

Efforts Relating to Local Environmental Issues

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

Environmental Measures at Coal-Fired Power Stations

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

Measures to Control Noise and Vibration

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

Measures to Control Coal Dust

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

Measures to Control Thermal Water Discharge

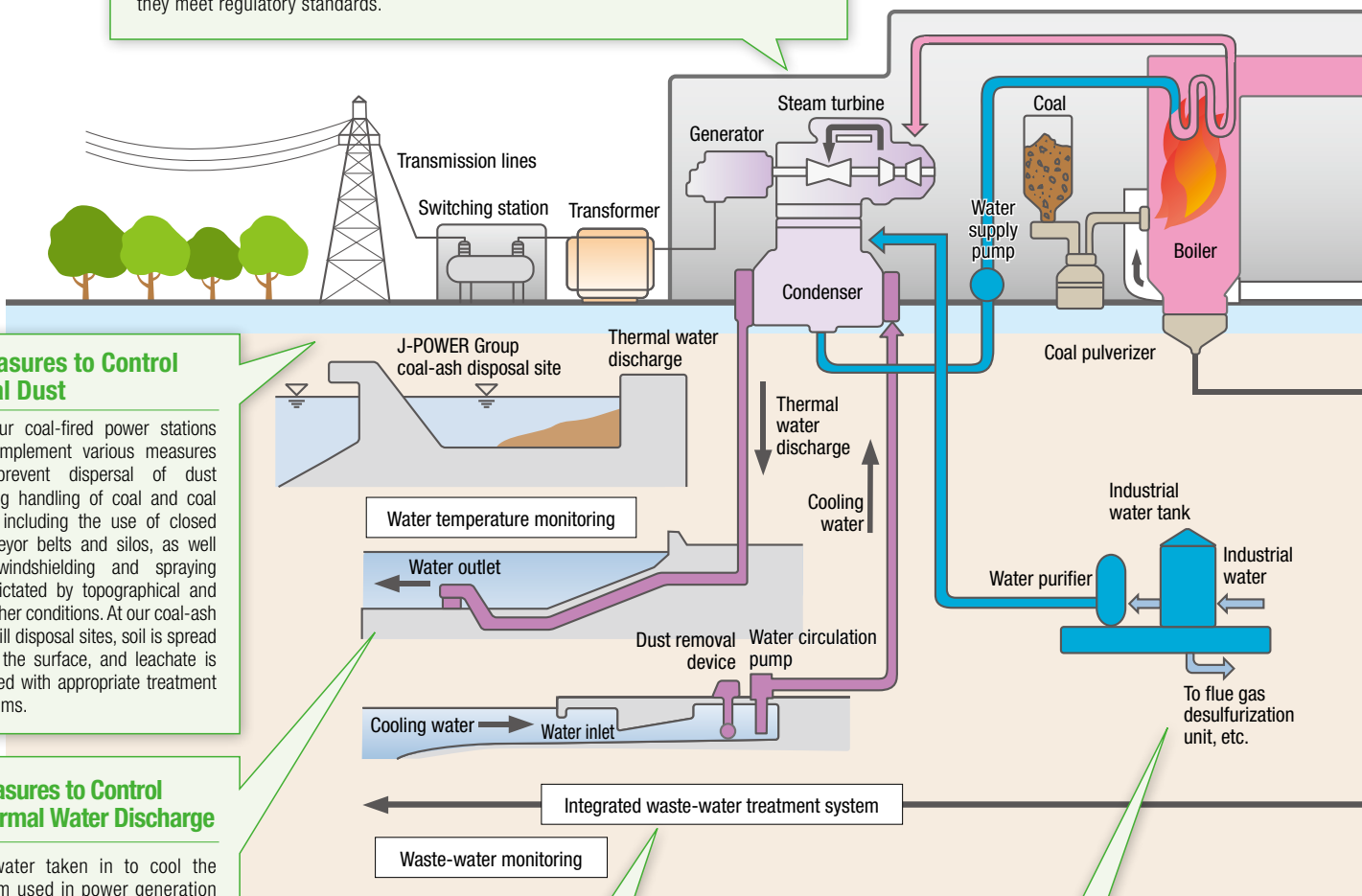
Seawater taken in to cool the steam used in power generation is released as thermal water discharge. We control intake and discharge properly to prevent any negative impact on marine life in the vicinity, and monitor the temperature of thermal water discharge around the clock to ensure that it remains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

