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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.