

# Environmental Management

## Environmental Governance Promotion Structure

To carry out appropriate and robust activities toward sustainability under the leadership of the Representative Director and President, the Daigas Group has established the ESG Council, which comprises executives and deliberates sustainability action plans and reports, and the ESG Committee chaired by the Head of ESG Promotion (Representative Director and Vice-President), who supervises the Group's sustainability activities. The ESG Promotion Committee meets four times a year to discuss and report to the Board of Directors on important matters, including the status of performance against ESG management targets related to sustainability and business plans that are expected to have a significant financial impact due to climate change.

In addition, the Environment Subcommittee has been set up to advance environmental management in coordination with the ESG Committee. Under the supervision of the Head of ESG Promotion, Osaka Gas operates a company-wide integrated environmental management system (EMS) based on ISO 14001 to ensure that all employees reduce the environmental impact of our business activities and comply with environmental laws and regulations.

Domestic Daigas Group companies also operate under EMS standards, such as ISO 14001 and the Daigas Group Environmental Management System and others.

### Environmental Management Promotion Structure



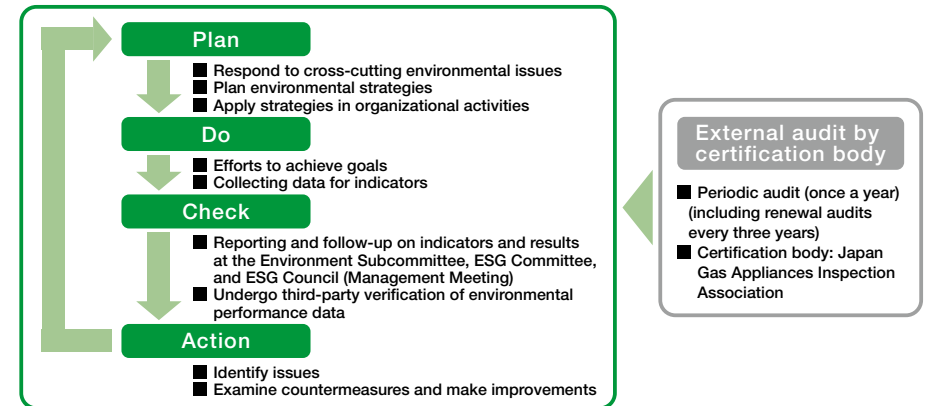
## How the Daigas Group's Environmental Management System Works

To reduce the environmental impact of its Group-wide business activities in line with the Daigas Group Environmental Policy, the Daigas Group has set medium-term environmental targets in its Long-Term Management Vision 2030 and other plans and manages progress in achieving the targets. The environmental targets include those for CO<sub>2</sub> emissions reduction, more widespread use of renewable energy, waste reduction and recycling, and the reduction of excavated soil for final disposal. We also annually calculate GHG emissions that affect climate change from the activities throughout our Group's value chain and use that data to advance our efforts to reduce GHG emissions. These targets and the results of our efforts to achieve the targets are managed by following a PDCA (plan-do-check-act) cycle, which utilizes the mechanism of the EMS.

Please see [P.45, P.47](#) for information on the climate change-related framework.



### PDCA Cycle utilizing the Mechanism of EMS



### Remuneration system for executives with environmental value taken into account

Osaka Gas at its Board of Directors meeting held on December 23, 2021 resolved that remuneration for the executives would reflect the ESG indicators achievement coefficient of the previous fiscal year in order to help improve short- and medium- to long-term improvements in corporate value. In the environmental field, the ESG indicators achievement coefficient takes into account how much the target for CO<sub>2</sub> emissions reduction has been achieved for achieving carbon neutrality. The resolution took effect with remuneration for July 2023 and thereafter, paid based on the results for FY2023.3

## Introduction of ICP

Osaka Gas introduced the concept of “Environmental Management Efficiency” in 2003, which is used to quantify the environmental impact of business activities by converting environmental impacts per volume of gas produced into monetary values. In addition, from FY2022.3, we have adopted internal carbon pricing (ICP) to identify the carbon impact of our invested projects. From FY2024.3, we also reference ICP when making decisions on new investments in business fields that have a large carbon impact.

## ISO 14001 Certification Acquisition Status

In FY1998.3, Osaka Gas launched efforts to acquire certification of each business unit's compliance with ISO 14001, a set of international standards for EMSs, resulting in seven business-unit-specific EMSs covering the entire Company by FY2006.3. In FY2007.3, the Company began to work to integrate all the different EMSs into a unified one and obtained certification of its Company-wide compliance with ISO 14001 in December 2007. Since 2009, the Company has undergone triennial ISO 14001 renewal audit and has continued to obtain integrated certification in response to organizational restructuring, including the transfer of functions to three Core Energy Business Companies in 2020 and Osaka Gas Network Co., Ltd. in 2022.



