Enhancement of Energy Security

Basic Policy

In the face of rising expectations for the role of natural gas after the 2011 Great East Japan Earthquake as well as major changes in the energy-related environment in Japan, such as full deregulation of the gas and electricity retail markets, the Tokyo Gas Group acknowledges the public’s expectations of securing a stable and low-cost energy supply, ensuring customer safety and providing better services. Moreover, we are accelerating the pace of our business expansion overseas and establishing our LNG value chain at home and abroad to contribute to a stable energy supply and energy infrastructure while offering energy solutions in Japan and other countries in which we do business.
Stable Supply

Why Is this Materiality?

- To serve society by providing stable and low-priced supplies of energy amid heightened expectations for natural gas following the Great East Japan Earthquake and during the ongoing transformation of the Japanese energy industry brought about by reforms in the country’s electricity and gas systems.
- To maintain a safe and stable supply by developing competitive power sources and expanding electricity sales to provide optimal energy solutions that not only combine gas and electricity but also add value.
- To contribute to the development of local energy services and energy infrastructure in our overseas operations by applying the accumulated technologies of the Tokyo Gas Group.

FY2017 Results and Evaluation

Criteria for evaluating KPIs

- Target achieved (100% or above)
- Target not achieved but improved from the previous fiscal year
- Target not achieved

Note: Qualitative indicators with no evaluation axis are assessed on the basis of whether progress has been made since the previous fiscal year.

<table>
<thead>
<tr>
<th>Target (CSR KPIs)</th>
<th>FY2017 Results</th>
<th>Evaluation</th>
</tr>
</thead>
</table>
| LNG procurement to ensure stable and affordable supply | ■ Further diversification of LNG procurement  
  • April 2017: Began studying the possibility of forming a strategic partnership on LNG procurement with Kyushu Electric Power Co., Inc., and reached an agreement to pursue collaboration for achieving flexible and agile reductions in LNG procurement costs and enhancing stability of supply.  
  • Built four economically efficient LNG tankers, capable of transiting the Panama Canal, to start receiving LNG from Cove Point in the U.S. from 2018.  
  • March 2018: Concluded a new LNG sales and purchase agreement with Malaysia LNG Sdn. Bhd.  
  • LNG under long-term contracts: 12 projects in 5 countries (as of end March 2018)  
  Proven global natural gas proved reserves: 193.5 trillion m³  
  Source: BP Statistical Review of World Energy 2018 | ○ |
### Diversification and expansion of overseas business
- **Promotion of overseas business in Southeast Asia and North America**
  - May 2017: Tokyo Gas America Ltd. acquired 30% of the shares of Castleton Resources LLC to participate in the natural gas development business in the U.S.
  - July 2017: Tokyo Gas Asia Pte. Ltd. acquired 24.9% of the shares of PetroVietnam Low Pressure Gas Distribution Joint Stock Company and concluded a strategic alliance agreement.
  - October 2017: Tokyo Gas Asia Pte. Ltd. formed a joint venture with the Development Bank of Japan Inc. to acquire 33% of the shares of PT Panji Raya Alamindo, a gas distributor in Indonesia.

### Infrastructure development to accommodate wider use of natural gas
- **Development of natural gas infrastructure based in the northern Kanto area**
  - Installed an additional vaporizer and tank lorry loading facility at the Hitachi LNG Terminal.
  - Continued preparations for construction of a second LNG tank at the Hitachi LNG Terminal, scheduled for completion in 2020.
  - Development of trunk lines
  - Completed construction of the Koga-Moka Line that connects to our existing network.
  - Formulated plans for construction of the Ibaraki Line between Hitachi and Kamisu, scheduled for completion in FY2020.

### Expansion of competitive power generating capacity and electric power sales
- **Expansion in scope of business related to solar power generation**

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**Key Initiatives for FY2018 and Beyond**

We reviewed the Tokyo Gas Group’s key CSR activities and materiality in fiscal 2017. Please visit the related link to view the latest information on our materiality and CSR KPIs.

[Link](#) **Identifying New Materiality**

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**The Pursuit of Safety**

**Why Is this Materiality?**
- To provide for customers after major earthquakes and ensure that they can use gas safely.
- To enhance the energy security that supports safe and secure living.
- To contribute to energy system innovation to support energy conservation and CO₂ emissions reduction.

---

**FY2017 Results and Evaluation**

Criteria for evaluating KPIs
- ○ Target achieved (100% or above)
- △ Target not achieved but improved from the previous fiscal year
- × Target not achieved

*Note: Qualitative indicators with no evaluation axis are assessed on the basis of whether progress has been made since the previous fiscal year.*
Target (CSR KPIs) | FY2017 Results | Evaluation
--- | --- | ---
Promotion of earthquake, tsunami and other disaster measures | ■ Promotion of measures against earthquakes, tsunamis and other disasters to ensure greater disaster resilience and a safe supply of gas  
- June 2017: Subdivided the low-pressure service network of the head office area, from 252 blocks into 261, for a more precise remote shutting down of the gas supply in order to prevent disaster. | ☐
Promotion of maintenance measures for aging pipes and other infrastructure | ■ Promotion of safety measures including upgrading aging gas pipes  
- Informed users during safety inspections and by other means of advice on replacing aging underground house pipes other than those already replaced in FY2015 and performed upgrades upon request. | ☐
Improvement of disaster resilience | ■ Promotion of switching to safer appliances  
- Expanded the adoption of cooking stoves equipped with safety sensors for auto shut-off to prevent overheating and flame failure, with 1.75 million units sold to date (as of March 31, 2018).  
- Encouraged customers using appliances such as water and bath boilers lacking safety devices to prevent imperfect combustion to switch to safer appliances through direct mail and providing information during periodic safety inspections.  
- Periodic safety inspections  
- Paid 3.931 million visits for periodic safety inspections of gas equipment in fiscal 2017 and completed 3.555 million inspections, excluding times when customers were not at home.  
- Initiatives for more frequent contact with customers  
  Conducted voluntary safety inspections in addition to legally mandated inspections during periodic inspections to facilitate reliable risk conversations with customers. Specific information on voluntary inspections was published via a comparison site for voluntary safety measures of gas retailers by an operator under consignment from the Ministry of Economy, Trade and Industry. Tokyo Gas efforts were rated top class. | ☐

**Key Initiatives for FY2018 and Beyond**

We reviewed the Tokyo Gas Group’s key CSR activities and materiality in fiscal 2017. Please visit the related link to view the latest information on our materiality and CSR KPIs.

**Why Is this Materiality?**

- To deliver better products and services based on proactive communication and customer feedback, thereby enabling customers to use energy safely, securely, and comfortably in keeping with the intent of electricity and gas system reforms.
FY2017 Results and Evaluation

Criteria for evaluating KPIs

- **Target achieved (100% or above)**
- **Target not achieved but improved from the previous fiscal year**
- **Target not achieved**

*Note: Qualitative indicators with no evaluation axis are assessed on the basis of whether progress has been made since the previous fiscal year.*

<table>
<thead>
<tr>
<th>Target (CSR KPIs)</th>
<th>FY2017 Results</th>
<th>Evaluation</th>
</tr>
</thead>
</table>
| **Provision of products, services, and related information** | ■ Response to full liberalization of the electricity retail market  
  - March 2018: Number of applications for electricity service (ongoing) reached approximately 1.13 million. We sought to win more contracts by publicizing the electricity and services offered by Tokyo Gas, largely through direct promotion by LIFEVAL and Enesta, and by pursuing initiatives for expanding partnerships.  
  ■ Promotion of the wider use of ENE-FARM (“EF”) residential fuel cells  
  - We sold 18,500 EF units in FY2017, bringing the cumulative total of units sold since FY2009 to approximately 98,000.  
  ■ Expansion of use of combined heat and power (CHP) systems\(^1\), commercial gas air conditioners and other systems  
  We developed and sold the following devices:  
  - A high-efficiency GHP chiller, which is about 20% more efficient than conventional models, was commercialized in December 2017.  
  - Smart Multi\(^2\), an addition to the lineup of air conditioners that combine a gas heat pump (GHP) and electric heat pump in a single refrigerant system, was commercialized in October 2017.  
  - ENESINFO\(^2\), a remote control system that saves energy and cost by optimizing the operational ratio between a GHP and electric heat pump.  

\(^1\) CHP systems generate electricity and recover waste heat generated as a by-product.  
\(^2\) Smart Multi and ENESINFO received the Environmental & Equipment Design Award from the Association of Building Engineering and Equipment.  

