

J-POWER Group Integrated Report 2023

Supplementary Material

Environment

Index

Environment

1. **Input-Output (domestic operations)** [P.2](#)
2. **Environmental Consideration at Power Plants** [P.3](#)
3. **J-POWER Group Environmental Action Guidelines** [P.4-5](#)
4. **Addressing Climate Change** [P.6](#)
 - Project to create seaweed beds
5. **Addressing Local Environment Issues** [P.7-10](#)
 - Creation of a recycling-oriented Society
 - Managing chemical
 - Biodiversity conservation
 - Protecting aquatic environments
6. **Ensuring Transparency and Reliability** [P.11-12](#)
 - Improving environmental management level
 - Ensuring compliance with laws, regulations, agreements, etc.
 - Promoting environmental communication activities
7. **List of Environmental Data** [P.13-17](#)
8. **Scope of Environmental Data** [P.18](#)

1. Input-Output (domestic operations) [FY2022]

*The followings cover J-POWER and its domestic consolidated subsidiaries in the electric power business and electric power-related and other related businesses. The consolidated subsidiaries' portion is the one equivalent to J-POWER's investment ratio.

Input		Emission/Waste		Output	
Use of fuel		Use of electricity from others		Emission to the atmosphere, etc.	
Coal [10 kt] (dried; 28 GJ/t equivalent)	1,514	Purchased electricity [0.1 TWh]	0.98	CO ₂ . fuel burning [10 kt-CO ₂]	4,064
Natural gas [million Nm ³]	0	Use of chemicals		CO ₂ . electricity usage [10 kt-CO ₂]	15
Heavy oil [10 ML]	25	Limestone (CaCO ₃) [10 kt]	17.0	N ₂ O [10 kt-CO ₂] Dinitrogen monoxide	9.3
Light oil [10 ML]	24	Ammonia (NH ₃) [10 kt]	1.2	SF ₆ [10 kt-CO ₂] Sulfur hexafluoride	0.3
Other fuels [kL] (gasoline equivalent)	0.6	Discharge to waters, etc.		NOx [kt] Nitrogen oxide	23.0
Biomass fuel [10 kt]	12.2	Highly treated wastewater [10,000 m ³]	443	SOx [kt] Sulfur oxide	9.3
Use of water		COD in wastewater [t]	24	Dust [kt]	0.7
River water [10,000 m ³]	5,127,000	Chemical emission and transfer		Discharge of waste, etc.	
Sea water [10,000 m ³]	944,000	Toluene [t]	14.2	Industrial waste [10 kt]	7.5
Industrial water [10,000m ³]	929	Xylene [t]	1.5	including coal ash [10 kt]	6.9
Tap water [10,000 m ³]	27	Asbestos [t] *disposed as industrial waste	1.5	including plastics [t]	765
Others [10,000 m ³] (e.g. underground water)	26	Styrene [t]	1.0	Specially-controlled industrial waste [t]	290
Use of paper		Ethyl benzene [t]	1.0	General waste (old paper) [t]	18
Copier papers [10,000 sheets] (A4-size equivalent)	3,615			General waste (driftwood from dam) [1,000 m ³]	1.6
				Electricity supply by power industry	
				Generated electricity [0.1 TWh]	596
				Sold electricity [0.1 TWh]	548
				Effective use	
				Coal ash [10 kt]	157 95.8%
				Gypsum [10 kt]	28 100%
				Sludge [10 kt] (excluding gypsum)	1.3 87.2%
				Other industrial waste [10 kt]	1.9 82.6%
				Paper waste [t]	216 92.4%
				Driftwood from dam [1,000 m ³]	10 76.2%

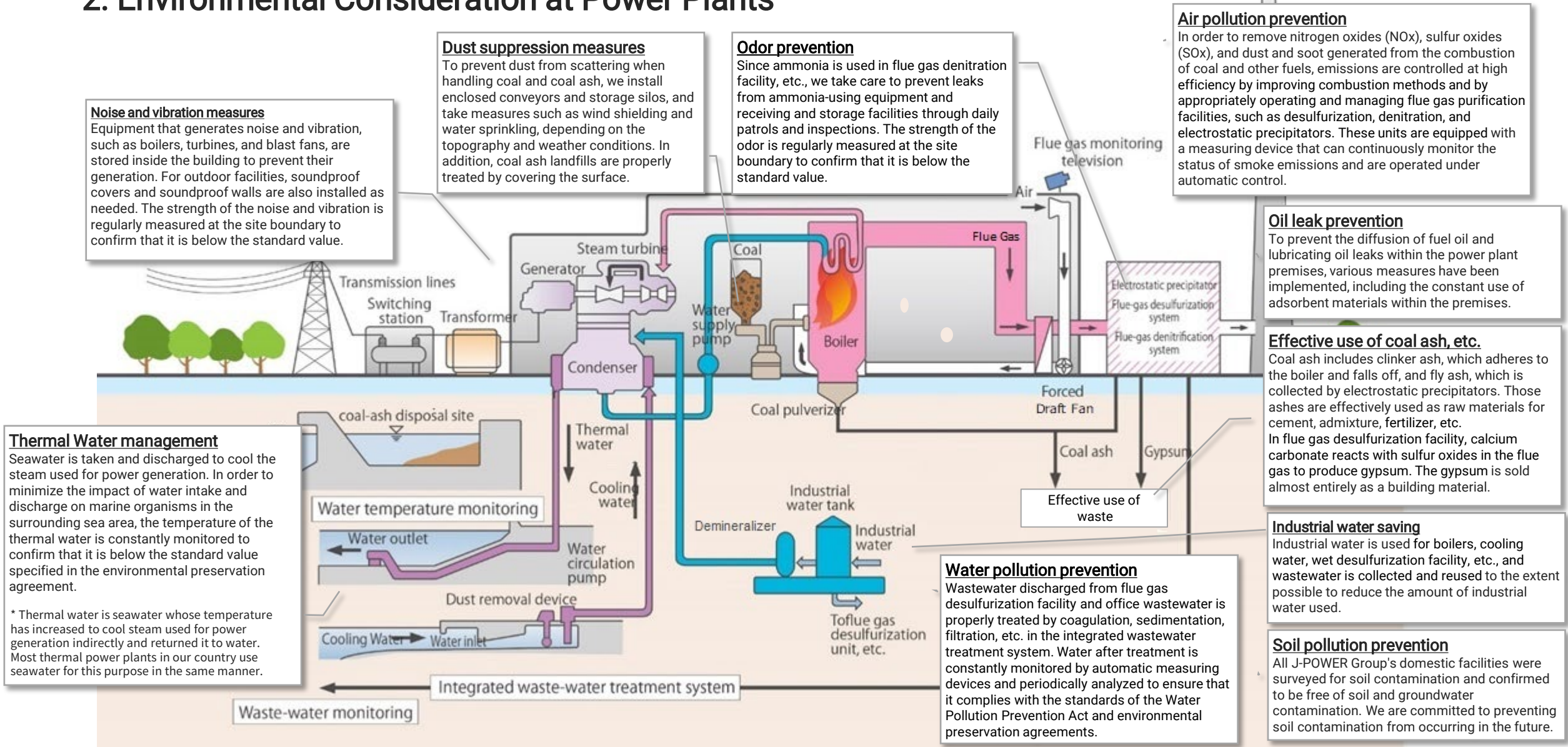
Output

We will meet people's needs for energy without fail.