Certificate of Registration for ISO14001



External audit meeting for renewal of ISO 14001 certification

### All affiliates in Japan completed EMS building and certification

As a general, all affiliates in Japan have constructed and operate an EMS, and these efforts are based on the Group common rules “Environmental Management Rules.”

The EMSs introduced by affiliate companies include ISO 14001 and an EMS established under the leadership of local governments as well as the Daigas Group Environmental Management System (OGEMS), a voluntary EMS that functions in a similar way to such an EMS.

## Violations of Laws and Fines

During FY2023.3, Osaka Gas did not impose any administrative sanction due to the violation of environment-related laws.

## Osaka Gas Certified as the Eco-First Company

On April 5, 2023, Osaka Gas was certified as an Eco-First company by the Minister of the Environment. Under this certification program, companies declare Eco-First Commitments, which are commitments to advanced and unique environmental conservation activities that have ripple effects, and the Minister of the Environment certifies environmentally advanced companies in each industry. We are the first Eco-First company in the energy industry.



From left, Masataka Fujiwara, President of Osaka Gas; Miki Yamada, State Minister of the Environment (Job titles are as of the time of the certification ceremony.)



## Environmental Communication

### Environmental education

#### Various events during the Environment Month

Every year in June, designated as Environment Month, employees of the Daigas Group engage in various environmental activities. Among them are energy-saving efforts at offices, environmental preservation activities, environmental education both inside and outside the Company, and participation in regional environmental events such as cleaning activities. By participating in these activities, each and every employee comes to recognize the great connection existing between his or her activities, and their impact on the environment. Such activities provide the Group with opportunities to continue efforts to build an environmentally harmonious society.

### E-learning and collective training programs for employees

The Daigas Group provides e-learning and collective training programs as part of operating the environmental management system to ensure that employees are capable of keeping up with the environmental initiatives.

In the ISO Environmental Education Course via e-learning, employees learn basic knowledge about the environment, details of group initiatives, and knowledge of environmental laws and regulations.

In addition, in collective training programs, employees learn about the latest trends in environmental issues and practical examples of initiatives, increasing their awareness of the environment.



E-learning

### Environmental awareness-raising activities

#### Environmental communication based on the assets we have accumulated through business activities

As a corporate group operating in a community-based manner, the Daigas Group believes that its good relationships with local communities is an indispensable foundation for its management. In addition to disseminating knowledge on energy conservation and information useful for familiar energy conservation activities through media such as the “My Osaka Gas” membership site, we are also striving to foster the next generation through “energy and environmental education” and other programs that leverage the resources the Group has cultivated through its business activities.

Verified by a third party A third-party verification has been conducted by Bureau Veritas Japan Co., Ltd.

## Environmental Impact throughout the Daigas Group Value Chain

### Main materials and fuels

Amount of LNG procured	<b>6,488 thousand tons</b>
	The figure above includes the amounts of the items listed below: <ul style="list-style-type: none"> <li>● Materials of city gas</li> <li>● Fuels at LNG terminals</li> <li>● Fuels for power generation by Group companies</li> </ul>
LPG used for calorific adjustment of city gas	<b>210 thousand tons</b>

### Procurement of materials and fuels (Business activities by companies outside the Group)

<b>LNG, natural gas</b> City gas use/power generation use/marketing use	<b>LPG</b> City gas use/marketing use
<b>Coal, biomass</b> Power generation use	<b>Other purchased goods</b> Materials/consumable goods/capital goods/gas equipment for sale/electricity/gasoline and others

### Amount of energy used

City gas	<b>1,232 million m<sup>3</sup></b> (including gas whose calorific value has yet to be adjusted)
Purchased electricity	<b>493 million kWh</b>
Other energy sources	<b>13,568 TJ</b>

### Amount of vehicle fuel used

Gasoline	<b>1,553 kl</b>
City gas	<b>31 thousand m<sup>3</sup></b>
Diesel	<b>699 kl</b>
LPG	<b>4 thousand m<sup>3</sup></b>

### Business activities by Osaka Gas

City gas production/supply	Business office
Power generation	Heat supply
LBS business	Others*

\* Engineering/energy services/renovation/maintenance service/R&D etc.