Reference  
- CHP systems developed in FY2017: 90,000 kW (cumulative stock: 2,070,000 kW)  
- Commercial gas air-conditioning systems developed in FY2017: 120,000 RT (cumulative stock: 4,010,000 RT)  

■ Initiatives by Tokyo Gas LIFEVAL  
- Acted as a one-stop source of home-related services, including periodic safety inspections of gas equipment, meter reading, opening and closing of gas valves and processing of applications for gas and electricity services in general, as well as the sale, repair and installation of gas appliances, and renovation work for the kitchen, living room and plumbing.  

■ Better use of customer feedback and initiatives for business improvement  
- Total number of customer comments: 16,460; 1,260 expressions of gratitude (7.7%), 1,358 complaints (8.2%), and 13,842 system requests (84.1%)  
- Customer feedback was used to identify and analyze issues and improve operations related to rates, customer inquiries via phone and website, and patrols. Examples of improvements were published on our website.
Provision of useful information to customers
- October 2017: Began providing “Heat Shock Forecasts” to raise awareness of accidents caused by heat shock while taking baths in the winter.
- October 2017: Began offering a service that gives users centralized control of information related to their gas and household appliances through a collaboration between the “Torisetsu” smartphone app and myTOKYOGAS.
- July 2017: Launched the “Furomimi” service to present a new lifestyle of enjoying audiobooks while taking a bath.

Key Initiatives for FY2018 and Beyond
We reviewed the Tokyo Gas Group’s key CSR activities and materiality in fiscal 2017. Please visit the related link to view the latest information on our materiality and CSR KPIs.

Link
- Identifying New Materiality
Further Diversification of LNG Procurement

We are committed to further diversifying our procurement of LNG to safeguard the stable delivery of affordable supplies of LNG. As Asia leads the expansion in global demand for LNG and deregulation increases the likelihood of greater volatility in LNG demand in Japan, we must be more price competitive and flexible in our LNG transactions. In the years ahead, we will seek to increase the flexibility of LNG procurement through measures such as raising the ratio of short-term spot procurement while taking advantage of our partnerships in Japan and overseas to enhance the efficiency of transportation and adjust inventory in our transactions.

● Triple Initiatives for Diversification

1. **Procurement sources**
   We will broaden our procurement sources from conventional sources mainly in Asia and Australia to a wider range of regions around the world, including North America.

2. **Contract conditions**
   We will seek to diversify contract conditions from being primarily linked to crude oil prices to incorporating multiple benchmarks such as the Henry Hub price and gain greater destination flexibility by eliminating destination clauses.

3. **LNG network**
   We will seek to acquire gas fields, power stations, etc., on a global basis. Developing an LNG network linking Asia, North America and Europe will lead to reducing regional disparities in market prices and create an environment for more flexibly adjusting supply and demand.

Since Tokyo Gas began procuring LNG from Alaska in 1969, our LNG imports have steadily risen to meet growing demand. The company currently imports LNG under long-term contracts with 13 projects in 6 countries, including Russia (Sakhalin) and other countries in the Asia-Pacific region such as Malaysia, Australia and Brunei.

In March 2016, we entered into a new contract for an additional purchase of approximately 200,000 tons per year of LNG from the Cameron LNG project in the U.S. Combined with the approximately 520,000 tons of LNG that we had previously committed to purchase from the same project and our contract for 1.4 million tons per year from the Cove Point project in the U.S., we now have access to several sources of LNG at prices linked to the Henry Hub Natural Gas Spot Price in the U.S. natural gas market. Furthermore, we are strengthening our partnerships with a variety of LNG buyers and other companies. Overseas sources include PetroVietnam Gas in Vietnam, Korea Gas Corp., and Centrica LNG in Europe, while partnerships in Japan include utilities such as Kansai Electric Power and Kyushu Electric Power. We are striving to ensure the stable, low-priced procurement of LNG by diversifying our sources and contract terms and by forming partnerships with buyers in Japan and overseas.
## LNG Project Contract Volume (as of April 2018)

<table>
<thead>
<tr>
<th>Project name</th>
<th>Contract volume (Unit: 10,000 tons)</th>
<th>Start of operation</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>100</td>
<td>1973</td>
<td>20 + 20 + 10 years (until 2023)</td>
</tr>
<tr>
<td>Malaysia I (Satu)</td>
<td>50</td>
<td>2018</td>
<td>6 + 7 years (until 2031)</td>
</tr>
<tr>
<td>Australia (Western Australia)</td>
<td>53</td>
<td>1989</td>
<td>20 + 8 years (until 2024)</td>
</tr>
<tr>
<td>Malaysia II (Dua)</td>
<td>90</td>
<td>2015</td>
<td>10 years (until 2025)</td>
</tr>
<tr>
<td>Qatar</td>
<td>35</td>
<td>1998</td>
<td>24 years (until 2021)</td>
</tr>
<tr>
<td>Malaysia III (Tiga)</td>
<td>34</td>
<td>2004</td>
<td>20 years (until 2024)</td>
</tr>
<tr>
<td>North West Shelf (NWS) Expansion</td>
<td>107</td>
<td>2004</td>
<td>25 years (until 2029)</td>
</tr>
<tr>
<td>Darwin (Australia)</td>
<td>100</td>
<td>2006</td>
<td>17 years (until 2022)</td>
</tr>
<tr>
<td>Sakhalin II</td>
<td>110</td>
<td>2009</td>
<td>24 years (until 2031)</td>
</tr>
<tr>
<td>Pluto (Australia)</td>
<td>150</td>
<td>2012</td>
<td>15 years (until 2025)</td>
</tr>
<tr>
<td>Queensland Curtis (Australia)</td>
<td>120</td>
<td>2015</td>
<td>20 years (until 2035)</td>
</tr>
<tr>
<td>Gorgon (Australia)</td>
<td>110</td>
<td>2016</td>
<td>25 years (until 2039)</td>
</tr>
<tr>
<td>Cove Point (U.S.A.)</td>
<td>140</td>
<td>2018</td>
<td>20 years</td>
</tr>
<tr>
<td>Ichthys (Australia)</td>
<td>105</td>
<td>2018</td>
<td>15 years (planned)</td>
</tr>
<tr>
<td>Cameron (U.S.A.)</td>
<td>Approx. 52 (8 cargoes)</td>
<td>2020</td>
<td>Approx. 20 years</td>
</tr>
<tr>
<td>Cameron (U.S.A.)</td>
<td>Approx. 20 (3 cargoes)</td>
<td>2020</td>
<td>Approx. 20 years</td>
</tr>
</tbody>
</table>

### Enhancement of LNG Transportation Arrangements

Through our wholly owned subsidiary Tokyo LNG Tanker Co., Ltd., we efficiently manage our own fleet of carriers, which transport LNG under long-term contracts from Malaysia, Australia and Sakhalin in Russia.

Four LNG carriers with a highly economic design are being built to transit the Panama Canal, which will be used to ship LNG mainly from Cove Point in the U.S.
Strengthening Overseas Business

We effectively use the increased number of overseas facilities and personnel and intend to stabilize and boost earnings. We are striving to maximize the value of our projects, primarily in Southeast Asia and North America, and join new projects while considering the development of businesses in new sectors and locations.

Overview of Our Business Abroad

Business Development in Southeast Asia

Demand for natural gas is projected to grow in Southeast Asia, where we are forming partnerships with leading local companies to expand business particularly in the midstream and downstream sectors. We plan to promote and expand the use of eco-friendly LNG and build up relevant infrastructure especially in developing countries, where energy demand is rising, with the use of Tokyo Gas technologies and expertise.

Business Development in North America

We plan to establish a revenue base in North America, with ample opportunities for market entry, through participation in the planning of upstream and power generation projects. The development of shale gas and other types of natural gas, in addition to LNG, is increasingly taking place in North America. We can contribute to reducing the environmental load by expanding our natural gas business in North America.

Categories of Overseas Business

<table>
<thead>
<tr>
<th>Production/Procurement</th>
<th>Transportation</th>
<th>Production</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream</td>
<td>Midstream/Downstream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tokyo Gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shale gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TGES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cigarette</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nong Fab LNG receiving terminal PMCI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bangladesh LNG receiving terminal F1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overseas Projects in FY2017 (Project Name, Country, Business Category)

(Upstream business: Gas field development and other resource development, LNG procurement, gas transportation, etc.)
In May 2017, Tokyo Gas America Ltd. acquired a 30% equity interest in Castleton Resources LLC (CR) to develop gas in Texas. This is the third gas development project in which Tokyo Gas has participated and the first capital investment in a U.S. gas developer. CR owns a leasehold in Texas where it develops shale gas and tight sand gas, which show promising potential as new sources of energy, through an affiliated operating company. We believe that our latest investment will contribute to the sustainable and stable supply of energy.