Percentages indicate each effective utilization rate.

2. Environmental Consideration at Power Plants



Noise and vibration measures
 Equipment that generates noise and vibration, such as boilers, turbines, and blast fans, are stored inside the building to prevent their generation. For outdoor facilities, soundproof covers and soundproof walls are also installed as needed. The strength of the noise and vibration is regularly measured at the site boundary to confirm that it is below the standard value.

Dust suppression measures
 To prevent dust from scattering when handling coal and coal ash, we install enclosed conveyors and storage silos, and take measures such as wind shielding and water sprinkling, depending on the topography and weather conditions. In addition, coal ash landfills are properly treated by covering the surface.

Odor prevention
 Since ammonia is used in flue gas denitration facility, etc., we take care to prevent leaks from ammonia-using equipment and receiving and storage facilities through daily patrols and inspections. The strength of the odor is regularly measured at the site boundary to confirm that it is below the standard value.

Air pollution prevention
 In order to remove nitrogen oxides (NO_x), sulfur oxides (SO_x), and dust and soot generated from the combustion of coal and other fuels, emissions are controlled at high efficiency by improving combustion methods and by appropriately operating and managing flue gas purification facilities, such as desulfurization, denitration, and electrostatic precipitators. These units are equipped with a measuring device that can continuously monitor the status of smoke emissions and are operated under automatic control.

Oil leak prevention
 To prevent the diffusion of fuel oil and lubricating oil leaks within the power plant premises, various measures have been implemented, including the constant use of adsorbent materials within the premises.

Effective use of coal ash, etc.
 Coal ash includes clinker ash, which adheres to the boiler and falls off, and fly ash, which is collected by electrostatic precipitators. Those ashes are effectively used as raw materials for cement, admixture, fertilizer, etc. In flue gas desulfurization facility, calcium carbonate reacts with sulfur oxides in the flue gas to produce gypsum. The gypsum is sold almost entirely as a building material.

Thermal Water management
 Seawater is taken and discharged to cool the steam used for power generation. In order to minimize the impact of water intake and discharge on marine organisms in the surrounding sea area, the temperature of the thermal water is constantly monitored to confirm that it is below the standard value specified in the environmental preservation agreement.

* Thermal water is seawater whose temperature has increased to cool steam used for power generation indirectly and returned it to water. Most thermal power plants in our country use seawater for this purpose in the same manner.

Water pollution prevention
 Wastewater discharged from flue gas desulfurization facility and office wastewater is properly treated by coagulation, sedimentation, filtration, etc. in the integrated wastewater treatment system. Water after treatment is constantly monitored by automatic measuring devices and periodically analyzed to ensure that it complies with the standards of the Water Pollution Prevention Act and environmental preservation agreements.

Industrial water saving
 Industrial water is used for boilers, cooling water, wet desulfurization facility, etc., and wastewater is collected and reused to the extent possible to reduce the amount of industrial water used.

Soil pollution prevention
 All J-POWER Group's domestic facilities were surveyed for soil contamination and confirmed to be free of soil and groundwater contamination. We are committed to preventing soil contamination from occurring in the future.

3. J-POWER Group Environmental Action Guidelines (1/2)

*Integrated report reference page: p.59

Addressing climate change issues

Accelerating development of CO₂-free power sources

- Maintain stable operation of existing hydroelectric, geothermal, wind, biomass, and solar power generation.
- Improve efficiency by upgrading facilities at existing hydroelectric power plants and promote NEXUS Sakuma Project.
- Promote new development of hydroelectric, geothermal, wind, and solar power generation.
- Respond appropriately to the Nuclear Regulation Authority's new regulatory standards conformity assessment.
- Promote voluntary and continuous efforts to improve safety and build a nuclear power plant which is trusted by the community.

Reducing greenhouse gas (GHG) emissions

- Promote the Osaki CoolGen Project to develop high-efficiency IGCC power generation technology.
- Promote efforts to develop and commercialize CO₂ capture, utilization, and storage (CCUS) technologies.
- Maintain high-efficiency operation at existing thermal power plants.
- Expand introduction of biomass in existing thermal power plants, etc., and study practical application of ammonia co-firing.
- Improve existing thermal power plant facilities and promote the GENESIS project.
- Utilize and promote offset credit mechanisms.
- Reduce greenhouse gas emissions other than CO₂ such as SF₆, CFC, HCFC, HFC, and N₂O.

Promoting energy saving

- Reduce loss factor of plant-home use at power facilities.
- Promote energy saving at offices.
- Improve efficiency of transportation of raw materials, etc.
- Reduce environmental impact through use of public transportation and eco-driving.

Addressing local environmental issues.

Creation of a recycling-oriented society

- Promote the 3Rs of waste and appropriate disposal.
- Thoroughly separate plastic waste and monitor its amount discharged and recycled, etc. and promote 3Rs.
- Maintain appropriately the final disposal site and implement decommissioning procedures.
- Expand use of reused and recycled products, etc.

Biodiversity conservation

- Conserve and sustainably use the natural environment at planning, design, construction, and operation stage.
- Conserve rare animals, plants and their habitats.
- Raise awareness of biodiversity.

Forest conservation

- Conserve company-owned forests.
- Promote use of unutilized wood residues in forests.

Water environment conservation

- Appropriately use water resources and conserve water quality.
- Promote measures to reduce sedimentation sand and mitigate long-term turbid water in rivers.
- Appropriately manage waste water based on environmental agreements, etc.
- Control water pollutants through appropriate management of wastewater treatment facilities.
- Strengthen measures to prevent oil leakage from equipment, etc.

3. J-POWER Group Environmental Action Guidelines (2/2)

Addressing local environmental issues (continued)

Reducing air pollutant emissions

- Appropriately manage combustion and environmental facilities to control emissions of NO_x, SO_x, and Dust etc.

Suppressing noise, vibration, and odors

- Appropriately manage equipment that generates noise, vibration, and odors.

Appropriately managing chemical substances

- Ensure that emissions and transfers of chemicals are monitored, managed, and disclosed.
- Manage appropriately and dispose of PCB waste and PCB-used products in accordance with J-POWER policies.
- Manage appropriately and systematically remove asbestos.

