Benefits of LNG (Liquefied Natural Gas)

For more than 40 years since it first introduced LNG to Japan in 1969, the Tokyo Gas Group has worked to establish and advance its LNG value chain in an effort to spread and expand the use of natural gas, which excels in environmental soundness and supply security. The benefits of using LNG as a feedstock for city gas are as follows.

Benefits of LNG as Feedstock for City Gas

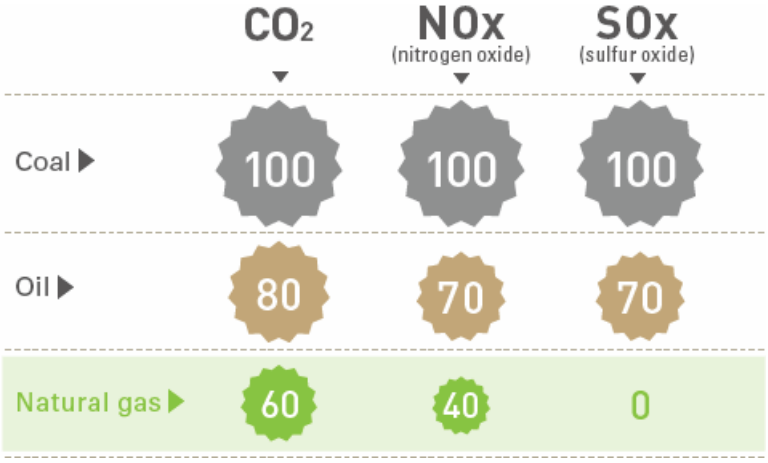
About LNG

LNG is produced by cooling natural gas, which is primarily composed of methane, to its liquid state. Methane is a gas at zero degrees Celsius under one atmospheric pressure and changes into a liquid when cooled to 162 degrees below zero Celsius, its cubic volume diminishing by six hundred times. Using this property to transport natural gas in the form of LNG on carriers allows for the transport and use of massive volumes of natural gas in regions where it cannot be delivered via pipelines.

Low Pollution

LNG is a clean source of energy without any hazardous substances such as SOx. When burned, it produces 20% to 40% less CO_2 compared to oil, coal and other fossil fuels.

Comparison of Emissions during Combustion (Coal = 100)



Source: Agency for Natural Resources and Energy, Energy White Paper 2013

Link

▶ Environmental Advantages of City Gas in Terms of Lifecycle CO_2 Emissions

Supply Security

The abundance of natural gas reserves around the world ensures a stable supply of raw material, which is fundamental to providing a long-term supply of city gas to customers. Also, the calorific value of city gas produced from LNG today is 2.15 times* higher than that of the gas initially produced and supplied by Tokyo Gas. This has increased our transport and storage capacity, enabling us to respond efficiently to any rise in demand.

*Calorific value of gas produced by Tokyo Gas

Calorific value of current city gas based on LNG: 45 MJ/m^3 (10,750 $kcal/m^3$)

Calorific value of gas initially produced by Tokyo Gas: approx. 21 MJ/m^2 (5,000 $kcal/m^2$)

Economic Advantages of Production

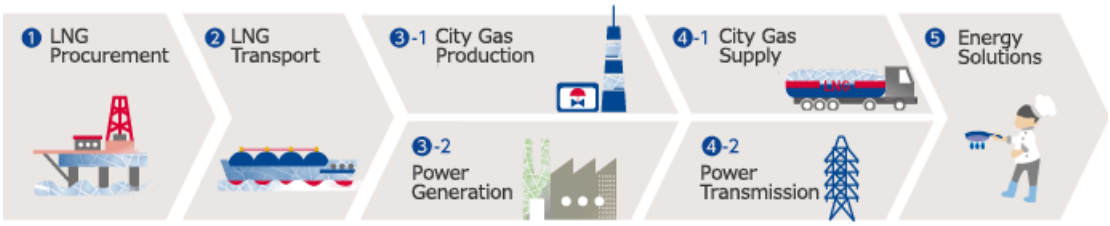
City gas using LNG as feedstock is produced by pouring seawater to vaporize LNG stored in a tank at minus 162°C and adjusting the calorific value. The process does not require large-scale manufacturing facilities, thereby keeping production costs down.

High Efficiency of Transport

After natural gas is vaporized to produce city gas at the LNG terminal, it is directly delivered to the point of consumption through pipelines, thus causing no loss due to energy conversion or transportation.

