

Addressing Social Issues through Energy Services

The Daigas Group has undertaken CSR activities as part of its efforts to build a sustainable society in line with the Daigas Group CSR Charter. The Group believes that the main philosophy envisioned under the SDGs is consistent with its basic idea on CSR. Therefore, we are convinced that we can contribute to achieving some SDGs through our CSR activities.

Among the 17 SDGs, Goal 13, "Take urgent action to combat climate change and its impacts," is closely related to business operations undertaken by the Daigas Group, a corporate group which is aiming to become a comprehensive energy service provider. The Daigas Group sees Goal 13 as the challenge to which the Group can contribute the most. It aims to reduce CO₂ emissions from its operations by a total of about 70 million tons between FY2018 and FY2031 under the Long-Term Management Vision 2030.

The Daigas Group is promoting various initiatives such as energy-saving town development through collaboration with universities and local governments, expanding use of renewable energy, disseminating state-of-the-art energy equipment and overseas expansion such as LNG utilization business. We believe that these activities can contribute to several Sustainable Development Goals (SDGs). These goals are "Goal 13: Take urgent action to combat climate change and its impacts", "Goal 12: Ensure sustainable consumption and production patterns", "Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all", "Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation." Moreover, by promoting these initiatives, we believe that it will lead to activities that create various opportunities, such as employment, creation of a place where diverse human resources can be active, and sustainable town planning.

The Daigas Group will address climate change as a comprehensive energy service provider. The Group is committed to contributing to development of industries and communities through the provision of sustainable energy.

13 CLIMATE ACTION

Cumulative amount of reduction of CO₂ emitted between fiscal 2018 and fiscal 2031 About 70 million tons

7 AFFORDABLE AND CLEAN ENERGY

- The Group will pursue an optimal energy mix with priority given to city gas.
- The Group will raise the proportion of renewable energy sources.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

- The Group will promote the sustainable utilization of natural resources.
- The Group will propose a lifestyle focusing on the use of sustainable energy sources and disseminate relevant information to people.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

- The Group will strive to establish a resilient energy infrastructure in which high-quality energy can be provided in a stable manner.

5 GENDER EQUALITY

- The Group will strive to establish a work environment in which female employees can display their abilities and play important roles.
- The Group will strive to create rewarding jobs for employees.

8 DECENT WORK AND ECONOMIC GROWTH

- The Group will strive to create new value backed by a variety of services and innovative ideas, with the aim of improving productivity and supporting economic growth.

11 SUSTAINABLE CITIES AND COMMUNITIES

- The Group will strive to promote sustainable urbanization by supporting the building of a community in which all people can lead safe and comfortable lives.

Action Establishment of Resilient Energy Infrastructure and Community Building ①



Establishing a Distributed Energy System through Which Impacts from Natural Disasters Can be Mitigated while Energy Consumption Can be Curbed

Osaka Gas is working on establishing resilient and efficient energy infrastructure in collaboration with local universities and municipalities, with the aim of building a safe, comfortable and sustainable community. By supporting efforts to build an anti-disaster distributed energy system, we are endeavoring to establish a system aimed at regionally neutralizing power output fluctuations associated with unstable renewable energy sources. We are also working on building a region-by-region power saving system and a system that can enable a peak-time cut in demand.

Kansai University × Osaka Gas

► **"Resilience Campus" Scheme Aimed at Functioning as a Local Disaster-Prevention Base**