Environmental consideration in business planning

- Conduct environmental impact assessments of business activities.
- Design and introduce high-efficiency, environmentally friendly facilities at the time of new installation or remodeling.
- Transfer environmental countermeasure technologies overseas.

Transparency and reliability initiatives

Improving environmental management level

- Continuously improve EMS at J-POWER Group companies.
- Study and implement EMS optimization.
- Raise employee awareness of environmental issues.
- Request for cooperation in environmental considerations to suppliers.
- Prevent environmental problems and when it occurs, communicate thoroughly and respond appropriately.

Ensuring compliance with environmental laws, regulations, agreements, etc.

- Ensure identification, dissemination, and application of laws, regulations, agreements, etc.
- Implement and actively participate in education on environmental laws and regulations, etc.
- Utilize waste disposal guidelines, etc. and expand the use of e-manifests.

Promoting environmental communication activities

- Conduct environmental reporting in consideration of external guidelines and social demands.
- Undertake third-party audits of environmental significant data.
- Actively respond to environmental ratings and surveys.
- Conduct communication activities with various stakeholders and respond appropriately.
- Make social contributions through public relations or local environmental preservation activities, etc.

4. Addressing Climate Change

Project to create seaweed beds with J Blue Concrete (carbon sequestration and storage by seaweeds)



J-POWER Chigasaki Research Institute, in collaboration with the Wakamatsu Operations & General Management Office, is working on the development of technology to increase the effectiveness of seaweed bed formation using “J Blue Concrete”, a concrete substitute material made mainly from coal ash and copper slag.

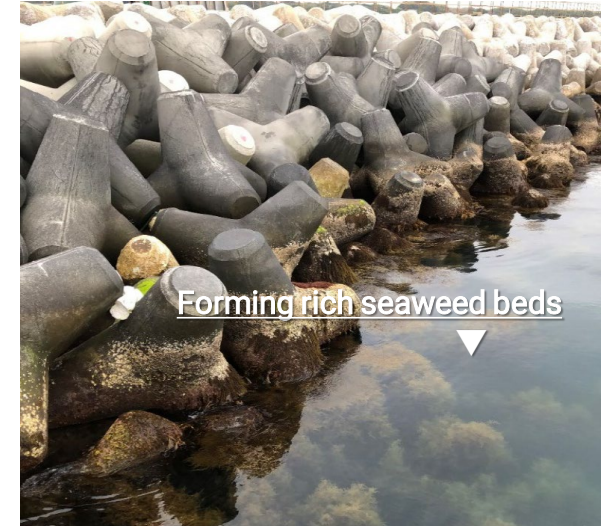
The wave-dissipating blocks made of this material have formed rich seaweed beds, and were the first private facilities to receive J Blue Credits for CO₂ absorption and fixation in FY2021, and continued to receive these credits in FY2022. This concrete substitute material reuses by-products from business activities, leading to a reduction in cement consumption (low-carbon emission).

* J Blue Credit is a system whereby the Japan Blue Economy Association (JBE), which was established and approved by the Ministry of Land, Infrastructure, Transport and Tourism, certifies and issues the credits.

In addition, we have concluded a memorandum of understanding with the Central Queensland University (CQU) in Australia for the following joint studies, and are working toward technological development and social implementation.

Details of joint studies

- Development of low-carbon materials that can promote symbiosis of living organisms, utilizing locally produced materials, and promotion of social implementation of marine blocks.
- This method will reduce CO₂ emissions from concrete-related construction and increase the amount of CO₂ (blue carbon) fixed by the attachment of seaweeds.



5. Addressing Local Environment Issues

Creation of a recycling-oriented society

We are striving to make effective use of waste with the environmental target of effective utilization rate of industrial waste of approximately 97%.

Coal ash and gypsum from thermal power plants account for 98% of the industrial waste, of which more than 96% is effectively utilized.

We also strive to make effective use of industrial waste other than coal ash. In FY2022, 96.2% of the total 1.95 million tons of industrial waste was effectively utilized.

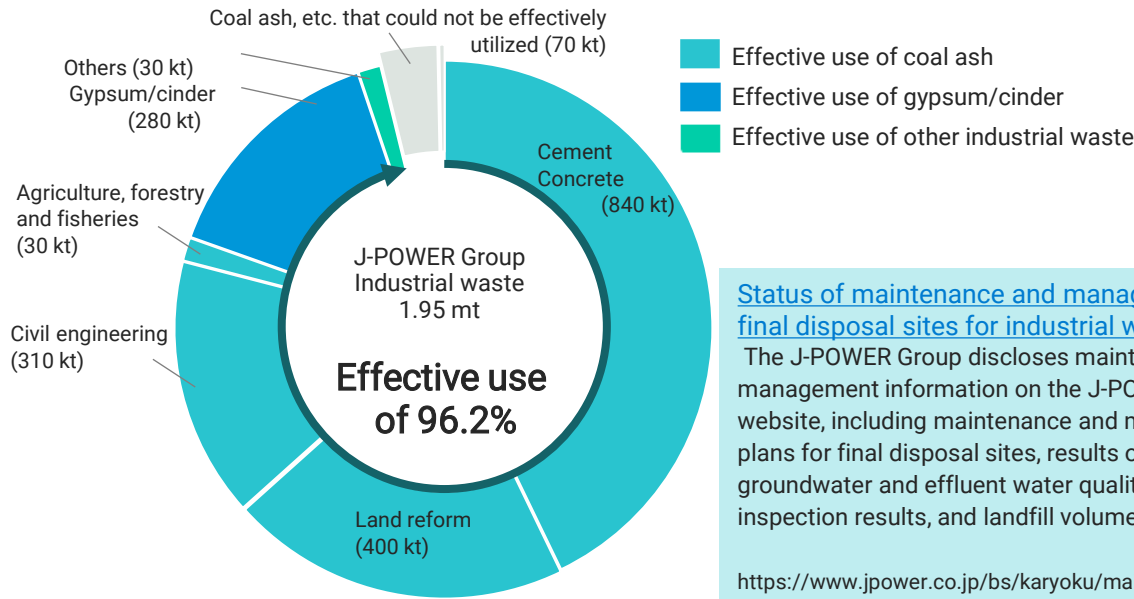


Fig: Discharge and effective use of industrial waste

Status of maintenance and management of final disposal sites for industrial waste

The J-POWER Group discloses maintenance and management information on the J-POWER Group website, including maintenance and management plans for final disposal sites, results of groundwater and effluent water quality analysis, inspection results, and landfill volumes.

<https://www.jpowers.co.jp/bs/karyoku/maintenance.html>

Discharge and recycling of industrial waste from plastic products.

Since waste plastics is generated as a result of equipment renewal and repair work, we promote thorough separation of waste and the 3Rs.

