

Energy Value Chain of the Osaka Gas Group

Osaka Gas provides secure and competitive gas supply by utilizing its strengths as a Group that covers both the upstream processes of extracting and transporting natural gas and the downstream processes of producing, supplying, and selling gas. We are now actively exploring ways to expand new business domains both in Japan and internationally that utilize the expertise we have gained through our operations to date to further strengthen the natural gas value chain.

Strengthening and Expanding the Domestic Energy Business



Business Domains of Certain City Gas Suppliers, including the Osaka Gas Group

Upstream Business



Natural Gas Extraction and Liquefaction



Natural gas is a raw material used in the production of city gas. After extraction overseas, natural gas is cooled and liquefied, and then imported into Japan as LNG. Currently, the Group has concluded long-term purchase agreements with natural gas suppliers in eight countries worldwide and is working to ensure stable LNG procurement.

Strengthening and Expanding the Value Chain

● Extracting and Liquefying Natural Gas Ourselves

Gorgon LNG Project and Other Projects

We are participating in several upstream business projects. By expanding our business fields, we are able to procure more cost-competitive LNG.



Freeport LNG Project

We liquefy and export natural gas procured in the USA. As well as using it in our own gas and electric power businesses, we aim to sell it to energy providers both in Japan and abroad.



LNG Transportation



We are proactively moving forward with the operation of our own LNG carriers to enable a more flexible response to changes in demand and other external factors, and to curtail transportation costs.

Strengthening and Expanding the International Energy Business

Strengthening and Expanding the Value Chain

● Using Our Own Group Carriers

Our Fleet of Eight Ships

By chartering out Group-managed vessels to third parties, we can increase the rate of operation of our LNG carriers and further contribute to profits.



Strengthening and Expanding the Value Chain

● **Expanding the Electric Power Business**

Securing a Competitive Source of Electric Power

The Senboku Natural Gas Power Plant has secured a high level of competitiveness through the cost sharing of production equipment.



Strengthening and Expanding the Value Chain

● **Energy Supply Across a Broad Area**

Developing Demand for the Himeji-Okayama Gas Pipeline

The Himeji-Okayama Gas Pipeline opened in March 2014. We are acquiring new demand along this newly established pipeline from the Kansai Electric Power Company's Aoi Power Plant, among others.



LNG Sales to Domestic Energy Providers

We sell LNG procured overseas to other domestic energy providers through the use of LNG carriers.

Strengthening and Expanding the Value Chain

● **Expanding the Electric Power Business**

Electricity Retail Business

We are leveraging our sales platform and know-how cultivated in the gas business to propose electric power services to customers.

Business Domains of Conventional Gas Suppliers

Downstream Business



City Gas Production



Imported LNG is stored in tanks and subjected to an evaporation process using the heat from seawater. Gas is then produced by adjusting the amount of heat. The Group produces gas at two LNG terminals—in Senboku and Himeji—aiming to ensure the stable supply of city gas.



Gas Supply



Focusing mainly on the Kyoto, Osaka and Kobe areas, we are developing a gas pipeline network that covers the Kansai urban region, ensuring the stable delivery of gas to customers through this network. At the same time, the Group actively promotes disaster countermeasures, particularly against earthquakes and tsunamis.



Sales and Services



From household demand for hot water and heating, to the industrial and commercial HVAC and combustion system markets, we propose optimal solutions to meet diverse customer needs through combining maintenance with a range of other services.

Strengthening and Expanding the Value Chain

● **Participating in the Gas Distribution Business**

Gas Distribution Business in Italy

Leveraging our experience and knowledge as a domestic gas provider, we are supporting the expansion of a city gas distribution company in Italy in which we have a capital stake, in an effort to earn stable revenues.



Strengthening and Expanding the Value Chain

● **Developing the Energy Services Business**

Energy Services Business in Southeast Asia

Leveraging engineering capabilities cultivated domestically, we are expanding our business globally, launching, for example, an energy services business in Thailand and an industrial gas sales business in Singapore.