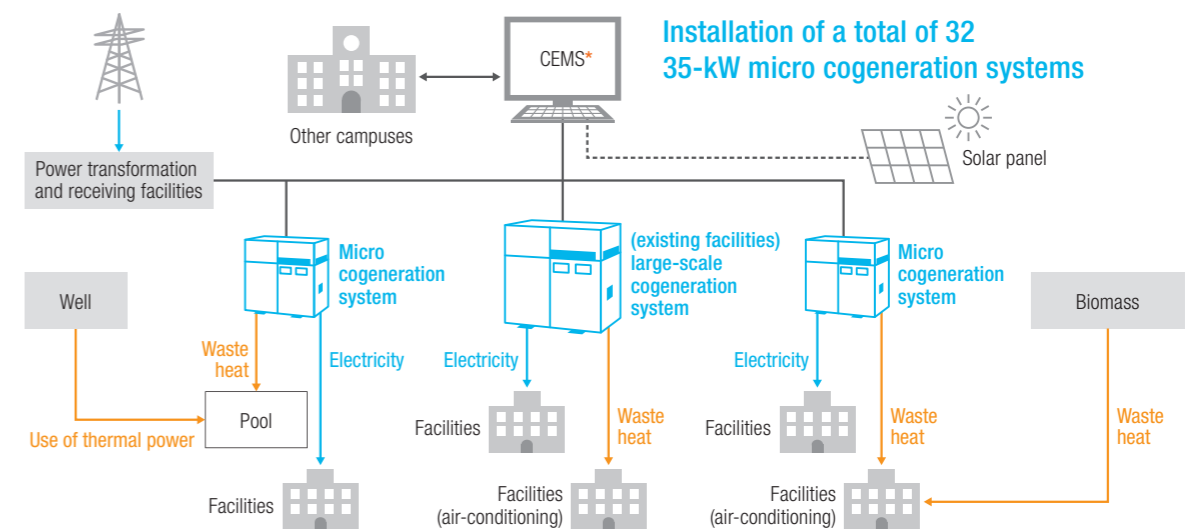
Kansai University promotes "a resilience campus" scheme, aimed at functioning as a local disaster-prevention base in the event of a natural disaster, mainly at its Senriyama Campus in Suita City, Osaka Prefecture—which our Group helps transform into a smart community by supporting the private university's efforts to establish a power-saving and more economical energy supply system that also focuses on regional disaster prevention.

The scheme envisages the installation of large-scale and micro gas cogeneration systems on the 350,000 m² Senriyama Campus in a distributed manner. Reliable intermediate-pressure gas pipes are used for gas delivery to both types of cogeneration systems, enabling a minimum necessary amount of electricity to be secured even in the event of an emergency. Therefore, it can

be expected that the Senriyama Campus will function not only as a resilient local disaster-prevention base but also as an "advanced eco campus" aimed at promoting power saving and reducing CO₂ emissions.

Furthermore, operations of facilities to be installed under the envisaged resilience campus scheme, including an already set up large-scale gas cogeneration system, the planned micro cogeneration system and facilities for renewable energy sources, can be controlled in an optimal manner under the Daigas Group's 24-hour monitoring so that overall energy saving at the campus and overall energy management including a peak-time demand cut will be realized.

■ **How Kansai University's Energy System Can Work**



* CEMS: The word stands for Community Energy Management System, aimed at promoting regional energy management.

Action Establishment of Resilient Energy Infrastructure and Community Building ②



Promoted Seismic Resistance and Tsunami Countermeasures in Manufacturing and Supply Facilities Prepared for Large-Scale Disasters

Osaka Gas is working on enhancing the resistance of manufacturing and supply facilities against earthquakes and strengthening anti-tsunami measures in preparation for the possible occurrence of a large-scale natural disaster. Specifically, we have introduced LNG tanks and polyethylene pipes with strong resistance to earthquakes, and established a series of measures to prevent possible damage caused by tsunami. These measures reflect our company's policy of giving the highest priority to ensuring customers' safety and stable supply.

When a major earthquake occurred in northern Osaka, our service was restored to normal operation at an early time thanks to anti-disaster measures we had put into practice, including the use of polyethylene pipes, the diffusion of microcomputer-based seismic sensing gas meters, subdivided the areas subject to service suspension, and the development of movable gas-generating machine. It was also confirmed that the earthquake caused no damage to our gas-processing plants, gas holders, and high-pressure and intermediate-pressure gas pipes.

► **Construct LNG Tanks and Expand Polyethylene Pipes with Strong Resistance to Earthquakes, and Establish a System to Prevent Damage Caused by Tsunami**

LNG tanks operated by Osaka Gas are safe against uneven land subsidence and vibration from earthquakes because they have been built on a solid foundation, supported by several hundreds of steel pipe piles that have been driven into the firm underground soil.

