Domestic Energy Business

What We Aim to Be in FY2031.3 and Summary of Current Situation

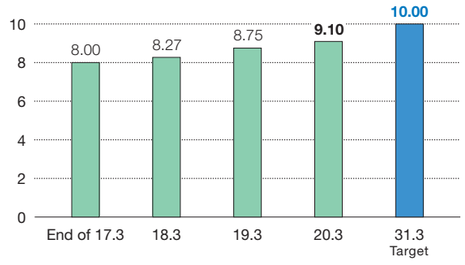
The Daigas Group are striving to develop our business as an energy marketer in a new era by strengthening each of the three areas in the Domestic Energy Business; namely, gas manufacturing and sales, gas distribution, and electric power generation and sales.
In addition to ensuring that customers in the Kansai area use city gas in a stable, safe, and secure manner, we are proceeding with comprehensive provision of energy and services by expanding the electric power and LPG businesses and enhancing life support services and one-stop services as a utility agent. Furthermore, we will expand the know-how and services developed in the Kansai area to a wide area through alliances.
With these activities going beyond customer expectations, business boundaries, and corporate boundaries, we aim to reach more than 10 million customer accounts by FY2031.3.

FY2020.3 Results

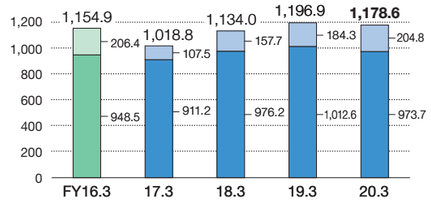
Net Sales ¥**1,178.6** billion Segment Profit* ¥**61.0** billion

* Operating profit (loss) + Share of profit (loss) of entities accounted for using equity method

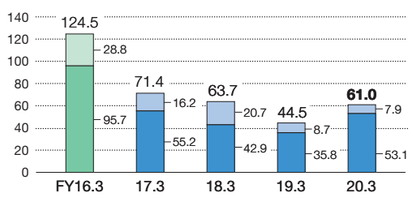
Number of Customer Accounts (million)



Net Sales* (billion yen)



Segment Profit* (billion yen)



Gas | LPG, Electricity and Other Energy | Domestic Energy/Gas | Domestic Energy/Electricity

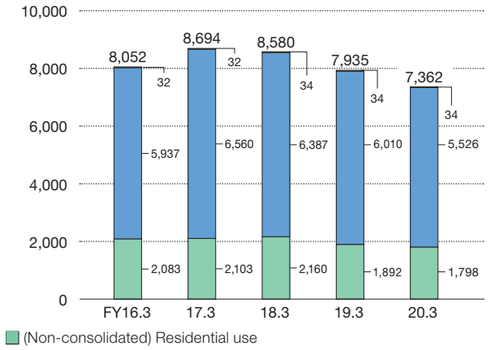
* Since FY19.3, Osaka Gas Engineering Co., Ltd. changed its segment from "Life & Business Solutions" to "Domestic Energy/Gas." FY18.3 results are calculated based on the contents after the change.

Daigas Group's Strategy

For residential use, we are implementing initiatives to provide more added value to customers, such as expanding electricity rate plan options, the Sumikata Service, and IoT service options, and launching gas equipment compatible with the IoT. For commercial and industrial use, we are making efforts to provide solutions for customer issues and enable optimized and efficient energy usage by launching new services using ICT / IoT and broadening the provision of engineering services, such as the development of technologies and products required by customers, into a wider area. In terms of measures for Wide Area Businesses and Power Source Development, in cooperation with various business operators, we are actively expanding energy and services in a wider area including the Greater Tokyo area, and establishing infrastructure through initiatives such as developing power sources (including renewable energy power sources). As a result of these measures, the consolidated number of gas supply was 5,345 thousand, and the number of low-voltage electricity supply reached 1,322 thousand as of the end of March 2020. The number of customer accounts reached 9.10 million.

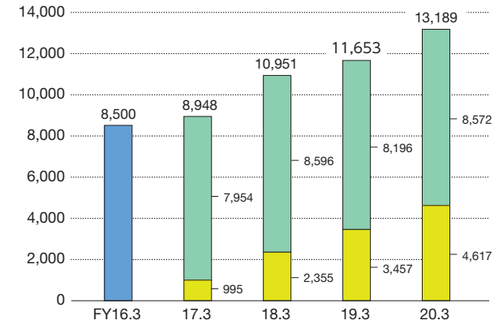
	End of 19.3	End of 20.3	Change
Consolidated number of gas supply (thousand)	5,579	5,345	-235
Non-consolidated number of gas supply (thousand)	5,553	5,225	-328
Number of low-voltage electricity supply (thousand)	945	1,322	+377
Number of customer accounts (million)	8.75	9.10	+0.36

Consolidated Gas Sales (million m³)



(Non-consolidated) Residential use
(Non-consolidated) Non-residential use | Consolidated subsidiaries

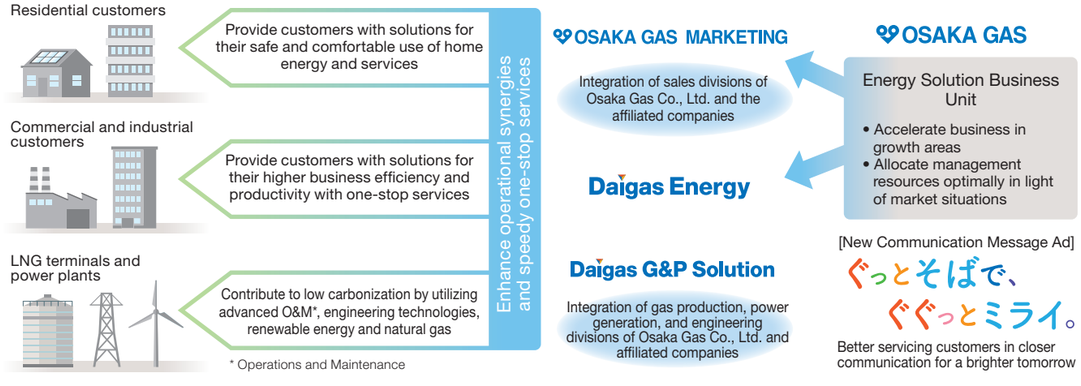
Consolidated (Domestic) Electricity Sales (million kWh)



Domestic electricity sales volume | Retail | Wholesale, etc.

Organizational Restructuring (Establishing Core Energy Business Companies and Changing Organizational Structure)

In October 2019, in order to achieve sustainable growth by adapting to changes in the business environment, we established several new affiliates that will take on central roles in the energy field as core energy business companies which started operating in April 2020. Furthermore, together with the launch of these core energy business companies, by consolidating the strengths of Osaka Gas Co., Ltd. and affiliates into the core energy business companies and changing the organizational structure of the sales divisions of Osaka Gas Co., Ltd., we will improve on-site mobility from a customer perspective and provide speedy one-stop services by enhancing operational synergies with our affiliates, each of which possess their own unique strengths.



Measures for Stable Gas Supply, and Safe and Secure Use

Low-cost and Stable Energy Resource Procurement

Natural gas is highly valued in terms of energy security because it is found all over the world. In addition, natural gas emits less carbon dioxide and other greenhouse gases than oil and coal, being considered a relatively clean type of energy. The Group owns its own LNG carrier fleet and operates it efficiently while diversifying its suppliers and price indexation. It also promotes activities in the trading company which was established in 2019. In these ways, we will seek even more low-cost and stable resource procurement.

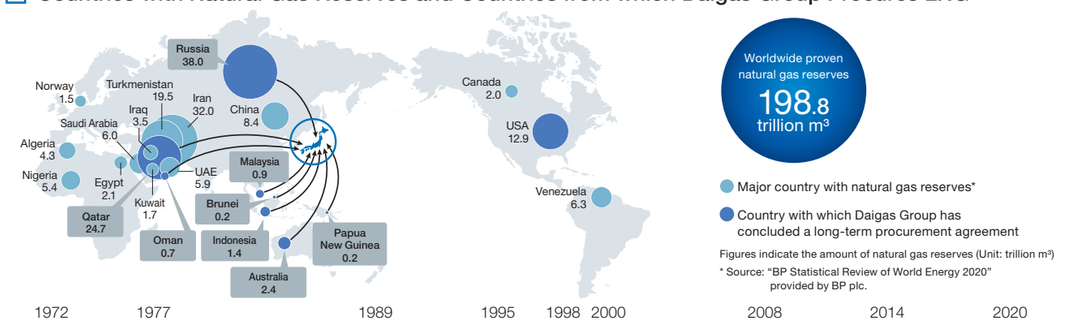
Environmental Advantages of Natural Gas

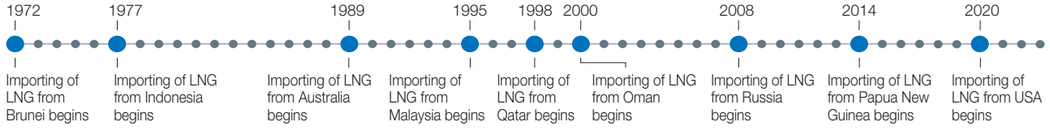
Liquefied natural gas (LNG), the raw material used for city gas, is a clean energy that contains almost no impurities. When LNG is produced by liquefying natural gas, impurities such as sulfur are removed. LNG is clean energy with excellent environmental benefits that generates little CO_2 (carbon dioxide), which is one of the greenhouse gases, NOx (nitrogen oxide), which is the cause of acid rain and air pollution, and zero SOx (sulfur oxide) during combustion.

