

In 2011, Japan experienced a trade deficit for the first time in 31 years. The trade deficit reached a record high 11.5 trillion yen in 2013. Japan's trade balance is currently facing a critical turning point and the main factor is the increase in fuel procurement costs. In the aftermath of the Great East Japan Earthquake, the ratio of thermal power in Japan's domestic power generation increased, with the LNG thermal power ratio reaching nearly 50%. In addition to the substantial increase

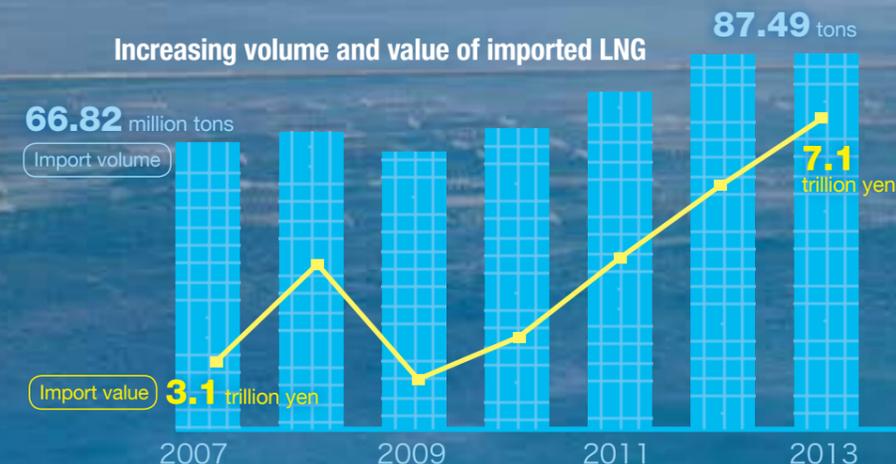
in LNG demand, the import price of LNG, which is linked to the crude oil import price, has also steeply risen. As a result of such factors, reducing LNG procurement costs has become an urgent task for Japan.

**The world supply-demand structure is changing with the "Shale Gas Revolution"**

Various measures are being taken in order to secure the stable and

competitive supply of natural gas. For example, dependence on specific regions or countries is being reduced by further diversifying supply sources. Also Japan is reinforcing its negotiating power by developing a cooperative framework among LNG consuming countries, such as alliances with other Asian countries which account for the majority of the global LNG consumption. The key point is the realization of U.S. LNG projects with the involvement of

Japanese companies. Due to the so-called "Shale Gas Revolution" and the increase in domestic shale gas production, the U.S. is expected to shift from being a net importer to becoming a net exporter of gas. This has dramatically changed the global LNG market structure. How have Japan and other countries reacted to such changes? We will describe the actions being taken to secure LNG.

