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Actions for Climate Change

Principle and Outline

The Daigas Group believes that climate change represents an important management challenge, and that initiatives to reduce CO₂ emissions are a crucial mission. In January 2021, we established and announced the "Daigas Group Carbon Neutral Vision," indicating our vision of how we strive to become carbon neutral by 2050. In light of the global trend to address climate change, we aim to become carbon neutral by 2050 by reducing CO₂ emissions at the Group, customers, and their value chains, to contribute to achieving a carbon neutral society.

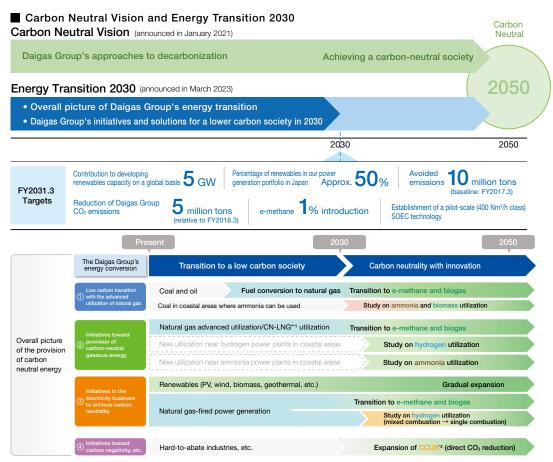
Carbon Neutral Vision

In response to the further increase in social demands for global warming countermeasures, the Daigas Group aims to become carbon neutral by 2050. We plan to reach the goal through decarbonization of our gas and electricity by introducing methanation to generate gas with renewable energy and hydrogen and by increasing the share of renewables in its power generation portfolio, in addition to continuing efforts to expand the use of natural gas to date.

Energy Transition 2030 (ET2030)

In Energy Transition 2030 (ET2030) released in March 2023, the Daigas Group outlines the overall picture of the provision of carbon neutral energy. The Group has been working on specific initiatives in accordance with a roadmap.

In order to achieve carbon neutrality, a steady transition to low-carbon energy is crucial, as a great deal of time and social cost will be required for technological innovation and the building of supply chains. It is also important to choose optimal energies and supply methods to suit the customer's energy use characteristics, such as the balance of electricity and heat use and their location. Focusing on the transition to low-carbon energy by 2030 through a shift from coal and oil to natural gas, and the seamless transition to carbon neutral energy with the introduction of e-methane and biogas in the future, we will continue to pursue carbon neutrality of power sources in ways that meet customer needs. This will include the use of hydrogen and ammonia, as well as carbon neutrality of power sources, such as renewable energy generation and zero-emission thermal power plants. Please see our Integrated report 2024, P.32 to P.37 for initiatives under the Medium-Term Management Plan 2026.



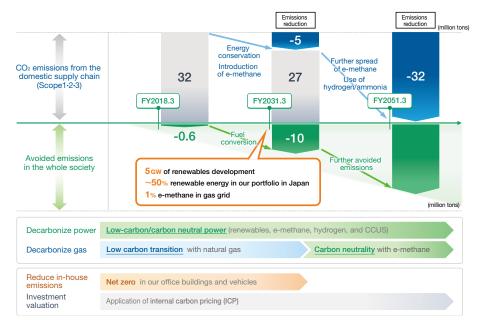
*1 CN-LNG: Carbon Neutral LNG, which is considered to produce no CO₂ on a global basis when greenhouse gases emitted in the supply chain from natural gas production to combustion are offset by CO₂ absorbed and reduced in a separate process from the value chain.

*2 CCUS: Carbon dioxide Capture, Utilization and Storage

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Daigas Group's CO₂ Emissions Reduction Roadmap

In Energy Transition 2030, we have declared targets for 2030 and 2050 regarding CO₂ emissions in our domestic supply chain and avoided emissions in the whole society, and presented a CO₂ emissions reduction roadmap. Through such measures as the 1% introduction of e-methane into existing infrastructure, we will aim to reduce the CO₂ emissions of the Daigas Group's supply chain in Japan by 5 million tons, and 10 million tons of avoided emissions in society as a whole in FY2031.3 through the Group's activities. After the introduction of "e-methane" in FY2031.3, we will pursue decarbonization through its wider use.