Diversification of Suppliers and Price Indexation

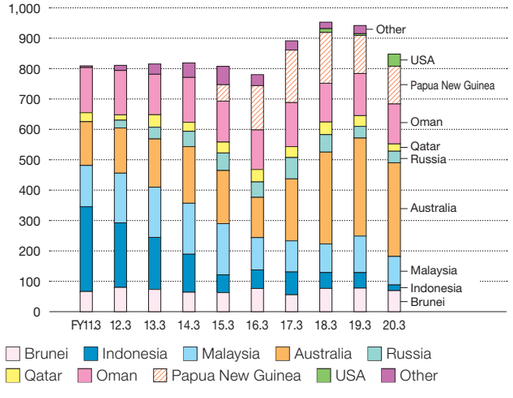
Since we started to import LNG from Brunei in 1972, we have sought to diversify our suppliers. A natural gas liquefaction project in Texas, USA started from December 2019, which has increased the number of countries with suppliers we source from to nine countries. We also entered into a new type of procurement where LNG procurement prices are indexed to Henry Hub prices, one of the price indexes for natural gas in the USA, in addition to traditional procurement in which LNG prices are generally linked to the crude oil price.
The diversification of price indexation will help stabilize LNG prices when crude oil prices fluctuate. In addition, by investing in liquefaction projects, we will be able to procure price-competitive LNG from among those linked to Henry Hub prices. We will continue to seek even more low-cost and stable LNG procurement.

Countries with Natural Gas Reserves and Countries from which Daigas Group Procures LNG





LNG Purchase Volume (10 thousand tons)



Use of Daigas Group LNG Carrier Fleet

By utilizing the Daigas Group LNG carrier fleet consisting of eight ships, we are striving to further stabilize the procurement of energy resources and reduce transportation costs while diversifying our suppliers in an effort to expand our LNG trading business.

Vessel name	LNG JUNO	LNG JAMAL	LNG DREAM	LNG BARKA	LNG JUPITER	LNG VENUS	LNG MARS	LNG SATURN
Capacity	180 thousand m³	135 thousand m³	145 thousand m³	153 thousand m³	153 thousand m³	153 thousand m³	153 thousand m³	153 thousand m³

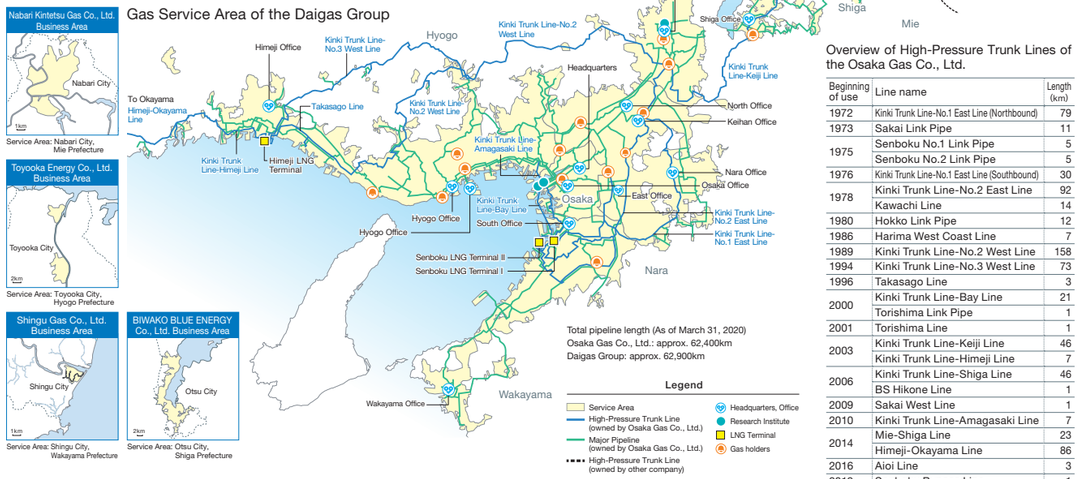
As of March 31, 2020

Supply Systems for Safe and Secure Use

Supply network structure

For stronger supply capabilities and improved reliability of city gas, we regularly inspect our pipeline network, implement planned reinforcements and replacements with stronger material on a regular basis. Additionally, we have been working to extend new pipelines as well to establish a strong network to improve supply reliability and to respond to increasing demand for city gas.

Gas Service Area of the Daigas Group



Overview of High-Pressure Trunk Lines of the Osaka Gas Co., Ltd.

Beginning of use	Line name	Length (km)
1972	Kinki Trunk Line-No.1 East Line (Northbound)	79
1973	Sakai Link Pipe	11
1975	Senboku No.1 Link Pipe	5
	Senboku No.2 Link Pipe	5
1976	Kinki Trunk Line-No.1 East Line (Southbound)	30
1978	Kinki Trunk Line-No.2 East Line	92
	Kawachi Line	14
1980	Hokko Link Pipe	12
1986	Harima West Coast Line	7
1989	Kinki Trunk Line-No.2 West Line	158
1994	Kinki Trunk Line-No.3 West Line	73
1996	Takasago Line	3
2000	Kinki Trunk Line-Bay Line	21
	Torishima Link Pipe	1
2001	Torishima Line	1
2003	Kinki Trunk Line-Keiji Line	46
	Kinki Trunk Line-Himeji Line	7
2006	Kinki Trunk Line-Shiga Line	46
	BS Hikone Line	1
2009	Sakai West Line	1
2010	Kinki Trunk Line-Amagasaki Line	7
2014	Mie-Shiga Line	23
	Himeji-Okayama Line	86
2016	Aioi Line	3
2019	Senboku Bypass Line	1

Safety Measures

Maintenance of Supply Network and 24-hour Emergency Dispatch System

For our pipeline network with a total extended length of approximately 62,400 km (equivalent to 1.5 times the circumference of the earth), regular inspection and maintenance are conducted as preventative measures for ensuring safety. In addition, The Central Control Office operates 24 hours a day to monitor and control the status of gas supply in an integrated manner and is ready to promptly respond and dispatch staff from respective locations upon receiving reports from customers.

Disaster Prevention Measures (Earthquake Countermeasures)

Preventive Measures

We are advancing efforts to minimize damage caused by earthquakes, such as promoting the spread of intelligent gas meters (residential use) that automatically stop gas when large shakes are detected, and actively adopting polyethylene pipes for low-pressure gas pipes.

Intelligent gas meters

During Great Hanshin-Awaji (Kobe) Earthquake 75%
End of March 2020 **100%**

Highly flexible polyethylene pipes

During Great Hanshin-Awaji (Kobe) Earthquake About 1,200km
End of March 2020 **About 16,700km**

Emergency Measures

We are stepping up our preparedness for earthquakes, by dividing the pipeline network into blocks, which enables gas supply suspension only for severely damaged areas, and having in place a Central Control Back-up center which will take over the Central Control Office of the head office if it is affected.

Segmenting the pipeline network into blocks

During Great Hanshin-Awaji (Kobe) Earthquake
55 blocks
▶ End of March 2020 **About 170 blocks**

Recovery Measures

We have stockpiled materials and equipment and carried out system maintenance for post-disaster quick recovery. In addition, a system to visualize the recovery situation provides gas recovery information in an easy-to-understand manner to customers in areas where gas supply is suspended when a large-scale earthquake occurs.

System to visualize the recovery situation

Visualization of gas recovery status by municipality (Checks with both maps and lists)

Measures to Maximize Customer Accounts

We are aiming to become a company that is consistently chosen by customers in the areas of energy supply such as city gas, LPG, electric power, and energy-related services by continuing to provide services that go beyond customers' expectations.

Measures for Residential Use

For more than 110 years, we have provided a stable city gas supply and superior safety and reliability to earn customers' trust. On the base of this trust, we are promptly providing energy, equipment, and lifestyle services and reforms, etc. that meet the needs of each individual customer to strengthen relationships with customers.

Contact points with customers

We have approximately 200 service chain partners in our supply area that work closely with customers in their areas providing Sumikata Services (home services) in addition to contract services for us (such as opening and shutting off gas service and maintenance of gas equipment).
Osaka Gas Co., Ltd.'s customer centers accept service reservations for any gas equipment trouble 24 hours a day, 365 days a year. If a call is received by 3:00 p.m., one of about 1,200 technicians qualified by us to repair gas appliances will visit the customer on that day. Customers have given approx. 98% customer satisfaction rating to the speed with which repairs are completed after their call is made.


Calls received 365 days a year (Osaka Gas Co., Ltd.'s customer centers)


Same-day repair system (for calls received by 3:00 p.m.)


High customer satisfaction

Various Electricity Rate Plan Options

We provide rate plan options offering good value, including the "Base Plan A-G" for gas contract customers and "Residential Gas-powered Electricity Generation Plan" for customers who use ENE-FARM, a residential fuel cell cogeneration system. During the fiscal year ended March 31, 2019, we created "Style Plan" electricity rate plan options that meet diverse customer lifestyles and individual needs. During the fiscal year ended March 31, 2020, we created "With Plan" electricity rate plan option, which supports fun and enriched lives for our customers with other companies and groups based on their personal hobbies and preferences. We support customers' lives by offering these rate plan options which is convenient, good value and meet customer lifestyles and needs.

