

# J-POWER GROUP INTEGRATED REPORT 2022



## J-POWER Group Integrated Report 2022 Supplementary Material

<Environment>

## Environment Contents

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# 1. INPUT/OUTPUT on Business Activities

The ★ marks denote data that are the subject of third-party assurance.

The table below details the resource consumption and environmental load of the fiscal 2021 J-POWER Group operations in Japan.

INPUT		EMISSION/WASTE		OUTPUT	
<b>Fuel</b>		<b>Emissions</b>		<b>Power generation business</b>	
Coal(Wet)	17.92mil.t ★	CO <sub>2</sub>	41.62mil.t-CO <sub>2</sub> ★	Electric power generated	62.3TWh ★
Heavy oil	37 mil.L ★	NOx	23kt ★	Electric power for sales	57.6TWh ★
Light oil	28 mil.L ★	SOx	11kt ★		
Natural gas	43.9mil.Nm <sup>3</sup> ★	Dust	1kt ★		
Biomass	32kt ★				
<b>Chemicals (as 100%)</b>		•CO <sub>2</sub> Emission from Activities			
Limestone(CaCO <sub>3</sub> )	179kt	Business sites	59kt-CO <sub>2</sub> ★		
Ammonia(NH <sub>3</sub> )	13kt	Offices	9kt-CO <sub>2</sub> ★		
<b>Internal use water</b>		<b>Discharged water</b>			
Industrial-use water	8.5mil.m <sup>3</sup> ★	Wastewater	4.02mil.m <sup>3</sup> ★		
Power for pumped storage	2.1TWh	Wastewater COD	12 t ★		
Business sites	70×10 <sup>3</sup> m <sup>3</sup>				
Offices	226×10 <sup>3</sup> m <sup>3</sup>				
<b>Electricity (purchased)</b>		<b>Waste</b>		<b>Resources Recycled</b> (Recycling rate)	
Business sites	101,880MWh★	Industrial waste	46kt ★	Coal ash	1,625kt (98.3%)★
Offices	15,770MWh★	(of which, coal ash	28kt) ★	Sludge(exclude gypsum)	18kt (81.4%)
		Specially Controlled Industrial waste	0.7kt ★	Gypsum	263kt (97.3%)★
		Wastepaper	20 t ★	Sulfuric acid	40kt (100%)
		Driftwood in dam reservoir	300m <sup>3</sup> ★	Other industrial waste	22kt (81.1%)
				Wastepaper	242t (92.5%)
				Driftwood in dam reservoir	15,000m <sup>3</sup> (93.6%)
<b>Fuel (as Gasoline)</b>					
Business sites	9,268kL				
Offices	1,211kL				
<b>Copy paper</b>					
Copy paper (asA4)	40mil.				
Green procurement ratio	98%				



\*desulfurization byproduct

\*The scope of applicability includes J-POWER and its consolidated domestic subsidiaries, which are engaged in the electric power business, electric power related business, and other business. The amounts attributed to consolidated subsidiaries are based on percentages corresponding to J-POWER's equity share. Note that two domestic equity method affiliates are included in the calculation of CO<sub>2</sub> emissions from thermal power stations.

## 2. Measures to Address Environmental Load

The J-POWER Group is addressing environmental conservation using the latest technologies and knowledge in order to reduce the environmental load caused by its domestic and overseas electric power businesses.

### Noise and Vibration

The boilers, turbines, air blowing fans are installed in a building to prevent noise and vibration. We installed soundproof covers and soundproof walls for outside facilities as required. The magnitude of noise and vibration is measured regularly at the boundary of the site to ensure that it remains at or below the standard value.

### Coal Dust, etc.

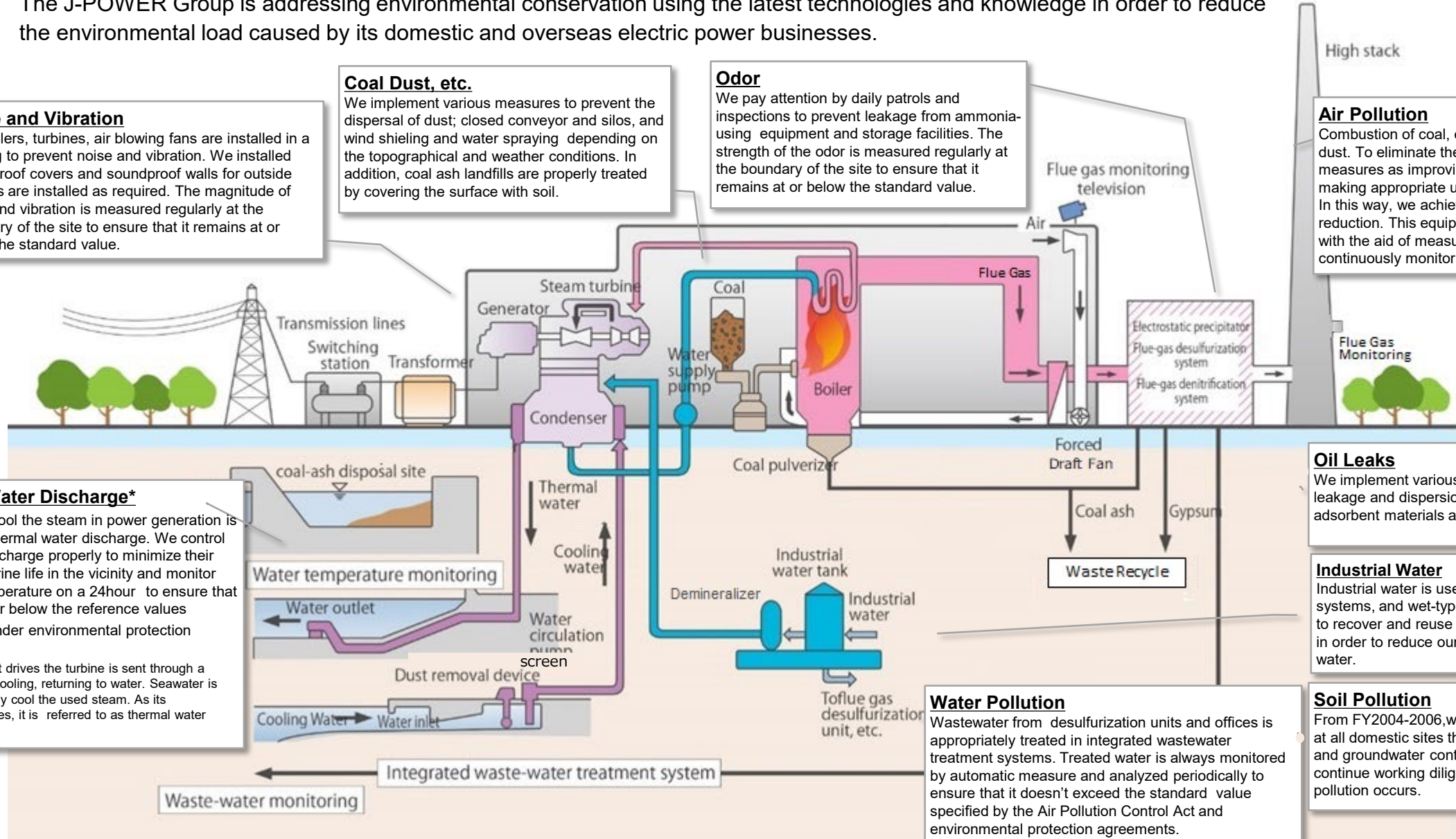
We implement various measures to prevent the dispersal of dust; closed conveyor and silos, and wind shielding and water spraying depending on the topographical and weather conditions. In addition, coal ash landfills are properly treated by covering the surface with soil.