In FY2022, J-POWER Generation Service Co., Ltd. and J-POWERHYTEC Co., Ltd. were classified as waste generators who generate large amounts of plastics (250 tons/year or more) under the Plastic Resource Circulation Act Japan. J-POWER, the installer of the power plants, and the entire group have set an environmental goal of waste plastics reducing emissions and promoting recycling. and will continue to work on thorough understanding of waste plastic sorting, emission volume, recycling, etc., and promotion of the 3Rs (Environmental Action Guidelines).

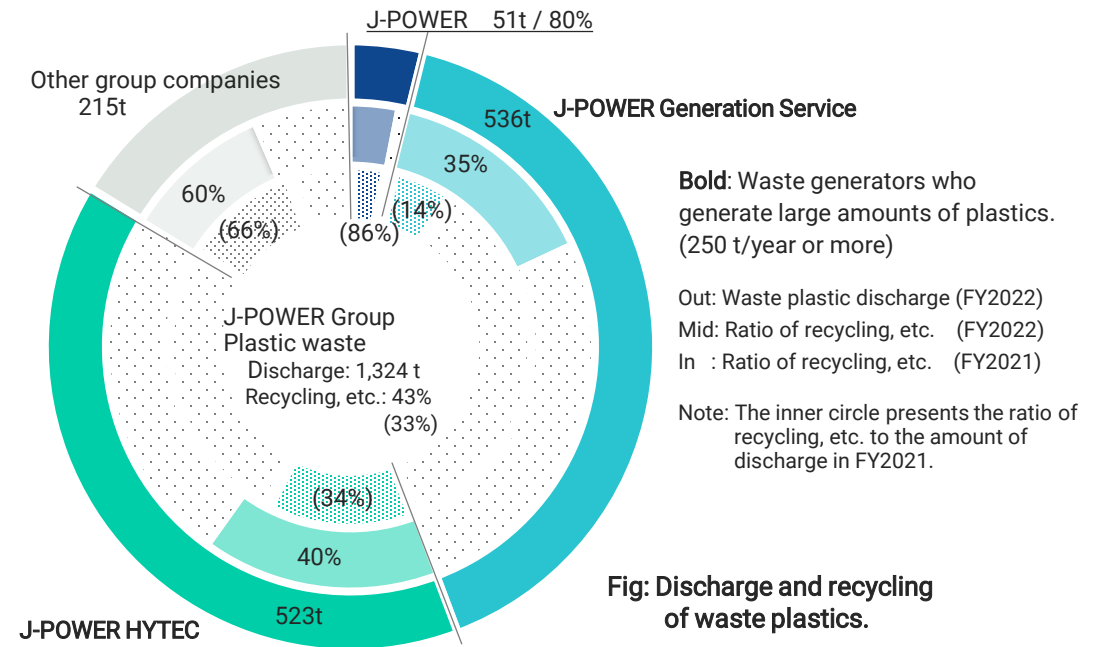


Fig: Discharge and recycling of waste plastics.

5. Addressing Local Environment Issues

Managing chemical

We comply with all applicable laws and regulations regarding the use, storage, management, and disposal of chemical substances and PCB waste (including equipment containing low concentrations of PCBs) contained in products or equipment used as well as products containing asbestos.

Management of releases and transfers of specified chemical substances

Some products used for painting on equipment and buildings and for treating water supply in thermal power plants contain chemical substances specified in law. Therefore, we are working to reduce the amount of waste handled by monitoring the amount of releases and transfers while complying with established procedures and handling it safely.

Table: Releases and transfers of chemical under the law (FY2022)

Material name	Major usage	Volume handled	Emission to environment	Amount moved in waste
Asbestos	Heat insulating material	1.5 t	-	1,530 kg
Ethyl benzene	Paint for equipment	1.0 t	1,000 kg	-
Xylene	Fuel for power generation	4.9 t	1,494 kg	-
Styrene	Paint for equipment	1.0 t	1,036 kg	-
1,2,4-Trimethylbenzene	Fuel for power generation	2.9 t	19.4 kg	-
Toluene	Fuel for power generation	14.2 t	14,242 kg	-
Hydrazine	Water supply treatment	1.0 t	0.1 kg	-
Boron compound	Fertilizer additives	15.7 t	0.4 kg	-

Note: The data was compiled for business establishments that handle 1 ton or more of Class I Specified Chemical Substances or 0.5 tons or more of certain Class I Specified Chemical Substances per year.

Asbestos

We continue to investigate and take measures against asbestos. Current usage is shown in the table below. We will continue to take appropriate measures such as systematically removing asbestos and replacing it with non-asbestos products in compliance with relevant laws and regulations.

Table: Major asbestos use in buildings and facilities (as of March 31, 2022)

Target	Place of use	Current (use status)	
Spraying containing asbestos	Soundproofing, heat insulation, and fireproofing materials for equipment rooms, etc.	Measures have been taken for sprayed materials confirmed to contain asbestos.	
Products containing asbestos	Building materials	Fireproof boards for buildings Used for floor material, etc.	
	Soundproofing material	soundproofing material for transformer (Substation facilities)	
	Asbestos Cement pipes	Pipeline materials for underground lines (Power transmission facilities)	
	Heat insulating material	Power generation facilities (Thermal power facilities)	Remaining asbestos-containing products: approx. 20,000 m3 (approx. 20% of total)
			Remaining asbestos-containing products: approx. 31,000 pcs (approx. half of total)
	Sealing materials and joints	Electric lines for overhead transmission lines (power transmission facilities)	Wire corrosion inhibitor, Length: approx. 76 km
	Thickener		
	Cushioning material	Suspension insulators for power transmission equipment, etc.	Number: About 490,000 pcs (Asbestos-containing products are used as cushioning materials inside insulators but not used for the porcelain portion of the insulator surface.)

5. Addressing Local Environment Issues

Biodiversity conservation

Through our business activities, from construction planning to operation of power plants, we are striving to preserve the inhabiting, habitat environment, and ecosystems of rare species of plants and animals.

For the Ohma Nuclear Power Station construction site (Aomori), efforts are being made to relocate larvae and pupae of *Zygaena nippona hakodatensis*, which is classified as an endangered species II, to outside the construction zone, to create ponds and marshes suitable for amphibian growth, and to exterminate non-native species.



Larvae of *Zygaena nippona hakodatensis*
(Endangered species II)



Invasive Alien species (*Cirsium vulgare*)

In addition, we contribute to forest conservation and CO₂ emissions reduction by preserving company-owned forests around hydroelectric power plants and processing forest residues into biomass fuel (to be burned at thermal power plants).

Protecting aquatic environments

At our hydroelectric power plants, we take measures to mitigate prolonged turbidity and sedimentation, and at thermal power plants, we manage discharged water in accordance with relevant laws and regulations and environmental preservation agreements with local governments.