Style Plan	Style Plan S	Service menu that comes with the Sumikata Guarantee Pack offering good value
	Style Plan P	Service menu that comes with Amazon's membership program Amazon Prime, offering good value
	Style Plan d	Service menu where "d Points" under the DOCOMO's point service accumulate according to monthly electricity bills
	Style Plan E	Service menu for customers who wish to use environmentally friendly electricity
With Plans	With radiko Plan	Service menu in which Osaka Gas Co., Ltd. bears the annual fee for "radiko premium" during the entire contract period
	With Yoshimoto Plan	Service menu in which Osaka Gas Co., Ltd. bears the annual fee for "Osaka Channel" during the entire contract period
	With ABEMA Plan	Service menu in which Osaka Gas Co., Ltd. bears the annual fee for "ABEMA Premium" during the entire contract period

Investment in Renovation Business

In May 2020, we acquired shares in Global Base Corporation, which operates a renovation business for used condominiums mainly in the Greater Tokyo area. Global Base Corporation has a competitive edge in its capability to procure properties in attractive locations and to undertake design and construction capabilities that meet various customer needs. In recent years, the company has also focused its resources on offering additional services and differentiating from its competitors in space design through collaboration with partners in other industries to offer more comfortable living spaces.
Meanwhile, we have continued to supply energy such as gas and electricity in the Kansai area, and have met the various needs of our customers through the provision of gas appliances and renovation projects for instance. As of the end of March 2020, we have received more than 350,000 orders for renovation projects.
In the future, we will strive to further enhance value for customers by enhancing operational synergies between the latest gas equipment that utilizes our IoT and the renovation design of Global Base Corporation.

Initiatives Aimed at Promoting Installation of Residential Fuel Cells "ENE-FARM"

Since its launch in 2009, cumulative sales of ENE-FARM exceeded 110,000 units as of October 2019. The new ENE-FARM type S product, which was launched in April 2020, has achieved the world's highest power generation efficiency of 55%*1, and features increased ease of installation through significant miniaturization of the main body of the device. This line of products generates electricity even during power outages, and includes the function to continue power generation throughout a power failure to ensure the continued availability of electricity. In addition, we have expanded our IoT services by adding a convenient Tsunagaru Switch*2 to the remote control that can be used in conjunction with the dedicated smartphone app. We are striving to advance further technology development and cost reduction while continually contributing to the realization of comfortable living for customers, mitigation of environmental loads, and enhancement of energy security.


ENE-FARM type S

Tsunagaru Switch

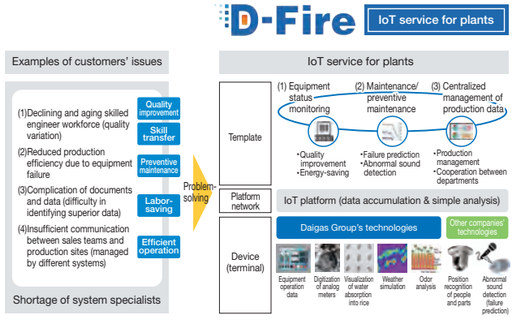
*1 The world's highest power generation efficiency under certain conditions (surveyed by Osaka Gas Co., Ltd. as of January 31, 2020).
*2 Choice and assign functions to the remote control from the application

Measures for Commercial and Industrial Use

To enable optimized, efficient energy usage, we provide one-stop solutions to meet utilities-related outsourcing needs at our customers, along with services that leverage engineering, the IoT and other advanced tools in the development of technologies and products needed by our customers.

IoT Services for Plants

In July 2019, the Daigas Group started a new service "D-Fire" that utilizes IoT to offer one-stop solutions that lead to higher plant productivity. In the new service, we select optimal devices and sensors for customers' plants and offer data visualization and analysis tools, and provide support for resolving any issues faced throughout the plant by utilizing the technology and expertise that we have has built up over the years to further improve consulting services for our customers.
Thus, the service enables minimizing unexpected equipment failures by monitoring trends in equipment operation data and stable quality control with checking processing conditions against product quality data. It also becomes possible to digitize the expertise of skilled engineers, supporting the transfer of skills. By combining our own expertise with AI, IoT, and other advanced technologies, we will continue to expand our services that are helpful for our customers to grow their businesses and resolve any issues that they may have.

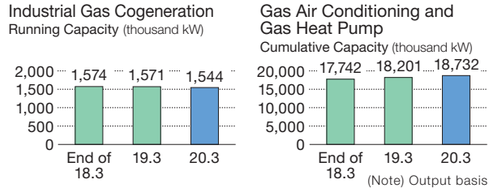


Services Using ICT

For the commercial and industrial customer, we have developed various services using Information and Communications Technology (ICT). "ekul" is a service which can measure immediately and provide gas and electricity usage information in real time, and can also measure various data, including water usage, number of customers, temperature, and humidity. In April 2019, the "ekul lite" service plan was also launched as a derivative plan of "ekul." The new service combines features such as simple device configuration, a measuring device that can be installed anywhere thanks to battery-powered operation, and the availability of existing "ekul" service functions. We will continue to help our customers grow their businesses by providing a wide variety of services.

Expanded Use of Gas Cogeneration Systems and Air Conditioning Systems

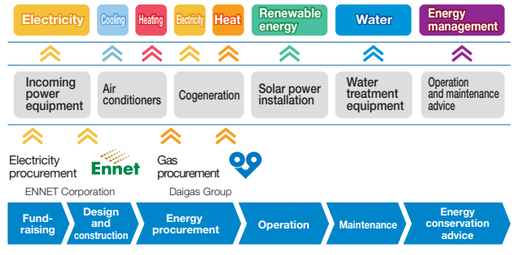
We are continuing to propose cogeneration systems and gas air conditioning systems that help reduce peak electricity and promote energy conservation.



Utility Agent* Contract

In Daigas Group's utility agent contracts, Daigas Energy Co., Ltd. provides a full-range of utilities-related services, combining nine categories. By proposing in a single package optimized utility facilities (for gas, electricity, water, etc.), no requirement for initial investment in facility introduction, optimized procurement of energy, facility operation/maintenance, and energy-saving technical advice after facility introduction, we ensure continuous energy- and cost-saving not only at the time of facility introduction but also during operation.

* Trademark "Utility Agent" is a registered trademark of Osaka Gas Co., Ltd. and Daigas Energy Co., Ltd.



Engineering Services

Leveraging technologies built up over the years, we carry out thorough investigations into energy load at all customer facilities and provide solutions to issues faced by the customer using simulations and other measures at one of Japan's largest test sites. Construction work and post-project maintenance are also carried out by the Daigas Group. We propose total solutions, including regular inspections, emergency troubleshooting, and facility upgrades.

Diagnosis results As of March 31, 2020

Industrial facilities	Power measurement
Approx. **6,700** units	Approx. **2,100** systems

Development of Energy and Services in a Wider Area, Establishment of Competitive and Environmentally Friendly Infrastructure

As an energy business operator, we will contribute to creating an overall low-carbon society by providing energy and services in a wider area while pursuing the development of competitive and environmentally friendly infrastructure.

Expansion of Wide-Area Businesses

As competition continues in the Kansai area's energy business, we aim to broaden our business areas across the country, particularly in the Greater Tokyo area, to grow our Domestic Energy Business. In addition to leveraging the expertise and know-how built through our businesses in the Kansai area, we will expand our operations going beyond regional and corporate boundaries through alliances with other companies.

Initiatives in the Greater Tokyo Area

We formed business tie-ups in electricity and gas sales, concentrating efforts at CD Energy Direct Co., Ltd. In addition, by enhancing our selection of rate plan options and implementing initiatives of mass promotion, we have acquired over 200,000 customers as of April 2020.
In April 2020, Ogishima Natural Gas Supply Co., Ltd.'s city gas production and supply facilities and Fukushima Natural Gas Power Plant launched commercial operations, and we were able to establish competitive energy infrastructure in the Greater Tokyo area. Through these initiatives, we aim to further grow the energy business in the Greater Tokyo area.

Major business tie-up partners

Business commencement*	Major tie-up partners	Nature of tie-up
October 2018	Tokyu Power Supply Co., Ltd.	Gas sales
September 2018	ARUHI Marketing Corporation	Electricity and gas sales
October 2018	ENEARC Kanto Co., Ltd.	Gas sales
January 2019	The Yomiuri Shimbun	Electricity sales
September 2019	Looop Inc	Gas sales
October 2019	CO-OP MIRAI	Gas sales

* The months that energy supply started are presented.