### Odor

We pay attention by daily patrols and inspections to prevent leakage from ammonia-using equipment and storage facilities. The strength of the odor is measured regularly at the boundary of the site to ensure that it remains at or below the standard value.

### Air Pollution

Combustion of coal, etc. generates SO<sub>x</sub>, NO<sub>x</sub>, and dust. To eliminate these emissions, we take such measures as improving combustion and always making appropriate use of such flue gas treatment. In this way, we achieve highly efficient pollutant reduction. This equipment operates automatically with the aid of measurement devices that continuously monitor the content of flue gas.



### Thermal Water Discharge\*

Seawater to cool the steam in power generation is released as thermal water discharge. We control intake and discharge properly to minimize their impact on marine life in the vicinity and monitor the water temperature on a 24-hour to ensure that it remains at or below the reference values established under environmental protection agreements.

\*The steam that drives the turbine is sent through a condenser for cooling, returning to water. Seawater is used to indirectly cool the used steam. As its temperature rises, it is referred to as thermal water discharge.

### Oil Leaks

We implement various measures to prevent the leakage and dispersion of oil, such as keeping adsorbent materials available in power stations.

### Industrial Water

Industrial water is used in boilers, cooling systems, and wet-type desulfurization. We work to recover and reuse as much of the wastewater in order to reduce our consumption of industrial water.

### Water Pollution

Wastewater from desulfurization units and offices is appropriately treated in integrated wastewater treatment systems. Treated water is always monitored by automatic measure and analyzed periodically to ensure that it doesn't exceed the standard value specified by the Air Pollution Control Act and environmental protection agreements.

### Soil Pollution

From FY2004-2006, we studied and determined at all domestic sites that they were free of soil and groundwater contamination. We will continue working diligently to ensure that no soil pollution occurs.

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

J-POWER Group established J-POWER Group Environmental Action Guidelines as issues that we should address, according to J-POWER Group Environmental Basic Policy.  
Based on these, we have set medium-term targets as J-POWER Group Divisional Environmental Targets.

#### J-POWER Group Environmental Basic Policy

- Addressing Climate Change
- Addressing Local environment Issues
- Ensuring Transparency and Reliability

#### J-POWER Group Environmental Targets

Targets set for medium-term issues and addressed by the whole Group.

#### J-POWER Group Environmental Action Guidelines

Issues that the J-POWER Group should address, and main details of initiatives for each issue.

#### J-POWER Group Divisional Environmental Targets

Divisions of the J-POWER Group consider the J-POWER Group Environmental Targets and Action Guidelines, set targets and work toward them.



	Issue	Detail of initiative
Addressing Climate Change	Accelerating the development of CO2-free power sources	<ul style="list-style-type: none"> <li>• Maintaining stable operation of existing hydropower, geothermal, wind power and biomass power generation, etc.</li> <li>• Efficiency improvement by means of replacement equipment in existing hydroelectric power plants</li> </ul>
		<ul style="list-style-type: none"> <li>• Promotion of new development for hydroelectric, geothermal, wind, and solar power generation, etc.</li> <li>• Appropriate response to the review of compliance with the new safety standards by the nuclear regulation authority</li> <li>• Construction of a nuclear power plant that are trusted by the local community while voluntarily working to further improve safety</li> </ul>
	GHG emissions reduction	<ul style="list-style-type: none"> <li>• Promoting the Osaki Cool Gen Project for the development of high-efficiency IGCC technology</li> <li>• Promotion of development technology on CCUS*. *CO<sub>2</sub> capture, effective use, and storage</li> </ul>
		<ul style="list-style-type: none"> <li>• Maintaining high-efficiency operations at thermal power stations</li> </ul>
		<ul style="list-style-type: none"> <li>• Promotion of mixed combustion of biomass at thermal power stations</li> <li>• Promotion of improvement and replacement at thermal power stations</li> </ul>
		<ul style="list-style-type: none"> <li>• Utilization and promotion of carbon offset and credit</li> <li>• Reduction of GHG other than CO<sub>2</sub> such as SF<sub>6</sub>, CFC, HCFC, HFC, N<sub>2</sub>O</li> </ul>
Promotion of energy saving	<ul style="list-style-type: none"> <li>• Reduction of self-consumed power.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Promotion of energy saving in offices.</li> <li>• Efficient transportation of raw materials, etc.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Reduction of environmental impact through eco-driving and using public transportation</li> </ul>	

※For details of J-POWER Group Environmental Basic Policy & J-POWER Group Environmental Targets, please refer to J-POWER Integrated Report 2022. (P.53)



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

Issue	Detail of initiative
Creation of a recycling-oriented society	<ul style="list-style-type: none"> <li>Promotion of 3Rs and appropriate waste disposal</li> </ul>
	<ul style="list-style-type: none"> <li>Promotion of 3Rs and thorough separation waste plastic</li> <li>Appropriate management and abolition procedure of disposal site</li> </ul>
	<ul style="list-style-type: none"> <li>Maintain and continue Green Procurement</li> </ul>
Biodiversity conservation	<ul style="list-style-type: none"> <li>Conservation and sustainable use of the natural environment at each business stage</li> <li>Conservation of rare animals, plants and their habitats</li> </ul>
	<ul style="list-style-type: none"> <li>Raising awareness of biodiversity</li> </ul>
Conservation of forest & sustainable management	<ul style="list-style-type: none"> <li>Conservation of owned forests</li> <li>Promotion the use of unused forest materials</li> </ul>
	<ul style="list-style-type: none"> <li>Conservation and appropriate use of water resources</li> </ul>
Protecting aquatic environments	<ul style="list-style-type: none"> <li>Promotion of measures against sand accumulation and measures to mitigate the long-term persistence of turbidity</li> <li>Appropriate management of wastewater based on Environmental agreements</li> <li>Control of water pollutants by managing wastewater treatment</li> </ul>
	<ul style="list-style-type: none"> <li>Strengthening measures to prevent oil leakage</li> </ul>
	<ul style="list-style-type: none"> <li>Appropriate management of combustion and environmental equipment to reduce emissions of NOx, SOx and soot, etc.</li> </ul>
Reduction of air pollutants emissions	<ul style="list-style-type: none"> <li>Appropriate management of combustion and environmental equipment to reduce emissions of NOx, SOx and soot, etc.</li> </ul>
Suppression noise/vibration /odor	<ul style="list-style-type: none"> <li>Appropriate management of equipment that generates noise, vibration, and odors</li> </ul>

