

## **Japanese and U.S. Oil/Natural Gas Supply/Demand Trends in 2013**

**-- Weaker yen inflates Japan's oil/natural gas import value by 5 trillion yen --**

Momoko Aoshima<sup>\*</sup>

### Summary

The production of crude oil and natural gas in the United States continued to increase during 2013, consistent with the development of unconventional resources. Crude oil production increased domestic supply, while the petroleum product exports hit record highs for volume and value in 2013. The resulting decline in crude oil imports, combined with an increase in revenues from petroleum product exports, improved substantially the U.S. trade balance, which in turn improved the U.S. economy.

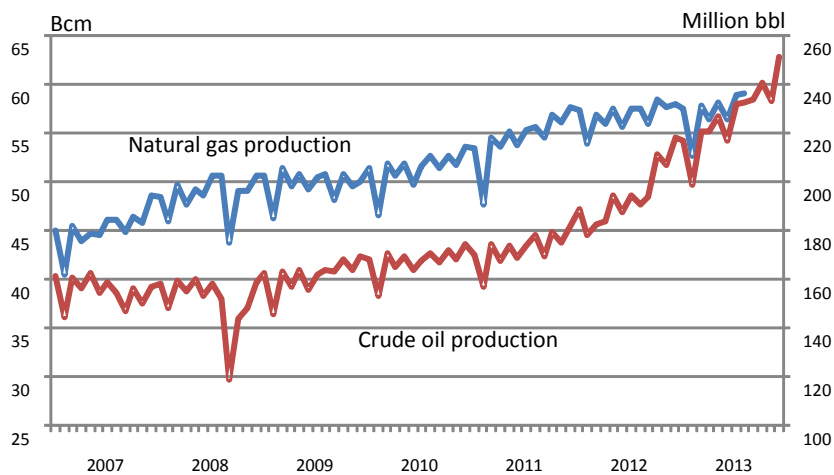
After the March 2011 Great East Japan Earthquake, very few nuclear plants remained in operation; at present none are operating. Japan replaced the significant loss of nuclear power with substantial imports of fossil fuels. As a result, Japan became the world's largest natural gas importer and Japan's power generation from oil is now as high as the oil input for power generation in Saudi Arabia (one of the world's largest oil producing countries). Japan oil and natural gas import volume and value hit record highs in 2013. In addition, the yen's depreciation contributed to inflate Japan's oil and natural gas import value by 5 trillion ¥ (yen) in that year which translates into 40,000 ¥ per capita. The increase in Japan's energy import value, stemming from the yen's depreciation, is weighing heavily on the Japanese economy.

### 1. U.S. Shale Revolution

In the United States, conventional and unconventional natural gas production grew by about 29% from 2007 to 2013, thanks to unconventional resources development. The natural gas production growth rate moderated substantially between 2012 and 2013, while the growth for crude oil production in 2013 was as high as 16%. The recent push for crude oil is due to developers shifting production from less profitable natural gas to more profitable shale oil. Since shale oil is a light crude oil containing more gasoline and diesel fuel, the expansion in U.S. shale oil production has affected other countries, such as Algeria and Nigeria that were exporters of light crude oils to the United States. In the future, growth in shale oil production will exert some impact on oil exports from U.S. neighbors, Mexico and Canada.

<sup>\*</sup>Senior Economist, Statistics Information Group, The Energy Data and Modelling Center, The Institute of Energy Economics, Japan

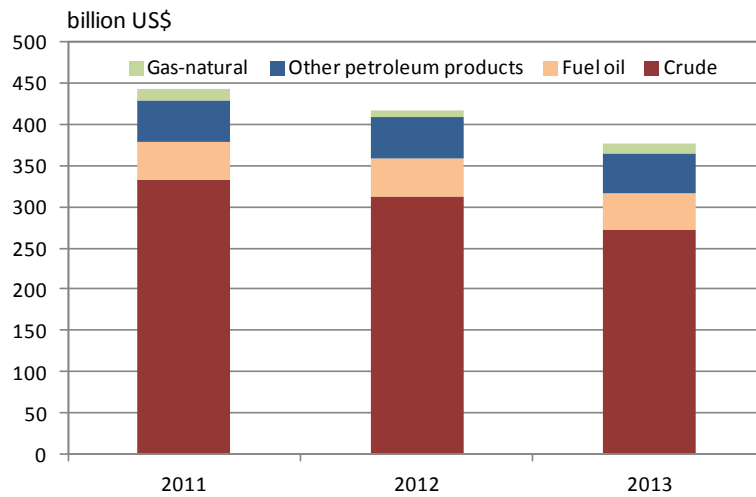
**Fig. 1-1 U.S. Monthly Production Trends**