Status of wide-area energy and services development

(as of June 30, 2020)

Himuka LNG Co., Ltd.
(LNG)
Stake: 34%
Operation launch:FY2022 (Scheduled)

Nagaoka Carbonic Co., Ltd.
(Industrial gas)
Stake: 100%
Operation launch: April 2021 (Scheduled)

Ogishima Natural Gas Supply Co., Ltd.
(Gas production/supply)
Stake: 15%
Operation launch: April 2020

Reliance Energy Okinawa, Co., Ltd.
(Energy service)
Stake: 15%
Investment period: March 2018

Progressive Energy Co., Ltd.
(Gas supply, energy service)
Stake: 25%
Investment period: March 2019

CD Energy Direct Co., Ltd.
(Gas, electricity, service)
Stake: 50%
Business launch: August 2018

Biwako Blue Energy Co., Ltd.
(Retail gas, security and services for gas/water)
Stake: 74.8%
Business launch: April 2019

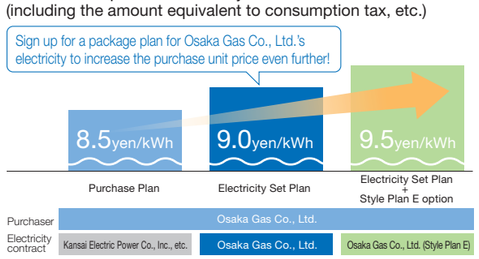
ENEARC Co., Ltd.
(LPG, electricity, service)
Stake: 50%
Business launch: October 2017

Initiatives Aimed at Promoting Renewable Energy Power Sources

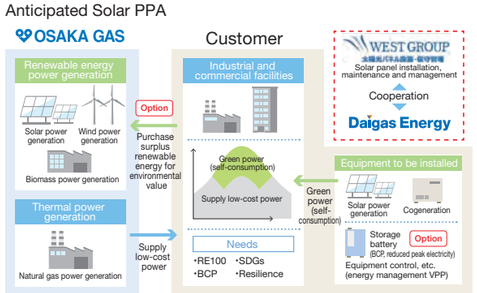
Amid growing global support for RE100, due to an increasing interest in renewable energy in Japan as well, the Daigas Group is engaging in the development and procurement of various sources of renewable energy, including wind power, solar power, and biomass, to be able to provide proposals that meet the needs of each customer.
Although we have been focused on power source development that utilizes the renewable energy feed-in-tariff system (FIT scheme) up to this point, in November 2019, we launched an initiative to procure power through a service to purchase surplus electricity generated by solar power systems*1 for customers whose purchase period (10 years) ended under the FIT scheme. In this way, we are working toward our goal of sustainable renewable energy business that spans the entire value chain by selling developed and procured electricity through means that meet the individual needs of our customers.
In addition, as one of our new initiatives, in March 2020, we signed a memorandum of agreement with West Holdings Corporation regarding a joint examination of new businesses that create new added value in the renewable energy field.
Taking into account increased environmental awareness in the future, the new businesses to be jointly examined are expected to include joint development of "self-consumption solar power generation (solar PPA)", "large-scale solar power generation" in the renewable energy field and "renewable energy trading."

*1 Service to purchase surplus electricity generated by solar power systems
We offer the Purchase Plan for electricity, which is available for any customer, and the Electricity Set Purchase Plan which offers an advantage to customers who use Osaka Gas Co., Ltd.'s electricity. In addition, the Style Plan E option is also available, in which the purchase unit price increases further in combination with Style Plan E, an environmentally friendly electricity rate plan option. The Style Plan E offers an electricity rate plan option for customers who want to use environmentally friendly electricity, through which they can use electricity generated through renewable means and ENE-FARM.

Purchase unit price for electricity
(including the amount equivalent to consumption tax, etc.)

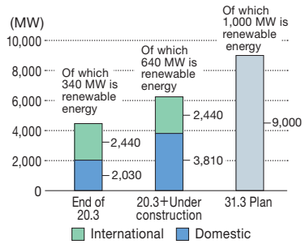


Anticipated Solar PPA



Power Source Development Initiatives

Our group owns a variety of power sources, primarily natural gas-fueled thermal power plants with low environmental impact, as well as cogeneration and renewable energy power sources. Our power generation capacity in Japan is approximately 2,030 MW as of March 31, 2020. As an overall Group power portfolio, we plan to be generating 9,000 MW in Japan and overseas by FY2031.3. In Japan, we aim to ensure flexible response to changes in demand and supply by combining procurement from the power market and peer suppliers. Moreover, by expanding power from renewable sources to a scale of 1,000 MW in both Japan and overseas markets, we will be contributing to creating an overall low-carbon society. Our goal is to create a competitive and environmentally friendly power supply portfolio toward FY2031.3.



Acquisition of All Shares in JGC Mirai Solar, Co., Ltd. (December 2019)

The Daigas Group has held 49% of the issued shares of the solar power generation business operator JGC Mirai Solar, Co., Ltd. since May 2014, and in December 2019, we acquired the remaining 51% of issued shares held by JGC Holdings Corporation and changed its corporate name to Daigas Oita Mirai Solar Co., Ltd. Going forward, Daigas Oita Mirai Solar Co., Ltd. will continue efficient and stable operation as a wholly-owned subsidiary of the Daigas Group.

Investment Decision on the Power Generation Business in Himeji City, Hyogo Prefecture (September 2019)

We have been examining and preparing for the power generation business in Himeji City, Hyogo Prefecture through Himeji Natural Gas Power Generation Co., Ltd. jointly established by Osaka Gas Co., Ltd. and Idemitsu Kosan Co., Ltd. in April 2016. As a result of examining the business, we have decided to invest in the power generation business with a capacity of approximately 1,200 MW of the total planned capacity of approximately 1,800 MW and has also reached an agreement with Idemitsu Kosan Co., Ltd. that Himeji Natural Gas Power Generation Co., Ltd. will be wholly owned by Osaka Gas Co., Ltd.
The power generation project includes the establishment of two high-efficiency gas turbine combined-cycle power generation units (approximately 600 MW per unit) on Idemitsu Kosan Co., Ltd.'s property and the supply of natural gas as fuel to these units from Osaka Gas Co., Ltd.'s Himeji LNG Terminal. Toward the start of operation planned in January 2026, we will further proceed with the project.

Commencement of Commercial Operation of Unit 1 of Fukushima Natural Gas Power Plant (April 2020)

The Unit 1 power generation equipment of the Fukushima Natural Gas Power Plant started its commercial operation in April 2020. It had been constructed by Fukushima Gas Power Co., Ltd. (FGP), in which Osaka Gas Co., Ltd. has a 20% stake. The power plant is a natural gas-fired thermal power plant with an output of 1,180 MW. It was constructed on No. 4 wharf of Soma Port, Fukushima Prefecture. It uses a gas turbine combined-cycle system with a high power generation efficiency. The generated electricity is received by companies that have invested in FGP, depending on the amount of fuel delivered to FGP.

Appearance of Unit 1 (Photo taken on-site: current as of April 2020)

Overall view of the power plant

Total Power Generation Capacity Domestic Total: approx. 2,025 MW*1 (As of March 31, 2020)

Thermal Power Sources, etc.*2

- Senboku LNG Terminal I 18 MW
- Himeji LNG Terminal 58 MW
- Senboku Natural Gas Power Plant 1,109 MW
- Torishima Energy Center 141 MW
- Uji Energy Center 67 MW
- Settsu Energy Center 18 MW
- Senri Energy Center 7 MW
- Funamachi Power Plant 149 MW
- Nagoya Power Plant (excludes biomass-mixed combustion) 142 MW
- Nagoya II Power Plant (excludes biomass-mixed combustion) 77 MW
- Fukushima Natural Gas Power Plant 1,180 MW
  April 2020: Launch of operations
- Himeji Natural Gas Power Plant 1,245 MW (Designing)
  January 2026: Launch of Unit 1 operations (Planned)
  May 2026: Launch of Unit 2 operations (Planned)

Thermal Power Sources, etc. Total: approx. 1,785 MW*1

Renewable Energy Power Sources*2

[Solar Power Generation]
- Daigas Oita Mirai Solar Power Plant 27 MW
- Energy Bank Japan Power Plants (26 locations) 44 MW
- Other Sources, such as Solar Power Generation, etc. 18 MW

Total: approx. 89 MW*1

[Biomass Power Generation]
- Matsusaka Woody Biomass Power Plant 2 MW
- Nagoya Power Plant (5% biomass-mixed combustion) 7 MW
- Nagoya II Power Plant (30% biomass-mixed combustion) 33 MW
- Ichihara Biomass Power Plant 50 MW (Under construction)
- Sodegaura Biomass Power Plant 75 MW (Under construction)
- Hirohata Biomass Power Plant 75 MW (Under construction))
- Tokushima Tsuda Biomass Power Plant 75 MW (Under construction)

Total: approx. 40 MW*1

[Wind Power Generation]
- Hayama Wind Farm Power Plant 20 MW
- Hirogawa Myojin-yama Wind Power Plant 16 MW
- Yura Wind Power Plant 10 MW
- Hizen Wind Power Plant 12 MW
- Hizen South Wind Power Plant 18 MW
- Hirao Wind Power Plant 9 MW
- Inami Wind Power Plant 26 MW
- Shiribetsu Wind Power Plant 27 MW (Under construction)

Total: approx. 111 MW*


Inami Wind Power Plant

Renewable Energy Power Source Total: approx. 240 MW*1

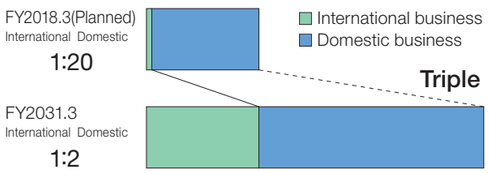
*1 Power generation capacity of the Daigas Group. Only shows power generation capacity in operation.
*2 Capacity of each project shows the power plant facility capacity.

International Energy Business

What We Aim to Be in FY2031.3 and Summary of Current Situation

As an energy business operator, the Daigas Group has focused on the natural gas value chain from early on and has made investments abroad accordingly. In the future, we will continue to invest outside of Japan and by FY2031.3 will increase our international-to-domestic business ratio to 1:2. The Daigas Group will create a business model capable of generating balanced earnings streams from North America, Asia, and Oceania.