Addressing Local Environment Issues

Issue	Detail of initiative
Addressing Local Environment Issues	<ul style="list-style-type: none"> <li>Appropriate management for chemical           <ul style="list-style-type: none"> <li>Investigation, management, and publication on amount of discharged and transported chemicals</li> <li>Appropriate management and disposal of PCB waste and PCB-used products based on J-POWER policies</li> <li>Appropriate management and planned removal of asbestos.</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Environmentally friendly business plan           <ul style="list-style-type: none"> <li>Conducting environmental impact assessments</li> <li>Design study and introduction of high-efficiency environmental equipment when installing or remodeling facilities</li> <li>International contribution by environmental technology</li> </ul> </li> </ul>
Ensuring Transparency and Reliability	<ul style="list-style-type: none"> <li>Improvement of environment management level           <ul style="list-style-type: none"> <li>Continuous improvement of Environmental Management System at J-POWER Group companies</li> <li>Rationalization of Environmental Management System</li> <li>Raise employee awareness of environmental issues</li> <li>Request to business partners for cooperation in environmental consideration</li> <li>Strengthening risk management through prevention of environmental problems and appropriate response to emergencies</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Full compliance with environmental laws and agreements           <ul style="list-style-type: none"> <li>Ensure identification, dissemination and application of laws, regulations, agreements, etc.</li> <li>Implement education on environmental laws and regulations and promote active participation</li> <li>Use of educational materials and expansion of the use of electronic manifests in waste disposal</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Environmental communication activities           <ul style="list-style-type: none"> <li>Implementation of environmental reporting in consideration of social guidelines and social needs</li> <li>Third-party review of environmental report to ensure reliability and transparency</li> <li>Active response to environmental ratings and questionnaires</li> <li>Communication activities with various stakeholders</li> <li>Social contribution through PR or implementation of local environmental conservation activities, etc.</li> </ul> </li> </ul>

## 4. Creation of a Recycling-Oriented Society

### Discharge and Effective Use

Most of the industrial wastes discharged from the J-POWER Group are coal ash and gypsum from thermal power plants, of which more than 98% is effectively used.

In addition, the J-POWER Group sets "Improvement effective utilization rate of industrial waste" and is striving to effectively utilize industrial waste other than coal ash.

The total amount of industrial waste that J-POWER Group generated in FY2021 was 1.98million tons, with a recycling rate of 97.7%.

#### Waste plastics

"Law for recycling Plastic materials" is enforced on 2022, in Japan. We will continue to 3Rs and separation to waste plastics with J-POWER Group Environmental Target.

J-POWER Group Environmental Targets

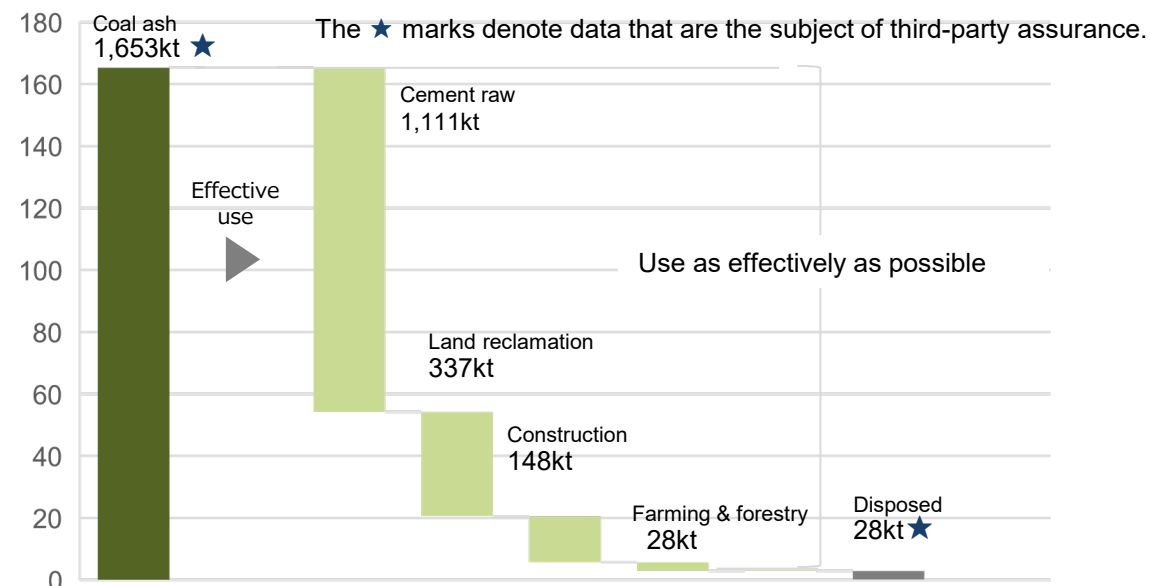
**Reduction of waste plastic emissions and recycling of resources**

### Information on maintenance and Management

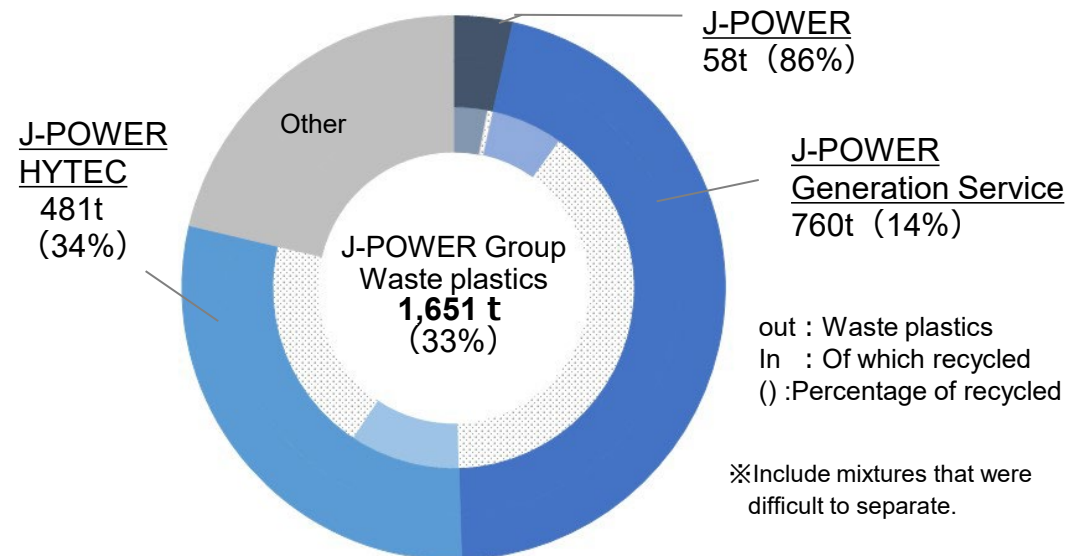
The J-POWER Group discloses information related to disposal sites on its website, including maintenance and management plans, results of water quality analysis of groundwater and wastewater, inspection results, and landfill volumes.