Polyethylene pipes are very durable and their life is almost permanent after being laid underground because they cause no corrosion. Such pipes are very strong and also flexible. Their strong resistance to earthquakes was confirmed through major earthquakes that occurred in Japan, including the January 1995 Hanshin-Awaji Great Earthquake, the March 2011 Eastern Japan Earthquake, and the June 2018 northern Osaka earthquake. At

present, polyethylene has basically been used as material for all low-pressure pipes being newly laid, with the total length of polyethylene pipes laid by our company reaching more than 15,900 km.

Also, in preparation for the Nankai Trough earthquake of which possible occurrence is expected in the future, we have developed and operated the "Tsunami Damage Prevention System." Connected to tsunami surveillance cameras installed in the premise, the System functions to monitor tsunami information such as seismic intensity, magnitude, tsunami warning, tidal level announced by Japan Meteorological Agency, etc. in a unified manner. In addition, it has a support function to judge supply stop by comprehensively judging from these information.



LNG tanks



Polyethylene pipe



Tsunami surveillance camera

Action Taken in Taiwan

Technological Consulting Using Know-How Acquired through Operations of LNG Terminals

The Daigas Group has acquired technological know-how through the design, construction and management of LNG terminals, and applied it to overseas operations, leading to the diffusion of LNG and contributing to a reduction in CO₂ emissions. In Taiwan, for example, where LNG imports have been growing, the Daigas Group has offered technological consulting to CPC Corporation and Taiwan Power Co. when they design, construct and operate LNG terminals. In earthquake-prone Taiwan, expectations have grown high regarding proposals being put forward by the Daigas Group, which can offer highly advanced anti-earthquake technologies and safety measures it has developed through operations in Japan, also a quake-prone country.



Action Provision of Energy with Less Environmental Impact Using Nature's Power



Expand the Use of Renewable Energy Sources Such as Wind Power, Solar Power and Biomass in Pursuit of an Optimal Energy Mix

As part of its efforts to arrest global warming and create a recycle-oriented society, the Daigas Group has been undertaking various business projects in collaboration with domestic and overseas companies known to be active in pushing for renewable energy projects. Under its FY2019 management plan, the Group pledged to accelerate the development and obtainment of electricity generated from renewable energy sources and announced a plan to double its power output from such energy sources, from 500,000 kW to 1 million kW, in FY2031.

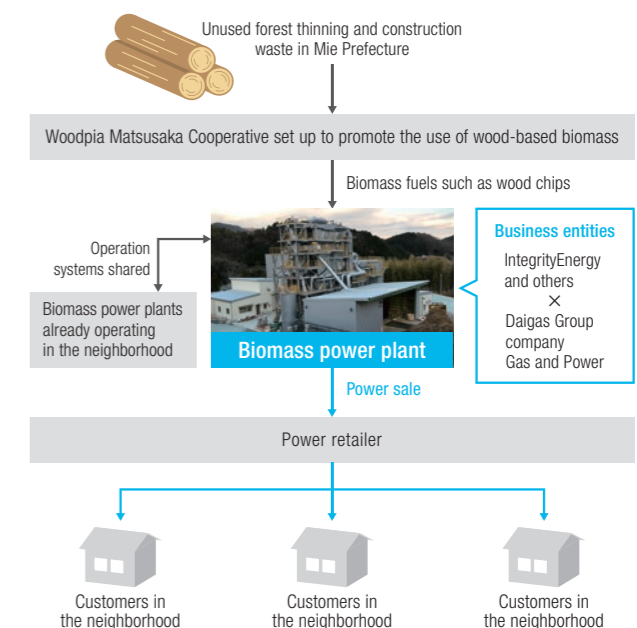
► **Active Use of Renewable Energy Sources to Curb Global Warming and Contribute to the Creation of a Recycle-Oriented Society**

The Daigas Group owns renewable energy sources, such as wind power, solar power and biomass, both in Japan and abroad. A 26,000-kW wind power plant put into operation by Inami Wind Power in Inami Town, Wakayama Prefecture in June 2018 marked the latest operation of a renewable energy facility for our Group. The combined capacity of the Group's power output from renewable energy sources has totaled about 210,000 kW in Japan and about 100,000 kW abroad.

In Matsusaka City, Mie Prefecture, the Daigas Group launched biomass business in January 2018 by having its subsidiary Gas and Power Co., Ltd. invest in a business entity established mainly by IntegrityEnergy. The biomass facility built under the project is fueled by locally unused forest-thinning, with the electricity generated being supplied to customers in the neighborhood through a power retailer. The project realized local production and local consumption through the biomass business.