Anticipated FY2031.3 consolidated ordinary profit

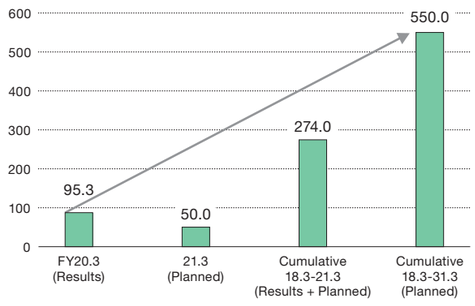


Results of Fiscal Year Ended March 31, 2020

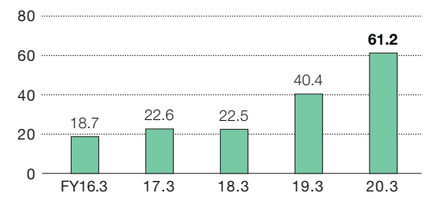
Net Sales ¥ **61.2** billion Segment Profit* ¥ **8.1** billion

* Operating profit (loss) + Share of profit (loss) of entities accounted for using equity method

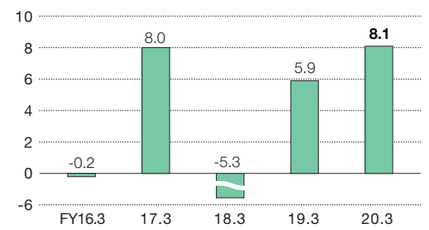
Growth investment in international business (billion yen)



Net Sales (billion yen)



Segment Profit* (billion yen)



Note: Since FY18.3, Sumisho Osaka Gas Water UK Limited, an equity-method affiliate, changed its segment from "Life & Business Solutions" to "International Energy Business." FY17.3 results are calculated based on the contents after the change.

Efforts to Become What We Aim To Be in FY2031.3

In order to become what we aim to be in FY2031.3, we will promote expansion from upstream to middle and downstream businesses, centering on our priority areas, namely North America, Asia, and Oceania. To do so, we will make full use of the expertise we have cultivated in Japan and the international business infrastructure we have built.
Also, we will expand our businesses based on the following three policy points.

1. Concentrating management resources on priority areas and priority business in each area
2. Accelerating business development by collaborating with mutually complementary partner companies and utilizing M&A
3. Increasing business engagement and improving business implementation capabilities (human resource development, development of a quick decision-making system, etc.)

☐ We will strengthen the profit structure of the international energy business by strengthening each business field.

Upstream and Trading Business

- Gas / oil field development
- LNG trading

Middle and Downstream Business

- IPP*1
- LNG terminal business
- LDC*2 business
- Retailing and energy services

Know-how of domestic businesses


Natural gas power plant


LNG terminal


Fuel conversion


Fleet operation

Existing international business bases


Freeport LNG Terminal*3 in USA


Fairview Natural Gas-Fired Thermal Power Plant in USA

City-OG Gas Energy Services

OSAKA GAS THAILAND

*1 Independent Power Producer *2 Local Distribution Company *3 Freeport LNG Development, provided by L.P.

☐ Efforts Toward Sustainable Growth

During the fiscal year ended March 31, 2020, we made significant progress in growth investment in the United States such as by acquiring all shares of Sabine Oil & Gas Corporation, a shale gas development company and launching commercial operation of Freeport LNG Project and Fairview natural gas-fired thermal power plant. As a result, we were able to grow the International Energy Business into a full-fledged pillar of business. We will continue to aim to acquire new projects and work to build a business portfolio towards achieving sustainable growth. Also, we will work to strengthen competitiveness in LNG procurement and expand the trading business.

Contribution to low-carbonization through efficient natural gas development and advanced use, etc.

Upstream business

(North America)
Acquisition of all shares in Sabine Oil & Gas Corporation, a shale gas development company in USA
►Achieve operator capability for the USA upstream business, stable profit contribution

(Australia)
Stable operation of Gorgon LNG Project and Ichthys LNG Project

Middle and downstream business (North America)

Launch of commercial operation of the train 1 of the Freeport LNG Project in USA
►Commercial operation of the 2 and 3 trains has started in 2020
Launch of commercial operation of the Fairview natural gas-fired thermal power plant in USA
►Utilize business expertise in IPP business in North America
Investment in SolAmerica Energy, LLC, a distributed solar energy project developer and Engineering, Procurement & Construction firm in USA
►Initiatives aimed at the spread of renewable energy

LNG trading

Osaka Gas Energy Supply and Trading Pte. Ltd., a trading company, was established in Singapore
►Reduce costs for energy resource procurement through strengthening optimization leveraging our diversified portfolio

Middle and downstream business (Southeast Asia)

A natural gas supply company was established in Vietnam
A solar power generation company was established in Thailand
Investment and conclusion of a strategic collaboration agreement with AGP International Holdings Pte. Ltd. which develops natural gas infrastructure overseas
►Active business development in Southeast Asia based on insights in the Domestic Energy Business

Low-cost and stable LNG supply

Contribution to development through stable and efficient energy supply

Upstream and Trading Business

Business Overview and Characteristics

In upstream businesses, we are contributing to growth and stabilization of overall our group earnings, in addition to acquiring useful expertise in LNG procurement. While steadily proceeding with projects in which our participation is already decided, we aim to create an earnings platform and improve our business promotion by acquiring new projects in production or development.
During the fiscal year ended March 31, 2020, we were able to expand profits and acquire the capability to serve as an operator in the upstream business through the acquisition all shares in Sabine Oil & Gas Corporation an upstream business in the United States. We aim to achieve long-term and stable profit contribution by promoting the USA upstream business. With regard to existing projects, the Gorgon LNG Project and Ichthys LNG Project in Australia are operating stably, and we can expect continued profit contribution.

With regard to trading business, we established Osaka Gas Energy Supply and Trading Pte. Ltd., an LNG trading company in Singapore, and aim to reduce costs for energy resource procurement while responding to customer needs through optimization leveraging our diversified procurement portfolio.


Gorgon LNG Project in Australia


Ichthys LNG Project in Australia
Courtesy of INPEX CORPORATION


East Texas Shale Gas Project in USA

Middle and Downstream Business

Business Overview and Characteristics

In middle and downstream businesses, we aim to grow sustainably by utilizing the know-how and experience cultivated in the Domestic Energy Business and amassed expertise in the region to improve the business value of each project and operate the business independently. The Group participates in LNG terminal and IPP businesses and other business in North America, Europe, the Middle East, and Australia. We are also engaged in natural gas sales and energy services in Southeast Asia and would like to expand into projects such as power plants and LNG terminals. We will continue to make use of business expertise amassed in the region to proactively develop our businesses.

Status of Investments

Participating in Electricity Business in USA

In USA, an environment-friendly natural gas-fired power plant is expected as demand for stable power supply is increasing due to the decommission of aging coal-fired power plants and the expansion of renewable energy sources. Since participating in North American natural gas thermal power plant projects in 2004, we have acquired projects, mainly in the US northeast including the PJM Market, one of the largest wholesale power markets in USA. In addition to expanding profit contributions, we have accumulated expertise on power plant operations, including fuel procurement and sakes of electric power to the market. In recent years, we took a 100% stake in Michigan Power's natural gas-fired power plant in 2018 and have taken other measures to accelerate the accumulation of business expertise by promoting more independent power plant operations, and we are making further efforts to achieve sustainable growth in the IPP business in North America by applying our accumulated business expertise to the operation of the Fairview natural gas-fired thermal power plant, which launched commercial operations in 2019. In addition, we have invested in SolAmerica Energy, LLC, a distributed solar energy project developer and Engineering, Procurement & Construction firm in 2020. We are proactively exploring other investment opportunities in renewable energy sources, which are expected to expand in USA.


Michigan Power natural gas-fired thermal power plant in USA


Fairview natural gas-fired thermal power plant in USA


Solar power plant developed and constructed by SolAmerica Energy, LLC in USA
Courtesy of SolAmerica Energy, LLC