Measures to Prevent Water Pollution

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

Cutting Back on Industrial Water Use

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

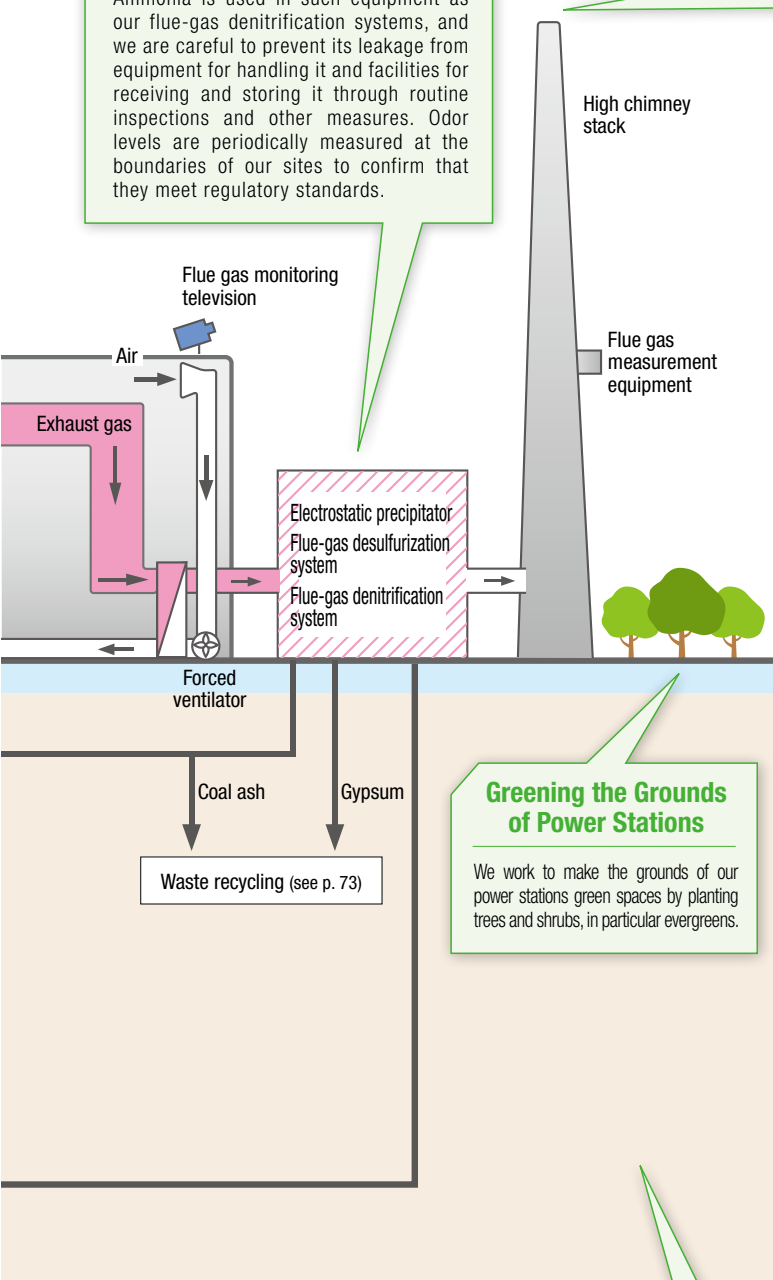


Measures to Control Odors

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

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.



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.