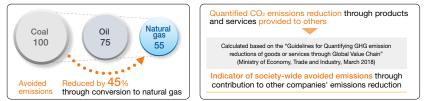
Approach to Avoided Emissions in Society

The following sums up our approach to avoided emissions in society. For example, we can reduce approximately 45% of CO_2 emissions with the switch from coal to natural gas. However, if we have supplied the natural gas, our gas sales volumes increase, which means an increase in Scope 3 CO_2 emissions according to the GHG Protocol^{*1} that is commonly used by companies to calculate their CO_2 emissions. For this reason, in the transition phase until 2030, our CO_2 emissions will increase by promoting fuel conversion from oil and coal to natural gas. On the other hand, by switching to natural gas, CO_2 emissions per the same calorific value will be reduced, which means that we can contribute to CO_2 emissions reduction in the whole society. However, under the current GHG Protocol, there is no way of evaluating the CO_2 reduction effect on society as a whole through contributions to other parties.

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To steadily promote the transition to low-carbon/decarbonization together with our many customers, we believe that it is important to understand our progress with an indicator that shows the effect of CO₂ emissions reduction in the whole society (avoided emissions) and to obtain the understanding of our stakeholders.

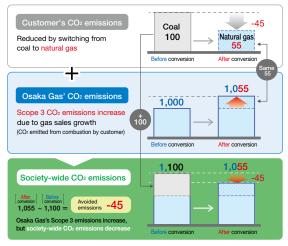
CO₂ Emissions Per Same Calorific Value*² What is "Avoided Emissions"?



*1 International standard for calculating and reporting GHG emissions

*2 Prepared based on the "Ordinance Concerning Calculation of GHG Emissions from Business Activities of Specified Emitters" issued by METI and the Ministry of the Environment

Avoided Emissions Calculation Example



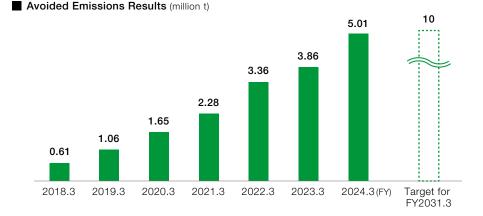
Daigas Group's Avoided Emissions

The Daigas Group is working to introduce various low-carbon or decarbonized systems both domestically and internationally at our customers' sites and in our own business activities. The avoided CO_2 emission is calculated for such systems that contribute to the reduction of CO_2 emissions in society as a whole.

The Daigas Group contributed to a 5.01-million-ton CO₂ emissions reduction, as revealed by the results of calculations of the effect of reducing CO₂ emissions in FY2024.3 (FY2024.3 results) achieved by using the systems listed below that the Daigas Group has introduced since FY2018.3 at customer sites and in its own business activities.

The results were calculated using the stock-based approach, based on the "Guidelines for Quantifying GHG Emission Reductions of Goods or Services through Global Value Chain" (published by the Ministry of Economy, Trade and Industry in March 2018), assuming the calculation method and baseline concept shown in the table below. The calculation results were validated by a third-party review by Bureau Veritas Japan Co., Ltd.

