

Environmental Management

Principle and Outline

The Daigas Group has established and operated an environmental management system (EMS) in line with the Daigas Group Environmental Policy, aiming for its achievement. The Policy declares our commitment to addressing climate change and other environmental issues, stating that we will work to further reduce environmental impact, prevent pollution, and protect the environment including biodiversity.



▶ Daigas Group Environmental Policy

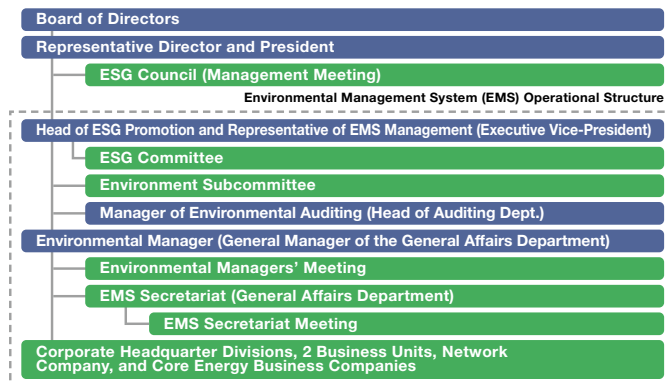
Environmental Governance Promotion Structure

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 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

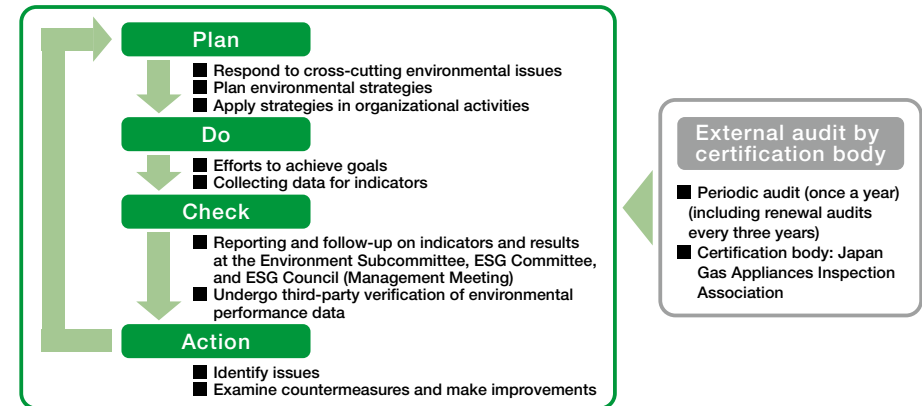


How the Daigas Group's Environmental Management System Works

To reduce the environmental impact of its Group-wide business activities, 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 CO₂ 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.049](#) 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 short- and medium- to long-term improvements in corporate value. The resolution took effect with remuneration for July 2023 and thereafter, paid based on the results for FY2023.3. From FY2025.3 onward, the ESG indicators achievement coefficient includes the achievement of the target for providing carbon neutral energy and other non-financial (materiality) indicators included in the Medium-Term Management Plan 2026. Please see [P.123-P.124](#) for officer remuneration system.

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.

From 2023, we have adopted internal carbon pricing (ICP) to conduct scenario analysis when evaluating investments with a large carbon impact, which we reference as one of tools when making decisions, including the degree of risk and the existence and effectiveness of countermeasures.

Prices are set according to investment target countries/timeframes with reference to carbon price trend forecasts by the International Energy Agency (IEA), etc. They are to be reviewed annually based on the latest policy trends and other factors.

■ Example: ICP Applied to Domestic Investment Projects (as of June 2024)

2030	40 dollars/t-CO ₂
2040	70 dollars/t-CO ₂
2050	90 dollars/t-CO ₂

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 FY2024.3, 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.



E-learning

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.

Environmental awareness-raising activities

Environmental communication based on expertise 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 expertise 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	6,121 thousand tons
	The figure above includes the amounts of the items listed below: <ul style="list-style-type: none"> ● Materials of city gas ● Fuels at LNG terminals ● Fuels for power generation by Group companies
LPG used for calorific adjustment of city gas	231 thousand tons

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

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

Amount of energy used

City gas	1,382 million m³ (including gas whose calorific value has yet to be adjusted)
Purchased electricity	494 million kWh
Other energy sources	11,516 TJ

Amount of vehicle fuel used

Gasoline	1,494 kl
City gas	24 thousand m³
Diesel	801 kl
LPG	4 thousand m³

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	6,845 million m³
Electricity	15,883 million kWh

Use at customer site

City gas	Gas appliances
Electricity	Chemical products
LNG	Services

GHG (scope 3*1)

	Emissions (1,000 t-CO ₂ e)
LNG, natural gas	3,386
LPG, coal, biomass	179
Other procurement items	1,062
Total	4,627

GHG (scope 1 and 2)

	Emissions (1,000 t-CO ₂ e)	
	Scope 1	Scope 2
City gas production	34	82
Business office (including supply)	15	16
Power generation	4,011	20
Heat supply	56	34
LBS and others	325	173
Total	4,441	324

GHG (scope 3*2)

Emissions (1,000 t-CO ₂ e)
97

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 ₂ e)
Combustion of city gas	15,219
Combustion of LNG	923
Total	16,143

Companies subject to the calculation of GHG emissions: 69 companies in total, including Osaka Gas Co., Ltd., 2 overseas subsidiaries and 66 companies among 159 consolidated subsidiaries, are subject to calculation of GHG emissions. Those housed in office buildings as tenants and whose environmental data are difficult to grasp and whose environmental effects are minimal and overseas companies, except two companies, are not subject to such calculation.

