustainability Co., Ltd. **Ryoji Terada**

The direction taken by energy policy will often influence the core of electric power company management. J-POWER is a private enterprise, but due to the nature of its business is called upon to manage its operations to be in line with national government policy.

This is also the case with nuclear power, and the Ohma Nuclear Power Station, which is now under construction, has been a focus of attention in society. As part of its weighty social responsibility, J-POWER will be called upon to implement measures based on objective analysis and assessment of the diverse technological, economical, environmental, and social aspects related to Ohma Nuclear Power Station, and to provide still further information disclosure.

Meanwhile, coal-fired power makes up 40% of the world's electric power. In this context, as the possessor of the world's highest level of power generation efficiency in coal-fired power, J-POWER's measures to deploy USC generation, IGCC, and other such technologies in a global replacement initiative are extremely effective from the practical perspective of reducing emissions. I look forward to more advanced practical implementations in the future as J-POWER combines this strategically with a phased expansion of renewable energy sources.

As they are at present, renewable energy sources also face the bottlenecks of higher power generation cost and instability. However, J-POWER is aiming to deploy this technology actively out of concern over global warming. Expansion of the feed-in tariff program will lower facilities costs, in addition to which J-POWER can use the highly efficient thermal power and other existing facilities it owns to make up for the instability. Further promotion of this approach can therefore be anticipated.

Having gone through the earthquake disaster, people have focused their attention on energy, and the notion of what an electric power business should be appears to be on the point of changing significantly. In this context, electric power companies will be called upon to provide more explanation than before of the events leading to their own management decisions. It will be by performing multifaceted analysis of the business environment and implementing objective, good-faith disclosure, with figures, of information about the issues, including strategy, planning, objectives, and financial aspects, taking into account government policy and public opinion, that a corporation will be able to further enhance its reliability. I think this may prove to be an important key for J-POWER to survive the coming changes.

Toward Diversification of Energy Sources at Various Stages

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

It is a basic principle that the stable supply of energy be supported by diversifying the sources of electric power. From the perspective of energy security, and taking Japan's energy self-sufficiency into account, it is important to secure diverse electric power sources, and those sources also include nuclear power.

The volume of natural gas currently being used in Japan as a whole is enormous, and due to circumstances in the supplying countries, there is a risk that the price will become unstable. One value of the options provided by having diverse sources of electric power is bargaining power with respect to natural gas. However, the world does not yet seem to properly appreciate that value.

As the owner of a large coal-fired power capacity, J-POWER must diversity its sources of fuel for that coal-fired power. Securing the supply chain from upstream to downstream will also be crucial.

From the perspective of the diversification of electric power sources, the possibility of combining or otherwise using renewable energy sources with some other electric power sources should be considered. The problem with renewable energy sources is supply stability, and I think that serious thought could well be given to combining those renewable sources with existing electric power sources so that they complement each other.

Since the Great East Japan Earthquake, measures against global warming should be reconfigured on the basis of new preconditions. In addition to the highly efficient utilization of coal, which has been pursued from well before, serious examination should also be given to the possibilities of diversifying electric power sources by such means as combining renewable energy sources with LNG thermal power, and the true costs of doing so.

Toward Further Utilization of Renewable Energy Sources that Have Roots in Local Communities

Journalist, Environmental Counselor **Yuko Sakita**

As the dependence on nuclear power has grown problematic since the Great East Japan Earthquake, public concern over energy sources has been increasing.

In a country like Japan that has a low degree of energy self-sufficiency, various different energy sources have to be sought. Considering the stable supply of electric power from the perspective of energy security, it is important to think in a systematically organized manner about energy as a whole, meaning not just coal-fired power, but also including natural gas and renewable energy sources. Measures for thermal power generation, in particular, together with measures to address their CO_2 issues and other aspects of environmental consideration are going to be of great importance.