<http://www.jpowers.co.jp/bs/karyoku/maintenance.html> (Japanese Only)

#### Effective use of coal ash



#### Waste plastics discharge and recycle in FY2021



out : Waste plastics  
In : Of which recycled  
( ) : Percentage of recycled

※Include mixtures that were difficult to separate.

## 5. Management of Chemicals (1/2)

The J-POWER Group complies with applicable laws and regulations and properly uses, stores, manages, and treats chemical substances regulated by the PRTR Act, dioxins, PCB waste material (including equipment that contains trace amounts of PCB), materials that contain asbestos, and other substances that are used in power plants or are included in equipment or machinery.

### PRTR substance release and transfer Volumes (FY2021)

Substance	Use	Handled	Released	Transferred as waste
Asbestos	Insulation for Equipment	2.6 t	0 kg	2 586 kg
Ferric chloride	Wastewater treatment agents	5.9 t	0 kg	0 kg
Xylene	Coating for machinery	4.5 t	1,320 kg	0 kg
Styrene	Coating for Machinery	5.8 t	5,785 kg	0 kg
1,2,4-trimethylbenzene	Fuel (kerosene)	4.2 t	21 kg	0 kg
Toluene	Fuel for power generation (coal)	14.7 t	14,736 kg	0 kg
Boron compounds	Manure additives	17.5 t	0.5 kg	0 kg

※The figure includes business establishments that handle 1.0 tons or more of Class 1 designated chemical substance or 0.5 tons or more of specified Class 1 designated chemical substances per year.



## 5. Management of Chemicals (2/2)

### Use of asbestos in buildings and facilities (at the end of March 2022)

Item	Type of use	Present conditions
Blown-in materials Containing asbestos	Acoustic insulation, thermal insulation and fireproofing materials in facility buildings	Appropriate measures have been taken for products containing asbestos
Asbestos-containing products	Building materials	It is considered that asbestos is contained in the building materials used before August 2006. No asbestos-containing products have been used since then.
	Acoustic insulation	For transformers (Transformer facility) Appropriate measures have been taken for products containing asbestos.
	Asbestos-cement pipes	Duct wiring for underground wires (Transmission facility) Approx. 0.6km
	Thermal Insulation	Power generation facilities (Thermal power facility) Remaining products containing asbestos : Approx. 21,000m <sup>3</sup> (about 20 % of total)
	Sealing materials, gaskets	Power generation facilities (Thermal power facility) Remaining products containing asbestos : Approx. 31,000 (about half of total)
	Thickeners	Electric wire for overhead transmission lines (Transmission facility) Electric wire corrosion prevention material : Approx. 76 k m
		Power generation facilities (Hydro power facility) Asphalt surface shielding membrane : 3 facilities Otsumata-Dam : Fukushima Numappara-Dam : Tochigi Hombetsu Power Station : Hokkaido
Buffers	Suspension insulations for transmission facilities Approx. 490,000	Asbestos-containing products are used as buffers inside the insulations. Not used for the surface part.

## 6. Conservation of Aquatic Environments and Biodiversity (1/2)

### Conservation of aquatic environments

Each sites are addressing conserving local water environment through training assuming oil-leakage, conservation activities for river and the sea around sites, and so on. In addition, we are taking measurements for sand accumulates and shortening muddy water discharge period in hydro-power stations and control waste-water discharge accordance with relevant regulations in thermal-power stations.

### Use and risk management of water

The use of water is essential in our business. Hydro-power stations use river water, and thermal-power stations use seawater and industrial water for power generation and steam cooling. Therefore, in order to reduce various water risk, J-POWER Group is taking measures such as environmental impact assessments and followings.

**Assessment** Assessing water stress using WRI Aqueduct(3.0) on J-POWER and consolidated subsidiary power stations.  
Domestic : No sites with high water stress. (At most “Medium-high”)  
Overseas : Some sites have high stress of ”Extremely high” to “Medium-high” results in Thailand.

#### **Management**

##### **Hydroelectric power plant**

-Accordance with laws, we comply with permitted intake water amount, and discharge water necessary to maintain the river environment. When rivers are expected to rise due to heavy rain, advance discharge from dam is carried out based on flood control agreements with the national government in order to cooperate with local disaster prevention as much as possible.

##### **Thermal power Plant**

-We strive to reduce water consumption by circulating water used for power generation, etc. We comply with laws and regulations as well as environmental protection agreements by monitoring the temperature of seawater used for steam cooling and control the quality of treated wastewater. In particular, thermal power stations in Thailand where water stress is high strive to minimize impact to watersheds by increasing the circulation frequency of cooling towers and reusing treated wastewater to reduce water consumption. In addition, appropriate reservoirs are installed to reduce operational risk according to the conditions of each location.

## 6. Conservation of Water Environment/Biodiversity (2/2)

### Conservation of Biodiversity

At the planning and design stage, conservation measures for the flora, fauna, and ecosystems around the site are taken based on environmental impact assessments. In addition, around operated power plants, the flora, fauna including rare species, their habitat, and their growth are conserved.



Fig. Manage of restored wetlands  
[Okutadami·Otori-dam]



Fig. Rare plant transplanted  
“Gaultheria adenothrix”  
[Onikobe-geothermal]

Conservation measures are taken according to local environment and conditions such as outdoor work with consideration for raptor such as golden eagles, animals, and plants around Okutadami-Otori dam, continued management on restored wetland, and conserving animals and plants in Onikobe geothermal power replace project.

In addition, we contribute conservation and CO2 reduction by conserving company-owned forest around hydro-power plants and manufacturing pellet bio-fuel from forest residue for mix combustion in coal fired power plants.

#### ■ Support initiative

We support these initiatives and conservation biodiversity.

“Keidanren Declaration on Biodiversity and Action Guidelines (revised version)”

・・・Japan Business Federation

“Biodiversity Action Guidelines by the Japanese Electric Utility Industry(revised version)”・・・the Federation of Electric Power Companies of Japan

## 7. Implementation of Accurate Environmental Impact Assessments

Prior to construction or expanding power plants, we conduct environmental impact assessments in accordance with applicable laws and regulations and implement adequate environmental preservation measures, taking the opinions of local residents into consideration. After a power plant becomes operational, we carry out ongoing monitoring in accordance with environmental protection agreements with related local governments to ensure that our environmental preservation measures are effective.