Please refer to □□ P.035 for CO₂ emission factors used.

Waste

	Generated	Recycled
General waste	1,007 t	96%
Industrial waste	105,439 t	97%
Excavated soil	566,000 t	100%
PE pipe	126 t	100%
Used gas appliances recovered	1,498 t	86%

Amount of water intake and water discharge Stated on □□ P.058

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)

Calculation of environmental impacts in the value chain on [P.034](#)

■ CO₂ emission factors used (GHG scopes 1 and 2)

- Electricity: 0.65 kg-CO₂/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-CO₂/m³ (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 CO₂ 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 (CO₂ equivalents)

The chart below uses life cycle assessment (LCA^{*1}) 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-CO₂/MJ, Total Calorific Value)

	Coal ^{*2}	Oil ^{*2}	LPG ^{*2}	LNG ^{*2}	City gas 13A ^{*3}
Production	4.58	4.06	4.94	8.62	7.63
Transport	1.71	0.79	1.80	1.83	1.48
Domestic manufacturing	–	–	–	–	0.49
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	60.90
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 FY2024.3.

Environmental Accounting

FY2024.3 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. Regarding environmental conservation costs for FY2024.3, environmental investment increased from the previous fiscal year mainly due to an increase in environmental R&D-related investment, while expenses decreased from the previous fiscal year mainly due to a decrease in the amount of green purchasing. 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			FY2022.3	FY2023.3	FY2024.3	FY2022.3	FY2023.3	FY2024.3
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.	216	48	68	577	597	493
	Pollution prevention	Capital investment in and management and labor costs incurred by the prevention of air, water, and noise pollution	54	6	5	49	31	33
	Resource recycling	Capital investment in and management and labor costs incurred by the reduction and recycling of excavated soil, waste management, etc.	0	2	0	32	20	21
	Environmental management	Costs of green purchasing, environmental education, the development of environmental management systems, the operation of environmental organizations, etc.	0	0	0	8,927	4,320	4,265
	Other	Greening at plants, environmental preservation grants, etc.	3	2	7	50	15	18
Environmental impact reduction at customers' sites	Environmental R&D	Cost of researching and developing technologies for environmental impact reduction, environmentally sustainable products, etc.	127	128	174	328	156	136
Environmental impact reduction by recycling	Recycling of used gas appliances	Cost of collecting and recycling sold gas appliances, their packaging, etc.	0	0	0	47	37	16
Social contribution activities			1	22	0	7	115	138
Total			400	208	253	10,018	5,291	5,119

(2) Internal economic benefits

	Economic benefits (million yen)		
	FY2022.3	FY2023.3	FY2024.3
Saving from reducing and recycling excavated soil	1,847	1,836	2,585
Sales of valuable resources (LNG cold heat)	169	195	218
Saving from conserving energy, resources, etc.	128	-940	-69
Total	2,143	1,091	2,734

(3) Environmental conservation results

	Impact per output			Total amount			Reduction		
	Unit	FY2023.3	FY2024.3	Unit	FY2023.3	FY2024.3	Unit	FY2023.3	FY2024.3
NOx emissions from LNG terminals in the city gas business	mg/m ³	2.35	2.53	t	16.01	16.55	t	94.18	101.05
COD at all LNG terminals	mg/m ³	0.40	0.40	t	2.72	2.60	t	9.55	8.66
CO ₂ emissions from LNG terminals	g-CO ₂ /m ³	16.25	17.37	1,000 t-CO ₂	116.30	115.43	1,000 t-CO ₂	0.00	0.00
CO ₂ emissions from other sites	g-CO ₂ /m ³	4.35	4.68	1,000 t-CO ₂	31.15	31.07	1,000 t-CO ₂	34.41	29.80
Excavated soil for final disposal	t/km	0.00	0.00	1,000 t	0.65	0.63	1,000 t	22.20	39.90
General waste for disposal	g/m ³	0.00	0.00	t	11.15	11.11	t	1,062.40	985.79
Industrial waste for disposal (including used gas appliances)	g/m ³	0.03	0.03	t	223.64	218.67	t	1,238.76	1,213.28

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

	FY2022.3 monetary value (million yen)	FY2023.3 monetary value (million yen)	FY2024.3 monetary value (million yen)
NOx emissions from LNG terminals in the city gas business	14	34	36
COD at all LNG terminals	13	14	13
CO ₂ emissions from LNG terminals	0	0	0
CO ₂ emissions from other sites	120	121	105
Excavated soil for final disposal	447	491	883
General waste for disposal	3	3	3
Industrial waste for disposal (including used gas appliances)	103	38	37
Total	700	702	1,077