In Ichihara City, Chiba Prefecture, a biomass power plant with a power-generating capacity of about 50,000 kW is under construction through a business entity set up by our Group together with Itochu Corp. and Mitsui E&S Engineering. In addition, our subsidiary Gas and Power acquired an equity stake in Shiribetsu Wind Power Development, which is constructing wind power plants with an output capacity of about 25,000 kW in Suttsu Town and Rankoshi Town in the northernmost prefecture of Hokkaido. The power plant in Suttsu aims to begin operating in 2020, and the plant in Rankoshi in 2021.

■ **Biomass Power-Generating Project in Matsusaka City, Aimed at Realizing Local Production and Local Consumption**



Action Taken in Thailand

Biomass-Refining Verification Project Undertaken with a Thai Local Company

The Daigas Group has been developing technologies to refine biogas as part of its efforts to effectively use biomass such as agricultural residue. Our verification project aimed at commercializing the technologies began in Thailand in 2017. The project involves fermenting organic matter contained in waste water discharged from a palm oil factory. The fermentation is designed to generate biogas from which CO₂ will be removed, a process that leaves methane gas. The ratio of recollecting methane gas of which impurities are removed under the project is more than 99%, with the refined gas being used as a fuel to power natural gas vehicles.



Action Promotion of Optimal Energy Use in Cooperation with Customers



Realize More Efficient Energy Use at Customers' through Connection to IoT

CO₂ is emitted through the use of energy sources such as gas, electricity and oil fuels. The Daigas Group is convinced that an important key to reducing CO₂ emissions in society is the further diffusion of highly energy-efficient equipment and systems, including Ene-Farm and cogeneration systems [21], which are promoted by the Group as they use natural gas with less CO₂ emission.

These highly energy-efficient systems enable the more expeditious and efficient management of energy use with the rapid development of fully Internet-connected IoT and AI. With the advancement of these systems, people's lives have become safer and more comfortable. Among such systems is one aimed at monitoring the safety of elderly people and providing healthcare support to them.

For Household Customers

▶ New Energy Service "Ene-Farm" and "Eco-Jozu," Developed Thanks to IoT

In April 2016, Osaka Gas launched Ene-Farm type S, an IoT-compatible home-use solid oxide fuel cell (SOFC) [21]. As of the end of FY2018, more than 80% of Ene-Farm type S users were subscribed to a remotely controlled power-generation monitoring system or a remotely controlled energy equipment service. The monitoring system won high acclaim from 94% of its customers, who said they were able to confirm the safety of the remote operation being monitored.

In October 2017, the Company launched the energy-saving and IoT-compatible hot-water supply system "Eco-Jozu," which have various user-friendly functions. Among such functions are sending a message to the subscriber's smartphone when the device develops a problem, and monitoring temperature and other conditions inside the bathroom as a way to prevent bathroom accidents. The Eco-Jozu also offers a healthcare management service to customers by monitoring their health condition while having a bath.

In addition to these services, new services taking advantage of IoT technologies were launched in April 2018 to provide new value to users, including informing the user via a "smart speaker" when the bathtub is filled up, and informing the record of use of the bathtub to the user's relative living in a remote place via smartphone.

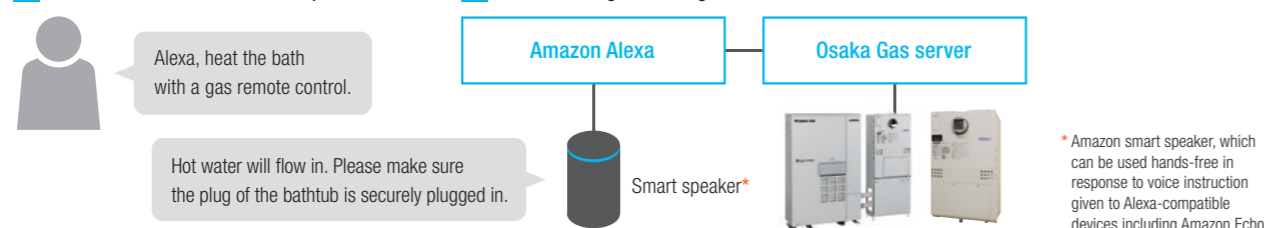
Subscribers to "My Osaka Gas," an exclusive online club for Osaka Gas customers, can confirm online the breakdown of the gas used (hot water supply, heating, reheating) through the heat source equipment of Ene-Farm type S. The Web service enables customers to grasp how the gas has been used.