### Environment Impact Assessment (24 Projects, as of 31 July 2022)

Project	Area	Project	Area
<b>Shin-Aso-Oguni Wind Farm</b>	Minamioguni, Oguni-Aso-Kumamoto Pref. Kokonoe-Kusu-Oita Pref.	<b>Nakanoto Wind Farm</b>	Nakanoto-Kashima, Shika-Hakui, Nanao-Ishikawa Pref.
<b>Watarai-Minamiise Wind Farm</b>	Watarai, Minamiise-Mie Pref.	<b>Fukui Ono-Ikeda Wind Farm</b>	Ikeda-Imadate, Ono-Fukui Pref.
<b>Shin-Koriyama-Nunobiki Wind Farm</b>	Koriyama-Fukushima Pref.	<b>Kichu Wind Farm</b>	Hirokawa-Arita, Hidakagawa-Hidaka, Tagawa-Arita-Wakayama Pref.
<b>Shin-Aso-Nishihara Wind Farm</b>	Otsu-Kikuchi, Nishihara-Aso-Kumamoto Pref.	<b>Hisatsu Wind Farm</b>	Minamata-Kumamoto Pref. Isa, Izumi-Kagoshima Pref.
<b>Shin-Minamiosumi Wind Farm</b>	Minamiosumi-Kimotsuki-Kagoshima Pref.	<b>Hiroshima-Nishi Wind Farm</b>	Akiota-Yamagata, Hatsukaichi, Hiroshima-Hiroshima Pref.
<b>Shin-Tahara bayside Wind Farm</b>	Tahara-Aichi Pref.	<b>Nishi-Chugoku Wind Farm</b>	Yoshika-Shimane Pref. Iwakuni, Shunan-Yamaguchi Pref.
<b>Shin-Setana bayside Wind Farm</b>	Setana-Kudo-Hokkaido Pref.	<b>Fukui Awara offshore Wind</b>	Awara-Fukui Pref.
<b>Kita-kagoshima Wind Farm</b>	Satsuma-Satsuma, Satsumasendai, Izumi, Akune-Kagoshima Pref.	<b>Hiyama area offshore Wind</b>	Kaminokuni, Esashi, Otobe, Yakumo, Setana-Hokkaido Pref.
<b>Seiyo-Yusuhara Wind Farm</b>	Kihoku-Kitauwa, Seiyo-Ehime Pref. Yusuhara-Takaoka-Kochi Pref.	<b>Saikai offshore Wind</b>	Saikai-Nagasaki Pref.
<b>Wajima Wind Farm</b>	Wajima-Ishikawa Pref.	<b>Yamagata Yuza offshore Wind</b>	Yuza-Akumi-Yamagata Pref.
<b>Youra Wind Farm</b>	Saiki, Tsukumi-Oita Pref.	<b>Upgrading of Sakuma East-West Interconnection</b>	Nambu-Minamikoma-Yamanashi Pref.
<b>Kunimiyama Wind Farm</b>	Otoyo, Motoyama-Nagaoka, Kami-Kochi Pref.	<b>GENESIS Matsushima</b>	Oseto-Saikai-Nagasaki Pref.

## 8. Improvement of Environmental Management Level

The J-POWER Group has introduced an environmental management system (EMS) at all of our business sites. We draw up Environmental Action Plans, periodically review and evaluate initiatives, and revise measures to be taken, following the PDCA cycle. In this way, we work to constantly enhance environmental management. In addition, the J-POWER Group plans and implements environmental education, using such means as online classes and e-learning, to foster a deeper awareness of environmental issues and sense of personal responsibility among employee.

### In house Environmental training (FY2021)

Training category		Results	Content	
General	General Issues	Environmental information exchange meeting	91 office	Sharing information and exchange opinions between headquarters and sites
		Environmental lecture	62 people	Theme "Climate and Water" by guest lecturer
		Basic knowledge regarding environmental issues (e-learning)	87.9 %	To reduce Environmental troubles
Advance & Special	EMS Operation	Internal environmental auditor training	64 people	Knowledge necessary to conduct internal audits under EMSs
		Follow-up for internal environmental auditor	15 people	Knowledge necessary to oversee audit teams conducting internal audits under EMSs
		For EMS administrator, manager	20 people	Knowledge to EMS administrator, manager
	Law & Regulation	Skill enhancement training for waste operations	224 people	Explanation of the key points of the Waste Disposal Act
		Training on environmental laws and Regulations	4 office	Checking provisions of agreements and manifests specified by law
	Environmental law & regulation	212 people	Explanation of environmental laws & regulations	



## 9. Full Compliance with Law, Agreement, etc.

In order to constrain the impact of our business activities on the surrounding environment, we take appropriate steps to comply with laws, regulations, agreements, and other rules applicable to our business activities, and work to make these widely known. We also engage 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, employing waste disposal consulting firms to directly confirm the status of waste disposal by local organizations.

### ■ Responding to Environmental Incidents

Regarding the management of environmental incidents, based on our environmental management systems, we make every effort to prevent environmental incidents before they occur and to minimize harm if they do occur. We have in place a notification framework for the occurrence of environmental incidents, under which we notify local agencies concerned as well as the J-POWER Headquarters Emergency Response Team and related departments. The J-POWER Headquarters Emergency Response Team promptly notifies top management and, in the interest of information disclosure, releases information on emergencies to the media and other relevant parties. We also devise measures to prevent recurrences. In fiscal 2021, there were two environmental incidents that were reported through the mass media.

Status of Environmental Incidents FY2019 : 0 FY2020 : 2 FY2021 : 2

Point	Situation / Measures
<p>Okutadami Kanko Co., Ltd. Okutadami-dam (Uonuma City - Niigata Pref.)</p>	<p>On October 6, 2021, at the Ginzandaira wharf in Okutadami Dam, diesel fuel (about 170 liters) leaked into dam lake during fueling pleasure boat "Oze". Immediately, we made every effort to minimize environmental impact, such as deployed oil fences around the vessel and in the downstream area and carried out oil collecting operations. In addition, we have conducted lake surface inspections and water sampling at several locations in the river where the oil spill occurred and in the downstream dam lake. It was confirmed that there was no environmental impact on the river around environment.</p> <p>We have formulated measures to prevent oil leakage during refueling operations and are working to prevent recurrence</p>
<p>Totsugawa №2 power station Futatsuno-dam lake (Yoshino City – Nara Pref.)</p>	<p>On March 2, 2022, at Futatsuno Dam Lake, hydraulic oil leaked (about 15 liters) around the backhoe barge during test-operation after replacing the oil. At that time, we had deployed oil fences around the barge, so we collected all spilled oil and confirmed there was no oil leak into dam lake and downstream area. We have formulated measures to prevent disconnection of O-ring of oil supply port and are working to prevent recurrence.</p>

# 10. Data Related to Environmental Load (Third-Party Assurance)



## Translation

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

August, 19 2022

## Independent Assurance Report

TO:  
Mr. Toshifumi Watanabe  
Representative Director President and Chief Executive Officer  
Electric Power Development Co., Ltd.

Kenji Sawami  
Engagement Partner  
Ernst & Young ShinNihon LLC  
Tokyo, Japan

We, Ernst & Young ShinNihon LLC, have been commissioned by Electric Power Development Co., Ltd. (hereafter the "Company") and have carried out a limited assurance engagement on the Key Environmental Performance Indicators (hereafter the "Indicators") of the Company and its major subsidiaries for the year ended March 31, 2022 as included in Supplementary Material: Environment attached to J-POWER Group Integrated Report 2022 (hereafter the "Report"). The scope of our assurance procedures was limited to the Indicators marked with the symbol "★" in the Report.