The Tokyo Gas Group's LNG Value Chain and Key Initiatives Contributing to Sustainable Development

The Tokyo Gas Group's LNG Value Chain



❶ LNG Procurement

Long-term Contracts

13 projects across 6 countries

LNG Procurement Volume

14.244 million tons

Darwin LNG Project

In order to source natural gas to meet demand flexibly and competitively, we work with diverse players in Japan and abroad while diversifying our procurement sources, contract conditions, LNG networks and other factors.

Key Initiatives Contributing to the Sustainable Development of Society

- LNG procurement to ensure stable and affordable supply
- Reduction of GHG emissions from gas fields and liquefaction facilities of LNG suppliers
- Conservation of biodiversity in the vicinity of LNG sources

❷ LNG Transport

LNG Carriers Owned and Operated by Tokyo Gas

9 vessels

Energy Horizon

The Tokyo Gas Group owns and operates its own fleet of LNG carriers, allowing LNG to be shipped swiftly and flexibly.

Key Initiatives Contributing to the Sustainable Development of Society

- Reduction of GHG emissions from transport of LNG by carriers
- Conservation of biodiversity through control of ballast water discharged from LNG carriers

❸-1 City Gas Production

Storage Capacity of LNG Terminals

3.785 ML

By receiving LNG and constantly producing city gas, the Group contributes to energy security in the Tokyo metropolitan area. Our four LNG terminals at Negishi, Sodegaura, Ohgishima and Hitachi function as mutual backups for each another, ensuring uninterrupted city gas supplies even in the event of a power failure or other incidents.

Key Initiatives Contributing to the Sustainable Development of Society

- Augmentation and development of LNG terminal storage capacity to ensure stable supply
- Prevention of production problems due to natural disasters and other causes
- Reduction of GHG emissions from city gas production, promotion of resource saving and recycling and conservation of biodiversity

Sodegaura LNG Terminal

Ohgishima LNG Terminal

Negishi LNG Terminal

Hitachi LNG Terminal

❸-2 Power Generation

Power Generation Capacity (Own Stake)

1.60 million kW

We operate high-efficiency combined cycle natural gas-fired power stations utilizing our LNG procurement capabilities and LNG terminals, pipelines and other facilities. In addition, we generate electricity using wind power and other renewable energy resources.

Key Initiatives Contributing to the Sustainable Development of Society

- Augmentation and development of capacity to ensure stable power supply
- Soil pollution control
- Reduction of GHG emissions from power stations and conservation of biodiversity

Ohgishima Power Station

Kawasaki Natural Gas Power Generation Co., Ltd.

Tokyo Gas Yokosuka Power Co., Ltd.

Tokyo Gas Baypower Co., Ltd.

Wind power facility at Sodegaura LNG Terminal

❹-1 City Gas Supply

Note: Our pipeline network is shared with gas retailers.

❹-2 Power Transmission (by General Power Transmission Utilities)

Note: Power is transmitted via a grid operated by general power

Total Length of Pipelines

63,557 km

We are further developing our pipeline network and using LNG tanker trucks and coastal tankers to ensure the safe and uninterrupted delivery of city gas. In addition, we are expanding our wholesale distribution of gas to other gas suppliers.

Key Initiatives Contributing to the Sustainable Development of Society

- Development of pipeline network and safety measures to ensure stable supply
- Prevention of supply problems due to natural disasters and other risks
- Reduction of emissions of excavated soil during gas pipeline construction and promotion of resource saving and recycling

High-pressure pipeline

LNG tanker truck

transmission utilities.

⑤ Energy Solutions

Gas Sales Volume

15,568 million m^3

Residential 3,570 million m^3
Commercial 2,722 million m^3
Industrial 7,290 million m^3
Wholesale 1,985 million m^3

Number of City Gas Customers

11.678 million

Electric Power Sales Volume

14.66 billion kWh

Number of Electricity Customers

1.13 million

We develop energy solutions by combining distributed energy systems such as fuel cells and combined heat and power (CHP) systems* that reduce CO_2 emissions, energy consumption and peak load, with the wider use of environmentally friendly gas appliances and renewable sources of energy. Alongside selling energy in the form of gas and electricity, we offer new value and services that enrich the lives of customers.

*Gas engine-based CHP systems generate electricity and recover waste heat generated as a by-product.