Source: APEC Monthly Oil/Gas Data

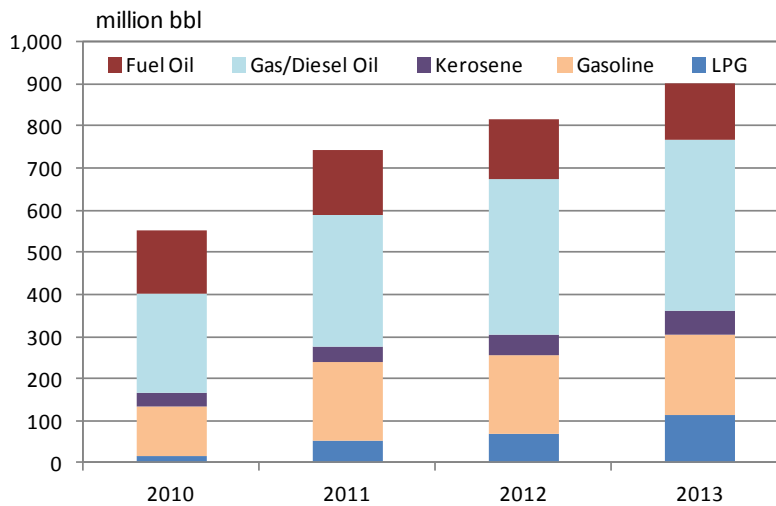
As domestic production grew, the United States has substantially reduced their dependence on oil (crude and fuel oil) and natural gas imports. The import value for crude oil, the largest U.S. import item, has declined remarkably. Furthermore, the United States has expanded petroleum product exports, which hit record highs both in volume and value in 2013. The crude oil import decline and the increase in petroleum product exports have contributed to improving the U.S. trade balance, shrinking substantially the trade deficit for 2013. Coupled with a fall in domestic energy prices, the improved trade balance has supported economic growth.

**Fig. 1-2 U.S. Energy Import Trends by Source**



Source: U.S. Department of Commerce

**Fig. 1-3 U.S. Export Trends by Petroleum Product**

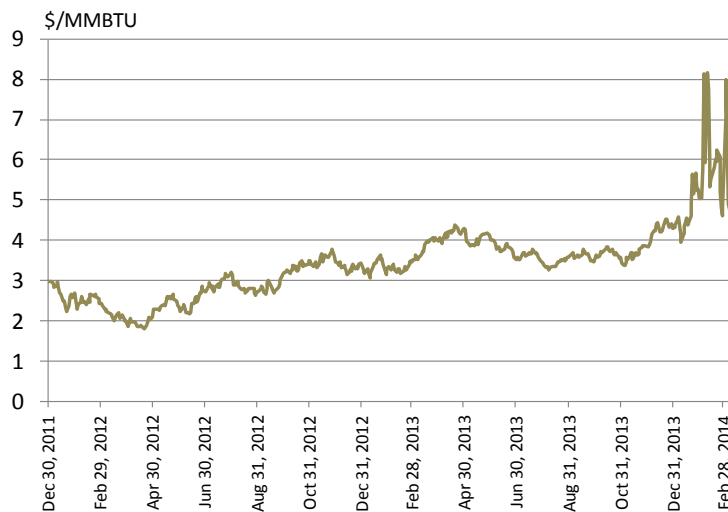


Source: APEC Monthly Oil/Gas Data

Analysts are divided over whether energy prices will remain low. The benchmark U.S. natural gas spot price rose sharply in 2014, reaching as high as \$8.15/MMBTU on February 10, a 4.5-fold jump from the bottom in April 2012. The sharp rise stemmed from a tighter supply-demand balance amid record cold waves. As heating demand increased rapidly, inventories dropped substantially while at the same time, the cold waves dampened U.S. natural gas production.