Calculation Method



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	Low-carbon/ carbon-neutral system	Reduction effect calculation method	Baseline concept		Low-carbon/ carbon-neutral system	Reduction effect calculation method	Baseline concept
Reduction of CO ₂ emissions from business activities	Renewable energy sources	Average electricity emission factor of thermal power*	Substitution for thermal power generation	Reduction of CO ₂ emissions at customer sites	High-efficiency distributed system	Household fuel cell system: Number of installed units × Reduction per unit	Substitution for conventional water heaters (boilers) and purchased electricity
	Wind farm Solar power plant					Cogeneration system: Installed capacity × Reduction per unit capacity	
	Biomass power plant etc.				Expanded and advanced use ofnatural gas	Fuel conversion: Amount developed × Difference in CO ₂ emission factor	Emissions comparison with other fuels
	High-efficiency thermal power generation		Comparison with emission factor of existing thermal power generation			Gas-powered air conditioning: Capacity sold × Reduction per unit capacity	Substitution for conventional air conditioners
	High-efficiency thermal power plant	emission factor between high-efficiency and existing thermal power				High-efficiency water heater: Number of installed units × Reduction per unit	Substitution for conventional water heaters
	Cryogenic power generation facilities using cold heat generated in the manufacturing process of city gas	Amount of electricity generated × Average electricity emission factor of thermal power	Substitution for thermal power generation		Proposals for energy saving (Photovoltaic power generation systems/Conversion to LED lighting)	Amount of electricity generated or saved × Average electricity emission factor of thermal power*	Substitution for thermal power generation

*Calculated using the average electricity emission factor of thermal power given in the Plan for Global Warming Countermeasures (approved by the Cabinet on October 22, 2021): 0.65 kg-CO₂/kWh (FY2014.3)

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Efforts to achieve net zero emissions regarding the Group's CO₂ emissions (environmental impact throughout the Daigas Group value chain)

The Daigas Group calculated the amount of greenhouse gas (GHG) emissions from companies that constitute the Daigas Group's value chain network, based on the GHG Protocol, an international emission accounting standards. The methodology of the calculation and its results have been certified by an independent organization to verify their reliability and accuracy.

Combined GHG emissions by the Daigas Group and value chain companies, measured by CO₂, totaled about 25.63 million tons in FY2024.3. The sum breaks down into about 4.77 million tons, or about 19%, for GHG emitted through business activities by the Daigas Group (Scope 1 and Scope 2), and about 20.87 million tons, or about 81%, emitted by others in our value chain (Scope 3). GHG emissions from city gas and LNG combustion on the customer side amounted to 16.14 million tons in the reporting year in terms of CO₂, accounting for about 63% of the total. GHG emissions through electricity generation, as measured in terms of CO₂ in the year, amounted to 4.03 million tons, accounting for about 16% of the total emissions, which represented the majority of GHG emissions from the Group's own business activities. As a way of reducing GHG emissions from power generation, the Group will continue to actively introduce highly advanced energy-efficient power generation facilities and use renewable energy sources.

GHG emissions from material and fuel procurement totaled 4.63 million tons, as measured in terms of CO₂ in the year, accounting for about 18% of the total emissions. The procurement of energy sources, especially LNG, accounted for over 70% of that amount. Under these circumstances, we will continue our efforts to improve fuel efficiency regarding the operation of LNG tankers in collaboration with resource suppliers.

Reduction of CO₂ emissions from the Group's own business activities facilitating the development of renewable energy sources

The Daigas Group aims to raise by FY2031.3 the percentage of renewables in its power portfolio in Japan to about 50% and renewables development contribution on a global basis to 5 GW. To achieve these targets, it is engaged in renewable energy businesses such as wind, solar, and biomass.

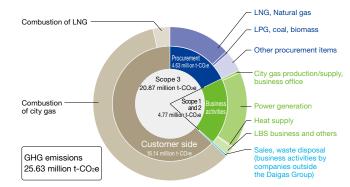
In FY2024.3, the percentage of renewables in our power portfolio was 22.4%, and renewable power development contribution was 3.17 GW.

In November 2023, we acquired a 40% stake in Sano Solar Power Plant operated by a company owned by Sonnedix Power Holdings Limited, a global renewable energy generator. As a result of the investment in the power plant, we have achieved the target set forth in the Daigas Group Medium-Term Management Plan 2023 (to increase our contribution to developing renewables capacity to 2.5 GW by FY2024.3).