Business Climate Surrounding the Osaka Gas Group

Characteristics of Natural Gas

Environmental Friendliness of Natural Gas

Natural gas, a fossil fuel like petroleum and coal, is an energy resource which contains methane as its principal component. A major advantage of natural gas over petroleum and coal is its low emissions of carbon dioxide (CO₂), a cause of global warming. When it is burned, natural gas emits only limited amounts of nitrogen oxides (NO_x), a contributing factor in air pollution, because of its low nitrogen content, and emits no sulfur oxides (SO_x), which are a contributor to acid rain.

Prospects for Natural Gas

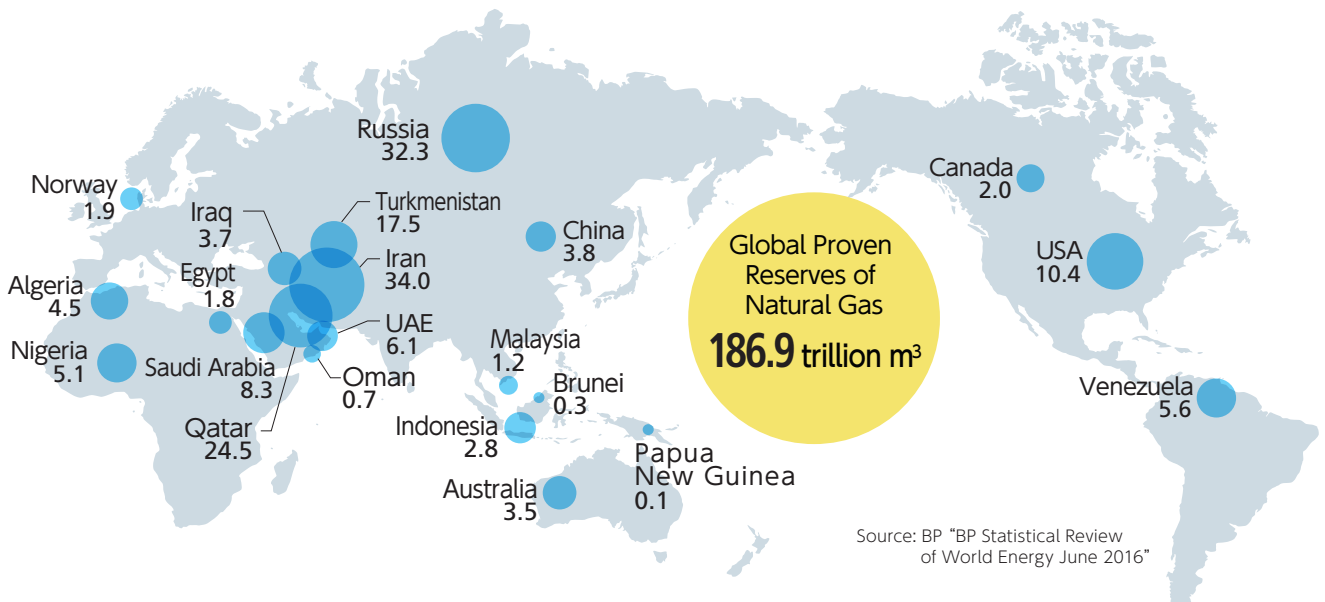
Against a backdrop of increasing demand for energy in emerging countries, the expanding use of natural gas as a non-conventional energy source, and changing conditions in electricity supply and demand in Japan, natural gas has been growing in importance. The International Energy Agency (IEA) predicts that the world's energy demand is going to continue to increase until 2040, and that the percentage of natural gas will increase in the world's primary energy consumption composition mix as we move toward the achievement of low-carbon, efficient energy systems.