Japan and many other countries have placed great expectations on the impact of the U.S. shale revolution. Although a good portion of the recent natural gas price upsurge is attributable to seasonal factors and gas prices are unlikely to remain so high, such increase is an indication that U.S. natural gas prices are determined by the market. Prices cannot be guaranteed to be as low as they were until 2013, especially since developers have been shifting production from less profitable natural gas to more profitable shale oil.

**Fig. 1-4 Spot Natural Gas Price Trends**

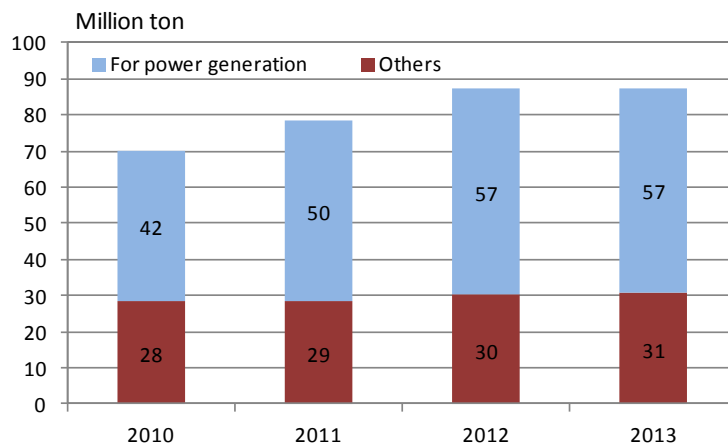


Source: EIA Henry Hub Gulf Coast Natural Gas Spot Price

## 2. Decomposition Analysis of Changes in Japan’s Oil and LNG Imports

After the March 2011 Great East Japan Earthquake, very few nuclear plants remained in operation; at present none are operating. Consequently, oil and liquefied natural gas imports for electricity sources, replacing nuclear energy, have continued to expand ever since. Japan’s LNG import volume in 2013 rose by 25% from 2010 to 87 million tons. As a result, Japan became the world’s largest natural gas importer.

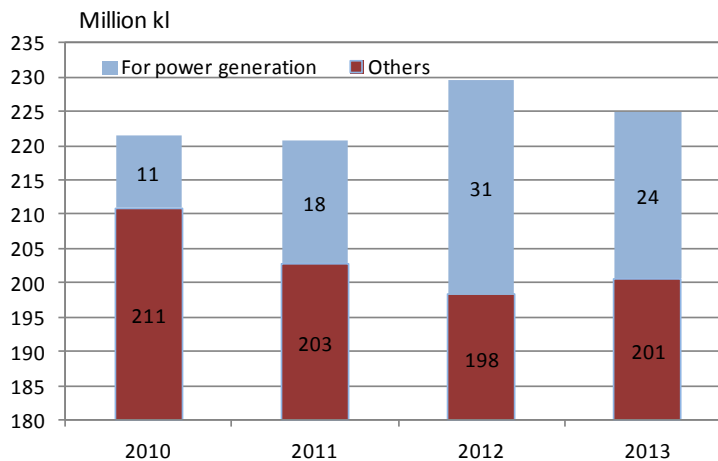
**Fig. 2-1 Imported LNG Consumption by Use**



Source: APEC Monthly Oil/Gas Data

Japan’s oil (crude and fuel oil) import volume in 2013 fell by 2% from the previous year to 225 million kiloliters. Oil imports for power generation in the year, though declining from the previous year partly due to the restoration of some coal thermal power generation capacity, more than doubled from the level before the earthquake. Power generation in Japan from oil is now as high as the oil input for power generation in Saudi Arabia (one of the world’s largest oil producing countries). Oil imports for other purposes including refining, transportation and household consumption increased slightly in 2013.