Launch of commercial operation of Freeport LNG Project

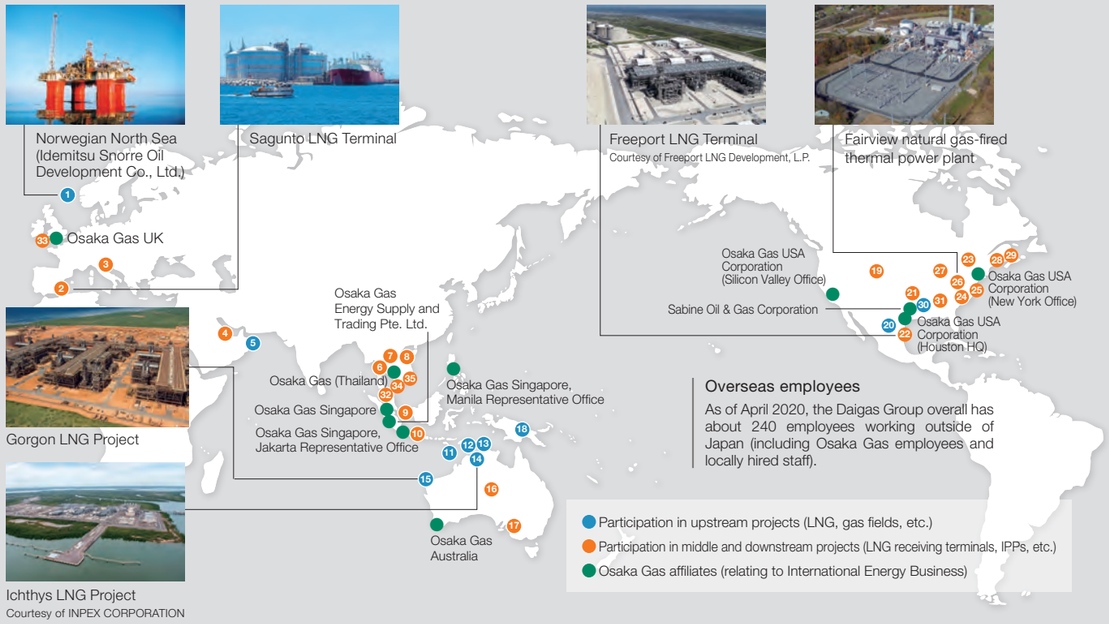
In the liquefaction business at the Freeport LNG Project in Texas, USA, commercial operation of the train 1 has been launched in 2019. Commercial operation of the train 2 and 3 trains has been sequentially started in 2020. In addition to expanding stable profit contribution through the liquefaction business, we are starting LNG procurement from the USA to secure LNG without restrictions on the country of destination, and at the same time, promoting diversification of our supply sources and our LNG price indexation to achieve stable and flexible LNG procurement.

Business Development in Southeast Asia

In 2013 we set up a local representative company in Singapore and Thailand, and in 2018 we also set up a local company in Indonesia, to start selling natural gas and provide energy services. We are accelerating business development, such as the establishment of a natural gas supply company in Vietnam and a solar power generation company in Thailand in 2019, and investment and conclusion of a strategic collaboration agreement with AGP International Holdings Pte. Ltd. which develops natural gas infrastructure overseas. We will be expanding our International Energy Business by promoting business activities corresponding to local needs, particularly in Southeast Asia, where the demand for natural gas is expected to grow.


Artist's impression of completed Phu My 3 Specialized Industrial Park in Vietnam

Investments in the International Energy Business (As of April 2020)



Participation in upstream projects (LNG, gas fields, etc.)

1 **Norwegian North Sea (Idemitsu Snorre Oil Development Co., Ltd.)**
Stake since 2005: 1-10%

5 **Qalhat LNG**
Stake since 2006: 3% LNG output: 3.3 million tons/year

11 **Crux Gas and Condensate Field**
Stake since 2007: 3%

12 **Sunrise LNG Project**
Stake since 2000: 10%

13 **Evans Shoal Gas Field**
Stake since 2000: 10%

14 **Ichthys LNG Project**
Stake since 2012: 1.2% Projected LNG output: 8.4 million tons/year (planned)

15 **Gorgon LNG Project**
Stake since 2009: 1.25% Projected LNG output: 15.0 million tons/year (planned)

18 **Western Papua New Guinea Gas and Condensate Field**
Stake since 2014: 10 - 20% (ratio depends on field)

20 **Pearsall Shale Gas and Liquids Development Project**
Stake since 2012: 35%

30 **Sabine Shale Gas Project**
Stake since 2018: 100%

Participation in middle and downstream projects (LNG receiving terminals, IPPs, etc.)

2 **Sagunto LNG Terminal**
Ownership interest since 2010: 20% Vaporization capacity: 6.4 million tons/year

3 **Erogasmet**
Ownership interest since 2015: City gas distribution business

4 **Shuweihat S2 IWPP**
Ownership interest since 2011: 10% (25% equity interest in the operation and maintenance company) Power generation capacity: 151 MW Freshwater processing capacity: 10 million gallons/day

6 **Osaka Gas (Thailand)**
Ownership interest since 2013: Energy services business

7 **OGP Energy Solutions**
Ownership interest since 2015: Energy services business

8 **NS-OG Energy Solutions**
Ownership interest since 2014: 30% Cogeneration business

9 **CITY-OG Gas Energy Services**
Ownership interest since 2013: 49% Gas retail business

10 **PT OSAKA GAS INDONESIA**
Ownership interest since 2018: Natural gas joint marketing business

16 **EII (Energy Infrastructure Investments)**
Ownership interest since 2008: 30.2% Four pipelines, two gas-refining facilities, two power plants, two interconnected power transmission lines Power generation capacity: 18 MW

17 **Hallett 4 Wind Farm Project**
Ownership interest since 2009: 39.9% Power generation capacity: 53 MW

19 **Osaka Gas Power America**
Ownership interest since 2005: 6 IPP projects Power generation capacity: 301 MW

21 **Tenaska Gateway IPP**
Ownership interest since 2004: 40% Power generation capacity: 338 MW

22 **Freeport LNG Terminal (vaporization business)**
Ownership interest since 2008: 10.81% Vaporization capacity: 13 million tons/year

22 **Freeport LNG Project**
Ownership interest since 2012: 25% (first train) LNG output: 4.64 million tons/year (planned)

23 **Aurora Solar Power Generation Project**
Ownership interest since 2012: 50% Power generation capacity: 51 MW

24 **St. Charles Energy Center Natural Gas-Fired Power Plant**
Ownership interest since 2015: 25% Power generation capacity: 181 MW

25 **Shore Natural Gas-Fired Thermal Power Plant**
Ownership interest since 2017: 20% Power generation capacity: 145 MW

26 **Fairview Natural Gas-Fired Thermal Power Plant**
Ownership interest since 2017: 50% Power generation capacity: 525 MW

27 **Michigan Power Natural Gas-Fired Thermal Power Plant**
Ownership interest since 2018: 100% Power generation capacity: 125 MW

28 **Kleen Energy Natural Gas-Fired Thermal Power Plant**
Ownership interest since 2018: 24.3% Power generation capacity: 151 MW

29 **Towantic Natural Gas-Fired Thermal Power Plant**
Ownership interest since 2018: 49.5% Power generation capacity: 399 MW

31 **SolAmerica Energy, LLC**
Ownership interest since 2020: Development and construction of distributed solar power generation

32 **AGP International Holdings Pte. Ltd.**
Ownership interest since 2019: LNG business

33 **Igloo Energy Supply Ltd.**
Ownership interest since 2019: Electricity and gas retail business

34 **OE Solar Co., Ltd.**
Ownership interest since 2019: 49% Solar power generation business

35 **Sojitz Osaka Gas Energy Company Ltd.**
Ownership interest since 2019: 49% Gas supply business

Life & Business Solutions (LBS Business)

What We Aim to Be in FY2031.3 and Summary of Current Situation

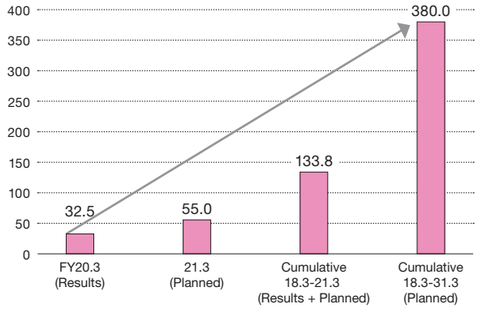
The Daigas Group actively applies the technologies and know-how it has accumulated in the energy business, developing businesses that differ from the energy field in order to diversify business risk. These non-energy businesses are playing a major role in supporting the Daigas Group's earnings base as a stable source of earnings, particularly as crude oil prices and foreign exchange trends remain unclear.
We plan to accelerate growth in three core business areas in Life & Business Solutions—Real Estate, Materials Solutions, and Information Solutions—aiming to consistently increase profits through fiscal 2031.3.

Results of Fiscal Year Ended March 31, 2020

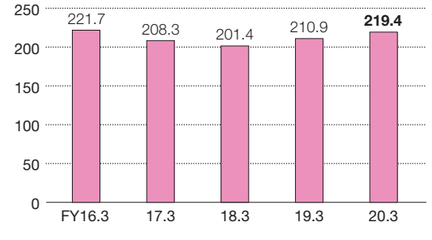
Net Sales ¥ **219.4** billion Segment Profit* ¥ **19.6** billion

* Operating profit (loss) + Share of profit (loss) of entities accounted for using equity method

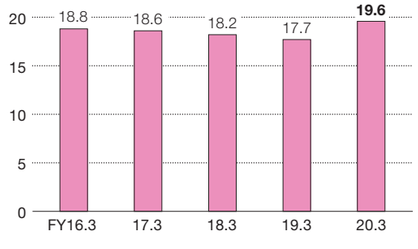
Growth Investment in LBS Business (billion yen)



Net Sales* (billion yen)



Segment Profit* (billion yen)



Note: Since FY1 9.3, Osaka Gas Engineering Co., Ltd. changed its segment from "Life & Business Solutions" to "Domestic Energy/Gas." FY1 8.3 results are calculated based on the contents after the change.
Since FY18.3, Sumisho Osaka Gas Water UK Limited, an equity-method affiliate, changed its segment from "Life & Business Solutions" to "International Energy Business." FY17.3 results are calculated based on the contents after the change.

Real Estate Business — Osaka Gas Urban Development Group

Business Overview and Characteristics

Our real estate business extends widely to include the development of properties such as sale and rental apartments, office buildings, management of buildings and facilities, and so on.