GHG Emissions from the Value Chain (FY2024.3 results)

Please see P.034 for detailed data.

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Companies subject to the calculation of GHG emissions:

67 companies in total, including Osaka Gas Co., Ltd. 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 are not subject to such calculation. Also excluded from the calculation are overseas companies, except two companies.

Contribution to Developing Renewables Capacity on a Global Basis*1 (FY2024.3)



Contribution to Developing Renewables Capacity on a Global basis: Targets and Results



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CO₂ Reduction Initiatives at Customers and in the Value Chain

The Daigas Group believes that it is important to reduce not only GHG emissions from its own business activities but also CO_2 emissions at customers' sites. We are seeking to assist customers in reducing their CO_2 emissions by popularizing the use of natural gas and developing and proposing highly energy-efficient equipment. We are also cooperating with our business partners and affiliated companies to reduce CO_2 emissions from logistics.

Efforts to reduce CO₂ emissions in LNG transportation

In 2022, Osaka Gas began chartering the lowfuelconsumption LNG carrier Grace Freesia to achieve even greater energy savings when transporting LNG, an essential material for city gas. The new type of LNG carrier is equipped with a dualfuel low-speed diesel engine and a reliquefaction device that effectively utilizes surplus boil-off gas to further reduce fuel consumption, CO₂ emissions, and transport costs.

NTC.

Low fuel consumption LNG carrier chartered

Reducing CO₂ emissions in logistics

In Japan, the number of trucks accounts for less than 20% of the overall number of automotive vehicles, yet CO₂ emissions in the transportation sector are as high as about 35%. Large trucks generate particularly high emissions, so the introduction of natural gas-powered large trucks can have a significant effect on reducing CO₂ emissions. According to a road verification report by the Organization for the Promotion of Low Emission Vehicles (LEVO), large natural gas trucks have 12.9% lower CO₂ emissions than large diesel trucks. Osaka Gas is working to expand the use of large natural-gas trucks for long-distance transport between cities, and small and medium-sized natural-gas trucks for transport within municipalities.

We have also transported LNG using LNG tanker trucks fueled by compressed natural gas (CNG). These LNG tanker trucks can help reduce CO₂ emissions by about 7%, compared with diesel-fueled tanker trucks.

Japan's first commercial LNG station was opened in Osaka City in June 2018, allowing the start of transport using large LNG trucks. LNG features high-efficiency fuel storage, which lets trucks run for over 1,000 kilometers without refueling for further reductions in CO₂ emissions.



LNG tanker truck fueled by CNG

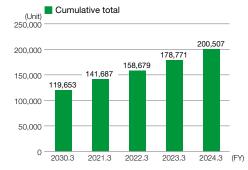
Approaches at customer sites to reduce CO₂ emissions through the introduction of high-efficiency decentralized system

To help realize a low-carbon society, Osaka Gas is striving to sell and disseminate "ENE-FARM" as a co-generation system for household use that helps conserve energy and reduce CO₂ emissions, which generates electricity through chemical reactions between the hydrogen extracted from city gas and oxygen in the air. "ENE-FARM" is a high-efficiency energy system that makes effective use of the heat generated alongside electricity to supply hot water.

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"ENE-FARM type S," launched in April 2020, attains the highest power generation efficiency in the world*¹ of 55%*². Moreover, the main unit has improved in durability and has been significantly downsized. It is equipped with the industry's first electric water-heating mode, which allows customers to use hot water heated by a built-in electric heater even when the supply of city gas is interrupted. As these features were highly regarded, "ENE-FARM type S" won the 7th Japan Resilience Award (2021)*³ and other awards. Additionally, we offer various enhanced services, which have been chosen by many customers. These include IoT connection service, which benefits the user with improved convenience and security, and the surplus power purchase service "E-Share," designed to improve ENE-FARM's environmental friendliness and economical efficiency even more.