### 1. The Company's Responsibilities

The Company is responsible for preparing the Indicators in accordance with the Company's own criteria, which it determined with consideration of Japanese environmental regulations as presented in the Investor Relations, IR Library, Integrated Reports, Calculation Standards of Environmental Information of the Company's website. Greenhouse gas (GHG) emissions are estimated using emissions factors, which are subject to scientific and estimation uncertainties, given instruments for measuring GHG emissions may vary in characteristics, in terms of functions and assumed parameters.

### 2. Our Independence and Quality Control

We have met the independence requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which is based on the fundamental principles of integrity, objectiveness, professional competence and due care, confidentiality, and professional behavior. In addition, we maintain a comprehensive quality control system, including documented policies and procedures for compliance with ethical rules, professional standards, and applicable laws and regulations in accordance with the International Standard on Quality Control 1 issued by the International Auditing and Assurance Standards Board.

### 3. Our responsibilities

Our responsibility is to express a limited assurance conclusion on the Indicators included in the Report based on the procedures we have performed and the evidence we have obtained.

We conducted our limited assurance engagement in accordance with the International Standard on Assurance Engagements: Assurance Engagements Other than Audits or Reviews of Historical Financial Information - ("ISAE 3000") (Revised), and with respect to GHG emissions, the International Standard on Assurance Engagements: Assurance Engagements on Greenhouse Gas Statements ("ISAE 3410"), issued by the International Auditing and Assurance Standards Board. The procedures, which we have performed according to our professional judgment, include inquiries, document inspection, analytical procedures, reconciliation between source documents and Indicators in the Report and the following:

- Making inquiries regarding the Company's own criteria that it determined with consideration of Japanese environmental regulations, and evaluating the appropriateness thereof;
- Inspecting relevant documents with regard to the design of the Company's internal controls related to the Indicators, and inquiring of personnel responsible thereof at the headquarters and one power station;
- Performing analytical procedures concerning the Indicators at the headquarters and one power station; and
- Testing, on a sample basis, underlying source information and conducting relevant re-calculations at the headquarters and one power station.

The procedures performed in a limited assurance engagement are more limited in nature, timing and extent than a reasonable assurance engagement. As a result, the level of assurance obtained in a limited assurance engagement is lower than would have been obtained if we had performed a reasonable assurance engagement.

### 4. Conclusion

Based on the procedures performed and evidence obtained, nothing has come to our attention that causes us to believe that the Indicators included in the Report have not been measured and reported in accordance with the Company's own criteria that it determined with consideration of Japanese environmental regulations.

Some of the important environmental information and performance data contained in the "J-POWER Group Integrated Report 2022 Supplementary Material: Environment" have been reviewed by Ernst & Young ShinNihon LLC, from the point of view of accuracy and comprehensiveness for important sustainability information as determined by the Japanese Association of Assurance Organizations for Sustainability Information (J-SUS). As a result of this review, said sustainability information has received an Independent Assurance Report. The data that were calculated in accordance with the specified calculation standards and are covered by this assurance are indicated by stars (★)

<b>GHG</b>	<ul style="list-style-type: none"> <li>• CO<sub>2</sub> Emissions and Intensity (domestic and overseas power generation business, etc., )</li> <li>• GHG Emissions (Scope 1 ~ 3)</li> <li>• GHG other than CO<sub>2</sub> (SF<sub>6</sub>, N<sub>2</sub>O, HFC)</li> </ul>
<b>Energy</b>	<ul style="list-style-type: none"> <li>• Thermal power efficiency (gross efficiency, HHV)</li> <li>• Fuel (Coal, Natural gas, Heavy oil, Diesel, Biomass)</li> <li>• Power generated (generation, sale)</li> <li>• Supplied by other companies</li> </ul>
<b>Air</b>	<ul style="list-style-type: none"> <li>• NO<sub>x</sub> Emissions and Intensity</li> <li>• SO<sub>x</sub> Emissions and Intensity</li> <li>• Soot and Dust Emissions and Intensity</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>• Industrial use water of thermal power plants</li> <li>• Wastewater of thermal power plants</li> <li>• Chemical Oxygen Demand in wastewater of thermal power plants</li> </ul>
<b>Waste</b>	<ul style="list-style-type: none"> <li>• Waste (volume of generated, recycled, discharged. Rate of recycling)</li> <li>• Coal ash (volume of generated, recycled, discharged. Rate of recycling)</li> <li>• Gypsum (volume of generated, discharged. Rate of recycling)</li> </ul>

## 10. Data Related to Environmental Load

### ■ Greenhouse Gas Emissions (Scope 1, 2, 3) <sup>※1,2,3</sup> [Unit : million t -CO<sub>2</sub>]

	FY2019	FY2020	FY2021	
Scope1	53.97	53.58	<b>47.95</b>	★
Domestic power generation	43.84	45.38	<b>41.62</b>	★
Overseas power generation	6.64	5.36	<b>4.90</b>	—
Other	3.49	2.84	<b>1.42</b>	—
Scope2	0.11	0.13	<b>0.14</b>	★

### ■ CO<sub>2</sub> emission intensity for electricity sales [Unit : kg-CO<sub>2</sub> /kWh]

	FY2019	FY2020	FY2021	
Domestic and overseas power generation	0.66	0.65	<b>0.64</b>	★
Domestic power generation	0.71	0.71	<b>0.70</b>	★

※1 The figure is a total of those of J-POWER and domestic and overseas consolidated subsidiaries and equity-method affiliates in Electric Power Business, Electric Power-Related Business, etc.

Consolidated subsidiaries and equity-method affiliates are considered in terms of investment ratio.

For the companies subject to aggregation, refer to the scope of aggregation of GHG emissions in "11. Scope of Environmental Load data."

※2 Since fiscal 2021, the scope of data was expanded from consolidated subsidiaries to include equity-method companies and was revised to take into account the equity share. Accompanying the change, data presented for FY2019 and 2020 was recalculated using the same criteria. Therefore, the figures are different than those appearing in the FY2021 integrated report.

※3 Due to the characteristics of our business, there is no energy consumption in the following Scope3 categories.

④ : Upstream transportation and distribution ⑧ : Upstream leased assets

⑩ : Processing of sold products ⑫ : End-of-life treatment of sold products

⑬ : Downstream leased assets ⑭ : Franchises

The ★ marks are guaranteed by a third-party review organization.