Water risk assessment

Using WRI Aqueduct (3.0), J-POWER and its consolidated subsidiaries' power plants were evaluated for water stress and no sites in Japan were found to have high water stress. ("Medium-high" was the highest.).

Overseas, the judgment in Thailand went from Medium-high to Extremely high. Since water stress is relatively high at some sites, we are working to reduce water intake/consumption and operational risk by reusing treated wastewater and installing water reservoirs to suit the environment at each site.

5. Addressing Local Environment Issues

Environmental impact assessments of business activities

Prior to the construction of new or additional power plants, we conduct environmental assessments in accordance with relevant laws and regulations, and give appropriate consideration to environmental impact at the planning stage, taking into account the opinions of local residents and other stakeholders.

Business activities	Progress	Area	Business activities	Progress	Area
New Setana Waterfront Wind Power Project	Scoping Documents procedure completed	Setana-cho, Kudo-gun, Hokkaido, Japan	West Chugoku Wind Farm Project	Document on primary EIC procedure completed	Shunan City, Iwakuni City, Yamaguchi; Yoshika-cho, Shimane; Japan
Setana Futoro Wind Farm Project	Scoping Documents procedure completed	Setana-cho, Kudo-gun, Hokkaido, Japan	Seiyo Yusuhara Wind Power Project	Scoping Documents procedure completed	Seiyo City; Kihoku-cho, Kitauwa-gun; Ehime, Japan Yusuhara-cho, Takaoka-gun, Kochi, Japan
New Koriyama Nunobiki Kogen Wind Power Generation Project	Scoping Documents procedure completed	Koriyama City, Fukushima, Japan	Wind Power Project at Mt. Kunimi, Kochi	Draft EIS procedure completed	Kami City; Motoyama-cho, Nagaoka-gun; Otoyo-cho, Nagaoka-gun; Kochi, Japan
Wajima Wind Farm Project	Draft EIS procedure completed	Wajima City, Ishikawa, Japan	New Aso Oguni Wind Farm Project	Scoping Documents procedure completed	Oguni-machi, Aso-gun; Minami-oguni-machi, Aso-gun; Kumamoto, Japan; Kokonoe-machi, Kusu-gun, Oita, Japan
Naka-Noto Wind Farm Project	Scoping Documents procedure completed	Nanao City; Shikamachi, Hakui-gun; Nakanoto-machi, Kashima-gun; Ishikawa, Japan	New Aso Nishihara Wind Farm Project	Scoping Documents procedure completed	Nishihara-mura, Aso-gun; Ozu-machi, Kikuchi-gun; Kumamoto, Japan
Fukui Ohno, Ikeda Farm Project	Scoping Documents procedure completed	Ohno City; Ikeda-cho, Imadate-gun; Fukui, Japan	Hisatsu Wind Farm Project	Draft EIS under examination	Minamata City, Kumamoto; Izumi City, Isa City, Kagoshima; Japan
New Tahara Waterfront Wind Power Project	Scoping Documents procedure completed	Tahara City, Aichi, Japan	Youra Peninsula Wind Power Project	Scoping Documents procedure completed	Tsukumi City, Saiki City, Oita, Japan
Watarai, Minami-Ise Wind Power Project	Scoping Documents procedure completed	Watarai-cho, Watarai-gun; Minami-Ise-cho; Mie, Japan	New Minami-Osumi Wind Farm Project	Draft EIS procedure completed	Minami-Osumi-cho, Kimotsuki-gun, Kagoshima, Japan
Kichu Wind Farm Project	Document on primary EIC procedure completed	Aridagawa-cho, Arida-gun; Hidakagawa-cho, Hidaka-gun; Hirogawa-cho, Arida-gun; Wakayama, Japan	North Kagoshima (West and East Districts) Wind Power Project	Draft EIS procedure completed	Akune City; Izumi City; Satsumasendai City; Satsuma-cho, Satsuma-gun; Kagoshima, Japan
Hiroshima West Wind Farm Project	Scoping Documents procedure completed	Hiroshima City; Hatsukaichi City; Aki-Ohta-cho, Yamagata-gun; Hiroshima, Japan	GENESIS Matsushima Project	Scoping Documents procedure completed	Oseto-cho, Saikai City, Nagasaki, Japan

6. Ensuring Transparency and Reliability

Improving environmental management level

We have introduced an environmental management system (EMS) at each business site of the J-POWER Group, and are working to continuously improve the environmental management level by formulating environmental action plans, periodically monitoring and evaluating the status of our efforts, and reviewing our measures.

In addition, as a party to businesses with various environmental burdens, we provide environmental education appropriate to job level so that each employee understands environmental management as the J-POWER Group and remembers responsibility for his or her role. (right figure)

In addition to this, skill development training specific to waste management operations is offered according to work experience. Site inspection by industrial waste consultants are also conducted every year.

Waste

Training to improve skills in waste management operations
(150 persons for Beginner's Meetings and 113 for Standard Meetings in FY2022)
The program aims to improve the practical skills of employees who are in charge of waste management, based on legal regulations and case studies of legal interpretation.

Waste

Waste disposal risk assessment (3 sites)
Each year, several sites are visited with industrial waste consultants. Proper execution of waste management operations is diagnosed, and improvement points, if any, are made known to other sites.

For all employees, e-learning courses on the environment are held every year, and information exchange meetings are held at many locations to facilitate communication between the local site and the head office.

