

# IEEJ e-NEWSLETTER

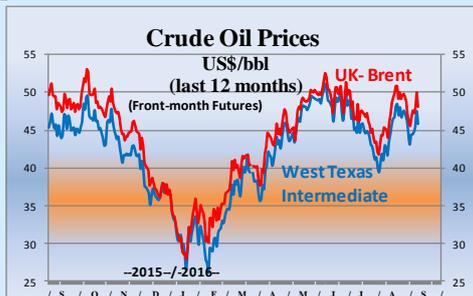
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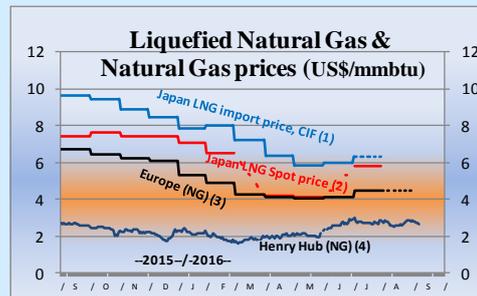
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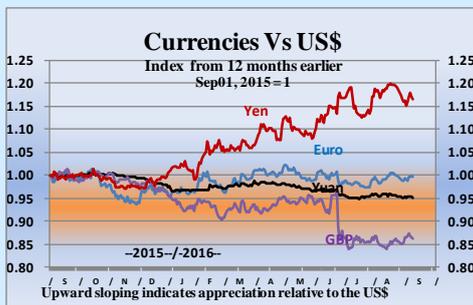


Source: DOE-EIA, Financial Times, NASDAQ



Sources:

- (1) Ministry of Finance "Japan Trade Statistics"
- (2) Ministry of Economy, Trade and Industry (contract month basis)
- (3) Estimated by World Bank and World Gas Intelligence
- (4) DOE-EIA, NYMEX (Front-month Futures)



Source: x-rates.com



Source: Financial Times

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## Summary

### **【Energy Market and Policy Trends】**

#### **1. Developments in Nuclear Power**

A nuclear power subsidy program was approved in New York State, US, enabling the state's nuclear power stations to fend off early closure. However, the environment for investing in nuclear power plant construction remains tough, as the wholesale electricity price remains low.

#### **2. Recent Developments in the Oil Market**

Oil prices climbed in August, but could start falling again if the macro economy worsens, the US's inventory level rises or production cuts bottom out, or if the production freeze negotiations between producers break down.

#### **3. Recent Developments in the LNG Market**

Since the beginning of the year, natural gas demand has been robust in China and India due to falling international prices and the reduction in regulatory prices to promote the use of gas. Meanwhile, natural gas is struggling in the power and industrial sectors of South Korea.

#### **4. Update on Energy Efficiency and Conservation Policies**

The Energy Efficiency and Conservation Subcommittee held its second meeting in August and started discussions on the expansion of energy management units and effective use of third parties, thus deepening its energy conservation policy.

#### **5. Efforts for Expanding the Introduction of Battery Cells**

While projects to install large-scale batteries on power grids have made a head start, smaller batteries installed on the demand side are also gathering attention as a core technology of the Virtual Power Plant (VPP).

## 1. Developments in Nuclear Power

**Tomoko Murakami**, Manager  
Nuclear Energy Group, Strategy Research Unit

On August 1, the US New York Public Service Commission approved the Clean Energy Standard, which aims to generate 50% of the state's electricity output from renewable energies. The Standard includes a subsidy program (Zero Emission Credits, ZECs) for three of the state's nuclear power stations. Under the ZECs program, the electricity providers will receive an estimated \$17.48/MWh for two years from April 2017. With ZECs, the three nuclear power plants are now likely to stave off early closure, which was feared as wholesale electricity prices and the plants' economic efficiency had deteriorated. Accordingly, on August 9, Exelon announced that it would purchase the ownership and operating license of the Fitzpatrick Nuclear Power Plant from Entergy for \$110 million, anticipating that the plant's finances would improve. The plant had previously been scheduled to close.