The utilization of renewable energy sources is becoming an increasingly essential element in measures to address CO_2 issues, but I do not think that renewable energy sources have come anywhere close to exhausting their potential as yet. I have expectations for the thoroughgoing utilization of "energy sources with roots in local communities." Even though local government bodies and communities are interested in energy matters, however, my impression is that they do not have sufficient knowledge and experience to judge which energy resource utilization is appropriate for their locality. It is my hope that J-POWER will take action, for example by providing advice on creating energy facilities suited to the locality, and in doing so contribute to regional revitalization.

As far as nuclear power is concerned, this is not something that can immediately be reduced to zero, considering both Japan's energy self-sufficiency and global warming countermeasures. It will also be an important source of electric power in terms of supporting growth in countries throughout the world, and particularly in Asia and Africa. I would like to see J-POWER create something that can serve as a model for the future while giving across-the-board attention to safety.

A Response to Opinions

"Harmonizing Energy Supply with the Environment" is a basic policy of J-POWER management, and we consider measures to provide a stable supply of energy and reduce carbon to be crucial issues for the J-POWER Group management. To that end, we will approach issues from our areas of strength, such as "Reducing CO_2 Emissions from Coal-Fired Power," "Conducting Research and Development of Next-Generation Low-Carbon Technology," and "Expanding CO_2-Free Power Generation Facilities." In our mid- to long-term perspective, we will situate technology as our central focus and strive to reduce CO_2 emissions and realize a stable supply of energy for Japan and the world.

We intend to be guided by these experts' opinions as we engage each of the issues before us. In doing so, we will raise every J-POWER Group member's awareness of "harmonizing energy supply with the environment" and heighten our consciousness of "energy sources with roots in local communities," as well as of "harmonizing with local communities and society at large."

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

J-POWER Group Overview (As of the end of March 2013)

Group Overview

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: 2,373
	J-POWER Group: 7,156
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*1 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*2.

*1 Wheeling: 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.

*2 New Energy: Forms of energy that are designated in ordinances related to the Law Concerning Special Measures to Promote the Use of New Energy and that the J-POWER Group is engaged in include geothermal, wind, biomass, and solar power.

Overview of facilities

Wholesale power supply

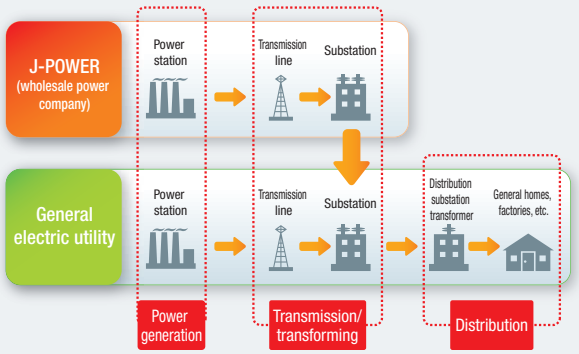
• Power generation facilities (output)		
Hydroelectric power stations	58	8.56 GW
Thermal power stations (including 1 geothermal)	8	8.43 GW
	Total 66	16.98 GW
• Transmission lines		2,408 km
AC power transmission lines		2,141 km
DC power transmission lines		267 km
Substations (output)	4	4.30 million kVA
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



Major Consolidated Subsidiaries (Percentage figures in parentheses are J-POWER equity shares)

J-POWER Group

71 consolidated subsidiaries

Electric power-related business (25 companies)

- JPec Co., Ltd. (100%)
- JPHYTEC Co., Ltd. (100%)
- JP Business Service Corporation (100%)
- KEC Corporation (100%)
- JP Design Co., Ltd. (100%)
- J-POWER EnTech, Inc. (100%)
- J-POWER RESOURCES Co., Ltd. (100%)
- Japan Network Engineering Co., Ltd. (100%)
- JM Activated Coke, Inc. (100%)

and 16 other companies

Electricity business (12 companies)

- Bay Side Energy Co., Ltd.(100%)
- ITOIGAWA POWER Inc.(80%)
- Ichihara Power Co., Ltd.(60%)
- J-Wind Co., Ltd. (100%)
- Green Power Aso Co., Ltd. (100%)
- Minami Kyushu Wind Power Co., Ltd. (99%)
- Nagasaki-Shikamachi Wind Power Co., Ltd. (70%)
- Nikaho-Kogen Wind Power Co., Ltd. (67%)
- Sarakitomanai Wind Power Co., Ltd. (49%)

and 3 other companies

International business (27 companies)