Key Initiatives Contributing to the Sustainable Development of Society

- Ensuring safety at customer sites
- Reduction of GHG emissions and promotion of resource saving and recycling at customer sites
- Contributing to meeting challenges in local communities
- Protecting the personal information of customers
- Ensuring quality and customer satisfaction

Residential

Commercial

Industrial and other purposes

Wholesale

Note: Data for long-term contracts and for LNG carriers owned and operated by Tokyo Gas are as of the end of May 2018. Data on LNG procurement volume is the actual result for fiscal 2017. All other data are as of the end of March 2018.

Overseas Upstream Operations and Midstream/Downstream Operations

Overseas Business Expansion

Overseas Business Expansion

9 countries

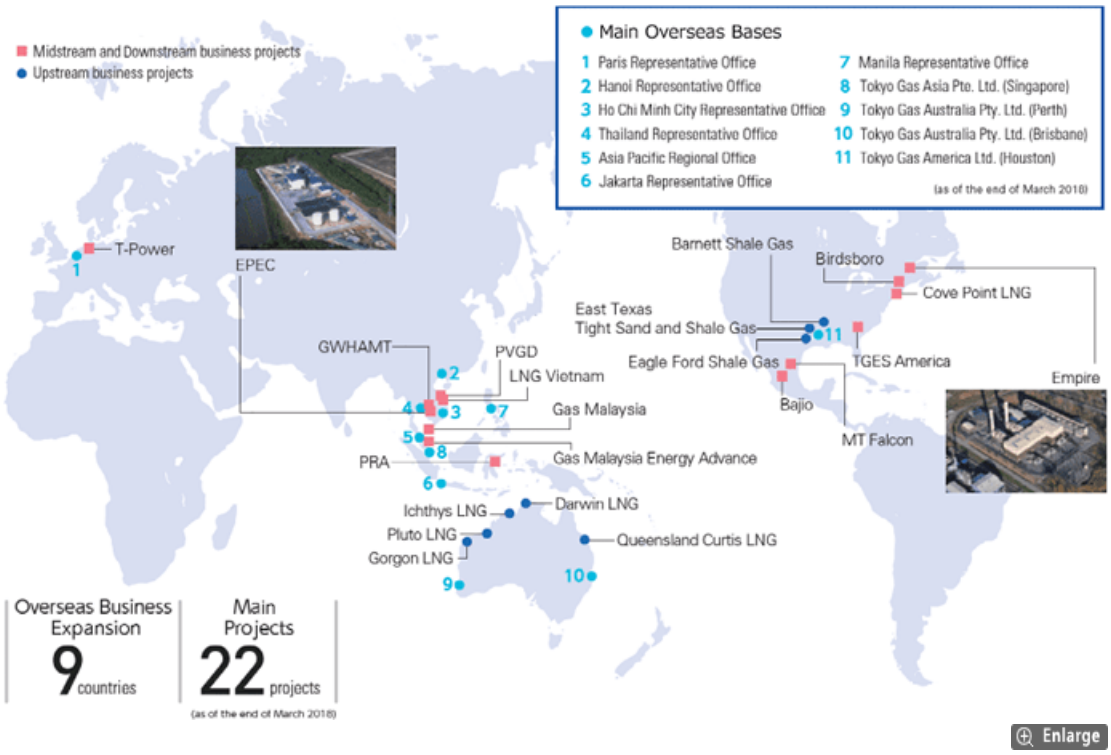
Major Projects

22 projects

In addition to sourcing gas from large-scale LNG projects and acquiring participating interests, we are diversifying and expanding our sources and upstream projects overseas through involvement in unconventional gas such as shale gas, and in small- and medium-scale LNG projects. We also leverage the Group's technologies and expertise in the total energy business to develop energy infrastructure and energy solutions for customers expanding their overseas operations, particularly in Southeast Asia and North America. By extending our LNG value chains overseas, we seek to contribute to both the flexible procurement of LNG for Japan and stable supplies of energy in the countries where we operate.

Key Initiatives Contributing to the Sustainable Development of Society

- Development of energy infrastructure
- Prevention of bribery and corruption of foreign public officials
- Contributing to meeting challenges in local communities



Note: Data are as of the end of March 2018.

Key Initiatives Relevant to the Entire LNG Value Chain to Contribute to the Sustainable Development of Society

- Enhancement and Strengthening of Corporate Governance
- Respect for Human Rights
- Promotion of Compliance
- Ensuring of Information Security
- Promotion of Employees' Occupational Safety and Health Activities
- Development of Global Human Resources
- Development of Technologies Contributing to Safety and Environmental Friendliness