On August 3, the US Nuclear Regulatory Commission announced the completion of the final safety assessment report for the application for a combined construction and operation license (COL) for William States Lee 1/2. When the application process is completed in a few months, the country's fifth-ever COL will be issued. While public and direct financial aid is expected to help existing plants survive, the business environment for American nuclear power remains tough due to the continuing low wholesale electricity price, which is the root cause of the loss of competitiveness. Whether Duke Energy, the plant's applicant, will make the investment decision remains uncertain.

Meanwhile, new construction and development of nuclear power remains active in developing countries. On August 17, in Russia, the fast reactor BN-800 (sodium-cooled MOX fuel, 864 MW), which was connected to the grid at the end of last year, reached its rated output. The plant is due to start commercial operation this fall, upon approval by the nuclear regulators, thus becoming one of the world's largest fast reactor power plants in operation.

Discussions on the licensee of Japan's prototype fast reactor Monju have made no real progress since a report on the licensee of Monju was submitted by the Ministry of Education, Culture, Sports, Science and Technology to the Nuclear Regulation Authority on May 31. With plans for building fast demonstration reactors of several hundred MW also ongoing in China and India, developing countries including Russia, China, and India could be the only ones in the world to be operating fast reactors by the 2020s. Although Japan's Strategic Energy Plan declared in 2014 to "promote R&D of fast reactors, etc., through international cooperation with the U.S. and France, etc.", players in the nuclear industry are understandably concerned about the future of the fast reactor. To thoroughly stop the outflow of human resources and the decline of R&D, stronger policy targets for the business sector in the nuclear fuel cycle are required.

After starting up on August 12 and connecting to the grid on the 15th, Shikoku Electric's Ikata Unit 3 completed the final test and started commercial operation on September 7.

## 2. Recent Developments in the Oil Market

**Tetsuo Morikawa, Senior Economist, Manager**  
Oil Group  
Fossil Fuels & Electric Power Industry Unit

After hitting \$39 on August 2nd, WTI price climbed to \$48 by the 18th. This rise was prompted by an announcement by OPEC Secretary General Al Sada on August 8th that an unofficial OPEC meeting would be held at the International Energy Forum in late September. Accordingly, on the 11th, Khalid Al-Falih, the Saudi Minister of Energy, Industry and Mineral Resources, commented that Saudi Arabia is closely monitoring the oil market and will cooperate with both OPEC members and non-members to rebalance the market if necessary. These announcements led the market to speculate that oil producers might agree on a production freeze.

The drop in the US oil inventory level also propped up oil prices. The oil inventory level is released by the US Energy Information Administration on a weekly basis. The drop in gasoline inventory on the 12th and in both oil and gasoline inventory levels on the 17th were seen by the market as a reason to buy.

Speculation over a US interest rate increase may have also propped up prices. As oil is an asset typically traded in US dollars, a weak dollar makes oil seem cheaper in other currencies and stimulates buying, which may cause oil prices to rise. The minutes of the meeting of the Federal Reserve Board (FRB) released on the 17th show varying views within the Board members on a rate increase: some are reluctant, believing that the global economy is even more uncertain at present, while others support a rate increase, emphasizing the strength of the US economy and fearing that inflation might greatly exceed the target rate. It is also possible that the divided views among the Board members led to a sell-off of the dollar and contributed to the rise in oil prices.

However, in view of the supply and demand fundamentals, the current rise may not last. It is never easy to reach a consensus among oil producers on production level, and further, the output of major producers such as Saudi Arabia, Russia, Iraq, and Kuwait is already at a historic high, while the combined output of the OPEC countries is also at extremely high levels. Further, although the US continues to cut production, the rig count has risen for seven weeks straight, suggesting that the production has bottomed out, at least as long as prices hover around the current level. Meanwhile, the demand for gasoline has not yet increased as hoped during the driving season in the US. Demand remains robust in Asia, but the market could still react to bearish factors such as the above. In its July monthly Oil Market Report the International Energy Agency predicted that supply and demand will be balanced by the first half of 2017. In its August report, the Agency moved back the timing of the rebalancing to the second half of 2017. If macroeconomic uncertainties resurface, if the US's inventory level rises or production cuts bottom out, or if the production freeze negotiations between producers break down, prices could start falling again.