### Sales, waste disposal (Business activities by companies outside the Group)

Commuting, business trips	Waste disposal
Product shipment	Leasing of assets
Outlets providing sales support to Osaka Gas	

### Sales volume of main products

Gas	<b>6,845 million m<sup>3</sup></b>
Electricity	<b>15,883 million kWh</b>

### Use at customer site

City gas	Gas appliances
Electricity	Chemical products
LNG	Services

### GHG (scope 3\*1)

	Emissions (1,000 t-CO <sub>2</sub> e)
LNG, natural gas	3,362
LPG, coal, biomass	192
Other procurement items	1,051
<b>Total</b>	<b>4,606</b>

### GHG (scope 1 and 2)

	Emissions (1,000 t-CO <sub>2</sub> e)	
	Scope 1	Scope 2
City gas production	34	82
Business office (including supply)	16	15
Power generation	3,869	21
Heat supply	56	34
LBS and others	431	172
<b>Total</b>	<b>4,406</b>	<b>324</b>

### GHG (scope 3\*2)

Emissions (1,000 t-CO <sub>2</sub> e)
<b>99</b>

GHG emissions due to energy consumption arising from various activities, including commuting of employees, business trips, transportation of products, business activities at outlets that provide sales support to Osaka Gas, disposal of own waste, disposal of product waste, and leasing of assets.

### GHG (scope 3\*3)

	Emissions (1,000 t-CO <sub>2</sub> e)
Combustion of city gas	15,675
Combustion of LNG	867
<b>Total</b>	<b>16,542</b>

Companies subject to the calculation of GHG emissions: 63 companies in total, including Osaka Gas Co., Ltd. and 62 companies among 154 consolidated subsidiaries. Those housed in office buildings as tenants and whose environmental data are difficult to grasp and whose environmental effects are minimal are not subject to such calculation. Also excluded from the calculation are overseas companies, except two companies.

Please refer to □□ P.35 for CO<sub>2</sub> emission factors used.

#### Breakdown of Scope 3 categories

\*1 Category 1-4 (purchased products, capital goods, fuel procurement, upstream transportation)

\*2 Category 5-7, 9, 12-14 (waste, business trips, commuting, leased assets, product shipment, end-of-life treatment of sold products, franchises)

\*3 Category 11 (use of sold products)

### Waste

	Generated	Recycled
General waste	1,103 t	96%
Industrial waste	101,654 t	96%
Excavated soil	580,000 t	100%
PE pipe	137 t	100%
Used gas appliances recovered	1,569 t	86%

### Amount of water intake and water discharge Stated on □□ P.49

## Calculation of environmental impacts in the value chain P.34

### ■ CO<sub>2</sub> emission factors used (GHG scopes 1 and 2)

- Electricity: 0.65 kg-CO<sub>2</sub>/kWh (Average emission factor of thermal power plants in FY2014.3, stipulated in the Plan for Global Warming Countermeasures issued by the government in 2021)
- City gas: 2.29 kg-CO<sub>2</sub>/m<sup>3</sup> (based on Osaka Gas data)
- Others: Factors listed under the Law Concerning the Promotion of Measures to Cope with Global Warming

### ■ Sources of emission factors used for calculating CO<sub>2</sub> emissions (GHG scope 3)

- Production and transmission of city gas: “Life cycle evaluation of city gas” on the website of the Japan Gas Association
- Production and shipment of LNG: Calculation of life cycle greenhouse gas emissions of LNG and City Gas 13A (papers presented at research presentation meetings of the 35th Meeting of the Japan Society of Energy and Resources, June 2016)
- Production and shipment of LPG and coal: Future forecast for life cycle greenhouse gas emissions of LNG and City Gas 13A (Energy and Resources, Vol. 28, No. 2, March 2007)
- Other main emission factors: Emission factors for calculating supply-chain greenhouse gas emissions, etc. (Database Ver. 3.3) published in March 2023 by the Ministry of Environment

### LCA comparison of GHG emissions by fossil fuel (CO<sub>2</sub> equivalents)

The chart below uses life cycle assessment (LCA<sup>\*1</sup>) to show a comparison of fossil fuel greenhouse gas emissions (as carbon dioxide equivalents), covering all processes from production to combustion. LNG is the cleanest energy of all fossil fuels in terms of GHG emissions.

### ■ Greenhouse gas emissions comparison (g-CO<sub>2</sub>/MJ, Total Calorific Value)

	Coal <sup>*2</sup>	Oil <sup>*2</sup>	LPG <sup>*2</sup>	LNG <sup>*2</sup>	City gas 13A <sup>*3</sup>
Production	4.58	4.06	4.94	8.62	7.57
Transport	1.71	0.79	1.80	1.83	1.48
Domestic manufacturing	–	–	–	–	0.48
Infrastructure	0.11	0.08	0.11	0.05	0.34
Combustion	88.53	68.33	59.85	49.40	50.96
Total	94.93	73.26	66.70	59.90	60.83
Ratio	160	122	111	100	

\*1 LCA

Life Cycle Assessment. A comprehensive quantitative method of survey, analysis, and evaluation for best assessing the amount of environmental impact of products and services. The assessment covers all processes related to products and services from resource extraction to waste disposal including production, transportation, consumption, recycling, and disposal.