Vietnam
In July 2017, Tokyo Gas Asia Pte. Ltd. acquired a 24.9% equity interest of PetroVietnam Low Pressure Gas Distribution Joint Stock Company (PVGD), a Vietnamese gas distributor, and concluded a strategic alliance agreement. Tokyo Gas had signed a comprehensive cooperation agreement on developing an LNG value chain with PVGD’s parent company PetroVietnam Gas Joint Stock Corporation in March 2012, and our latest agreement resulted from continuous negotiations on the substance of cooperation. The acquisition of PVGD stock is the second case in which we have expanded our business domain in Vietnam under a comprehensive cooperation agreement. In the years ahead, we will strive to enhance the value of PVGD’s business by applying the Tokyo Gas Group’s know-how on developing demand and energy-saving technologies.

Indonesia
Tokyo Gas Asia Pte. Ltd. established a joint venture with Development Bank of Japan Inc. in October 2017 to acquire a 33% equity interest of PT Panji Raya Alamindo (PRA), a gas distributor and subsidiary of PT Rukun Raharja Tbk, the largest private gas company in Indonesia. This is Tokyo Gas’s third investment in an overseas gas distributor. Indonesia is experiencing remarkable economic growth, and demand for energy in the industrial and commercial sectors is expanding rapidly. We will seek to raise the value of PRA’s business by making use of the Tokyo Gas Group’s know-how and human resources.
### Projects Joined by Tokyo Gas

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Host Country</th>
<th>Business Description</th>
<th>Participation Year</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayu-Undan/Darwin LNG</td>
<td>Australia</td>
<td>Production, liquefaction and sale of natural gas</td>
<td>2003</td>
<td>3.07%</td>
</tr>
<tr>
<td>Pluto LNG</td>
<td>Australia</td>
<td>Same as above</td>
<td>2008</td>
<td>5%</td>
</tr>
<tr>
<td>Gorgon LNG</td>
<td>Australia</td>
<td>Same as above</td>
<td>2009</td>
<td>1%</td>
</tr>
<tr>
<td>Queensland Curtis (QC) LNG</td>
<td>Australia</td>
<td>Same as above (coalbed methane)</td>
<td>2011</td>
<td>Production: 1.25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liquefaction: 2.50%</td>
<td></td>
<td>Liquefaction:</td>
</tr>
<tr>
<td>Ichthys LNG</td>
<td>Australia</td>
<td>Same as above</td>
<td>2012</td>
<td>1.575%</td>
</tr>
<tr>
<td>Barnett shale gas</td>
<td>U.S.A.</td>
<td>Production and sale of natural gas (shale gas)</td>
<td>2013</td>
<td>25%</td>
</tr>
<tr>
<td>Eagle Ford shale gas</td>
<td>U.S.A.</td>
<td>Production and sale of natural gas (shale gas)</td>
<td>2016</td>
<td>25%</td>
</tr>
<tr>
<td>East Texas tight sand and shale gas</td>
<td>U.S.A.</td>
<td>Production and sale of natural gas (shale gas, tight sand gas)</td>
<td>2017</td>
<td>30%</td>
</tr>
<tr>
<td>Gas Malaysia</td>
<td>Malaysia</td>
<td>Gas distribution</td>
<td>1992</td>
<td>14.8%</td>
</tr>
<tr>
<td>Bajio</td>
<td>Mexico</td>
<td>Natural gas-fueled power generation</td>
<td>2004</td>
<td>49%</td>
</tr>
<tr>
<td>MT Falcon</td>
<td>Mexico</td>
<td>Same as above</td>
<td>2010</td>
<td>30%</td>
</tr>
<tr>
<td>T-Power</td>
<td>Belgium</td>
<td>Same as above</td>
<td>2012</td>
<td>26.66%</td>
</tr>
<tr>
<td>Cove Point LNG</td>
<td>U.S.A.</td>
<td>Liquefaction of natural gas and sale of LNG</td>
<td>2013</td>
<td>49%</td>
</tr>
<tr>
<td>LNG Vietnam</td>
<td>Vietnam</td>
<td>Procurement and sale of LNG, construction</td>
<td>2016</td>
<td>10%</td>
</tr>
</tbody>
</table>
Tokyo Gas Engineering Solutions’ Overseas Projects

Tokyo Gas Engineering Solutions Corporation (TGES) provides engineering solutions in Japan and abroad on the basis of its proprietary users’ know-how acquired in receiving LNG and designing, constructing, operating and maintaining primarily city gas production and supply facilities. With its highly regarded advanced technology, the company won a contract from PTT LNG Company Limited in fiscal 2017 for project management consultancy for the construction work of the Nong Fab LNG Receiving Terminal (7.5 million tons/year) to be built in Thailand. The construction is part of plans by PTT Public Company Limited, the parent firm of PTT LNG, to boost its capacity for receiving LNG by 2023 and helps establish an energy infrastructure in the Southeast Asian country. TGES is committed to actively expanding its overseas operations for the supply of natural gas and other environmentally sound energy sources.
Amid heightened expectations for natural gas following the Great East Japan Earthquake and due to the major changes in the Japanese energy industry, such as full liberalization of the retail electricity and gas markets, we will continue to produce city gas, recognizing that the public expects the Tokyo Gas Group to consistently ensure a stable supply of energy.

### Stable Production of City Gas and Stringent Quality Control

#### Stable Production of City Gas

Our four city gas production terminals mutually back up each other so that we can continue to deliver a stable supply of gas to customers, even in the event of power outages or other problems. Highly reliable power receiving systems with core facility redundancy are also in place to ensure steady production of city gas. Each terminal is equipped with highly reliable facilities, and we are enhancing our safety measures by steadily upgrading aging facilities and strengthening earthquake resistance for even greater stability in production.

#### Compliance with Statutory Requirements for Controlling Calorific Value, Combustibility and other Properties

To ensure delivery of high-quality city gas to customers, we daily inspect calorific value, combustibility and other properties, as stipulated by law, and strive to improve quality further by conducting independent monitoring regularly while also maintaining and managing facilities though periodic maintenance and daily inspections.

#### Strategic Development of Production Facilities

We are strategically developing our production facilities from a long-term perspective that emphasizes economic performance, applying a comprehensive approach as we consider issues such as projected future demand for city gas. To encourage the broader adoption of natural gas, a goal under our Challenge 2020 Vision, we began commercial operations at the Hitachi LNG Terminal in March 2016 to meet expanding demand in the northern Kanto region. The Hitachi LNG Terminal has a big jetty capable of receiving large LNG carriers and a 230,000 kl aboveground LNG tank, the largest of its kind in the world. In April 2018, we began constructing a second tank, scheduled to start operating in fiscal 2020, to keep pace with the growing demand for natural gas.

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![Hitachi LNG Terminal](image_url)

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#### Initiatives for Handing Down Skills

The Tokyo Gas Group actively manages knowledge by sharing and utilizing the valuable learnings, technology and skills it has acquired over many years of operating terminals in order to deepen each employee’s understanding and thereby enhance their performance and abilities. We are also
systematically developing human resources to ensure that skills are smoothly transferred to each succeeding generation.
The Tokyo Gas Group is developing its electric power business in the belief that providing a stable source of energy at low cost is a vital public expectation as demand for natural gas is rising after the Great East Japan Earthquake and the domestic environment surrounding energy is undergoing major changes, such as full liberalization of the retail electricity and gas markets.

**Expansion of Competitive Power Sources**

**Building an Optimal Portfolio of Power Sources**

Tokyo Gas recognizes that it is more important now than ever before to provide a stable source of electricity, taking into account major changes in the energy-related environment, such as power and gas system reforms, and growth in our sales stock. The stable acquisition of power sources is thus absolutely necessary, and we are building an optimal power source portfolio centered on natural gas-fueled thermal power generation combined with other power sources such as electricity generation using alternate fuels and electricity supplied by other companies with a strategic alliance.

**Securing Additional Power Sources**

We have the largest power source capacity among new entrants into the retail electricity market. We will establish a system for stable electricity supply by expanding our own power source capacity from the current level of about 1.6 million kW to 3 million kW in 2020. To construct natural gas-fueled power stations, which we are promoting as the foundation for the electric power business, we are committed to ensuring stable supply in the following ways. First, we will construct power stations close to areas of demand. Second, we will use highly efficient combined cycle power equipment to reduce environmental impact. And third, we will locate power stations near our LNG terminals to benefit synergies and enable efficient and stable management.