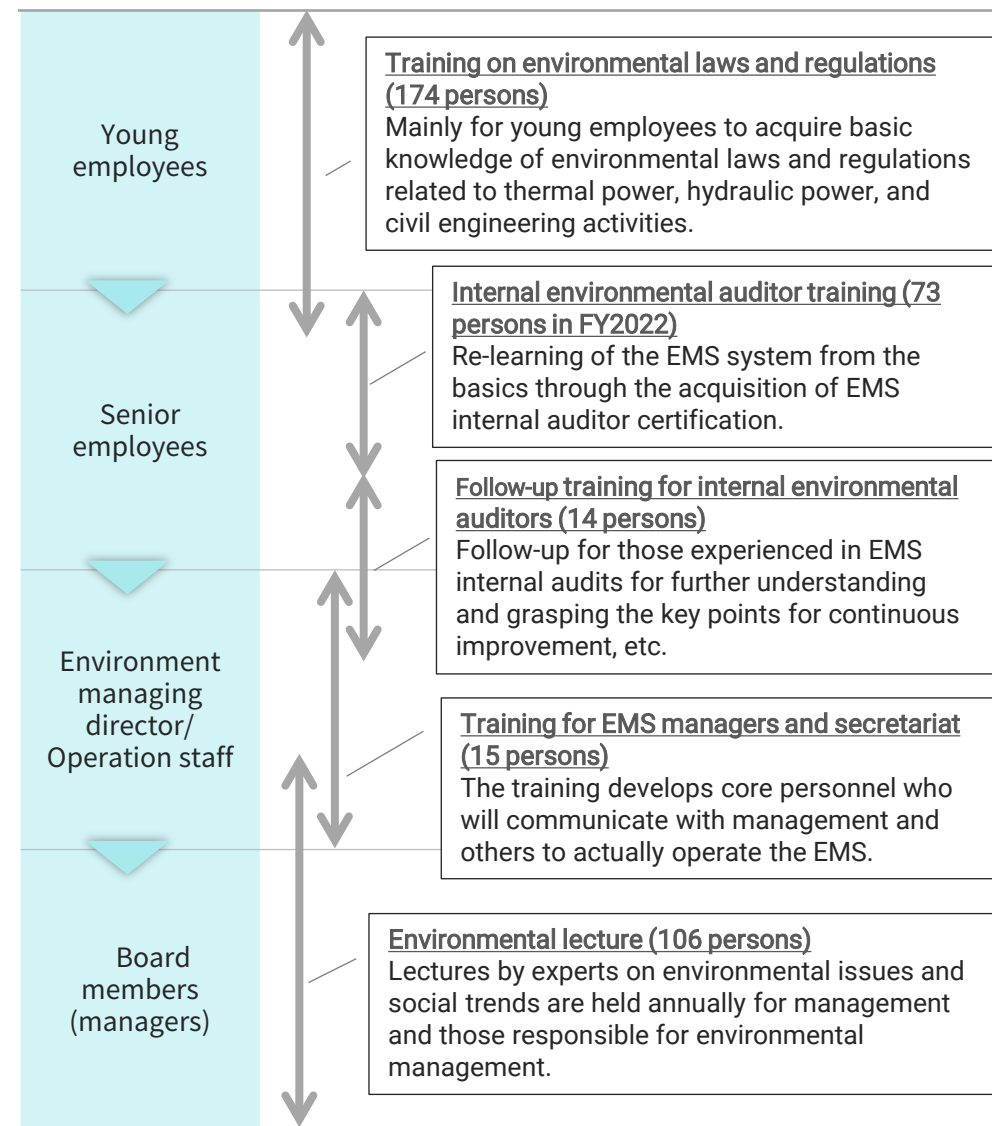
All employees

Environment e-learning (attendance rate: 86.0%)
E-learning sessions are held annually for all employees to spread awareness of environmental issues regardless of job function or years of experience.

Local site - head office

Environmental information exchange (99 sites)
Information exchange between the environmental department at the head office and the environmental managers and staff at each business site. Communication regarding social movements and legal changes. Exchange of opinions on continuous improvement of environmental management, etc.

Figure: Environmental education based on job level (FY2022)



6. Ensuring Transparency and Reliability

Ensuring compliance with laws, regulations, agreements, etc.

In order to reduce the impact of our business activities on the surrounding environment, we strive to improve our facilities and operations, as well as to properly inform and apply laws, regulations, agreements, etc. applicable to our business activities.

Responding to environmental problems

Based on the environmental management system, each business site is prepared to prevent environmental problems before they occur and to prevent the spread of damage in the event that environmental problems do occur. We also have a communication system in place in the event of environmental problems, and are prepared to promptly report and communicate with local relevant organizations and departments, including the Crisis Management Response Team at J-POWER's head office. The Crisis Management Response Team will promptly share information with top management and, if necessary, disclose the situation to the media. We are also taking measures across the department to prevent recurrence not only at the subject location but also at similar locations.

Environmental problems disclosed in FY2022 through the media

2022 8/29	<p>At Kaminokuni Wind Farm Unit No. 3, we confirmed that there was an oil leak (estimated at 9.3 liters) outside the wind turbine. We immediately collected the leaked oil, took emergency measures to prevent spillage, and notified the relevant authorities. In addition, since scattered oil droplets were adhering to crops in the surrounding fields, all the oil was collected and the surrounding soil was analyzed, and the results showed that oil contamination was at a very low level with no impact.</p> <p>We are taking measures to prevent oil leakage to the outside and are working to prevent recurrence of such leakage.</p>
--------------	---

Promoting environmental communication activities

In addition to reporting and disclosing environmental information to society, we participate in cleanup activities and social events in each region, placing importance on face-to-face interactions.

We also hold environmental information exchange meetings within the group companies to share information on environmental management.

Table: Environmental communication with internal and external parties (excerpts)

Target	Details
Information disclosure to society	<ul style="list-style-type: none"> • News releases *As needed on the J-POWER website • Issuing integrated reports *every August • Responses to questionnaires (CDP, domestic press, etc.)
Report to the government, etc.	<ul style="list-style-type: none"> • Periodic reporting on Act on Rationalizing Energy Use and Act on Promotion of Global Warming Countermeasures *Consent to voluntary disclosure • Notification based on PRTR system • Act on Waste Management and Public Cleansing, etc.
Interaction with local community	<ul style="list-style-type: none"> • Cleaning around offices • Participation in community exchange events (nature observation, learning events, etc.) • Holding open-house events of offices • Planting, seeding, and flowerbed maintenance on the office premises, etc.
Information sharing within the group companies	<ul style="list-style-type: none"> • Timely sharing of environmental information (e.g., information on legal revisions, trouble cases, etc.) • Environmental information exchange • Cleaning and beautification activities at business sites, etc.

7. List of Environmental Data (list of environmental index calculation standards)

*Integrated report reference page: p.102

Greenhouse gas emissions

*Data is published in the J-POWER Group Integrated Report 2023.