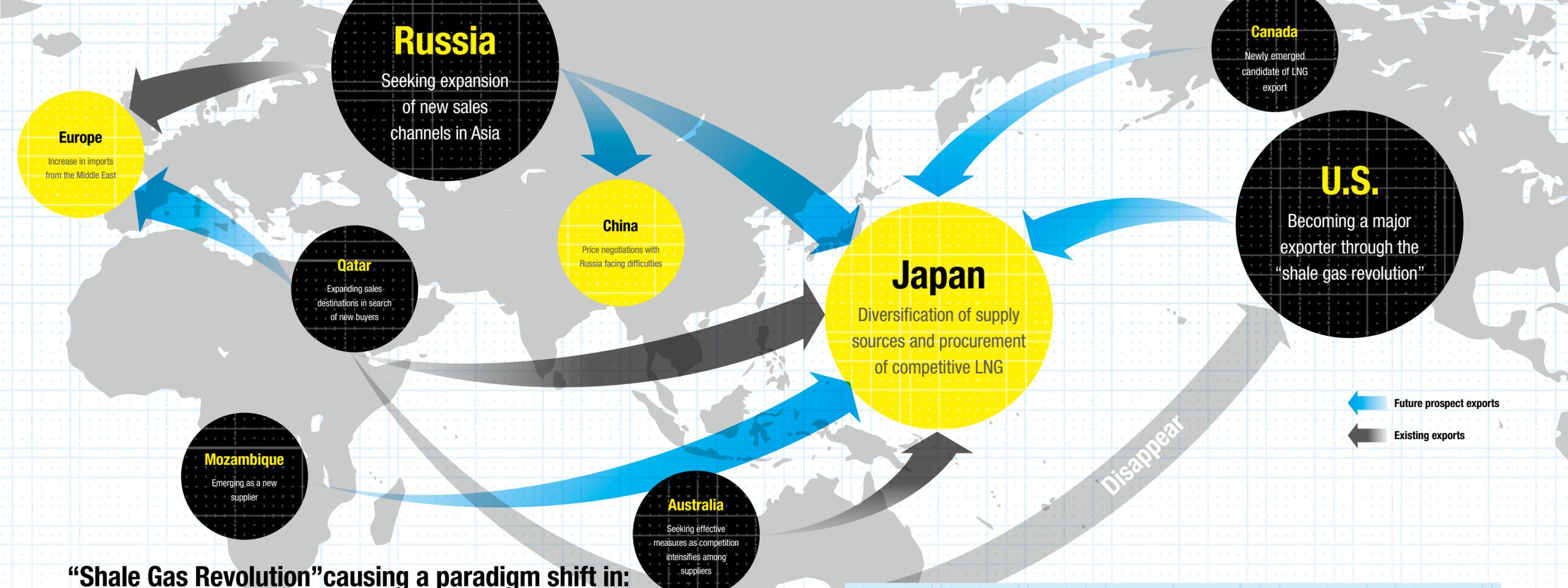


As a global trend, fuel prices have begun to rise again, despite the temporary drop after the Lehman Shock. In the midst of this trend, Japan's LNG demand increased by about 20% following the Great East Japan Earthquake (from 70.01 million tons in 2010 to 87.49 million tons in 2013). Due to the combination of these factors, the import values increased from 3.5 trillion yen in 2010 to 7.1 trillion yen in 2013.

**Sufficient Supplies at Lower Costs!**

# The Road to Securing LNG

Japan depends on imports for most of its natural resources. Japan's fuel import costs, especially for LNG (liquefied natural gas), have greatly increased since the Great East Japan Earthquake. What direction should Japan take as the global LNG market undergoes a paradigm shift? An unprecedented challenge has begun for Japan to secure LNG.



# “Shale Gas Revolution” causing a paradigm shift in: The Power Balance of the Global Natural Gas Market

Triggered by the “Shale Gas Revolution,” the relationship between buyers and sellers is dramatically changing. In order to ensure steady progress in Japan’s efforts, a global-scale perspective is indispensable. Here, let us briefly summarize the current status of the global LNG market.

Resources are limited, and natural gas is no exception. Although there are various views as to the total amount of reserves, in addition to conventional oil and gas, the amount of technically recoverable natural gas has dramatically increased with the establishment of new technology. This is known as the “Shale Gas Revolution.” But exactly what is happening in various regions around the world?

## The relationship between buyers and sellers is changing

As a result of the increase in the domestic production of shale gas, the U.S. is decreasing its imports and shifting from being an importer to becoming an exporter of gas. LNG from the Middle East and Africa, which was looking to the U.S. as its primary market, was, in turn, redirected to Europe. This has led to the decline in the market share of Russian gas in Europe. Russia turned its attention to

the Asia, including Japan and China, in the search for new markets. In addition, competition between exporting countries is expected to increase as new supplier countries such as Canada and Mozambique emerge. Thus, the “Shale Gas Revolution” which started in the U.S. has changed the power balance in the global natural gas market. Taking advantage of the situation, Japan is promoting the stable and competitive procurement of LNG.

## Answering questions about LNG!

### What is LNG?

Natural gas is widely distributed throughout the world

LNG is the abbreviation for liquefied natural gas. It is obtained by cooling and liquefying natural gas. While the global mainstream is to supply natural gas in gaseous form via pipelines, countries which are geographically distant from producing countries, such as Japan, import natural gas in a liquefied form. In 2013, Japan imported 87.49 million tons of LNG from countries such as Australia, Qatar, and Malaysia. In contrast to oil reserves, which are unevenly distributed in the Middle East, natural gas has a wider geographical distribution throughout the world, allowing for the existence of various sources of supply.

### How is LNG transported?

LNG is delivered in a liquefied form for long-distance sea transportation

Natural gas is cooled to -162 degrees Celsius and liquefied in the producing country. It is then transported by sea to Japan by LNG tankers, and is returned to its gaseous form at re-gasification terminals. Thereafter, the natural gas is delivered to households and power plants throughout Japan. About 30% is distributed as utility gas and 70% is used for power generation.