**Fig. 2-2 Imported Oil Consumption by Use**

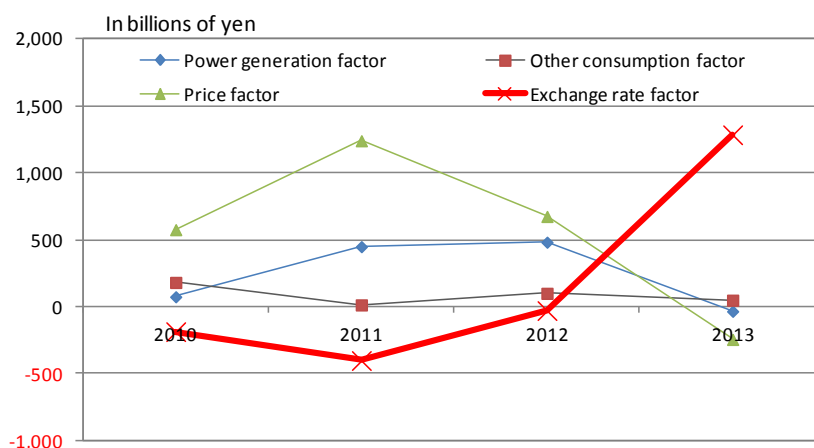


Source: APEC Monthly Oil/Gas Data

Despite a very small increase in volume imported, Japan’s LNG import value in 2013 rose by 18% or 1,053 billion ¥ from the previous year to a record of 7,056 billion ¥. The change in import costs between 2012 and 2013 was broken down into four components: two volume factors (power generation and other consumption); a price factor (in ¥); and, an exchange rate factor. The analysis indicates that the overall increase consisted mainly of a positive 1.3 trillion ¥ for the exchange rate factor counter-balanced by the other factors at negative 35 billion ¥ for the power generation factor, a small positive 48 billion ¥ for the other volume factor, and a negative 250 billion ¥ for the price factor.

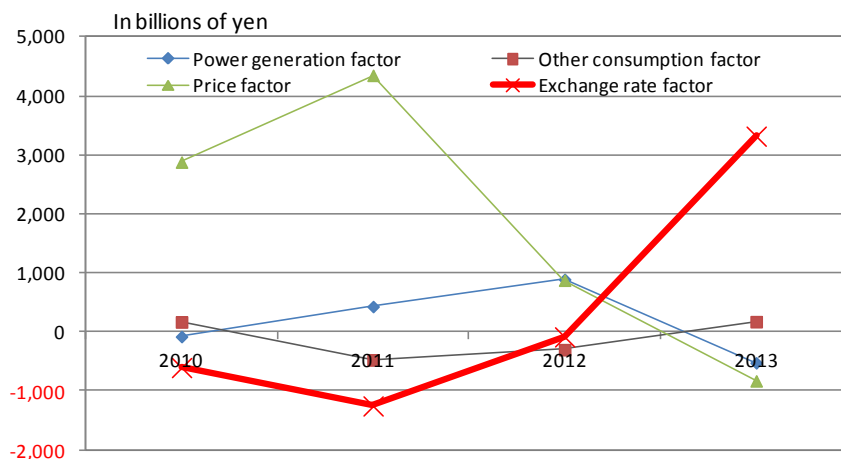
In 2011 and 2012 when a rise in dollar-denominated prices coincided with an increase in LNG imports for replacing nuclear energy for power generation, both price and power generation factors contributed positively to an LNG import expansion. In 2013, however, prices and consumption volume, though being at historically high levels, declined slightly from the previous year, leading the price and power generation factors to make some negative contributions to the overall expansion. Meanwhile, the exchange factor made the largest positive contribution due to the yen’s depreciation.

**Fig. 2-3 Decomposition Analysis of Changes in LNG Import in Japan**



The result of a decomposition analysis for the increase cost in oil (crude and fuel oil) imports is similar to the LNG import increase analysis. Japan’s oil import value in 2013 grew by 14% from the previous year to a record high of 18 trillion ¥. The increase consisted of negative 520 billion ¥ for the power generation factor, positive 175 billion ¥ for the other consumption factor, negative 830 billion ¥ for the price factor and positive 3.3 trillion ¥ for the exchange factor.

**Fig. 2-4 Decomposition Analysis of Changes in Oil Import in Japan**



In 2013, the exchange factor contributed to a deterioration of Japan's trade balance of 4.6 trillion ¥ for oil and LNG imports alone. That's equivalent to about 40,000 ¥ per capita. Although Prime Minister Abe's economic policy has remarkably improved the economic sentiment in Japan, the impact of the yen's depreciation reduced the anticipated value of exports and, in some cases, has forced some Japanese companies to transfer production bases abroad.

It is important to note that the loss of revenues from exports and the increase in the cost of imports, stemming from the yen's depreciation, are both heavily weighing on the Japanese economy.

Contact: [report@tky.ieej.or.jp](mailto:report@tky.ieej.or.jp)