Scope 1 emission N ₂ O emission	Calculated by multiplying the amount of each fuel used by the relevant emission factor based on the method specified in the Act on Promotion of Global Warming Countermeasures.
SF ₆ emission	Calculated by multiplying the amount of leakage (annual amount of SF ₆ filled into relevant equipment) by the relevant emission factor according to the method specified by the Act on Promotion of Global Warming Countermeasures.
Scope 2 emission (based on location)	Calculated by multiplying the amount of electricity purchased by the emission factor for the area.
Scope 2 emission (based on market)	Calculated by multiplying the amount of electricity purchased by the emission factor of each purchasing power company.
Scope 3 emission	Calculated based on the method specified in the "Basic Guidelines for Calculating Greenhouse Gas Emissions through the Supply Chain."
Category 1 Purchased goods and services	Calculated by multiplying the quantity data of chemicals (limestone and ammonia) purchased and acquired by the company, as well as repair and outsourcing costs, by the relevant emission intensity.
Category 2 Capital goods	Calculated by multiplying the total capital investment by the emission intensity.
Category 3 Fuels and energy-related activities	Total emissions from production of fuel for power generation, procurement of electricity for resale, and transportation of coal <ul style="list-style-type: none"> - Calculated by multiplying the quantity data of fuel purchased by the company by the emissions intensity. - Calculated by multiplying the electricity input data to the company by the average emission intensity of all power sources. - Calculated by multiplying the ton-kilometers of transports by rail, ship, and air by the emission intensity of each transportation agency based on the ton-kilometer method.
Category 5 Waste generated in operations	Calculated by multiplying the amount of industrial waste consigned for treatment (including the amount of effective utilization) by the emissions intensity.
Category 6 Business travel	Calculated by multiplying the number of employees by the emission intensity.
Category 7 Employee commuting	Calculated by multiplying the number of employees of each work type and city class by the number of business days and emission intensity.
Category 9 Downstream transportation and distribution	Emissions from coal transport from coal mines <ul style="list-style-type: none"> - Calculated by multiplying the ton-kilometers of transports by rail, ship, and air by the emission intensity of each transportation agency based on the ton-kilometer method.
Category 11 Use of sold products	Emissions from the sale of coal produced in coal mines <ul style="list-style-type: none"> - Calculated by multiplying the total sales volume of fuel, etc. by the emission intensity.
Category 15 Investments	Calculated by multiplying each investment's emissions by its equity.

7. List of Environmental Data (list of environmental index calculation standards)

*Integrated report reference page: p.102

Power generation and energy use

*Electricity sales data is published in the "J-POWER Group Integrated Report 2023".

Electricity generated and sold	The data is automatically collected by the measuring instruments. The measuring instruments are calibrated in accordance with regulations.
Various fuels and purchased electricity	Calculated in accordance with the Act on Rationalizing Energy use and Shifting to Non-fossil Energy.

Emission to the atmosphere

NO _x , SO _x , dust	Calculated based on data from automatic measuring instruments in accordance with the Air Pollution Control Law. The measuring instruments are calibrated in accordance with regulations.
--	--

Use of water resources

River water, sea water	Total water volume is estimated from secondary data such as electricity generated and pump power.
Industrial water	The data automatically measured by the instrument is totaled. The measuring instruments are verified in accordance with Article 72 of the Measurement Act.
Water supply and wastewater volumes	The amount of usage measured by the instrument is calculated.
Amount of highly treated wastewater and COD in wastewater	The amount of wastewater discharged (measured) from the business sites that have wastewater treatment facilities is calculated. The COD concentration in wastewater is measured and multiplied by the wastewater volume to calculate the COD volume as well.

Generation and effective utilization of industrial waste

Industrial waste generated	The quantities listed on the manifest* as stipulated by the Waste Management and Public Cleansing Act are totaled. Driftwood was counted by volume of material collected from the dam lakes.
Effective utilization rate of industrial waste	Ratio of the amount of waste recycled or reused and the amount of valuable materials sold to outside vendors, to the amount generated.

*Manifest: A control slip that must be issued when outsourcing the collection, transportation, and disposal of waste materials to an outside contractor. The weight and disposal method of the waste are described.

7. List of Environmental Data

Power generation and energy use		FY2020	FY2021	FY2022
Generated electricity [0.1 TWh]	Total		690	710
	Domestic	664	623	596
	Overseas	-	67	114
Coal ^[10 kt] (dried; 28 GJ/t equivalent)	Total		1,565	1,514
	Domestic	1,705	1,565	1,514
	Overseas	-	0	0
Natural gas ^[million Nm³]	Total		1,274	1,857
	Domestic	56	44	0
	Overseas	-	1,230	1,857
Heavy oil ^[10 ML]	Total		3.7	2.5
	Domestic	3.6	3.7	2.5
	Overseas	-	0	0
Light oil ^[10 ML]	Total		2.8	33.2
	Domestic	2.9	2.8	2.4
	Overseas	-	5.9	30.8
Other fuel ^[10 ML] (gasoline equivalent)	Domestic	1.17	1.05	0.65
	Overseas	-	-	-
	Total		3.2	12.2
Biomass fuel ^[10 kt]	Domestic	3.6	3.2	12.2
	Overseas	-	0	0
	Total		3.2	12.2
Purchased electricity [0.1 TWh]	Total		2.45	3.00
	Domestic	1.06	1.18	0.98
	Overseas	-	1.27	2.02
Total energy used ^[10 ML] J-POWER Group J-POWER alone	Domestic	1,317	1,207	1,159
		1,293	1,185	1,154

Emission to the atmosphere		FY2020	FY2021	FY2022
Nitrogen oxide (NOx) ^[kt]	Total		24.1	23.9
	Domestic	24.2	23.0	23.0
	Overseas	-	1.1	0.9
NOx emission intensity ^[g/kWh]	Domestic	0.44	0.46	0.48
	Overseas	-	0.16	0.08
	Total		10.5	9.3
Sulfur oxide (SOx) ^[kt]	Domestic	10.8	10.5	9.3
	Overseas	-	0.0	0.0
	Total		10.5	9.3
SOx emission intensity ^[g/kWh]	Domestic	0.20	0.21	0.19
	Overseas	-	0.00	0.00
	Total		0.6	0.8
Dust-emission ^[kt]	Domestic	0.6	0.5	0.7
	Overseas	-	0.1	0.1
	Total		0.6	0.8
Dust-emission intensity ^[g/kWh]	Domestic	0.01	0.01	0.01
	Overseas	-	0.01	0.01
	Total		0.01	0.01

Sulfur hexafluoride management

		FY2020	FY2021	FY2022
Collection rate at time of inspection [%]	Domestic	99.7	99.6	99.2
Collection rate at time of removal [%]	Domestic	99.2	99.2	99.3

*"Total energy consumption" is calculated in crude oil equivalent based on the Energy Conservation Act.