Efforts Toward Sustainable Growth

We aim to strengthen the earnings base of existing businesses and establish new earnings by expanding both our range of business offerings and their geographical expansion to the Greater Tokyo area. Specifically, we will actively apply the strengths of the Daigas Group in the real estate development business to acquire new projects, improve the profitability of existing projects, propose comprehensive facility management services in the building maintenance business, and steadily promote development of KRP Bldg#10 in the research park business.

What We Aim to Be in FY2031.3

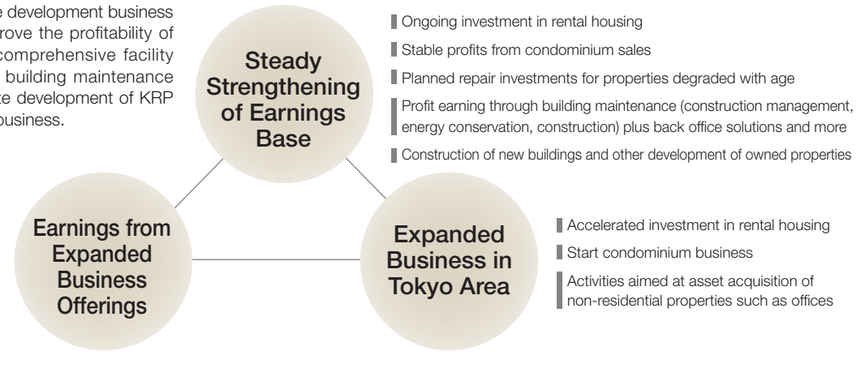
The Group aims to be a strong player in diverse areas such as leasing, sales, and maintenance by expanding business in the Kansai area as well as in the Greater Tokyo area.


Tsukaguchi


Nihombashi Suitengu


Kikukawa


Sanadayama



About the Osaka Gas Urban Development Group

Osaka Gas Urban Development Co., Ltd.

Osaka Gas Urban Development Co., Ltd. is developing condominiums for sale under the "SCENES" brand, along with rental condominiums and rental offices under the "Urbanex" brand.

Osaka Gas Facilities Corporation (OGFA)

Osaka Gas Facilities Corporation provides comprehensive management services such as facility operation management, security, and cleaning at facilities such as office buildings, hospitals, research facilities, and factories. In addition, we meet the wide-ranging needs of customers in relation to buildings and facilities, extending from repair work and large-scale renovations to energy conservation, CO_2 reductions, and the visualization of energy consumption.

Kyoto Research Park Corp. (KRP)

Kyoto Research Park Corp. is an industrial cluster home to nearly 400 tenant venture companies and organizations. In addition to providing offices and laboratories, KRP promotes the creation of new businesses in collaboration with Kyoto Prefecture, Kyoto City, and universities. KRP aims to be a hub for innovation that generates new ideas and business by bringing together individuals and companies working in diverse fields.

Prime Estate Co., Ltd. (PE)

Prime Estate Co., Ltd., based in the Yokohama and Shizuoka areas, is engaged in real estate development, leasing, and sales brokerage, primarily from the Greater Tokyo area to the Tokai area.

Umekita Second Zone (Tentative Name) Development Project Begins

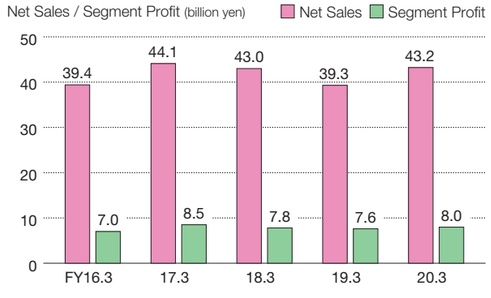
The plan for the Umekita Second Zone (tentative name) Development Project, in which Osaka Gas Urban Development Co., Ltd. participates, was confirmed in April 2020.
The project is founded on an urban development philosophy of fusing "midori (green)" and "innovation." We will engage in urban development in Umekita that will provide an example to Osaka, to the entire Kansai region, and to the world, and aim to achieve urban development that will lead to economic development not only in the Umekita area, but also in Osaka and the entire Kansai region.

About the Fiscal Year Ended March 31, 2020

In the fiscal year ended March 31, 2020, profits increased from the previous year due to an increase in the number of properties in the leasing business and an increase in the number of units sold in the built-for-sale housing business.

Osaka Gas Urban Development Group

Net Sales / Segment Profit (billion yen)



Materials Solutions Business — Osaka Gas Chemicals Group

Business Overview and Characteristics

We develop, manufacture and sell highly functional materials based on our own coal chemistry technologies and pharmaceutical- and agrochemical-related technologies. In 2014 we acquired Jacobi Carbons AB (Sweden) and are developing our business globally.

What We Aim to Be in FY2031.3

Engaged primarily outside of Japan, we aim to become a manufacturer of functional materials with a top position in niche markets that contributes positively to industry, life, and the environment.

Efforts Toward Sustainable Growth

We aim to establish a stable earnings base and achieve sustainable growth by developing and expanding sales of products with high added value in a diverse product offering, while also pursuing synergies and developing new markets.

We will also be working on substitutions in our business portfolio on a continuous basis to adapt to changes in the times.

Fine Materials

Development of various applications for fluorene with its excellent optical properties and heat resistance

Resins for camera lenses in smartphones and other devices, semiconductor materials, liquid crystal displays

Carbon Materials

Expanded sales of DONACARBO carbon fiber with its excellent heat insulation and abrasion resistance

Molded insulation for silicon manufacturing furnace for photovoltaic cells

Acoustic insulation material for train cars

Activated Carbon

Expanded global value chain through cooperation between the Jacobi Group and Osaka Gas Chemicals Co., Ltd.

Activated carbon for purification processes in food, alcohol and pharmaceutical manufacturing, air purifiers and water filters

Silica- and Alumina-based Materials

Expanded sales of adsorbents and additives and efforts toward developing new applications

Activated clay for petroleum and for refining cooking oil

Preservatives

Development of wood preservatives, industrial preservatives, industrial coating agents

Xyladecor wood preservative, Xylamon termiticide

About the Osaka Gas Chemicals Group

Osaka Gas Chemicals Co., Ltd.

Established in 1931, Osaka Gas Chemicals Co., Ltd. employs technologies cultivated in coal chemistry and pharmaceuticals to develop highly functional materials that add value to customers' products.

Mizusawa Industrial Chemicals Group

Mizusawa Industrial Chemicals, Ltd. was established in 1937 to domestically refine the activated clay needed for refining petroleum and fats and oils. It joined the Daigas Group in 2015.

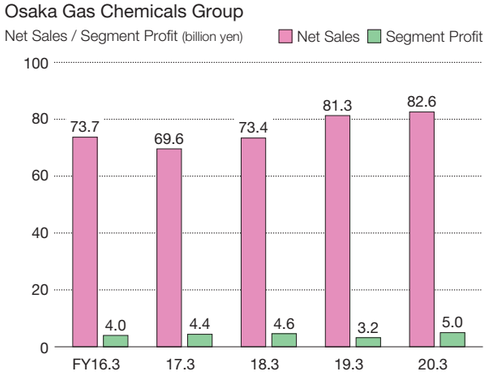
Jacobi Carbons Group

An activated carbon producer established in Sweden in 1916, Jacobi Carbons AB does business in 21 countries. It joined the Daigas Group in 2014. Osaka Gas Chemicals Co., Ltd. and the Jacobi Group together form the second largest activated carbon producer in the world. (Based on Osaka Gas Chemicals Co., Ltd.'s FY2018.3 performance)

About the Fiscal Year Ended March 31, 2020

In the fiscal year ended March 31, 2020, profits increased from the previous year due to better profit margins in activated carbon, etc.

Osaka Gas Chemicals Group



Information Solutions Business — OGIS-RI Group

Business Overview and Characteristics

OGIS-RI traces its roots back to developing and managing systems for the gas business of Osaka Gas Co., Ltd. After various acquisitions, it organized a group of system providers to offer services to the manufacturing and financial industries. By sharing the expertise of each company in the group, we provide comprehensive IT services ranging from consulting, design, development, and the operation of corporate information systems to data centers, cloud services, and security.

What We Aim to Be in FY2031.3

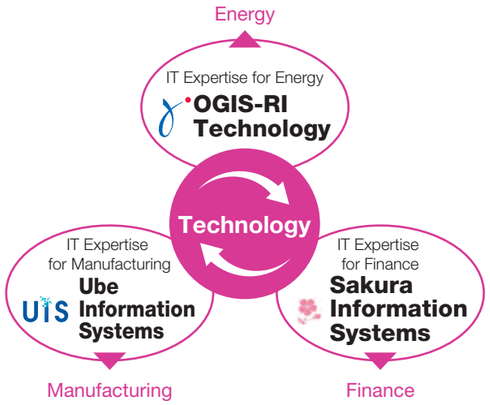
Through high-level innovation in information and communications technologies, we aim to be a corporate group that provides new value and grows sustainably with customers.

Head Office of OGIS-RI Co., Ltd.

Efforts Toward Sustainable Growth

Our strategy is to differentiate ourselves with a priority placed on the fields of finance, manufacturing, and energy as we expand service businesses for the domains of IoT, cloud technology, and authentication.

We will apply our cumulative expertise and introduce new technologies to improve the competitiveness of the Daigas Group.



About the OGIS-RI Group

OGIS-RI Co., Ltd.