With the commencement of the commercial operation of the Ohgishima Power Station's Unit 3 in February 2016, the Tokyo Gas Group's power sources comprise Tokyo Gas Baypower Co., Ltd., a wholly owned subsidiary with a total output of about 100,000 kW, Tokyo Gas Yokosuka Power Company, Ltd., a 75% owned unit with 240,000 kW, Kawasaki Natural Gas Power Generation Co., Ltd., a 49% owned unit with 840,000 kW, and Ohgishima Power Company, Ltd., a 75% owned unit with 1.22 million kW. In addition, we have decided to receive the entire output of about 1.24 million kW of the Moka Power Station, which Kobelco Power Moka Inc., a wholly owned subsidiary of Kobe Steel, Ltd., is building in Moka, Tochigi Prefecture, with supply by the first unit to start in the second half of 2019 and that by the second unit in the first half of 2020. In May 2015, we established Chiba-Sodegaura Energy Co., Ltd. with Idemitsu Kosan Co., Ltd. and Kyushu Electric Power Company Inc. to explore development of coal-fired power plants.
Stable Power Generation

The Group’s thermal power stations are fueled by natural gas produced at our LNG terminals. The stations maintain a stable supply of electricity through their operational and control activities as well as daily checks and periodic inspections. Capitalizing on expertise acquired in the gas service business, we will do our best to ensure safety and stable supply while addressing environmental concerns and also supply electricity at lower cost, in our efforts to meet social demand and expectations as a total energy business company.

Link

▶ Measures in the Electric Power Business
We have been developing our natural gas pipeline network to ensure long-term stable gas supply in line with growing demand for city gas and the expansion of our service area.

### Pipeline Network Development to Meet Demand and Service Area Expansion

To accomplish its FY2018–2020 medium-term management plan GPS2020, Tokyo Gas is efficiently building up its gas pipeline network and working to ensure the stable supply of gas for a rise in the total number of customers, including household users, thanks to the potential growth in demand primarily from industrial users in the Kanto region.

In the course of developing our high-pressure pipeline network, we completed the Saito Line in October 2015, the Ibaraki-Tochigi Line in March 2016 and the Koga-Moka Line in October 2017, and we connected the Hitachi LNG Terminal with our three other LNG terminals on Tokyo Bay, improving supply stability mainly in the northern Kanto region.

We started the construction of the Ibaraki Line in fiscal 2017 to improve supply stability and expand transmission capacity through a looped network of high-pressure trunk lines. The construction work is continuing toward completion in fiscal 2020.

In fiscal 2018, we continued working to ensure stable supply, through such steps as conducting tighter inspections of key supply facilities, such as high-pressure pipelines, key medium-pressure lines and facilities for receiving gas from other companies and strengthening our emergency backup system and conducting emergency drills.

#### Plan for Main Supply Infrastructure Buildup

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Line</th>
<th>Section</th>
<th>Scheduled Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion of regional infrastructure</td>
<td>Ibaraki Line</td>
<td>Hitachi City-Kamisu City</td>
<td>Fiscal 2020</td>
</tr>
</tbody>
</table>
**Initiatives at the Supply Control Center**

The Supply Control Center centrally monitors and controls the operational status of city gas production and supply facilities in the Tokyo metropolitan area, 24 hours a day and 365 days a year. It accurately guides the adjustment of gas output at LNG terminals, pressure at governor stations and storage and withdrawal at gas holders to ensure the stable transmission of city gas in the context of regular checkups and maintenance work at LNG terminals and on high-pressure trunk lines.

In the event of a natural disaster, the center collects information, assesses the extent of the damage and handles first-response work for preventing secondary disasters, such as a suspension of gas supply. In cooperation with the Cabinet Office and Tokyo Metropolitan Government, it works to prevent the damage from worsening by sharing information through dedicated communications terminals and discussing responses through teleconferencing.

![Supply Control Center](image)

**Transportation Service for New Entrants into the Liberalized Retail Gas Market**

We operate the Transportation Service Center, which was opened in response to Japan’s complete liberalization of its retail gas market. The center helps new entrants operate smoothly, receiving their applications to use our gas pipelines for consignment supply and setting up a billing system for after the start of the service.

We treat all gas retailers fairly and maintain neutrality by physically isolating the center’s relevant office to ensure appropriate management of information on gas retailers and banning the use of information related to the service for other purposes.

**Working on Aging Gas Pipes and Other Facilities**

**Replacement of Aging Cast-iron and Other Pipes**

We are accelerating efforts to ensure the safety of gas pipes, including adequately upgrading and improving equipment such as aging cast-iron pipes and other old pipes. Each of our pipeline network centers in charge of gas pipelines works out and properly implements annual plans for examination and inspections as well as replacement and upgrading in light of priorities.
Replacement of Aging House Pipes

House (galvanized) pipes at customer sites are subject to corrosion underground. We are proceeding to replace them with polyethylene or other corrosion-free pipes. We explain to individual customers the need to replace house pipes at buildings requiring high security and carry out upgrading work on request. For other buildings, we inform customers of our replacement initiative during such occasions as regular checkups and conduct the necessary work on request.

Regular Gas Leakage Checks

In accordance with the Gas Business Act, we conduct regular gas leakage checks for the early detection of gas leaks on streets and immediately perform repairs at the identified sites. We follow regulatory and administrative guidelines and notices whenever we plan, conduct and manage a regular checkup. Besides the legally mandated regular checkups, we plan and constantly carry out our own gas leakage inspections in order to build customer confidence in our services.

Patrolling High-pressure Gas Trunk Lines

High-pressure gas trunk lines are the arteries for transmitting city gas from our four LNG terminals to the Tokyo metropolitan area and the rest of the Kanto region. We go to great lengths to ensure the safe transmission of city gas and use the latest equipment for maintaining and managing these trunk lines. One important effort is to patrol these lines.

During the patrols, we check whether other companies carry out construction work without asking Tokyo Gas in advance about the locations of nearby gas pipes. Also, we watch for any road damage such as cracks or depressions that may affect gas pipes. The patrols also include inspecting gas supply equipment and confirming that pressure regulators that adjust gas pressure and valves which shut off gas flows operate without vibration or noise. Daily patrols for these extensive inspections ensure operation safety.
Transmitting Gas Safely

Technologies that Sustain City Gas Business
As a gas supplier, we must maintain basic and expert knowledge and technologies associated with gas, supply equipment and gas appliances at a more thorough level than anyone else to support customers in the safe use of gas. We intend to create and refine a system for developing and passing on basic technologies that are indispensable for customer safety and security. In developing our expertise, we focus our research and development on technologies related to combustion, heat transfer and fluid analysis, which are required for the highly efficient and safe use of gas; technologies for assessing materials and seismic capacity required for the safety of infrastructure, such as pipeline networks; and gas analysis technologies for maintaining the high quality of the gas supplied to customers. In the event of an accident caused by a natural disaster or faulty gas appliances, engineers specialized in relevant fields respond quickly to investigate the cause and take necessary measures to prevent the recurrence of a similar accident or equipment failure.

We work to develop and improve methods for pipeline construction, maintenance and management to continually improve the safety and performance of pipeline construction work. As an industry pioneer, we will contribute to improving the safety of gas pipelines and develop the entire gas industry by introducing the fruits of our efforts to other gas utilities.

Research on Earthquake and Disaster Preparedness of Gas Supply Infrastructure
We conduct research and development on ways to protect pipelines and other gas supply infrastructure from earthquakes and other disasters so customers can use gas safely. Testing with the aid of a 3D shaking table, which simulates ground motions from an earthquake as strong as the 7.3-magnitude Great Hanshin-Awaji Earthquake in 1995, allows us to assess the safety of various items of equipment that comprise the gas supply infrastructure. We use numerical analysis simulation, which simulates real-world phenomena on computers, to conduct seismic performance assessments that take into account the complex movement of underground pipelines. The results of the research have been applied to our own measures to protect the gas supply infrastructure against earthquakes as well as similar efforts across the entire gas industry. Looking ahead, we will continue conducting research to strengthen the earthquake resistance of the gas industry as a whole.

![Testing seismic resistance with a 3D shaking table](image1)

![Numerical analysis simulation for the assessment of pipeline movements](image2)
Tokyo Gas addresses earthquake and disaster preparedness under the three pillars of prevention, emergency and restoration so that customers can use gas safely and conveniently at any time, 24 hours a day and 365 days a year. In the event of a disaster, we strive to minimize the impact on customers.

### Prevention

#### Highly Earthquake-resistant Facilities

We employ multiple layers of safety in addition to reinforcing city gas production and supply equipment and facilities. Important facilities are designed to withstand earthquakes as powerful as the 7.3-magnitude Great Hanshin-Awaji Earthquake in 1995 and the 9.0-magnitude Great East Japan Earthquake in 2011.