[Unit : million t -CO<sub>2</sub>]

	FY2019	FY2020	FY2021	
Scope3	22.22	15.27	<b>13.60</b>	★
① Purchased goods and services	—	—	<b>0.31</b>	★
② Capital goods	—	—	<b>0.44</b>	★
③ Fuel- and energy- related activities (not included in scope1 or scope2)	—	—	<b>3.84</b>	★
⑤ Waste generated in operations	—	—	<b>0.08</b>	★
⑥ Business travel	—	—	<b>0.001</b>	★
⑦ Employee commuting	—	—	<b>0.002</b>	★
⑨ Downstream transportation and distribution	—	—	<b>1.02</b>	★
⑪ Use of sold products	—	—	<b>6.21</b>	★
⑮ Investments	—	—	<b>1.69</b>	★

#### Calculation methods in each Scope 3 category

① Calculated by multiplying each product or service purchased by respective emission factor

② Calculated by multiplying the capital investment by the emissions intensity

③ Sum of the following two values

1) Emissions from production and transportation of fuel used by the company

2) Calculated by multiplying the amount of electricity procured from sources other than the company by the emission intensity

⑤ Calculated by multiplying the amount of emissions by waste type by the emissions intensity of each treatment method

⑥ Calculated by multiplying the number of employees by the emissions intensity

⑦ Calculated by multiplying the number of employees and number of business days by type of work and by rank of employee, respectively, by emission intensity

⑨ Calculated by multiplying the ton-kilometers of sold coal transported by emission intensity

⑪ Calculated by multiplying the volume of coal sold by the emissions intensity

⑮ CO<sub>2</sub> emissions from power plants in which J-POWER's equity portion is 20%

## 10. Data Related to Environmental Load

The ★ marks are guaranteed by a third-party review organization.

### ■ GHG emissions (SF<sub>6</sub>)

	Unit	FY2019	FY2020	FY2021	
Use & Storage	t	124	123	<b>123</b>	—
Emissions	t	0.0	0.0	<b>0.4</b>	★
Handled	t	3.4	3.3	<b>2.7</b>	★
Recovery (maintenance)	%	99.9	99.7	<b>99.6</b>	★
Recovery (revocation)	%	99.3	99.2	<b>99.2</b>	★

※"Use & Storage" is data as of March 2022.

※The amount handled is the total amount of equipment owned for the work, etc.

※Data of SF<sub>6</sub> are from January through December 2021 in accordance with Act on Promotion of Global Warming Countermeasures.

### ■ GHG emissions (N<sub>2</sub>O)

	Unit	FY2019	FY2020	FY2021	
Emissions	t	610	574	<b>545</b>	★

※ Fuel use in facilities and machinery and equipment used for fuel combustion

### ■ GHG emissions (HFCs)

	Unit	FY2019	FY2020	FY2021	
Specified CFCs Use	t	0.0	0.0	<b>0.0</b>	—
Emissions	t	0.0	0.0	<b>0.0</b>	—
Halons Use	t	4.7	4.7	<b>4.7</b>	—
Emissions	t	0.0	0.0	<b>0.0</b>	—
Other CFCs Use	t	4.4	4.2	<b>3.7</b>	—
Emissions	t	0.0	0.0	<b>0.1</b>	—
HFCs Use	t	21.3	22.6	<b>22.9</b>	—
Emissions	t	0.2	0.1	<b>0.1</b>	★

※"Use" is data as of March 2022.

## 10. Data related to Environmental Load

The ★ marks are guaranteed by a third-party review organization.

### ■ Total thermal power efficiency (Gross efficiency, HHV)

	Unit	FY2019	FY2020	FY2021	
Thermal Efficiency	%	40.8	40.9	<b>40.7</b>	★

### ■ Fuel Consumption

Upper : Domestic  
Lower : Overseas

	Unit	FY2019	FY2020	FY2021	
Coal (dry coal) 28MJ/kg Equivalent	mil. t	16.98	17.05	<b>15.65</b>	★
				—	—
Usage intensity	t /GWh	334	334	<b>334</b>	★
				—	—
Natural gas	mil. Nm <sup>3</sup>	96	56	<b>44</b>	★
				<b>1,230</b>	—
Heavy oil	GL	0.03	0.04	<b>0.04</b>	★
				—	—
Diesel	GL	0.03	0.03	<b>0.03</b>	★
				<b>0.06</b>	—
Biomass	M t	0.03	0.04	<b>0.03</b>	★
				—	—

### ■ NOx, SOx, Soot and Dust

Upper : Domestic  
Lower : Overseas

	Unit	FY2019	FY2020	FY2021	
NOx Emissions	k t	27.5	24.2	<b>23.0</b>	★
				<b>1.1</b>	—
Intensity	g /kWh	0.50	0.44	<b>0.46</b>	★
				<b>0.16</b>	—
SOx Emissions	k t	11.9	10.8	<b>10.5</b>	★
				<b>0.0</b>	—
Intensity	g /kWh	0.22	0.20	<b>0.21</b>	★
				<b>0.00</b>	—
Soot and Dust Emissions	k t	0.6	0.6	<b>0.5</b>	★
				<b>0.1</b>	—
Intensity	g /kWh	0.01	0.01	<b>0.01</b>	★
				<b>0.01</b>	—

※ Usage intensity is the amount of coal consumed divided by the amount of electricity sold by the thermal power plants.

※ "Intensity" is calculated based on the amount of power generated at thermal power plants.

※ "Soot and Dust emissions" are calculated from monthly measurement.



## 10. Data related to Environmental Load

The ★ marks are guaranteed by a third-party review organization.

### ■ Electricity(Purchased)

	UNIT	FY2019	FY2020	FY2021	
Business site	GWh	105.8	90.42	<b>101.88</b>	★
Office	GWh	14.29	15.61	<b>15.77</b>	★

### ■ Fuel ※Gasoline equivalent

	UNIT	FY2019	FY2020	FY2021	
Business site	kL	9,636	10,462	<b>9,268</b>	—
Office	kL	1,274	1,222	<b>1,211</b>	—

### ■ Green Procurement ※“A4” paper size equivalent

	UNIT	FY2019	FY2020	FY2021	
Purchased	mil. sht.	49.98	43.70	<b>39.57</b>	—
Green Procurement rate	%	99	99	<b>98</b>	—

### ■ Use of Water

Upper : Domestic  
Lower : Overseas

	UNIT	FY2019	FY2020	FY2021	
Total Intake	×10 <sup>4</sup> m <sup>3</sup>	—	5,927,000	<b>6,035,400</b> <b>1,300</b>	— —
River water (hydro power plants)	×10 <sup>4</sup> m <sup>3</sup>	—	4,970,000	<b>5,165,800</b> —	— —
Sea water (thermal power plants)	×10 <sup>4</sup> m <sup>3</sup>	—	9,56,000	<b>868,400</b> —	— —
Industrial use water	×10 <sup>4</sup> m <sup>3</sup>	1,001	978	<b>850</b> —	★ —
Tap Water	×10 <sup>4</sup> m <sup>3</sup>	30	29	<b>30</b> —	— —
Other	×10 <sup>4</sup> m <sup>3</sup>	—	92	<b>305</b> —	— —
Consumption	×10 <sup>4</sup> m <sup>3</sup>	—	680	<b>665</b> <b>650</b>	— —

※From FY2021, we have also aggregated data of overseas sites.

※“River water” is used for hydro power generation. After generating electricity, almost of all intake water is returned to river.