7. List of Environmental Data

Use of water resources

		FY2020	FY2021	FY2022
River water [10,000 m ³]	Domestic	4,970,000	5,166,000	5,127,000
Sea water [10,000 m ³]	Domestic	956,000	868,000	944,000
Industrial water [10,000 m ³]	Domestic	978	850	929
Sewage water [10,000 m ³]	Domestic	29	30	27
Other water resources [10,000 m ³] (e.g. underground water)	Domestic	92	305	26
Total water intake [10,000 m ³]	Domestic	5,927,000	6,035,400	6,072,300
	Overseas	-	1,300	683
Highly treated wastewater [10,000 m ³]	Domestic	485	491	443
COD in waste water [t]	Domestic	28	27	24
Water consumed [10,000 m ³]	Domestic	680	665	607
	Overseas	-	650	490

Number of sheets of copier paper procured (A4-size equivalent)

		FY2020	FY2021	FY2022
Number of sheets of copier paper procured [10,000 sheets]	Domestic	4,370	3,957	3,615
Green procurement rate [%]		99%	98%	96%

Generation and effective utilization of industrial waste

		FY2020	FY2021	FY2022
Industrial waste generated [10 kt]		205	198	195
Effective use rate [%]		99.2%	97.7%	96.2%
including coal ash generated [10 kt]		169	165	164
Effective use rate [%]		99.9%	98.3%	95.8%
including gypsum generated [10 kt]		29	26	28
Effective use rate [%]		99.8%	97.3%	99.9%
Industrial waste discharged [10 kt]		1.6	4.6	7.5

Discharge and recycling of plastic waste (domestic)

		FY2020	FY2021	FY2022
J-POWER	Amount of discharge [t]	-	58	51
	% of recycling, etc. including heat recovery [%]	-	86%	80%
J-POWER Generation Service*		-	760	536
			14%	35%
J-POWER HYTEC*		-	481	523
			34%	40%
Other group companies		-	352	215
			66%	60%
Total for J-POWER Group		-	1,651	1,324
			33%	43%

*Falls under the category of high-volume emitters under the Law for Recycling Plastic Materials.

7. List of Environmental Data



Chemical releases and transfer

	PRTR Control No.	FY2020	FY2021	FY2022
Asbestos (Removal of thermal insulation) [kg]	33	9,320	2,586	1,530
Ethyl benzene (painting) [kg]	53	-	-	1,000
Xylene (Fuel combustion) [kg]	80	3,153	1,320	1,494
Styrene (painting) [kg]	240	3,040	5,785	1,036
Toluene (Fuel combustion) [kg]	300	16,194	14,736	14,242
Hydrazine (water supply treatment) [kg]	333	-	-	0.1
Boron compound (Fertilizer additives) [kg]	405	0.8	0.5	0.4
Trimethylbenzene (Fuel combustion) [kg]	691 (296)	75	21	19

*In accordance 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 system), 1 ton or more per year of Class I designated chemical substances and 0.5 tons or more per year of certain Class I designated chemical substances handled at each business site are counted.

*From April 2023, "1,2,4 Trimethylbenzene (control number 296)" has been integrated into "Trimethylbenzene (control number 691)".

8. Scope of environmental Data

-  Scope of GHG emissions calculation
 Scope of environmental data

Domestic Business		Overseas Business	
<p>= Transmission Business =</p> <ul style="list-style-type: none"> J-POWER Transmission Network Co., Ltd. 100% <p>= Electric Power-Related Business =</p> <ul style="list-style-type: none"> J-POWER HYTEC Co., Ltd. 100% J-POWER Generation Service Co., Ltd. 100% J-POWER Business Service Corporation 100% J-POWER Telecommunication Service Co., Ltd. 100% J-POWER Design Co., Ltd. 100% J-POWER Insurance Service Corporation (100%) J-POWER EnTech, Inc. 100% JM Activated Coke, Inc. 90% J-Wind Service Co., Ltd. 100% Miyazaki Wood Pellet Co., Ltd. 98.33% <p>= Other Business =</p> <ul style="list-style-type: none"> Kaihatsu Hiryo Co., Ltd. 100% Japan Network Engineering Co., Ltd.*1 100% Ohmuta Plant Service Co., Ltd. 100% Biocoal Osaka-Hirano Co., Ltd. 60% Green Coal Saikai Co., Ltd. 60% Biocoal Yokohama-Nanbu Co., Ltd. 60% 	<p>= Electric Power Business =</p> <ul style="list-style-type: none"> Electric Power Development Co., Ltd (J-POWER) 100% Mihama Seaside Power Co., Ltd.*2 100% ITOIGAWA POWER Inc. *2 64% J-Wind Co., Ltd. 100% J-Wind KUZUMAKI Co., Ltd. 100% Nagasaki-Shikamachi Wind Power Co., Ltd. 70% J-Wind SETANA Co., Ltd. 100% Esashi Green Energy CO., Ltd.*3 70% Tosa Power Co., Ltd. 45% Kashima Power Co., Ltd. 50% Yuzawa Geothermal Power Generation Corporation 50% <p>*1 Japan Network Engineering merged with J-POWER Telecommunications Services in December 2022. *2 Shares were transferred to other companies in June 2022 for J-POWER Ichihara Power Station and Mihama Seaside Power Co. and in August 2022 for Itoigawa Power Co *3 Esashi wind farm started commercial operation in February 2023. *4 Batang Power Plant started commercial operation in August 2022 *5 Jackson Power Plant started commercial operation in March 2022 *6 Triton Knoll Offshore Wind Farm started commercial operation in April 2022</p>	<p>Thailand</p> <ul style="list-style-type: none"> Gulf JP UT Co., Ltd. (60%) Gulf JP NS Co., Ltd. (60%) Gulf JP NNK Co., Ltd. (60%) Gulf JP CRN Co., Ltd. (60%) Gulf JP NK2 Co., Ltd. (60%) Gulf JP TLC Co., Ltd. (60%) Gulf JP KP1 Co., Ltd. (60%) Gulf JP KP2 Co., Ltd. (60%) Gulf JP NLL Co., Ltd. (44.99%) EGCO Cogeneration Co., Ltd. (20%) Roi-Et Green Co., Ltd. (24.7%) Gulf Yala Green Co., Ltd. (49%) Gulf JP1 Co., Ltd. (60%) Gulf Power Generation Co., Ltd. (49%) <p>Indonesia</p> <ul style="list-style-type: none"> PT. BHIMASENA POWER INDONESIA*4 (34%) <p>The Philippines</p> <ul style="list-style-type: none"> CBK Power Co., Ltd. (50%) 	<p>The United States</p> <ul style="list-style-type: none"> Jackson Generation, LLC *5 (100%) Tenaska Frontier Partners, Ltd (31%) Elwood Energy, LLC (50%) Green Country Energy, LLC (50%) Pinelawn Power LLC (50%) Equus Power I, L.P. (50%) Tenaska Virginia Partners, L.P. (15%) Edgewood Energy, LLC (50%) Shoreham Energy, LLC (50%) Orange Grove Energy, L.P. (50%) Tenaska Pennsylvania Partners, LLC (25%) <p>The United Kingdom</p> <ul style="list-style-type: none"> Triton Knoll Offshore Wind Farm Ltd. *6 (25%) <p>Australia</p> <ul style="list-style-type: none"> Clermont Coal Joint Venture (22.2%) Narrabri Joint Venture (7.5%) Maules Creek Joint Venture (10%) <p>China</p> <ul style="list-style-type: none"> Shaanxi Hanjiang Investment & Development (27%) China Resources Power (Hezhou) (17%)

*Figures in % indicate the share of equity held by J-POWER, while those in brackets () indicate the share of equity held by the consolidated subsidiary.