**LNG Tanks**

Tanks used for storing imported LNG are designed to maintain high structural integrity that can fully withstand major earthquakes. There have been no incidents of LNG leakage from any major earthquake.

**High-pressure and Medium-pressure Gas Pipelines**

These gas pipelines, connecting LNG terminals and district pressure regulators, are made of strong, flexible materials that can withstand the impact of ground movement caused by earthquakes.

**Gas Holders**

These containers hold the gas supplied in response to demand and feature a robust structure of multiple steel plate layers.

**Low-pressure Gas Pipelines**

A low-pressure gas pipeline comprises about 90% of the total length of a gas pipeline, and newly installed low-pressure gas pipelines are made of polyethylene to minimize damage caused by earthquakes.
Quick Shutdown of Gas Supply to Prevent Secondary Disasters

Our system is capable of remotely shutting down gas supply to individual buildings as well as to entire zones in the event of a major earthquake. In addition, the gas pipeline network is separated into regional blocks to minimize the inconvenience of a gas supply suspension.

How Gas Supply Is Shut off to Individual Houses

In each house, intelligent gas meters are equipped with a safety device that will automatically cut off gas supply to individual buildings when it detects earthquakes measuring 5 or greater on the Japanese seismic scale or an abnormal gas flow. Moreover, multiple layers of safety, including safety features of gas cocks and appliances, are in place to completely safeguard homes. Emergency shut-off valves at underground malls and skyscrapers can be remotely controlled from their disaster management center or building manager office to suspend gas supply to the entire facility.

*In case of a fire, regardless of whether an earthquake strikes, Tokyo Gas cuts off gas supply to individual buildings, and employees can close shut-off valves to further guarantee safety. These valves cannot be operated by customers.

Shutting off Gas Supply to Entire Districts Severely Impacted by a Disaster

In our service area, about 4,000 district pressure regulators, which convert medium-pressure gas to low-pressure gas, are equipped with seismographs to automatically shut off gas supply when a major earthquake is detected. Gas supply can also be cut off remotely. One seismograph is located in every square kilometer, an unprecedented density in the world, for monitoring the safety of each district.

Our SUPREME earthquake and disaster preparedness system uses densely installed seismographs. The system is capable of collecting earthquake data at about 4,000 locations, remotely shutting down district pressure regulators, and estimating damage on gas pipelines.
in order to monitor district safety. Within about five minutes after a major earthquake, the system identifies damage based on data gathered by seismographs. In about ten minutes, the system swiftly ensures safety by remotely operating district pressure regulators and suspending gas supply to areas where major damage is expected.

Locations of Seismographs in the Tokyo Gas Service Area and Temblor Strengths in the Southern Kanto Region during the Great East Japan Earthquake on March 11, 2011

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Safe and Swift Restoration of Gas Supply

We strive to restore gas supply as soon as possible to end the inconvenience in districts where service has been suspended, by effectively using equipment and systems made available during routine preparations and maintenance work, while closely cooperating with other gas utilities. Furthermore, we began introducing a system for remotely operating district pressure regulators in fiscal 2014 toward realizing same-day gas supply resumption in districts with no earthquake damage. We are working to apply this system to all such regulators.

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Post-disaster Relief and Support System

We drew lessons from relief activities after the 1995 Great Hanshin-Awaji Earthquake and 2007 Niigata-ken Chuetsu offshore Earthquake and deployed mobile gas generation equipment (large PA-13A) to high-priority customers such as hospitals to serve as relief and support equipment for those facilities as kitchens. Mobile equipment was used in the wake of the Great East Japan Earthquake in 2011.

To promote support measures carried forward from fiscal 2017, we will update customer information and provide education and training that use actual equipment in fiscal 2018. We have arranged with gas utilities in Japan via the Japan Gas Association to provide personnel and equipment to each other in the wake of a major disaster. The Tokyo Gas Group resumed its service in the aftermath of the Great East Japan Earthquake to some 30,000 of its customers in about a week and dispatched support personnel to six other gas utilities for about two months (up to 1,950 members a day). After the 2016 Kumamoto Earthquake, we engaged in gas pipe repair and restoration work with other gas utilities nationwide to achieve the resumption of gas supply to all affected customers in about two weeks. We are committed to rapidly achieving post-disaster service
Workers engaged in restoring gas service

Personnel working in a shelter to collect data on valves opened after the shut-off

**Topic**

**Relief Response to Northern Osaka Prefecture Earthquake**

After a 6.1-magnitude earthquake struck northern Osaka Prefecture on June 18, 2018, the Tokyo Gas Group supported work to restore the city gas service. We set up a local restoration task force within the day and dispatched about 1,200 personnel for restoration work with Osaka Gas Co., Ltd. and other gas utilities. As a result, gas service resumed for all customers in areas where it was needed, on June 24, six days after the quake. During the restoration period, the entire Tokyo Gas Group rendered support, including subsidiaries and affiliates such as ENETRUST, a gas pipeline construction company, Tokyo Gas LIFEVAL, Enesta and a drawing company. The entire Group is ready to do everything possible to restore service in response to future disasters.

**Routine Disaster Preparedness**

Tokyo Gas has established a business continuity plan (BCP) and routine disaster preparedness system against the risk of a major earthquake in the Tokyo metropolitan area.

**Development of a Business Continuity Plan (BCP)**

To cut off gas supply to prevent secondary disasters while continuing to safely supply gas in less affected areas, Tokyo Gas reviews all of its more than 600 operational procedures to prioritize business activities in times of a disaster. When the supply of gas has been interrupted in certain areas, a company-wide effort is made to promptly restore service through such measures as assigning staff responsible for operations in the suspended areas to recovery work.

**Establishment of Backup Centers**

Our systems are housed in a data center that meets high seismic standards. We have also established a backup center in case of a major disaster to maintain access to equipment and data primarily for safeguarding systems related to customer information and emergency safety.
operations so that we can swiftly restore services. In addition, emergency drills are regularly conducted, and redundancy is built into power supply and communication systems to minimize impact on customers during an emergency.

Comprehensive Disaster Prevention Drills
We have conducted comprehensive disaster prevention drills annually since 1983 to raise the level of the Tokyo Gas Group’s response to disasters. The drills are intended to confirm and verify that every team from the Emergency Response Organization is capable of acting in accordance with the guidelines to provide an initial response, facilitate transition to recovery, and ensure reliable collaboration with gas retailers that are new to the market.

Disaster Recovery Systems
Tokyo Gas operates an integrated system for monitoring the real-time status of our disaster response, which enables employees to share accurate information and swiftly take appropriate action to minimize damage. Earthquake data collected by our SUPREME system is sent to employees’ mobile phones within minutes of an earthquake and can also be used to confirm their safety and deliver instructions on reporting for duty during an emergency. Our earthquake data is also used by local authorities and government agencies.
Safety Management System

The Tokyo Gas Group has strengthened its safety management system in recognition of its fundamental mission as an energy company for whom safety represents a material issue that requires the direct involvement of top management. In August 2006, we established the Safety Committee, chaired by the Representative Director, President and CEO, to coordinate and promote safety measures. Under the Safety Committee we also set up the Safety Promotion Committee, chaired by the Chief Executive of the Pipeline Network Division, as well as several permanent subcommittees, to ensure we are fully capable of promptly responding to various safety issues.

Security System

Tokyo Gas maintains a 24-hour, 365-day emergency response system to prepare for gas leaks and other contingencies. To ensure customer safety, we operate a thorough security system in preparation for any incident.
Security Command Center

Any report of a gas leak to a Tokyo Gas facility such as the Customer Center is transferred to the Security Command Center. This center closely follows up on the situation and provides safety advice to the informant. Gaslight 24 personnel, instructed by the center, immediately rush to the emergency response site from their respective base. We also have established police and fire department hotlines to facilitate cooperation.

Gaslight 24

Gaslight 24 teams are 24-hour emergency dispatch bases capable of responding immediately to a gas leak or other emergency. Personnel specialized in emergency safety response are stationed in the service area. They are on call around the clock and respond swiftly in accordance with instructions from the Security Command Center.

Periodic Safety Inspections of Gas Equipment

Under the Gas Business Act, we periodically inspect gas equipment at all customer sites at intervals mandated by law. As a general gas pipeline operator, we check for gas leaks on customer premises. As a gas retailer, we visit customers to inspect gas appliances as well as air supply and exhaust systems. Also, as necessary, we recommend the installation of gas and carbon monoxide alarms and provide contact information for occasions when an industrial ventilation alarm goes off. To assure customers that they can safely use gas, we continue to maintain and improve the quality of our work through continued education for inspectors and other measures.