Supply Stability of Natural Gas

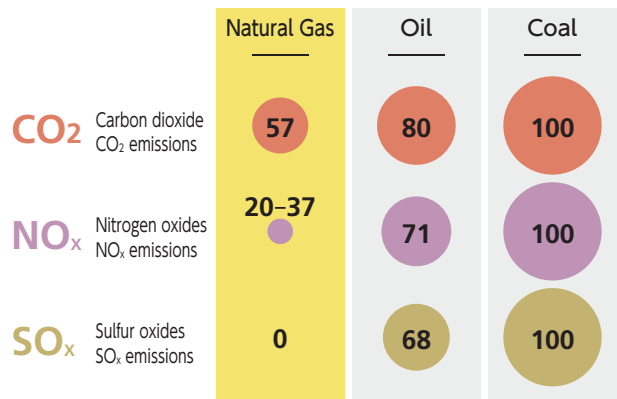
Abundant reserves of natural gas have been discovered around the world, making it likely that a stable supply of natural gas will be available to meet growing demand. Proven reserves of natural gas are sufficient to satisfy global demand for more than 50 years.

Nations with Major Natural Gas Reserves

● Volume of major proven natural gas reserves (trillion m³)

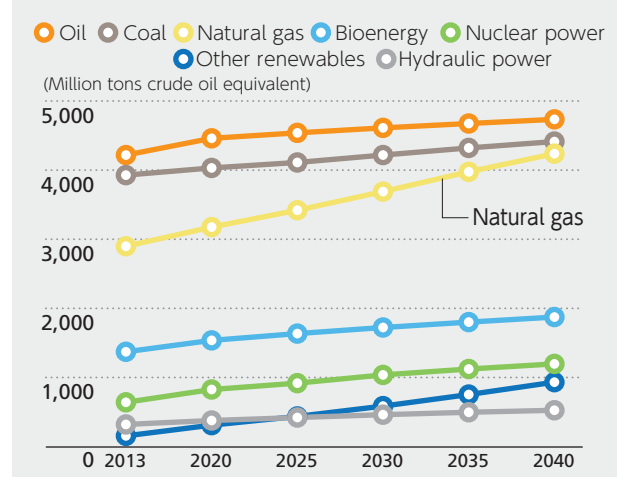


Comparison of Amount of Emissions with Coal as 100



(CO₂ figures) The Institute of Applied Energy, "Report on Thermal Power Plant Atmospheric Impact Assessment Technology Demonstration Surveys" (March 1990) (SO_x and NO_x figures) International Energy Agency (IEA), "Natural Gas Prospects to 2010" (1986)

Primary Energy Consumption Forecasts (Global)