The Daigas Group aims to become a corporate group that can contribute to further advancing customers' lives and businesses by continuing to offer innovative services backed by up-to-date technologies like IoT and AI.



■ Operate Gas Equipment via Smart Speaker

- 1 Voice instruction issued to fill up the bathtub
- 2 Hot water begins flowing onto the bathtub



For Corporate Customers

▶ Energy-Saving Proposal through "ekul" Service

Osaka Gas has offered energy-saving and energy-controlling services in a visible manner, using information and communication technology (ICT). Among such services are the "Eneflex" and the "Motto Save" service.

In FY2017, Osaka Gas launched the "ekul" data measurement service in response to customer demand for further "visualization" of various service data in addition to supporting customers' efforts to save energy, cut costs and increase labor efficiency. The "ekul" service is designed to provide its subscribers with gas and power

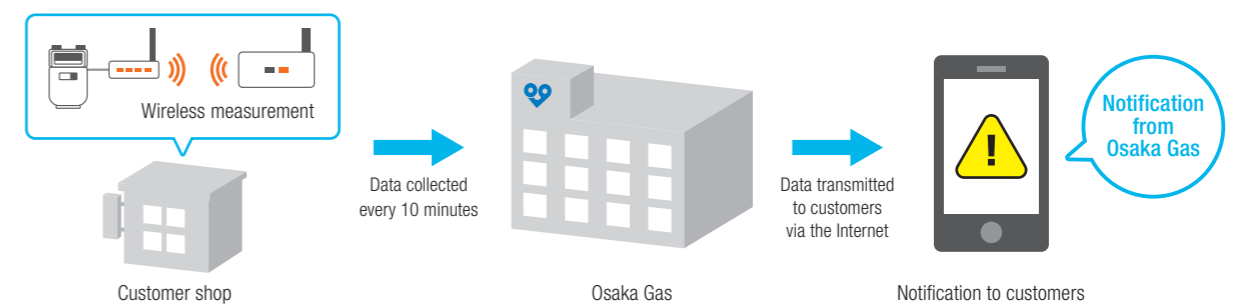
consumption data the moment these data are measured. Measurement of other data can be added to the service, including water consumption, the number of visitors, temperature and humidity.

IoT is also used in the "ekul" service. The IoT-based cloud service offered by Amazon Web Services and the use of the SORACOM Air SIM card has made "ekul" an expeditious and low-cost service. The business environment established in connection with the "ekul" service addresses security risks properly, eliminating customers' worries on the security front.

■ Visual Flow of "ekul" Service

Three-step service for data measurement and notification

- 1 Wireless installation of a measuring device
- 2 Data measured every 10 minutes
- 3 24-hour access to data from anywhere



Action Transformation into a Corporate Group Where Diversified Human Resources can Play Important Roles



Development of Human Resources and Promotion of Diversity

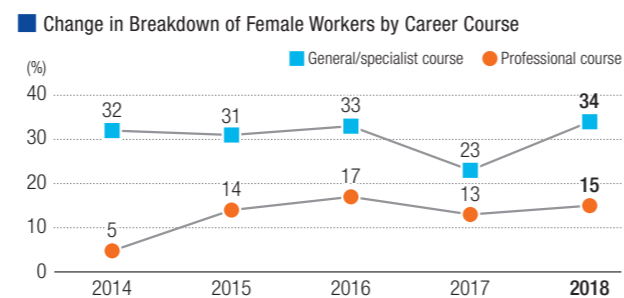
The Daigas Group is working on promoting the diversity of human resources to provide services in excess of customer expectations. The Group is developing human resources who can play important roles in the global community in response to expanding business fields covered by the Group. Furthermore, we aim to become a corporate group where human resources with various backgrounds can play their respective roles regardless of sex, age, nationality, employment style, lifestyle, religion, sexual orientation, gender identity or disability. By doing so, we are striving to establish and expand a work system in which diverse lifestyles, enhanced productivity, and efficient work styles are compatible to each other.