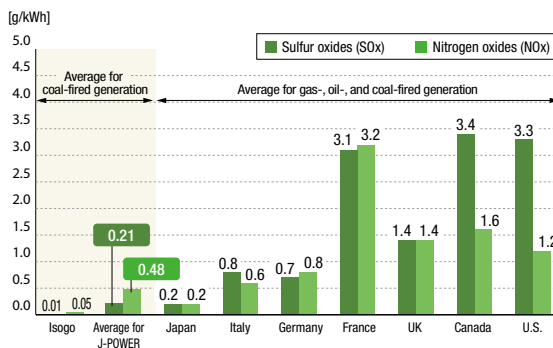
■ Flue-gas Emissions, FY 2011

Substance	Equipment efficiency (removal efficiency)	Emissions	Emissions intensity
SOx	65-99%	12,100 tons	0.21g/kWh
NOx	72-92%	28,500 tons	0.48g/kWh
Soot and dust	99%(as designed)	700 tons	0.01g/kWh

Notes:

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

■ International Comparison of SOx and NOx Emissions Intensity for Thermal Generation



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

Japan (Results for 2010) = Materials published by The Federation of Electric Power Companies of Japan

Figures for Isogo and J-POWER are formulated from results for 2011

Establishing a Sound Material-Cycle Society

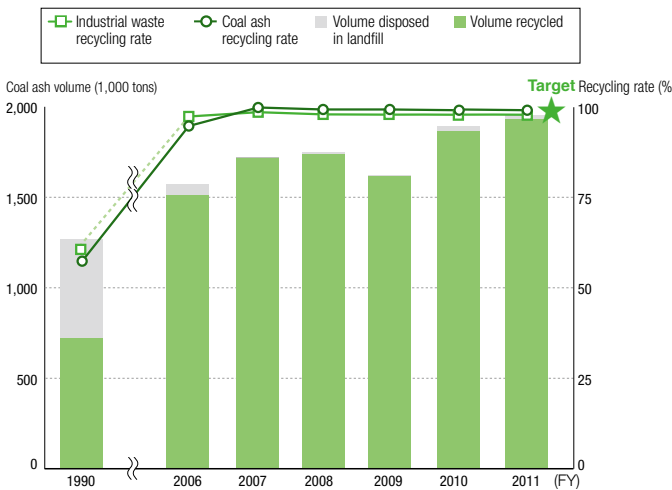
To help establish a sound material-cycle society, J-POWER Group is working hard to reduce the waste we generate and to properly treat and recycle the waste we do produce. We are also pursuing business undertakings that build on these practices.

Recycling and Reduction of Waste

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

We intend to promote more extensive recycling of coal ash and further reduce the industrial waste produced by the maintenance and operation of power stations and other business activities to achieve a recycling rate of 97% within J-POWER Group as a whole from FY 2012 onwards, with the goal of achieving zero emissions of industrial waste^{*1} (see p. 50, 88).

Industrial Waste and Coal Ash Recycling Rates



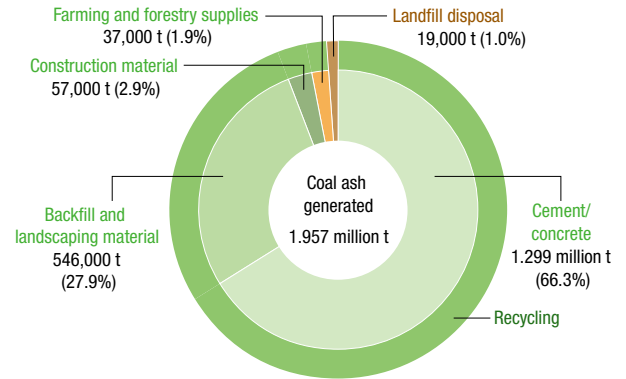
Beneficial Use of Coal Ash and Gypsum

Almost all the coal ash generated by coal-fired power stations is recycled, either as construction material such as a clay substitute in cement and backfill and landscaping material or farming and forestry supplies such as fertilizers (see p. 90). All of the gypsum and sulfuric acid generated by our flue-gas desulfurization systems is recycled.