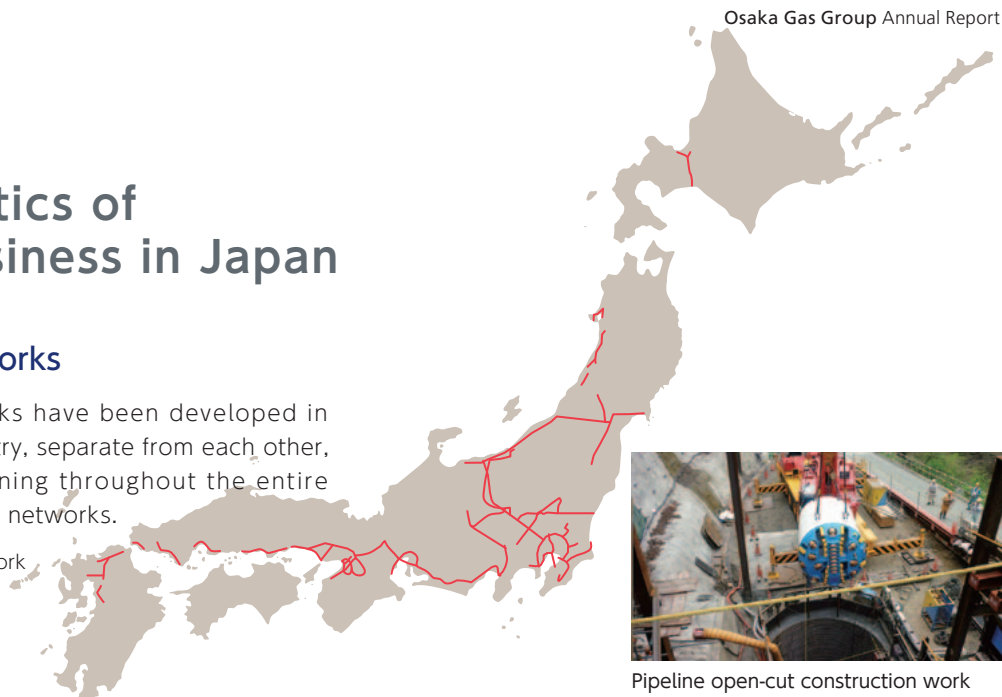


Characteristics of the Gas Business in Japan

Gas Pipeline Networks

Gas pipeline networks have been developed in each region of the country, separate from each other, with no trunk line running throughout the entire country connecting local networks.

— Major pipeline network

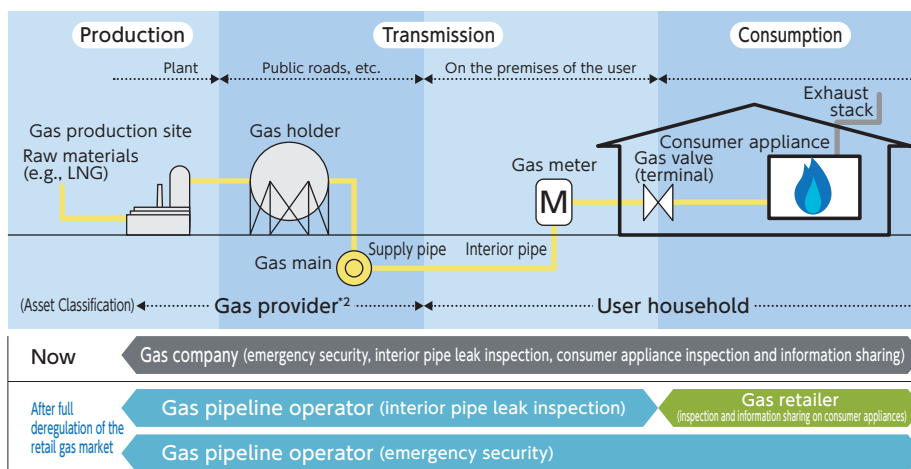


Pipeline open-cut construction work

Responsibility for Security

Gas companies have an obligation to maintain gas facilities, including the installed gas facilities that are assets of their customers, in compliance with technical standards that will allow them to supply gas safely. They are also obligated to inspect consumer gas appliances and to share with users the information necessary to prevent hazards associated with the use of those

consumer appliances. After the full deregulation of the retail gas market, the responsibility for the security of installed gas facilities, including those located on customers' premises, is to be ascribed to the gas pipeline operating company, while the obligation to carry out inspections and share information about consumer appliances will be ascribed to the gas retailer.



^{*1} Responsibility for security: Obligation to maintain compliance with technical standards for installed gas facilities stipulated in Article 28 of the Gas Business Act.

^{*2} After full deregulation of the retail gas market, this will be the gas pipeline operator.

Fuel Cost Adjustment System

The purchasing prices of LNG and LPG, both raw materials for the gas supplied to customers, fluctuate in accordance with movements in foreign currency exchange rates and the price of crude oil. The mechanism for determining gas rates is referred to as the Fuel Cost Adjustment System. In addition to reflecting external factors in gas rates, this system is

designed to clarify the results of efforts in enhancing operating efficiency in areas other than raw material costs. Due to its structure, it also causes a time lag before price fluctuations of raw materials are reflected in gas rates, which impacts performance on a single fiscal-year basis. However, these impacts are neutralized over the medium to long term.

System Reflecting Changes in Resource Costs in Gas Rates (example)