Improving the Quality of Gas Equipment Installation Work and Passing on Skills

While we certainly care about the comfort and convenience of using gas appliances, we also offer customers greater value through safety, security, and reliability. As part of this effort, we have continuously held emergency safety techniques and skills exhibitions for enhancing the quality of our emergency safety operations and passing on skills to the next generation of employees. At these exhibitions, installation teams representing Tokyo Gas and subcontractors demonstrate their techniques and skills for daily operations in order to inspire each other and further hone their skills. In fiscal 2017, 308 people were attended, including those from other gas service companies and new entrants in the gas retail business, with whom we need to cooperate in emergency safety operations. At the event site, many techniques and skills were vividly demonstrated. For example,
Participants competed in gas pipe repairs, during which new repair methods were explained, and role-played an initial response to a gas leak. The participants enthusiastically exchanged information, commenting on how the event increased their awareness of safety, security, and reliability. Through these efforts, we endeavor to raise awareness and ensure safety, security and reliability for customers.
Enhancing the Safety of Gas Appliances

To make sure customers are able to safely use our gas equipment and appliances, we conduct thorough, legally mandated periodic safety inspections of gas equipment and provide customers and appliance manufacturer information and training on safe use from the perspective of hardware and software.

Launch of Voluntary Action Plan on Product Safety

In response to the revised Consumer Product Safety Act, which came into force in May 2007, we drew up the Voluntary Action Plan of Tokyo Gas Concerning Product Safety as a company that repairs, installs and sells residential gas appliances, with the intention of ensuring product safety and fostering a culture of product safety. Under the plan, we strive to ensure and improve safety to meet social demands and expectations. Moreover, in our drive to promote a culture of gas appliance safety, we post important notices on the use of residential gas appliances on our website to enable customers to find accurate information quickly on the correct use of our products as well as recalls and reported problems.

The entire Tokyo Gas Group is committed to acting quickly and effectively in order to ensure safety and improve the quality of gas appliances under our three pillars of safety, security, and reliability.

VOLUNTARY ACTION PLAN OF TOKYO GAS CONCERNING PRODUCT SAFETY

Launched on November 7, 2007

Tokyo Gas defines the following Voluntary Action Plans to ensure product safety and establish a culture of product safety, thereby strengthening our group values of "Safety, Security, and Reliability" in our role as a company that sells, repairs and installs home gas appliances.

1. **Compliance with laws**
   - We shall comply with laws and regulations concerning product safety, formulate in-house voluntary standards for repair and installation work, and strive to ensure product safety.

2. **Establishment of a product safety promotion system**
   - We shall improve our company’s product safety promotion system to ensure product safety.

3. **Risk reduction of product-related accidents**
   - We shall contribute to reducing the risk of product-related accidents by sending feedback on product-related accidents and problems that come to our attention to the manufacturers and importers of gas appliances.

4. **System for collecting and transmitting information on product-related accidents**
   - Whenever we learn of a product-related accident we will promptly forward the information to senior management and related departments in the company, as well as to manufacturers and import companies.

5. **Maintenance and enhancement of product safety**
   - We shall promote awareness and disseminate information to our customers on the proper use of gas products, follow-up on questions from customers on product safety and commit to the cultivation of a culture of product safety.

6. **Cooperation with manufacturers and importers**
   - Whenever manufacturers or importers recover products due to recalls or other reasons, we shall cooperate with them to efficiently facilitate product recovery.
Improvements for Safer, User-friendly Gas Appliances

Measures to Improve the Quality of Gas Appliances
We address gas appliance failures or accidents at a section dedicated to quality in order to quickly identify the causes and determine effective responses. A new section was created in April 2011 to strengthen these efforts.

In the event of any gas appliance accident or gas appliance failure that requires the identification of a technical cause, we strive to ease customer concerns by immediately investigating the cause and taking the necessary actions in cooperation with manufacturers.

We share the results of any investigations of gas appliance failures along with the expertise gained through the analysis of past repair data with other gas utilities and gas appliance manufacturers to prevent similar failures in new products and improve product quality. As an example of success of these efforts, all balanced-flue bath boilers have been equipped since April 1, 2011, with safety devices to prevent irregular ignition caused by improper handling and also prevent the boiler from being left on. Some models remind the user through an alert light or error message on a remote control to have the equipment undergo a checkup when its use exceeds its design life. This is another example of our ongoing efforts to advance safety measures.

All Kitchen Stove Burners Fitted with Sensors
To improve the safety of gas kitchen stoves, the gas industry, including gas suppliers and gas appliance manufacturers and sellers, enforced self-regulating standards that require the installation of safety devices on all burners of residential gas kitchen stoves manufactured in April 2008 and later, except single-burner tabletop stoves. Every applicable burner must be fitted with sensors to prevent overheating of cooking oil and to detect flame failure and device to shut off after certain amount of time.

The industry refers to these kitchen stoves as Si-sensor-equipped cooking stoves to raise public awareness of kitchen stove safety.

Japan’s revised Gas Business Act, which came into force in October 2008, mandates overheating prevention sensors and flame control devices.

In March 2008, before the application of industry standards and revision of the law, Tokyo Gas required that all kitchen stoves sold by the company, except single-burner tabletop units, be Si-sensor-equipped cooking stoves and achieved cumulative sales of 1.75 million units*1 by the end of March 2018. Recent high-end models have more advanced safety features, such as pan detection that automatically lowers the flame when a pan is removed from the burner.

*1 Excluding single-burner tabletop stoves.

Development of More Advanced Alarms
We develop home-use combination alarms for fire, gas and carbon monoxide detection as well as home-use fire alarms so that customers can use gas safely and securely. Since 1999 we have been selling combination alarms, which detect a fire, gas leak or carbon dioxide from incomplete combustion and give out warning sounds and messages.

We are also broadening our lineup of alarms. In February 2010, we launched an indoor fire alarm powered by a battery with a life of 10 years and also launched a system of wirelessly networked fire alarms, in which activation of one alarm sets off the other alarms.

Research and development into low-power gas sensors began in 2006, and in October 2015 we launched a residential, battery-operated gas and carbon monoxide alarm with ultra-low power consumption.

Fire, gas, carbon monoxide combination alarm
Development of a Residential Ultrasonic Gas Meter and Wide-area Wireless Communications Device

Residential gas meters that measure customer gas consumption and monitor gas usage are called microcontroller meters*2. We jointly develop ultrasonic gas meters with Osaka Gas Co., Ltd., Toho Gas Co., Ltd. and appliance makers. These meters use ultrasonic sensors to measure gas flow and are utilized as microcontroller meters primarily for household use. Since ultrasonic gas meters have a simple structure with no mechanical moving parts, they are much lighter than conventional diaphragm gas meters, or about one-third the volume and half the weight, while performing the same functions. Therefore, they have a better appearance and offer users more leeway in deciding where to locate them.

We developed a PHS communications device that works for at least 10 years on three lithium batteries (2,400 mAh, 3V) as a wide-area wireless communications device for our Residential Monitoring Services, which serves as a remote gas shut-off and monitoring service for household customers. Using PHS devices enables us to provide stable services without relying on customer fixed-line telephone connection. Additionally, we are currently considering using a next-generation LTE wide-area communications device.

We launched a first-generation ultrasonic gas meter with communications and conventional safety capabilities in July 2005 and a second-generation model with a more advanced communications capability at the end of 2010. A pilot third-generation model made at significantly lower cost was introduced in the second half of fiscal 2016 and adopted officially in the second half of fiscal 2017. As a result, about 850,000 ultrasonic gas meters were in use as of the end of March 2017.

In addition, about 200,000 PHS communication devices, which were first installed in December 2012, were in use as of the end of March 2017.

Under our plan to install smart meters for all household customers, we are developing technologies to increase added values while reducing the costs of the meters, communications devices and installation. The Introduction of smart meters will provide more precise services based on measured data in addition to improving operational efficiency.

*2 Gas meters with embedded microcontroller-based safety devices

Development of a Multi-hop Relay Device

Along with Osaka Gas Co., Ltd., Toho Gas Co., Ltd. and appliance makers, we are jointly developing a multi-hop relay device for connecting residential gas meter readings and other data via multiple gas meters. The device applies intermittent rather than continuous transmission, sending and receiving signals every five seconds to save power consumption, and operating for 10 years despite being battery-powered. Current wireless devices allow transmission only within an area that can be served by radio waves and are only usable in buildings of up to five stories, within the reach of radio waves transmitted by ground-based meter checkers. They also require long transmission times. The new device, capable of multi-hop relays, allows wirelessly checking meters in commercial buildings and condominiums six or more stories high.