► Establish an Organization and System in Which Women Can Continue to Work

Osaka Gas aims to become a company where each worker's individuality and free will are respected, and employees can grow through work. At our company, women are treated as invaluable human resources and their promotion to management posts has been encouraged. As a result, the scope of business fields where women can play key roles has expanded to the widest-ever areas at Osaka Gas. Women and their supervisors in charge of educating them have been asked to enhance their awareness regarding their medium- and long-term career development plans. At the same time, Osaka Gas continuously works on attaining goals set on this front by establishing a system to support female workers' career development.

Osaka Gas has endeavored to establish a better work environment that is friendly not only to women but also to men by supporting child birth, child rearing and nursing care for aged parents. The

Company has institutionalized support given to employees during childbirth leave and childcare leave so that they can return to work smoothly. A project for a similar purpose has also been launched. In addition, a special leave system has also been established to encourage employees' participation in child rearing.



Promote Efforts for Recognition, Understanding and Penetration of SDGs

The Daigas Group is committed to solving social issues through its business activities and contributing to the attainment of the Sustainable Development Goals (SDGs). For these commitments to be fulfilled, the Group believes it is essential to enhance and diffuse employees' recognition and understanding of the SDGs. Starting in FY2018, the Daigas Group has been undertaking activities aimed at encouraging its employees to lead a life and work while taking into consideration social issues and the SDGs.

CSR Seminar for All Employees

News anchorwoman Hiroko Kuniya and SDG Partners CEO Kazuo Tase were invited to the Daigas Group's FY2018 CSR seminar, and about 190 employees—comprising both executives and rank and filers—participated in the seminar. Both guests talked about the importance of the SDG activities conducted by each employee, and the additional value companies could create by incorporating SDGs into their management strategies. In a survey conducted among the employees who attended the seminar, 92% of those polled said they could contribute to the attainment of the SDGs through their work and private activities.



Guest speakers Ms. Hiroko Kuniya (left) and Mr. Kazuo Tase

Round-Table Talks under the Title of “Daigas Group’s Efforts to Attain SDGs—Each Action for Helping Curb Climate Change—”

The Daigas Group has been undertaking activities aimed at achieving the SDGs by promoting business activities addressing climate change. To clarify issues to be addressed in its further SDG efforts, the Group has held a round-table talk with the attendance of experts familiar with the SDGs.

Panelists

Mr. Junichi Fujino
Institute for Global Environmental Strategies
Principal Policy Researcher
National Institute of Advanced Industrial Science and Technology

Mr. Tomonori Honda
Safety science division in the field of energy
Advanced Life Cycle Assessment (LCA) Research Group
Senior Researcher

Ms. Yuka Matayoshi
Mizuho Securities Co., Ltd.
Market Strategic Intelligence Department
Senior Researcher

Megumu Tsuda
General Manager of CSR & Environment
Department, Osaka Gas Co., Ltd.



Clockwise from lower right: Mr. Fujino, Ms. Matayoshi, Mr. Honda, Ms. Tsuda

and incorporating an environmental action mechanism in society so that you can take an appropriate approach to environmental issues. One good example to which I want to draw your attention is putting forward lifestyle proposals to reduce greenhouse gas emissions. For example, I want Osaka Gas to think how the Ene-Farm service can contribute to cutting greenhouse gas emissions, not in terms of statistical energy efficiency but in term of how it could be effective in improving people's lifestyles. I expect Osaka Gas to find new ways of utilizing the Ene-Farm and forging a mechanism for that purpose.

Ms. Tsuda: The process by which we are to achieve the goals is important. If the goals are not attained, we will come up with the next steps to be taken and check whether the goals that had been set reflected the reality. If judged necessary, the PDCA cycle will be put into place. We have visited customers and proposed solutions after analyzing how they had used gas appliances. If we mobilize all the know-how we have acquired through these solutions, we believe we can come up with a new proposal for addressing issues related to climate change.

Mr. Honda: It is hard to make a long-term forecast through 2050. But why don't you present an idea of how Osaka Gas should be in the future? This may be all the more important despite the expected difficulty of making a long-term forecast. If you demonstrate that you are really serious, you can reach a starting point for discussion, on themes including whether the accumulated technologies are usable and which direction Osaka Gas should take.