Cumulative Sales Total of the Fuel Cell Systems



- *1 Household fuel cell system whose rated output is 1 kW or less in Lower Heating Value (LHV). (based on a survey conducted by Osaka Gas as of the end of January 2020)
- *2 Power generation efficiency when rated power generation is continued for at least three hours (e.g. under the surplus electricity purchase system). In the cases other than the above, the rated power generation efficiency is 54% (overall efficiency: 87%) in Lower Heating Value (LHV).
- *3 A system organized by the Association for Resilience Japan that discovers, evaluates, and awards advanced activities related to resilience which are being developed throughout Japan in order to build a resilient society for the next generation. The award was held for the seventh time in FY2022.3.

Participated in the "Keidanren Carbon Neutrality Action Plan" (formerly titled "Commitment to a Low Carbon Society")

Recognizing that global warming is a global long-term issue to be solved, the Japan Business Federation (Keidanren) formulated a plan titled "Keidanren's Commitment to a Low Carbon Society" in 2013 (revised in 2017), presenting a vision common to the Japanese industries of leveraging their technological prowess to play a central role in achieving the target of reducing global GHG emissions by half by 2050. This plan envisions that each member industry should work to reduce CO₂ emissions from business activities and people's lives in Japan by introducing the best available technologies (BAT) to the maximum and that aspiring initiatives to stop global warming should be actively encouraged abroad. The plan also sets targets for strategically developing innovative technologies that will help achieve a breakthrough for the reduction of CO₂ emissions by half by 2050.

Among the industrial organizations participating in this plan, the Japan Gas Association and the Electric Power Council for a Low Carbon Society have established their own action plans to achieve a low-carbon society in the city gas industry and the electricity industry, respectively. Osaka Gas, a member of both organizations, participates in those plans for both industries and promotes initiatives to address global warming (climate change).

In June 2021, this plan was renewed as the "Keidanren Carbon Neutrality Action Plan." From now on, we will formulate a plan to achieve carbon neutrality by 2050 and promote initiatives to serve that purpose.

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In March 2019, Osaka Gas established Green Power Fuel Corporation (hereinafter, "GPF"), a joint venture company that procures and sells domestically grown woody biomass for biomass power plants, in cooperation with Seishin Shinrin Shigen Co., Ltd. and Nippon Paper Lumber Co., Ltd. The Daigas Group already operates or plans to operate seven biomass plants in Japan, including participating in operating the Matsusaka Woody Biomass Power Plant, which is fueled 100% by locally available biomass. In cooperation with Seishin Shinrin Shigen, which has abundant knowledge about forestry, and Nippon Paper Lumber, which has a long track record in dealing in domestically grown woody biomass, GPF procures and transports unused wood from woodlands in Japan as power generation fuel to ensure stable, long-term biomass supply for several biomass power plants owned or under development by the Daigas Group.

On December 17, 2021, Green Power Fuel Corporation signed a cooperation agreement with Shiso City, Hyogo Prefecture, on the utilization of fast growing trees^{*1} for fuel applications, aiming for local production and consumption of biomass fuels and sustainable growth of domestic forestry. GPF decided to start a demonstration project that aims to build a stable supply system of biomass fuels using fast growing trees, in cooperation with Shiso City, which has abundant forest resources (land suitable for project operationalization). The company focuses on fast growing trees, which are expected to have shorter growth and logging cycles than those of general tree species, from the viewpoint of further increasing its biomass procurement volume and reducing cost. As the first step of this project, the company plans to examine the growth of fast growing trees and evaluate their usefulness as biomass fuels through trial planting in the forests and on abandoned cultivated land owned by Shiso City. Through this demonstration project, GPF will work to build a sustainable business model for domestic forestry by utilizing fast growing trees as fuels. In addion, by utilizing the output of this project, the company will try to realize the independent operation*² of biomass power plants after the purchase period under the FIT scheme expires.