We started using the new devices to check gas meters at our corporate housing for employees in May 2014. In April 2017, the devices were incorporated into our My Tsuho notification service for owners of apartment houses and condominiums. The devices reliably collect gas meter readings and other data even at houses where PHS reception signals are weak. Moreover, they allow us to provide the service at large apartment houses and condominiums.
Promoting Switchover to Safer Appliances

We have been encouraging the switchover to safer appliances since January 2007. We recommend by direct mail or on the occasion of periodic safety inspections of gas equipment that customers who use water heaters or bath boilers not equipped with devices to prevent incomplete combustion to replace them with safer equipment as soon as possible. In fiscal 2017, we continued to promote the replacement of such appliances—small water heaters, wire mesh stoves, conventional flue-type water heaters and bath boilers, and forced exhaust-type water heaters (with downdraft diverters). This has helped to bring down the number of such appliances in our service area from about 160,000 at the start of the replacement campaign to 16,809 at the end of March 2018.

We will continue supporting this effort and steadily work to improve safety so that customers can safely use gas appliances.

Progress in Switchover to Safer Appliances

<table>
<thead>
<tr>
<th>Air supply and exhaust method</th>
<th>Target appliances</th>
<th>Number of units targeted for replacement at campaign start</th>
<th>Number of units at end of FY2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-type gas appliances</td>
<td>Small water heaters</td>
<td>37,000</td>
<td>2,395</td>
</tr>
<tr>
<td></td>
<td>Wire mesh stoves</td>
<td>4,200</td>
<td>448</td>
</tr>
<tr>
<td>Semi-closed-type gas appliances</td>
<td>Conventional flue-type water heaters and bath boilers / forced exhaust-type water heaters (with downdraft diverters)</td>
<td>120,000</td>
<td>13,966</td>
</tr>
</tbody>
</table>
Measures to Ensure the Safety of Commercial Equipment

To ensure the safe, comfortable use of commercial gas appliances in locations such as restaurant kitchens, we recommend the replacement of old-type gas outlets and rubber tubes and the installation of gas alarms and automatic gas shut-off devices.

Since November 2006, we have installed commercial ventilation alarms free of charge to prevent carbon monoxide poisoning accidents, targeting about 180,000 restaurants and other facilities that use gas appliances in commercial kitchens. A cumulative total of 500,000 units have been installed as of August 2017. (Customers using commercial-grade gas equipment are eligible for free installation.) The alarms are replaced with new ones before the expiration of their six-year certification.

Business-use ventilation alarm

<table>
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<tr>
<th>Fiscal Year</th>
<th>Alarms Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>No data available</td>
</tr>
<tr>
<td>2007</td>
<td>24,000</td>
</tr>
<tr>
<td>2008</td>
<td>100,000</td>
</tr>
<tr>
<td>2009</td>
<td>142,500</td>
</tr>
<tr>
<td>2010</td>
<td>153,292</td>
</tr>
<tr>
<td>2011</td>
<td>157,977</td>
</tr>
<tr>
<td>2012</td>
<td>166,095</td>
</tr>
<tr>
<td>2013</td>
<td>171,623</td>
</tr>
<tr>
<td>2014</td>
<td>177,092</td>
</tr>
<tr>
<td>2015</td>
<td>180,406</td>
</tr>
<tr>
<td>2016</td>
<td>183,692</td>
</tr>
<tr>
<td>2017</td>
<td>178,719</td>
</tr>
</tbody>
</table>

*1 Data in fiscal 2009 and earlier are estimates.

*2 Numbers as of the end of March each year.
Customer-oriented System and Activities

Customer-oriented CS Mindset
To remain the customer’s first choice, the Tokyo Gas Group believes that delivering customer satisfaction is more important than simply delivering a product or service. With this understanding, we set the CS Mindset as stated in Tokyo Gas Group Our Code of Conduct. Additionally, we intend to be a customer-oriented enterprise by instilling a mindset that guides our judgments and activities throughout Group personnel.

Concept of the CS Mindset

System for Promoting Customer Satisfaction
We seek feedback from customers through calls to our Customer Center, direct contact and various surveys. The opinions and requests we receive are shared within the company all the way up to top management. They are incorporated into our daily activities as we make improvements and enhance quality.
Customer Satisfaction Promotion Committee

Providing customers with greater satisfaction is high on our management agenda. Since fiscal 2004, we have been convening the Customer Satisfaction Promotion Committee, which comprises Corporate Executive Meeting members and is chaired by the president. The committee discusses solutions to issues deemed too difficult for individual workplaces or departments to solve as well as issues requiring response by the company as a whole. We also maintain a CS Improvement Promotion Subcommittee, primarily composed of the leaders of departments that come into frequent contact with customers, to promote various measures aimed at enhancing customer satisfaction.

CS Meetings in Each Department

Every department and workplace holds CS meetings to listen to customers and quickly respond to their needs. The meetings offer opportunities to receive new feedback from customers, discuss and implement improvements, and consider and share CS measures.

Service Quality Surveys

We apply the results of surveys to our efforts to meet diversified customer needs.

Survey Results in Fiscal 2017

<table>
<thead>
<tr>
<th>Survey</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDI-Japan Benchmark survey</td>
<td>☆☆☆ 3 Stars</td>
</tr>
<tr>
<td>Electricity retail industry customer service</td>
<td>☆☆☆ 3 Stars</td>
</tr>
<tr>
<td>Electricity retail industry portal support</td>
<td>☆☆☆ 3 Stars</td>
</tr>
<tr>
<td>JCSI(Japan Customer Satisfaction Index)</td>
<td></td>
</tr>
<tr>
<td>Electricity retail</td>
<td>1st place in customer satisfaction</td>
</tr>
</tbody>
</table>

Measures at the Customer Center

The Tokyo Gas Customer Center receives a wide range of inquiries by phone as the Group’s first point of contact for customers. Toward providing faster and more accurate responses, the center continually strives to improve its service by preparing detailed forecasts for inbound call traffic, optimizing shift work schedules, and creating a new system for receiving inquiries about retail electricity and other new services.
Making the Best Use of Customer Feedback

Using a Database to Identify Problems

We direct customer feedback received by the Customer Center and other points of contact as well as sales personnel to relevant sections so that they can take prompt action if necessary. Information obtained through these processes is stored in our customer feedback database toward recognizing and analyzing customer expectations for the Group and to identify problems that need to be addressed.

Breakdown of Customer Feedback

We received 16,460 items of customer feedback in fiscal 2017, of which 1,260, or 7.7%, expressed gratitude, 1,358, or 8.2%, stated complaints and 13,842, or 84.1%, provided opinions or requests about our system.

The Customer Center will continue to broadly collect customer feedback, mainly views on our system.

Breakdown of Customer Feedback

<table>
<thead>
<tr>
<th>Comments in total</th>
<th>Expressions of gratitude</th>
<th>Complaints</th>
<th>Requests about our system</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2017: 16,460</td>
<td>1,260 (7.7%)</td>
<td>1,358 (8.2%)</td>
<td>13,842 (84.1%)</td>
</tr>
</tbody>
</table>

Basing Business Improvement on Customer Feedback

Each department uses customer feedback to make improvements. We report back to customers on some of these efforts through our corporate website.

Improvement Example 1

I didn’t realize it was a combined bill for electricity and gas, and the breakdown is hard to read. The electricity fee is printed too small. I want to see the breakdown for the electricity bill. Please clearly indicate the amount and period of electricity use.

We improved our meter reading slip.
1. The new slip separates the “Total amount” from the “Breakdown” sections.
2. Items such as usage and billing amount are shown in larger letters.
3. Customers can review the details of their electricity contract and breakdown of fees as well as their gas contract.
Improvement Example 2

Customer feedback

- I want Tokyo Gas to provide answers that are easier to understand in the FAQ section of its website.

Improvements made

- After reviewing the FAQs, we added images and video clips to make our responses easier to understand.

Note: The FAQs below are the translation of the Japanese website. Please click here for English website.

Q: How do I install and remove a gas fan heater (gas stove)?

Category: Home User FAQs > Gas Appliances and Equipment > Gas Appliances > Fan Heaters

A: Answer

Please watch the video below, which explains how to install and remove gas fan heaters, or click here for written instructions.

Caution:
- When attaching a gas cord, make sure to connect it to the side of the appliance first. If the cord is connected to the gas valve side first, the safety device will detect the cord and make the appliance unusable.
- When removing a gas cord, make sure to disconnect it from the gas valve side first.