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

Breakdown of Coal Ash Recycling

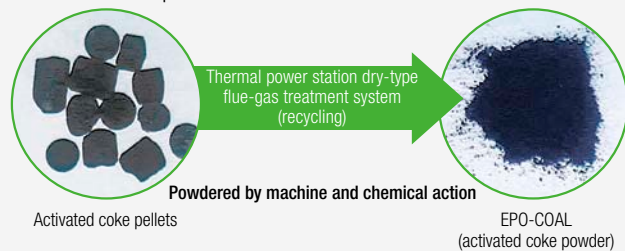


Column » EPO-COAL: Activated Coke Powder for Dioxin Removal

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

The purpose of J-POWER Group's involvement in this business is not only to reduce waste and raise our recycling rate but also to contribute to the creation of a material-cycle society. We also regard it as integral to our efforts to stem global warming, since recycling can reduce the CO₂ emissions that result from production of the activated

coke commonly available on the market. As a member of a society that is striving for harmonious coexistence with the environment, we plan to continue such operations.



References

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

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

Recycling of Construction By-products

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

Making Effective Use of Driftwood from Dam Reservoirs

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



Wood chips produced from driftwood



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

Reducing and Recycling Office Waste

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



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

Promoting Green Purchasing

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

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

● The J-POWER Group Green Purchasing Guidelines



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

3Rs^{*1} Promotion Month

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



Activities to Promote the 3Rs

References

*1 The 3Rs

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

Preserving Biodiversity

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

Steps to Preserve Biodiversity

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

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



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

Japanese Golden Eagle, Okutadami-Otori Area

The areas around Okutadami Dam and Otori Dam (Fukushima Prefecture / Niigata Prefecture) are one of habitat to the Japanese Golden Eagle, a protected species classified as "Endangered IB" in the Environment Ministry's Red Data Book. J-POWER Group is helping to protect the eagles by measures including avoiding outdoor work around these dams during the eagle's nesting season. If work needs to be carried out in the vicinity, we determine the status of nesting activity, seek the advice of ornithological experts, and take precautions to reduce vehicle traffic and noise level so as to minimize the impact on nesting activity.



Japanese Golden Eagle fledgling

Voice

Experience-based Environmental Education using Rooftop Green Space

The rooftop biotope (green space) of J-POWER's Wakamatsu Operations & General Management Office is a small-scale biotope covering a total area of about 160 m², but has been developed to provide opportunities for environmental education, with an area offering experience of harvesting crops from paddies and fields (dietary education), an area for the observation of nature, centering on a pond, and an area for learning about natural energy, incorporating solar generation equipment.

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

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

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



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



Seasonal flowers in the rooftop biotope

Harmony with the Aquatic Environment

River Maintenance Discharge

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



River maintenance discharge (Nanairo Dam, Mie and Wakayama Prefectures)

Restoration of Wetlands

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



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

Water Quality of Dam Reservoirs

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



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

Column » Measures to Prevent Sediment Buildup in Dams

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



Responding to sediment
(Futatsuno Regulating Reservoir, Nara Prefecture)

Management of Chemical Substances

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

Pollutant Release and Transfer Register (PRTR) Law

The PRTR system is a mechanism that seeks to enhance voluntary controls on chemical substances by businesses and to prevent environmental damage by requiring businesses to monitor the volume of hazardous chemical substances they release into the environment and transport outside their facilities as waste, and to report this data to the government for compilation and publication via the governor of the prefecture or similar administrative unit in which they are located. The legislation was enacted in 1999, and went into operation in FY 2001.

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

■ PRTR Substance Release and Transfer Volumes (FY 2011)

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

Note:

Figures represent total release and transfer volumes for all business sites handling 1 ton or more per year of a Class 1 designated chemical substance or 0.5 ton or more per year of a Specific Class 1 designated chemical substance.

Measures to Reduce Dioxins

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

Asbestos

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

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

PCB Waste

Management and Treatment of PCBs

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

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

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

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

Trace PCB Contamination

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