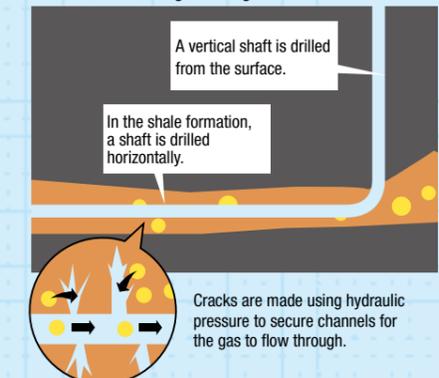


### What is shale gas?

Mining of shale gas became possible with the development of new technologies

Shale gas is natural gas trapped within hard rocks called shale. The development of new technologies to drill horizontally and to fracture rocks with hydraulic pressure, as shown in the illustration, have made it possible to mine in places where it was previously difficult. The amount of natural gas that can be produced has dramatically increased, which is creating a revolution in the natural gas market.

#### Mechanism of shale gas mining



# Bringing LNG to Japan

## The current situation in the U.S.

Converting the LNG receiving terminal into a LNG production terminal for export, similar sorts of projects are now under way in the U.S. Several Japanese companies are trying to participate in the projects as LNG producers, aiming to secure LNG supplies to Japan.

We will hear about the enthusiasm of these companies, which are opening up a new frontier.

“How can we bring the benefits of the shale gas revolution to Japan? We enthusiastically discussed the specific methods.” Mr. Hiroki Sato, General Manager of the Fuels Department, and Head of Trading Business, Chubu Electric Power Co., Inc. (Chubu Electric) recalls the beginning of the Freeport Project in Texas, in which his company and Osaka Gas Co., Ltd. (Osaka Gas) were

jointly engaged. Freeport will be newly constructing three trains for liquefaction facilities. Chubu Electric and Osaka Gas have executed a binding liquefaction tolling agreement for one of these trains with the aim of starting commercial operation in 2018. “The production amount is expected to be approximately 4.4 million tons per year. Chubu Electric has a contract for half of the total, 2.2 million tons.” Now, what advantages are generated through the company as it becomes a LNG seller in the U.S.?  
 “Due to few natural resources, Japan imports LNG from various producing countries and has been purchasing LNG at high prices compared with Europe, where they can procure gas through gas pipelines laid across the region. The prices may vary depending on the sources due to the differences of transportation costs, and liquefaction is another necessary cost, but if they remain at a rational level we can only but accept them. Also, we are concerned that current LNG prices are linked to crude oil prices and are determined where the actual supply and demand balance is irrelevant, and they have already exceeded an acceptable level. In order to reduce the impact of soaring fuel costs, we have decided to enter a LNG export project in the U.S., where LNG pricing is not linked to the price of oil.”

### Cutting to the core inside the “black box”

To this point in time, the title of LNG has transferred from LNG sellers to LNG buyers, who produced the LNG, at a LNG receiving terminal in Japan, or the

title has transferred to the LNG loading terminals in LNG producing countries and buyers have chartered LNG tankers and transported LNG. These were the typical methods through which Japan has always purchased LNG. Whatever the case, the production process of LNG has always been completely hidden as if in a “black box.”  
 “However, from now on, we will be able to manage the feed gas for producing LNG (including purchasing the gas and routing the pipeline to the LNG producing facility) as well as - needless to say- the transportation cost to Japan. The fact that we understand the cost structure means that we have an advantageous position in negotiations against the LNG sellers. Through participating in the project in the U.S., we can be involved in all sectors of the LNG producing process, which include the upstream gas field, liquefaction business midstream, and trading/ transportation of LNG downstream, which we refer to as the total value chain of LNG. If the import of LNG from the LNG project in which Japanese companies participate, projects such as Cove Point, Cameron, and Freeport, is realized, it will surely lead to a decrease in the import prices of resources within Japan,” says Mr. Sato.