### 3. Recent Developments in the LNG Market

**Yoshikazu Kobayashi**, Senior Economist, Manager  
Gas Group Fossil Fuels & Electric Power Industry Unit

Natural gas demand in China is strong. The country's domestic demand for natural gas was 995 billion m<sup>3</sup> for January-June 2016, up 9.8% year-on-year. Although the demand is no longer posting double-digit growth, an increase of this scale was not expected from a country whose economy is slowing. Behind this rise in demand are such factors as the reduction of the City gate price (wholesale price), which is the government's regulated price, by more than 20% to promote the use of natural gas last November and the cool weather at the start of the year. Further, judging from the trend of coal production and imports during the first half of 2016, the same period as above, it is likely that the switch to coal and natural gas has accelerated in the power generation and industrial sectors.

In predicting China's natural gas demand, the country's macro economy is clearly the most important factor, but the government's natural gas policy and the impact of the heavy rain and massive flooding in July must also be noted. For China, which is also a gas producer and a pipeline gas importer, an increase in gas demand does not translate directly into demand for more LNG imports. Nevertheless, a sudden surge in demand in the latter half of the year due to, for instance, weather conditions, may boost the amount of LNG lifted.

Demand also continues to grow in the other emerging LNG importer of Asia, India. According to the statistics of the Ministry of Petroleum and Natural Gas, India's imports grew by 46% year-on-year for January-May 2016 to 99 billion m<sup>3</sup>. This increase is driven primarily by robust power demand, demand for fertilizer raw materials, and the recent drop in oil prices and spot LNG price, and the increased demand is expected to continue especially for use for fertilizers as a new plant is planned to open. Regarding future demand expansion, the connectivity between LNG terminals and demand centers is considered to be a major bottleneck, and thus it is crucial for the central and regional governments to improve the supply infrastructure.

In South Korea, the demand for LNG remains low. The main reason is the increased use of coal and renewable electricity sources in the power sector, but other reasons may include the "reverse shift" in industry from city gas to petroleum products as the price competitiveness of city gas over oil has been eroded by the recent low oil prices. This is because industry is becoming more sensitive to energy prices due to the country's prolonged recession. The South Korean government projects that natural gas demand will remain at around 45 billion m<sup>3</sup> until 2020. Meanwhile, Japan's LNG imports dropped 5.3% year-on-year for January-June, 2016. While the main cause is the drop in demand for power generation, demand has also dropped year-on-year for city gas for residential and business use due to seasonal temperatures.

#### 4. Update on Energy Efficiency and Conservation Policies

**Naoko Doi**, Senior Economist, Manager  
Global Environment and Sustainable Development Unit

Japan's Long-term Energy Supply-Demand Outlook established in July 2015 aims to save 50.3 million kL of energy by FY 2030 compared to the reference case by introducing high-efficiency technologies and improving operational energy efficiency. This translates to an improvement in the energy-GDP intensity of final energy consumption by approx. 35% from current levels by FY 2030. This immense improvement is equivalent to that achieved between 1970 and 1990, and would require an annual average improvement of approx. 2%.

In contrast, the GDP intensity of final energy consumption improved between 1990 and 2010 by 12%, or by an annual average of just 0.63%. This deceleration resulted from various factors, including the very rapid efficiency improvements particularly in the manufacturing industry that squeezed the scope for improvements, changes in production structure, and an increase in energy-consuming equipment in the business and residential sectors. Considering these circumstances, to improve the average energy efficiency by 2% each year by FY 2030, new approaches will be needed in addition to existing policy measures.

The Energy Efficiency and Conservation Subcommittee, an advisory body to the Minister of Economy, Trade and Industry, held its second meeting in August to discuss a paradigm shift in the energy conservation policy. The key points were: (1) Expanding the unit of energy management, and (2) Effective use of third parties.