- *1 A general term for trees that grow faster than the commonly planted tree species. Some representative species include Chinaberry and Chinese Fir.
- *2 Under the feed-in tariff (FIT) scheme, renewable electricity is purchased at fixed prices for 20 years at maximum. After this period, the generated electricity must be sold at market prices. For this reason, GPF aims to substantially reduce mainly transportation costs by using domestically produced fuels, thereby realizing sustainable fuel costs.

Involvement in a forestry fund formed by the Sumitomo Forestry Group

In July 2023, Osaka Gas announced its joint investment, along with nine other Japanese companies, in the Eastwood Climate Smart Forestry Fund I ("the Fund") established by the Sumitomo Forestry Group.

The size of this fund is approximately USD 415 million, and the investment period is planned for 15 years. By 2027, the pooled capital will have been invested in the acquisition and management of 130



An example of forests purchased by the fund (Courtesy of Eastwood Forests, LLC)

thousand hectares of forest, primarily in North America. The Fund will contribute to the realization of a carbon-neutral society by generating new absorption of CO₂ and the production and trading of high-integrity carbon credits. (Approx. 46 thousand hectares of forest assets acquired as of June 2024.) The value of forests as natural capital will also be enhanced, such as by maintaining biodiversity and conserving water resources. the Fund will deliver global climate benefits by supporting responsible forest management at an area and financial scale beyond that which individual companies could achieve on their own.

Received "Director-General of the Agency for Natural Resources and Energy Award and the Energy Conservation Center, Japan Chairman's Award for Energy Conservation Grand Prize 2023"

Daigas Energy Co., Ltd. received two awards in the Product and Business Model Category of the Energy Conservation Grand Prize 2023, sponsored by the Energy Conservation Center, Japan: Director-General of the Agency for Natural Resources and Energy Award and the Energy Conservation Center, Japan Chairman's Award.

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The Energy Conservation Grand Prize is awarded to business operators that promote energy conservation in companies, factories, and business places in industrial, operation, and transportation sectors in Japan, as well as to business operators who have developed products with excellent energy conservation performance, and their activities are shared widely at the award ceremony. By so doing, it aims to contribute to the spread of energyconservation awareness, promotion of energy-saving products, development of energysaving industries, and building an energy conservation society.

Director-General of the Agency for Natural Resources and Energy Award in the Product and Business Model Category: "Dr.Flame," digital combustion control system for industrial furnaces

The system, launched in June 2022, is a digital combustion control system that is capable of precisely controlling the air ratio of gas fuel supplied to industrial furnace burners.

Since conventional combustion control system requires experience and skill to adjust the air ratio, it is difficult to adjust air ratio to ideal ratio. Dr.Flame is capable of automatically performing precise air ratio control over a wide range of combustion volume, making it a solution for the entire industrial furnace issues including energy conservation, CO₂ emissions reduction, and eliminating labor shortages.

■ The Energy Conservation Center, Japan Chairman's Award in the Product and Business Model Category: small pressure cooker for commercial use that both saves energy and reduces working hours (awarded jointly with HATTORI KOGYO K.K., which has co-developed the product)

Launched in November 2022, this product is a compact, low-priced product that can significantly reduce energy use without spending time and effort while maintaining the same good taste.

This product is the first pressure cooker for commercial use to be certified by the Japan Gas Appliances Inspection Association ("formal certification" and "gas appliance fire prevention performance rating").

Structure of forestry fund





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Osaka Gas Urban Development Co., Ltd. completed construction of its first logistics facility "MFLP•OGUD Osaka-Torishima"—environmentally friendly facility, including ZEB certification—

Osaka Gas Urban Development Co., Ltd. completed construction of "MFLP•OGUD Osaka-Torishima" (Konohana-ku, Osaka), a joint project with Mitsui Fudosan Co., Ltd., in February 2024. "MFLP•OGUD Osaka-Torishima" is the first logistics facility project by Osaka Gas Urban Development, with solar panels installed on its rooftop that generate approximately 650,000 kWh of electricity through a corporate PPA project^{*1} with Daigas Energy Co., Ltd. In addition, it supports carbon neutrality, including provision of LED lighting for indoor lighting in common and private areas and RE100-compliant green power to meet customer needs.