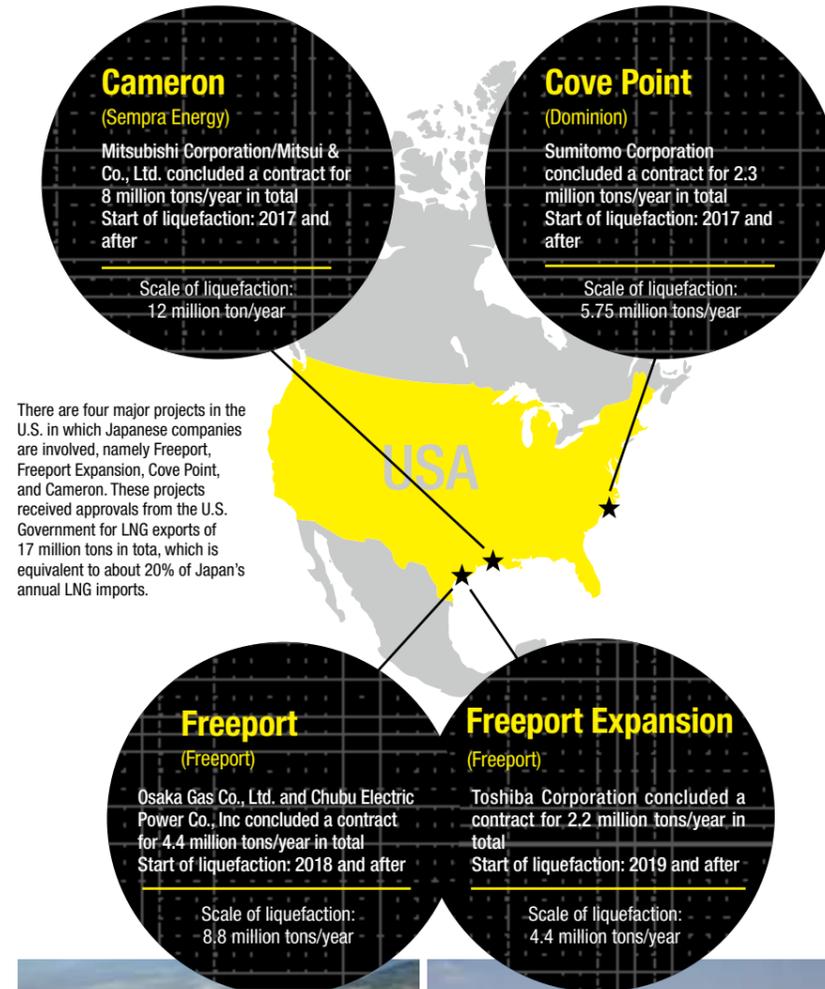
### Becoming a game changer; passion supports realization

Negotiations took place in the U.S. mainly between young, passionate representatives. The reason for being able to find a breakthrough in the U.S. market, where the major oil companies hold a lot of sway, was, according to Mr. Sato, “because we were driven by the belief that we would absolutely realize this project.”  
 Naturally, there is still a mountain of issues to be tackled. According to Mr. Tetsuo Yoshida, General Manager of North American LNG Business, Fuels Department, who plays a coordinating

role in the headquarters in Japan, “currently three representatives have been dispatched in Houston, engaged in a lot of preparation work. We are a newcomer in the U.S. gas market, but we have confidence that we can overcome the issues and turn our knowledge into results that become our valuable asset.” Let’s change the game—Mr. Sato chooses his words carefully, saying, “I hope this will lead the way in making a drastic change for the LNG industry.”

“It is normal for those working in the energy industry to try to procure fuels at the lowest possible price. In addition to that, we would like to eliminate the ‘Asian premium’ that is imposed on the Asian LNG market, including Japan. Although I am merely a staff member of a single company, I am doing my utmost in working to bring benefits to Japan.”

**CLICK!** Chubu Electric Power Co., Inc. Freeport LNG Project



There are four major projects in the U.S. in which Japanese companies are involved, namely Freeport, Freeport Expansion, Cove Point, and Cameron. These projects received approvals from the U.S. Government for LNG exports of 17 million tons in total, which is equivalent to about 20% of Japan's annual LNG imports.



The Freeport Project has scheduled the construction of three trains to service liquefaction facilities. The location is about 17,000 km from the LNG terminal in Japan. The LNG is scheduled to be transported efficiently using state-of-the-art ships.

**Mr. Hiroki Sato**  
 General Manager of Fuels Department  
 Head of Trading Business  
 Chubu Electric Power Co., Inc.

**Mr. Tetsuo Yoshida**  
 General Manager of North American LNG Business  
 Fuels Department  
 Chubu Electric Power Co., Inc.

“Support from the Japanese government in terms of LNG export permission from the U.S. government was also a great help in this case. We are also interested in exploring the potential for new business through LNG,” says Mr. Sato.