We created more specific and relevant answers by providing additional filtering options.
Proactive Information Disclosure to Customers

We proactively and appropriately disclose information in addition to providing community-based customer support to ensure the safe, secure and comfortable use of energy by customers.

Tokyo Gas Website

The Tokyo Gas website receives applications for gas and electricity services and provides useful information to customers, such as on how to respond in the event of an earthquake, gas leak or other emergency, as well as lifestyle and living guides. We provide information for both individual and organizational customers and disclose corporate information.

We also operate a membership website for customers of our electricity and gas services. Residential customers can refer to the myTOKYOGAS membership website to confirm monthly gas and electricity usage and exchange points earned through their patronage for points offered by tie-in
partner companies, various member privileges, environmental activities or contributions to the Japanese Para-Sports Association. The myTOKYOGAS Business site provides commercial and industrial customers with a service that visualizes monthly gas and electricity usage.

Heat Shock Forecasts
Tokyo Gas has been providing Heat Shock Forecasts, jointly developed with the Japan Weather Association, on the JWA’s tenki.jp website since October 2017. The service displays heat shock potential calculated from indoor temperature differences on the basis of weather prediction information and is intended to highlight the need to take baths safely in the winter. On the myTOKYOGAS membership website for residential customers, we provided personalized heat shock forecasts tailored to specific indoor conditions after having the customer enter information such as the type and age of their house. Our information on bath use patterns of customers and expertise on housing and air-conditioning equipment contributed to the development of the heat shock forecast service.

Unified Management of Information on Gas and Electronic Appliances
We have been providing a free-of-charge service since autumn 2017 that allows for the integrated management of information on gas and electronic appliances at home through the integration of the Torisetsu user guides through the smartphone app of TRYGLE Co., Ltd. with myTOKYOGAS. A customer simply enters their myTOKYOGAS login ID into Torisetsu to automatically register their major gas appliances. Customers can easily obtain user guides for gas appliances and contact information about nearby LIFEVAL and Enesta service outlets in the event of an emergency. The Web version of Torisetsu will have additional functions starting in summer 2018 so that it can be useful for more customers.
Audiobook Service Furomimi

In July 2017, we launched an audiobook service that allows users to listen to books read aloud while taking a bath. Furomimi was jointly developed with OTOBANK Inc. and QUANTUM Inc. with the concept of aural refreshment. Using waterproof smartphones, users can enjoy taking a bath with Furomimi, which provides original content such as stretching exercises for use in the bathroom as well as voice training and books.

Facebook

Tokyo Gas has an official Facebook page to offer instant access to our information. We post our seasonal information, recipes and other useful information for everyday life, including entertainment content such as Paccho’s (Tokyo Gas’s mascot character) Diary and disaster preparedness information on the safe use of city gas.

Ensuring Proper Information Provision

Proper Information Provision under Law, and Self-imposed Criteria

Despite the Tokyo Gas Group’s continued efforts to ensure the proper provision of necessary information on products and services, the commissioner of the Consumer Affairs Agency in July 2017 issued a cease and desist order against an event flyer that allegedly violated the Act against Unjustifiable Premiums and Misleading Representations. The Group has taken the incident seriously and is redoubling its efforts to ensure compliance with the law and properly advertise and label products and services. We will continue our efforts to provide proper information in cooperation with legal affairs personnel in the production of flyers, catalogs and pamphlets. We remain committed to ensuring the proper provision of information and labeling in accordance with the Japanese Industrial Standards (JIS), guidelines of such bodies as the Japan Gas Appliances Inspection Association, our in-house regulations and other rules, so that consumers can confidently use Group products and
To ensure that customer can safely use our products and services, we also abide by the guidelines for appropriate information provision and other matters that the Ministry of Economy, Trade and Industry has set forth in concert with the full deregulation of the electricity and gas markets.
Tokyo Gas Group’s Community-based Service System

To meet specific needs and foster a close relationship with each customer, the Tokyo Gas Group set up the Tokyo Gas LIFEVAL network as a one-stop shop for products and services that improve the quality of life. As of April 1, 2018, the network consisted of 32 corporations in 62 regional blocks. Tokyo Gas LIFEVAL performs a number of tasks, such as periodic safety inspections of gas equipment, meter readings, opening and closing of gas valves, the sale, repair, and installation of gas appliances, and processing of applications for gas and electricity services. In addition, they provide information related to energy and daily life, such as plumbing renovations, energy conservation and power generation, to help local residents enjoy safe, environmentally friendly, comfortable lives. We also actively hold fun, experience-oriented events such as cooking classes featuring up-to-date kitchen equipment that participants can enjoy seeing, touching and using. We provide a variety of training for LIVEVAL personnel in accordance with their objectives and occupational positions to improve their technical and customer service skills. In addition to supporting human resource development, we strive to offer better services and proposals through a system for collecting and sharing customer feedback on LIVEVAL.

The Tokyo Gas Group operates the Enesta and Enefit service outlets, in addition to LIVEVAL, to provide various services for supporting comfortable lives.

Always Reliable Services

What we call “Always Reliable Services” are intended to give customers peace of mind in using gas appliances while addressing a range of daily needs. In our efforts to provide customers with a sense of security, we broadened the lineup of Emergency Home Assist, Gas Fixture Troubleshooting Support and Residential Monitoring with the addition of Electricity Troubleshooting Support and Gas Fixture Special Support in April 2018.

Gas Fixture Troubleshooting Support*1

In the event that a city gas water heater or kitchen stove of a gas service customer*2 breaks down, we visit and repair the appliance without charging travel expenses.*3

*1 Customers must satisfy certain conditions to receive Gas Fixture Troubleshooting Support. Please visit the Tokyo Gas website for details. Some models are not covered by this service.
*2 Those in the service areas of TOSAI GAS, Inc. and Higashinihon Gas Corporation and in the Moka district served by NIPPON GAS CO., LTD. are not eligible for this service.
*3 Customers bear travel-related holiday and overtime wages as well as repair fees (technical fees and parts costs) and other expenses (diagnostic fees, parking charges, etc.).
Emergency Home Assist Services

We respond around the clock to problems with plumbing, house door locks and windows. Customers who receive Tokyo Gas gas and electricity package discounts are exempted from the monthly fees for this service. Users have expressed their gratitude for the quick response to plumbing problems and free-of-charge service.

*4 Customers must satisfy certain conditions to receive Emergency Home Assist Services. Please visit the Tokyo Gas website for details.

*5 Although travel expenses and labor fees up to 30 minutes by one worker are not charged for the initial response, there may be extra charges such as for parts and special work fees. Customers fully bear second response fees such as equipment replacement.

Residential Monitoring Services

Tokyo Gas remotely shuts off gas supply on behalf of a customer in response to a personal call or website request from outside the home about a failure or possible failure to turn off gas equipment. We also call customers if we notice unusual gas usage such as an extended period of non-use. Moreover, if no gas is used by a customer between 0:00 and 24:00, we email family members registered in advance. This is helpful for in terms of caring for family members who live far away. In October 2017, this service added an optional contract for emergency support through a business cooperation agreement with security service company SECOM CO., LTD.

*6 We may not be able to provide this service, depending on specific circumstances. For information, please visit the Tokyo Gas website or call 0120-117744 between 9 a.m. and 5 p.m., except on Sundays and holidays.

Overview of Residential Monitoring Service

Electricity Troubleshooting Support

We respond to problems associated with electric equipment or power distribution failure without charging fees for up to 60 minutes of labor needed to investigate the cause and perform temporary repair as well as worker travel expenses. The service is available for customers of the Tokyo Gas electricity service.

*7 Electricity Troubleshooting Support is available under certain conditions. Please visit the Tokyo Gas website for details.

*8 Customers bear parts costs, special work fees and fees for labor exceeding 60 minutes as well as secondary response expenses such as for equipment replacement associated with electric equipment failure or damage. We may not provide on-site service if the specific problem is not covered by this program, the problem is solved by guides over the phone or the problem concerns an extraordinary natural disaster or accident. In an emergency, such as a fire, please call the fire department and other authorities to ensure customer safety. Tokyo Gas does not report to the customer’s site under these circumstances.
Gas Fixture Special Support*9

For monthly fees of 500 yen including tax, we perform free-of-charge on-site repairs on home-use city gas appliances*10 and hot-water terminal equipment for unlimited times. We subsidize part of gas appliance purchase costs for replacement.*11

*9 Gas Fixture Special Support is available under certain conditions. Please visit the Tokyo Gas website for details.

*10 ENE-FARM, ECOWILL, HEATS and commercial-use equipment are not covered.

*11 Repair or replacement may not be possible. Please visit the Tokyo Gas website for information on equipment covered by the service and terms of service.