※ Industrial use water used for thermal power plants is mostly released into the atmosphere as water vapor except for wastewater.

※Totals may not equal total amounts, because of fraction are processed.

## 10. Data related to Environmental Load

The ★ marks are guaranteed by a third-party review organization.

### ■ Volume of industrial waste and effective utilization

	UNIT	FY2019	FY2020	FY2021	
Generated	k t	2,000	2,050	<b>1,980</b>	★
Coal ash	k t	1,630	1,690	<b>1,650</b>	★
Gypsum	k t	300	290	<b>270</b>	★
Recycled	k t	1,980 (99%)	2,030 (99%)	<b>1,940</b> (98%)	★ ★
Coal ash	k t	1,630 (99.8%)	1,680 (99.9%)	<b>1,620</b> (98.3%)	★ ★
Gypsum	k t	300 (100%)	290 (99.8%)	<b>260</b> (97.3%)	— ★
Discharged	k t	13	16	<b>46</b>	★

( ) :effective utilization rate

### ■ Waste plastics discharge and recycle (FY2021~)

	UNIT	FY2019	FY2020	FY2021	
J-POWER Group	t	—	—	<b>1,651</b> (33%)	—
J-POWER	t	—	—	<b>58</b> (86%)	—
<u>JPGS</u> ※	t	—	—	<b>760</b> (14%)	—
<u>JPHT</u> ※	t	—	—	<b>481</b> (34%)	—
Other	t	—	—	<b>352</b> (—)	—

( ) :Recycling rate.

※Generated waste plastics 250t/y or more in FY2021

JPGS : J-POWER Generation Service

JPHT : J-POWER HYTEC

# 11. Scope of Environmental Load data

% : ownership percentage of J-POWER

Domestic Business		Overseas Business	
<p><b>Electric (transmission)</b></p> <ul style="list-style-type: none"> <li>J-POWER Transmission Network 100%</li> </ul> <p><b>Electric Power-Related Business</b></p> <ul style="list-style-type: none"> <li>J-POWER HYTEC 100%</li> <li>J-POWER Generation Service 100%</li> <li>J-POWER Telecommunication Service 100%</li> <li>J-POWER Design 100%</li> <li>J-POWER Business Service 100%</li> <li>J-POWER Insurance Service 100%</li> <li>J-POWER EnTech 100%</li> <li>JM Activated Coke 90%</li> <li>PLANT-GIKEN 100%</li> <li>J-POWER RESOURCES<sup>※4</sup> 100%</li> <li>J-Wind Service 100%</li> <li>Miyazaki Wood Pellet 98.3%</li> </ul> <p><b>Other Businesses</b></p> <ul style="list-style-type: none"> <li>Kaihatsu Hiryou Co., Ltd. 100%</li> <li>Japan Network Engineering Co., Ltd. 100%</li> <li>Omuta Plant Service Co., Ltd. 100%</li> <li>Biocoal Osaka-Hirano Co., Ltd. 60%</li> <li>Green Coal Saikai Co., Ltd. 60%</li> <li>Biocoal Yokohama-Nanbu Co., Ltd. 60%</li> </ul>	<p><b>Electric (generation)</b></p> <ul style="list-style-type: none"> <li>J-POWER <sup>※1,2</sup></li> <li>J-POWER SUPPLY &amp; TRADING</li> <li>Mihama Seaside Power<sup>※2</sup></li> <li>Itoigawa Power<sup>※3</sup></li> <li>J-Wind 100%</li> <li>J-Wind KUZUMAKI 100%</li> <li>J-Wind SETANA 100%</li> <li>Nagasaki-Shikamachi Wind Power 70%</li> <li>Tosa Power 45%</li> <li>Kashima Power 50%</li> <li>Yuzawa Geothermal Power Generation 50%</li> </ul>	<p><b>Thailand</b></p> <ul style="list-style-type: none"> <li>Gulf JP UT Co., Ltd.</li> <li>Gulf JP NS Co., Ltd.</li> <li>Gulf JP NNK Co., Ltd.</li> <li>Gulf JP CRN Co., Ltd.</li> <li>Gulf JP NK2 Co., Ltd.</li> <li>Gulf JP TLC Co., Ltd.</li> <li>Gulf JP KP1 Co., Ltd.</li> <li>Gulf JP KP2 Co., Ltd.</li> <li>Gulf JP NLL Co., Ltd.</li> <li>Nong Khae Cogeneration Co., Ltd.<sup>※5</sup></li> <li>EGCO Cogeneration Co., Ltd.</li> <li>Roi-Et Green Co., Ltd.</li> <li>Gulf Yala Green Co., Ltd.</li> <li>Gulf Power Generation Co., Ltd.</li> </ul> <p><b>Philippines</b></p> <ul style="list-style-type: none"> <li>CBK Power Co., Ltd.</li> </ul> <p><b>China</b></p> <ul style="list-style-type: none"> <li>Shaanxi Hanjiang Investment &amp; Development</li> <li>China Resources Power (Hezhou)</li> </ul>	<p><b>The USA</b></p> <ul style="list-style-type: none"> <li>Jackson Generation, LLC<sup>※6</sup></li> <li>Tenaska Frontier Partners, Ltd</li> <li>Elwood Energy, LLC</li> <li>Green Country Energy, LLC</li> <li>Birchwood Power Partners, L.P.<sup>※7</sup></li> <li>Pinelawn Power LLC</li> <li>Equus Power I, L.P.</li> <li>Tenaska Virginia Partners, L.P.</li> <li>Edgewood Energy, LLC</li> <li>Shoreham Energy, LLC</li> <li>Orange Grove Energy, L.P.</li> <li>Tenaska Pennsylvania Partners, LLC</li> </ul> <p><b>England</b></p> <ul style="list-style-type: none"> <li>Triton Knoll Offshore Wind Farm Ltd.<sup>※8</sup></li> </ul> <p><b>Australia</b></p> <ul style="list-style-type: none"> <li>Clermont Coal Joint Venture</li> <li>Narrabri Joint Venture</li> <li>Maules Creek Joint Venture</li> </ul>
<p>Environment Related data</p> <p>GHG emissions data</p> <p>Environment Related data &amp; GHG emissions data</p>		<p>Note : Environment Related data about overseas business were limited to those shown in "Data related to Environmental Load".</p>	

※1 J-POWER merged with "J-POWER SUPPLY & TRADING" in December 2021.

※2 Ownership of J-POWER SUPPLY & TRADING (Ichihara power station) and Mihama Seaside Power were transferred in June 2022.

※3 Ownership of Itoigawa Power was transferred in August 2022.

※4 J-POWER RESOURCES was merged by J-POWER Business Service in October 2021.

※5 Nong Khae Cogeneration Co., Ltd was closed in October 2021

※6 Jackson Generation, LLC began commercial operation from May 2022

※7 Birchwood Power Partners, L.P. was closed in March 2021.

※8 Triton Knoll Offshore Wind Farm Ltd began commercial operation from April 2022.