- 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 Consulting (China) Co., Ltd. (China)

and 23 other companies

Other (7 companies)

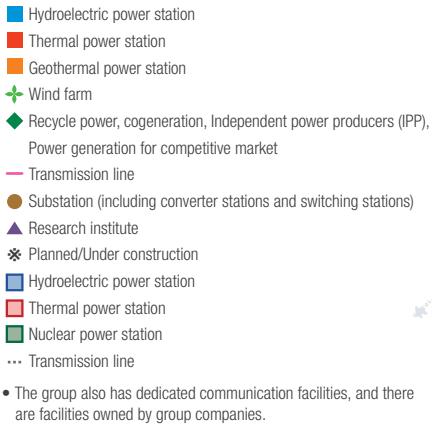
- Kaihatuhiryou Co., Ltd. (100%)
- Omuta Plant Service Co., Ltd.
- Ecogenomics, Inc.

and 4 other companies

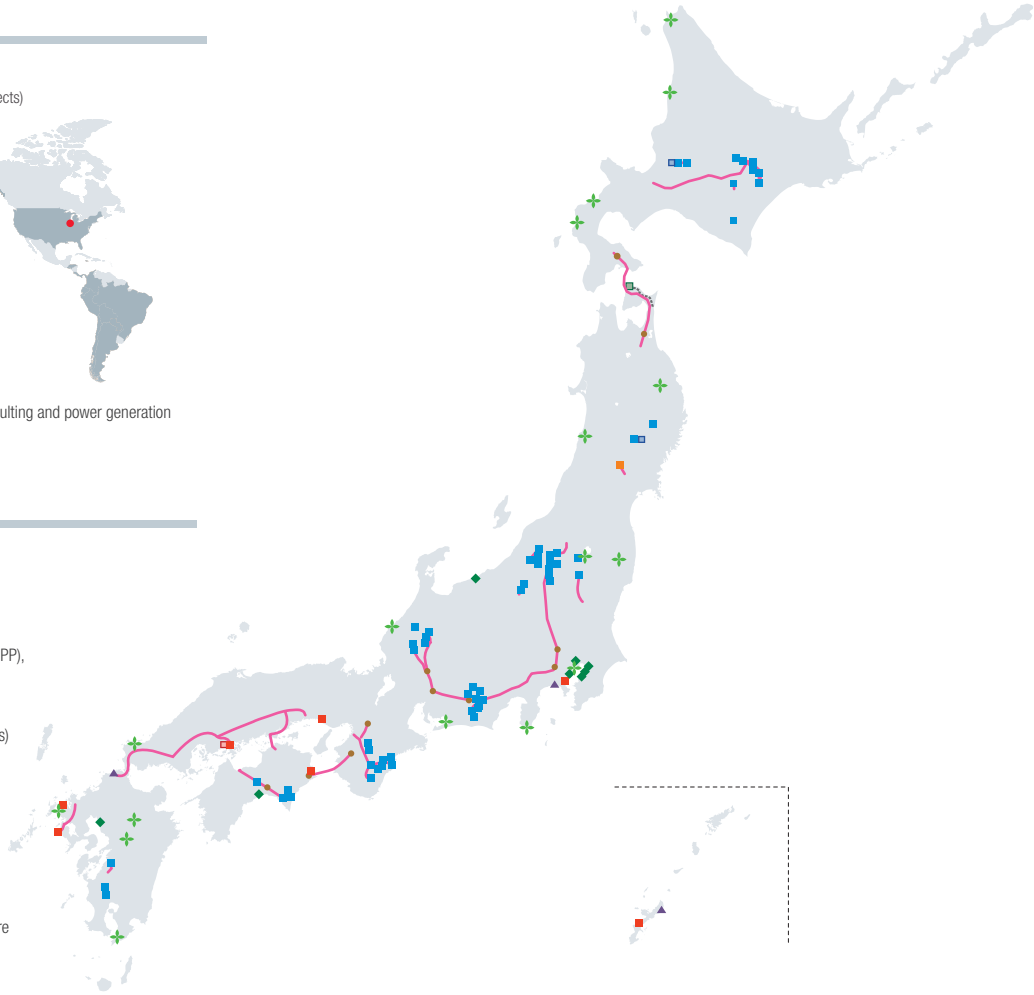
Overseas Operations

• Please refer to pp. 32-34 for information on international consulting and power generation projects.

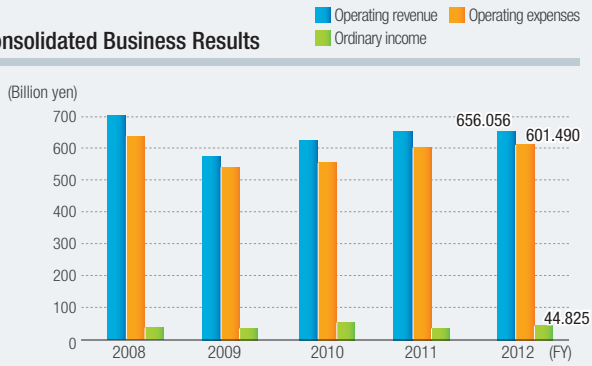
Facilities in Japan