\*2 Source

Future Forecast for Life Cycle Greenhouse Gas Emissions of LNG and City Gas 13A (Energy and Resources, Vol. 28, No. 2, March, 2007)

\*3 Source

Emission factors related to the production and transportation of city gas: “City Gas’s Life Cycle Assessment” on the Japan Gas Association’s website However, for domestic manufacturing, the figures are based on the Company’s emissions in FY2023.3.

## Environmental Accounting

### FY2023.3 results of environmental accounting

In FY2001.3, we introduced environmental accounting, which we see as an important tool for quantifying environmental costs and economic benefits toward more efficient environmental activities and continuous enhancement of our environmental performance. Environmental conservation costs—both environmental investment and expenses—for FY2023.3 decreased from the previous fiscal year mainly due to decreases in the amount of green purchasing and the environmental R&D-related costs. In terms of internal economic effects, cost reduction progressed due to reducing and recycling excavated soil.

We will continue to follow up on our environmental initiatives in monetary terms to ensure efficient environmental investment and expenses.

#### (1) Environmental conservation costs

Environmental conservation costs item			Investment (million yen)			Expense (million yen)		
Details			FY2021.3	FY2022.3	FY2023.3	FY2021.3	FY2022.3	FY2023.3
In-house activities	Global environment	Capital investment in and management and labor costs incurred by energy conservation, efficient energy use, the protection of the ozone layer, etc.	111	216	48	692	577	597
	Pollution prevention	Capital investment in and management and labor costs incurred by the prevention of air, water, and noise pollution	61	54	6	85	49	31
	Resource recycling	Capital investment in and management and labor costs incurred by the reduction and recycling of excavated soil, waste management, etc.	2	0	2	29	32	20
	Environmental management	Costs of green purchasing, environmental education, the development of environmental management systems, the operation of environmental organizations, etc.	0	0	0	8,351	8,927	4,320
	Other	Greening at plants, environmental preservation grants, etc.	2	3	2	14	50	15
Environmental impact reduction at customers' sites	Environmental R&D	Cost of researching and developing technologies for environmental impact reduction, environmentally sustainable products, etc.	324	127	128	93	328	156
Environmental impact reduction by recycling	Recycling of used gas appliances	Cost of collecting and recycling sold gas appliances, their packaging, etc.	0	0	0	32	47	37
Social contribution activities		Costs of voluntary greening, environmental advertising, the disclosure of environmental information, etc.	1	1	22	129	7	115
Total			502	400	208	9,424	10,018	5,291

#### (2) Internal economic benefits

	Economic benefits (million yen)		
	FY2021.3	FY2022.3	FY2023.3
Saving from reducing and recycling excavated soil	2,812	1,847	1,836
Sales of valuable resources (LNG cold heat)	180	169	195
Saving from conserving energy, resources, etc.	323	128	-940
Total	3,314	2,143	1,091

## (3) Environmental conservation results

	Impact per output			Total amount			Reduction		
	Unit	FY2022.3	FY2023.3	Unit	FY2022.3	FY2023.3	Unit	FY2022.3	FY2023.3
NOx emissions from LNG terminals in the city gas business	mg/m <sup>3</sup>	1.53	2.35	t	10.81	16.01	t	38.20	94.18
COD at all LNG terminals	mg/m <sup>3</sup>	0.39	0.40	t	2.77	2.72	t	8.63	9.55
CO <sub>2</sub> emissions from LNG terminals	g-CO <sub>2</sub> /m <sup>3</sup>	15.77	16.25	1,000 t-CO <sub>2</sub>	111.90	116.30	1,000 t-CO <sub>2</sub>	0.00	0.00
CO <sub>2</sub> emissions from other sites	g-CO <sub>2</sub> /m <sup>3</sup>	4.35	4.35	1,000 t-CO <sub>2</sub>	30.87	31.15	1,000 t-CO <sub>2</sub>	34.13	34.41
Excavated soil for final disposal	t/km	3.30	0.00	1,000 t	1.38	0.65	1,000 t	20.20	22.20
General waste for disposal	g/m <sup>3</sup>	0.00	0.00	t	10.67	11.15	t	1,053.73	1,062.40
Industrial waste for disposal (including used gas appliances)	g/m <sup>3</sup>	0.03	0.03	t	179.06	223.64	t	3,359.96	1,238.76

## (4) Social benefits of environmental conservation efforts (monetary value)

	FY2021.3 monetary value (million yen)	FY2022.3 monetary value (million yen)	FY2023.3 monetary value (million yen)
NOx emissions from LNG terminals in the city gas business	17	14	34
COD at all LNG terminals	14	13	14
CO <sub>2</sub> emissions from LNG terminals	17	0	0
CO <sub>2</sub> emissions from other sites	117	120	121
Excavated soil for final disposal	994	447	491
General waste for disposal	3	3	3
Industrial waste for disposal (including used gas appliances)	141	103	38
<b>Total</b>	<b>1,303</b>	<b>700</b>	<b>702</b>