These environmentally friendly efforts were highly regarded, and it received the A rank of the CASBEE Osaka Mirai (Comprehensive Assessment System for Built Environment Efficiency in Osaka City) and the highest rank of ZEB certification.

DBJ Green Building Certification*² was also obtained.

*1 Corporate PPA project

Long-term contracts for the purchase of renewable energy power between companies as consumers of electricity and power producers.

*2 DBJ Green Building Certification

A certification system established by the Development Bank of Japan Inc. (DBJ) in April 2011 to support real estate with environmental and social consideration.

Osaka Gas Urban Development Co., Ltd. has adopted ZEH-M Oriented as standard features of its condominium.

Osaka Gas Urban Development Co., Ltd. obtained ZEH developer certification in April 2022, and has since adopted ZEH-M Oriented as standard features for its new condominium brand "Scenes." For Scenes, efforts have been made to obtain Comprehensive Assessment System for Built Environment Efficiency (CASBEE) rank A certified, and certification as a low-carbon building (a building that contributes to the reduction of carbon dioxide emissions). In addition, the company is actively adopting energy-saving equipment such as household fuel cell system ENE-FARM, low-E double glazing, heated bathtubs, water-saving toilets, and LED lighting. Four new condominiums have been offered with ZEH-M Oriented as standard features by FY2024.3 (Ready: 1 and Oriented: 3).

Rental apartment series "Urbanex" of Osaka Gas Urban Development Co., Ltd. obtained certification for CASBEE for Real Estate

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Osaka Gas Urban Development Co., Ltd. develops urban-type rental apartment series "Urbanex." Urbanex Kobe Rokko obtained CASBEE for Real Estate^{*1} rank S★★★★, and Urbanex Sanadayama, Urbanex Doshin, Urbanex Kitahorie II, Urbanex Shinsaibashi II, Urbanex Shinosaka, Urbanex Kobe Mizukidori, and Urbanex Sannomiya Isobedori obtained rank A★★★★, as of April 21, 2023.

In addition to obtaining environmental certifications for its rented apartments, the company also works to obtain ZEH-M Oriented certification^{*2}, and to introduce renewable energy through Style Plan E-ZERO^{*3}.

NameUrbanex Doshin IIUrbanex Shinsaibashi EASTUrbanex Namba WESTExterior
viewImage: Shinsaibashi EASTImage: Shinsaibashi EASTImage: Shinsaibashi EASTOutlineCompleted in 2023
Total number of units: 91Completed in 2023
Total number of units: 70Completed in 2023
Total number of units: 112

Rented Apartments with Renewable Energy

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*1 CASBEE for Real Estate

CASBEE evaluates and rates the building's environmental performance. It is a system that comprehensively assesses the building's environmental performance including indoor comfort and consideration for the landscape, in addition to aspects of reducing environmental impact such as energy conservation, resource conservation, and recycling performance. CASBEE for Real Estate was developed to utilize the environmental assessment results of buildings in CASBEE for Real Estate assessment. The assessment is conducted on existing buildings that have been completed for at least one year, and buildings are scored in five categories of energy/greenhouse gases, water, resource use/safety, biodiversity/site, and indoor environment, and rated on four levels: "rank S \pm \pm ," "rank A \pm

*2 ZEH-M Oriented certification

ZEH is an abbreviation for "net Zero Energy House." ZEH-M Oriented certification is obtained by reducing annual primary energy consumption by 20% or higher by achieving substantial energy conservation while maintaining the indoor environment through measures such as improving insulation performance and introducing efficient equipment, etc. in ZEH-M, the housing complex version.

*3 Style Plan E-ZERO

Electricity price menu offered by Osaka Gas, with zero CO₂ emissions and consisting of 100% renewable energy.