Ms. Tsuda: We would like to think together with young employees concerning how our company should be toward 2050. The innovation we are to pursue is not an extension of what we are doing now. What we need is “discontinuous” innovation. I believe what society aims to achieve is what is sought under the SDGs. Therefore, we want to work consistently to reach the SDGs.

Promoting Information Disclosure and Dialogue, and the Process of Reflecting Them in Management Strategy are Important

Ms. Matayoshi: To build a sustainable society under the SDGs, not only a policy-oriented approach but also a change in money flow is necessary. Under these circumstances, investment indicators being used to evaluate companies based on ESG (environment, society and governance) have become a core framework in the capital market for achieving the SDGs. Especially important for energy companies heavily reliant on fossil fuels is enhanced information disclosure concerning the environment. A dialogue method as a means of addressing how information disclosure should be and enhancing corporate value has been a focus of discussion.

Ms. Tsuda: What companies had to do concerning information disclosure in the past was limited to disclosing financial information, which shows the company's “explosive power” and “muscular power.” Now, however, companies are required to disclose nonfinancial information, which shows the company's “internal organ” power that leads to sustainability. This is my perception.

Ms. Matayoshi: Information to be disclosed for evaluation is mainly data. Osaka Gas, however, should disseminate its vision concerning how the Company will recognize and respond to possible risks and opportunities deriving from uncertain factors to the investing public through dialogue. Furthermore, it is important for the Company to reflect what it has obtained through the dialogue in its management strategy. Mobilizing all options available is crucially important for the Company to solve not only climate change issues but also various social issues at the same time. In that sense, Osaka Gas should step up publicizing the fact that the active use of highly energy-efficient natural gas is instrumental in attaining the SDGs.

Ms. Tsuda: We will further analyze the risks and opportunities related to climate change and deepen our dialogue with investors, focusing on business strategies. Thank you very much for attending this panel discussion today.

Create Innovation, Deepen Communication and Enhance Motivation through SDGs

Mr. Fujino: SDGs is a key part of the United Nations' document titled “Transforming Our World: the 2030 Agenda for Sustainable Development,” adopted by the General Assembly in September 2015. The document's preamble described the 2030 Agenda as “a plan of action for people, planet and prosperity.” Behind the wording is a sense of crisis shared by UN members toward our planet based on the perception that human activities may have already surpassed the capacity of the Earth. The 2030 Agenda calls for the global community to share 17 goals to be achieved by 2030, followed by review and assessment of the results. The agenda envisages employing a back-casting approach in working out solutions. SDGs have become akin to a universal language, as they are used in dialogue with various stakeholders. The concept of SDGs can become an important factor when Osaka Gas ponders their meaning for society and the services to be provided to customers toward 2030. Employees of Osaka Gas can refer to the SDGs when discussing how to make their company a company of pride.

Ms. Tsuda: Since its foundation, Osaka Gas has undertaken its business activities with the aim of improving people's lives by lighting the town with gaslights and easing the burden of housework with gas stoves. These activities reflected our strong desire to help people. The characteristics of people working at Osaka Gas as conveyed in three slogans may have motivated our past actions. These three slogans, which also highlight our strength, are “a spirit of active involvement,” “a pioneering spirit” and “genuine sincerity.” We are proud of what we have done in the past. By utilizing SDGs effectively, we can accelerate innovation. SDGs can become a source of motivation for employees of Osaka Gas and a prime mover of the Company.

Mr. Fujino: Initially, Osaka Gas focused on achieving Goal 1 (ending poverty), Goal 2 (ending hunger) and Goal 5 (achieving gender equality). The Company has become what it is now by contributing to attaining these goals. Why not study how Osaka Gas has become what it is now and what mission it should fulfill toward 2030, while utilizing the SDGs?

Present Proposals on Social Mechanisms, including Lifestyles, and Mobilize All Know-How to Reduce CO₂ Emissions

Mr. Honda: Reducing greenhouse gas emissions as a means of curbing climate change has become an essential business element. It is important for Osaka Gas to manage its emission-cutting goals and their results. Equally important is accurately recognizing the status quo, reviewing these goals whenever necessary,