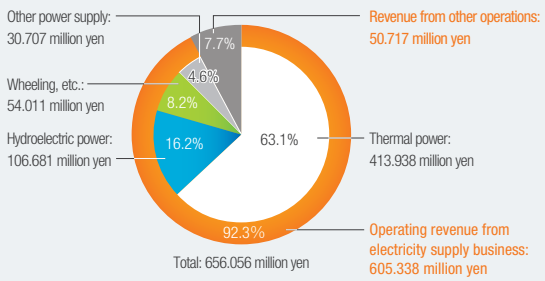
• The group also has dedicated communication facilities, and there are facilities owned by group companies.



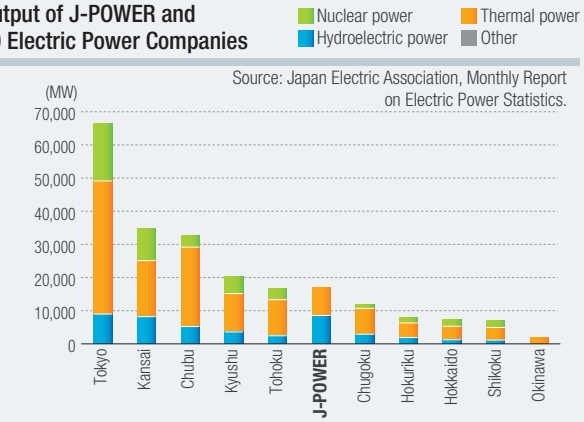
Consolidated Business Results



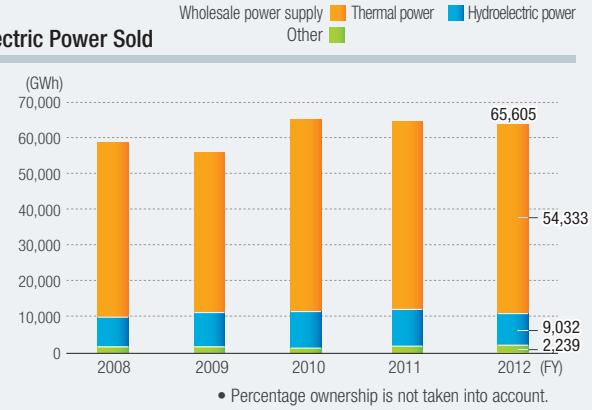
Breakdown of Consolidated Sales



Output of J-POWER and 10 Electric Power Companies



Electric Power Sold



• Percentage ownership is not taken into account.

Electric Power Development Co.,Ltd.

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