Regarding the unit of energy management, the current system has switched from managing the energy of each factory/workplace to that of each business operator, to better suit the reality of energy management. Consequently, it is now possible to apply the Energy Conservation Act to convenience stores, which was not possible under the factory/workplace-based scheme. Additionally, to account for the changing market environment, evaluation of the following efforts is being considered: (1) Collective energy-saving efforts including upgrading the facilities of a factory that houses the processes of multiple operators, and sharing truck transport and logistics management among multiple operators, and (2) Optimizing production, logistics, and sales, curbing overproduction, and controlling inventory by sharing demand forecasts over the entire supply chain, thus saving energy.

The effective use of third parties aims to promote energy conservation by strengthening the ties with third parties that can directly approach small and medium-sized enterprises and consumers, to whom direct regulation by the Energy Conservation Act is difficult. Specifically, a new Zero Energy House (ZEH) builder system has been launched, in which houses designed, built, and sold by builders who have set a target of building 50% of their new houses ordered by 2020 as ZEHs and licensed by METI, are exclusively subsidized. Further, to enable both energy retailers and consumers to conserve energy in the new liberalized electricity retail environment, a study has begun on how to reach out to consumers and provide information on energy saving, such as energy saving simulations and systems.

Regarding these efforts, specific measures including regulations and subsidies are planned to be discussed in FY 2016 for implementation from FY 2017, and hopefully will encourage energy conservation.

## 5. Efforts for Expanding the Introduction of Battery Cells

**Yoshiaki Shibata**, Senior Economist  
Manager, New and Renewable Energy Group  
New and Renewable Energy & International Cooperation Unit

Efforts to introduce large-scale batteries for grid stabilization are being stepped up around the world. In the US, the US arm of the German company E.ON signed an agreement with Tucson Electric Power of Arizona in July to provide a ten-year grid stabilization service by co-locating a 10 MW battery with a solar array. Further, major US independent electricity provider AES won an order from California's San Diego Gas and Electric (SDG&E) for two battery systems (total 37.5 MW). Both batteries will be installed in an existing SDG&E transformer substation, one of which will be the largest battery system (30 MW) in the US.

In Australia, an off-grid project consisting of a 10.6 MW solar PV plant + 6 MW battery was put in operation in June at a mine in Western Australia. Further, infrastructure investment firm Lyon Group announced a plan in August to introduce a 100 MW solar PV plant + 40 MW battery in South Australia.

In India, installation of a battery will be additionally required for solar PV bids with a combined output of 300 MW in the two states of Andhra Pradesh and Karnataka. India aims to introduce 175 GW of renewable energies by 2022, of which 100 GW will be solar PV. There are high expectations for the use of batteries due to the need to curb the impact of introducing large amounts of output-fluctuating renewables on the already vulnerable electricity system.

Likewise, in Japan, a new battery transformer substation was built in the Buzen area of Kyushu in this March, launching one of the world's largest NAS batteries (50 MW). There are plans to co-locate batteries with solar PV plants with a combined output of 65 MW in Tomakomai and Akkeshi, Hokkaido. These large-scale batteries, co-located with mega solar power stations, are categorized as grid batteries. This trend is being driven by, in addition to government support, the falling cost of both solar PV and batteries.

Meanwhile, efforts to install smaller batteries on the consumer side are often categorized as part of VPP. VPP, or Virtual Power Plant, is the concept of helping to maintain the supply-demand balance of electricity by aggregating renewable energy plants, batteries and demand response and managing them centrally by technology. The VPP project of South Australia announced in August plans to introduce a total of 5 MW of solar PV + 7 MWh batteries to 1,000 houses by April 2017. Japan also adopted seven projects in METI's Virtual Power Plant construction demonstration program at the end of July for verifying the technical and economic aspects of VPP. Although batteries are the central technology of VPP, demonstrations have only just begun, and thus batteries are still costly but offer various methods of operation. The demonstrations are expected to result in methods for reducing their cost and utilizing them more effectively.

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