Established in 1983, it is the systems provider company of the Daigas Group with extensive IT expertise in the energy industry.

Sakura Information Systems Co., Ltd.

Established in 1972, it is engaged in the construction and operation of key systems for the Sumitomo Mitsui Banking Corporation Group and has extensive expertise in the financial industry.

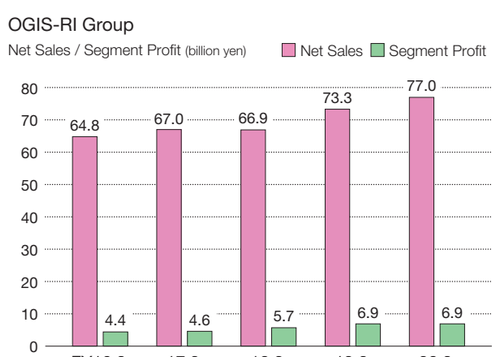
Ube Information Systems, Inc.

Established in 1983, it provides systems construction and operation as a comprehensive information processing service company of the Ube Industries Group and has IT technology in the manufacturing industry.

About the Fiscal Year Ended March 31, 2020

Segment profit for the fiscal year ended March 31, 2020 remained almost at the same level as the previous year.

OGIS-RI Group



Innovation / Technological Development

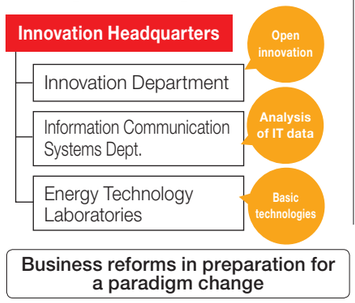
To address the challenge of creating new value beyond conventional frameworks, the Daigas Group will further commit to innovation, including open innovation and digital technologies, with the aim of ensuring optimized solutions for customers and fostering next-generation innovation.

Promotion of Innovation

Set up the Innovation Headquarters

- Set up the Innovation Headquarters with the aim of creating new values through business reforms
- Set up the Innovation Department and integrally promote companywide innovation activities

Challenge of creating new value



Business reforms in preparation for a paradigm change

Advance Open Innovation

- Collaborate with diverse corporate partners not only in the field of technology but also in the service field
- Strengthen Silicon Valley-based activities
- Collaborate with start-up companies at home and abroad

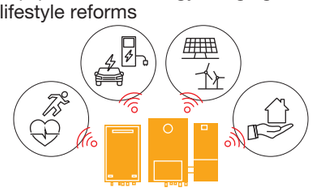
Co-create New Businesses

Products and services that go beyond customer expectations

Promote Digitization Exploration of Technology

- More convenient lifestyle services and business solutions utilizing IoT and AI
- New electric power business utilizing distributed energy sources and ICT
- High-level infrastructure operations with digitalization
- Innovative technology development such as fuel cells

Equipment and energy bringing lifestyle reforms

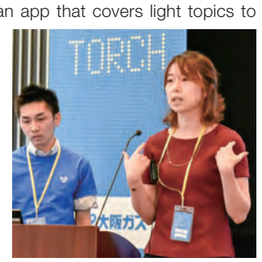


Achieving drastic business reforms

Examples of Major Initiatives

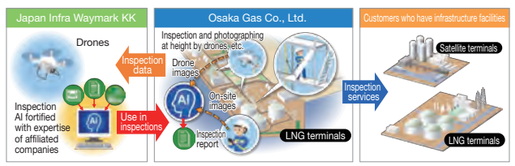
"TORCH": A Program for New Business Creation for Young Employees

We are promoting a program in which young, willing employees share ideas and create new businesses. The program name, "TORCH," stands for both the flame of gas and the passion of young employees. For the creation of ideas, our young employees use the "Foresight Creation" methodology of Osaka Gas Research Institute of Behavior Observation. Project management is entrusted to Loftwork Inc., which has a reputation for supporting the creation of new businesses within a company. Every year, we recruit about 20 young employees within the Group who meet the age requirement of 35 years old or less. These employees are divided into teams and spend about three months considering business ideas. The ideas are presented to Group employees in a contest format. In February 2020, the first new business that originated from TORCH called "Ramune" an app that covers light topics to refresh the user's mind, was released. While aiming to create new businesses that are not confined to existing business frameworks, participants will apply the knowledge gained through the program to their current operations, building a culture of innovation throughout the Group.



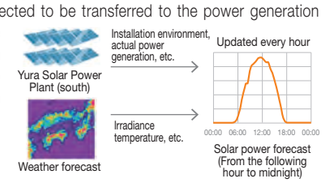
Investment in Company That Offers Infrastructure Inspection Using Drones

In April 2020, we took a stake in Japan Infra Waymark KK, which offers infrastructure inspection solutions using drones. Utilizing the expertise in inspection and other know-how built up over the years, we will improve safety and operating efficiency by developing AI related to corrosion inspection in LNG terminals and by reducing work at height using drones. We will expand new businesses by offering inspection services to plants of other companies.



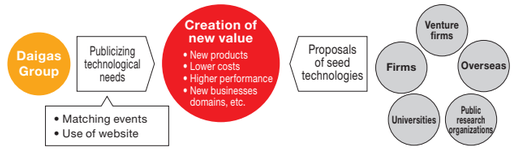
Demonstrative Experiment on Solar Power Forecasting on the Assumption of Revision in the FIT Scheme

We have worked together with Next Kraftwerke, a venture company in Europe, to jointly conduct a demonstrative experiment for the realization of highly-accurate solar-power forecasting services.
In the future, a review of the FIT scheme is planned, and the obligations of power forecasting, etc. currently assigned to power transmission and distribution business operators are expected to be transferred to the power generation business operators. In the face of this process, we aim to provide new services to properly operate and perform business transactions in regard to solar power generation.



Open Innovation Developments

By fusing proprietary and outside technologies, the Daigas Group is developing open innovation, aiming to speed up the pace of technological development while improving functionality and cutting costs. In the fiscal year ended March 31, 2010, we began publicizing technological needs. We have sponsored technology exhibitions, formed alliances with other companies, attended technology-matching conventions and developed alliances with universities.

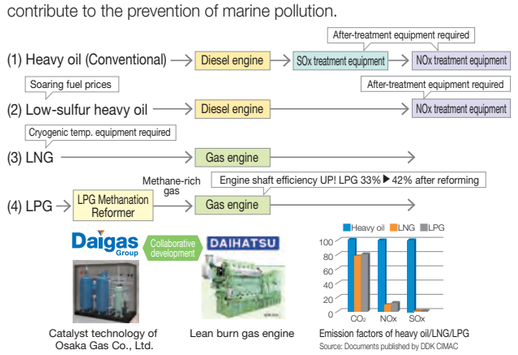


Investment in US Venture Fund

In April 2018, we invested in a venture investment fund operated by WiL LLC, a venture capital company headquartered in Silicon Valley. Through this investment, we aim to invest in and form alliances with start-up companies mainly in Japan and the United States to accelerate the pace of innovation-oriented activities, including the creation of convenient daily services and business solutions using the IoT, AI and other digital technologies, as well as ensuring high infrastructure operational standards.

Development of LPG Methanation Reformer to Contribute to Prevention of Marine pollution

Compared with conventional heavy oil, liquefied petroleum gas (LPG) has attracted attention as a ship fuel because it does not require exhaust gas treatment equipment to be able to significantly reduce the SOx and NOx emissions that are a primary cause of marine pollution. However, when using LPG directly by gas engines, there was an issue with knocking being prone to occur within engines, making high-efficiency operations difficult. Therefore, together with DAIHATSU DIESEL MFG. CO., LTD., we have jointly developed a reformer for the methanation of LPG using our own catalyst technology, and have improved its efficiency to 42%, equivalent to the LNG which has already been introduced as a fuel that complies with environmental regulations. In 2019, this reformer obtained the first Approval in Principle (AIP) for Japan from the Nippon Kaiji Kyokai, and we will continue to accelerate further toward the societal implementation of LPG fuel ships and contribute to the prevention of marine pollution.

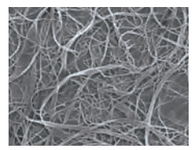


Catalyst technology of Osaka Gas Co., Ltd. | Lean burn gas engine | Emission factors of heavy oil/LNG/LPG

Source: Documents published by DDK CIMAC

Development of Fluorene Cellulose as a Fiber for Strengthening Resin

We have developed fluorene cellulose, a cellulose fiber with uniform dispersion, by reacting the cellulose fiber surface with a fluorene derivative. Fluorene cellulose does not mix easily with water but mixes easily with resin. Fluorene cellulose is a resin fiber material with low environmental impact and has strong potential for use in home appliances and as a structural material in automobiles.



Electron microscope image of fluorene cellulose

Successful Production of Ketone Bodies, Known for Their Use in Diets

We have developed a method for manufacturing ketone bodies, (R)-3-hydroxybutyric acid (3HB), using bioprocess (fermentation) technology cultivated over many years in collaboration with the National Institute of Advanced Industrial Science and Technology. Recent years have seen rising interest in ketone bodies for their effectiveness in dieting and improving athletic performance. We have succeeded for the first time in effectively generating and isolating 3HB using bioprocesses. We anticipate new applications for their use in the future in health foods, supplements, and cosmetics.

Fermentative production of (R)-3-hydroxybutyric acid (3HB), ethyl (R)-3-hydroxybutyrate (3HB ethyl)