

# IEEJ e-NEWSLETTER

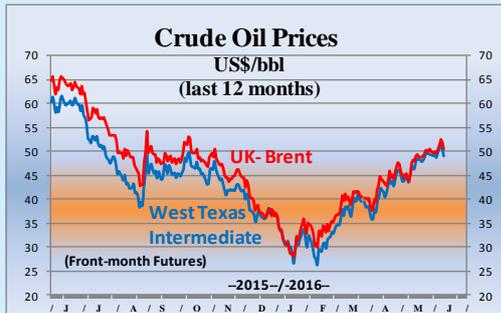
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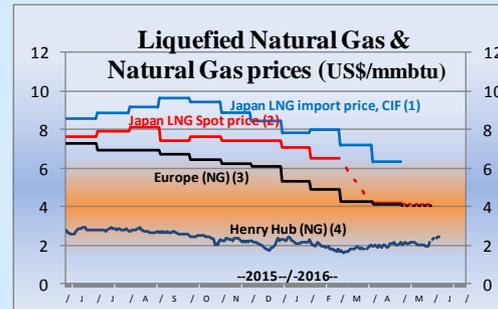
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The Institute of Energy Economics, Japan

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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**

The IFNEC international conference, which is attended by both the suppliers and customer countries of commercial nuclear power, discussed common issues such as financing and how to ensure the profitability of new plant construction projects. Regular information sharing will be continued.

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

Oil prices continued to rise in May due to an increase in demand driven by gasoline and diesel, and supply disruptions in Canada and Nigeria. However, the dominant view is that supply and demand will reach equilibrium in the latter half of this year.

#### **3. Recent Developments in the LNG and Gas Markets**

The spot LNG market, which continues to face easing of supply and demand, is likely to remain sluggish into the summer. The Japanese government announced Strategy for LNG Market Development. Efforts to achieve an inexpensive and stable supply of LNG will remain essential.

#### **4. Update on Climate Policies**

The Ad Hoc Working Group on the Paris Agreement, which discusses the rules for implementing the Paris Agreement, held its first meeting. The meeting ended without a substantial progress due to the delay in adopting the agenda caused by disagreement between developing and developed countries.

#### **5. Developments in Energy Storage Technology**

As variable renewable energies increase, the use of battery cells for grid stabilization is increasing worldwide. Japan should also consider using thermal storage devices, which are already installed in large numbers, for grid stabilization.

## 1. Developments in Nuclear Power

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

From May 9 to 12, the International Framework for Nuclear Energy Cooperation (IFNEC) was held in Paris, France to discuss topics that many countries share, such as securing financing and the profitability of nuclear power plant construction, as well as market-related issues including electricity prices and regulations. The highlight was the Nuclear Finance Conference, which was held on May 11 and 12 and was attended by over 150 participants from more than 30 countries, who presented the various risks of nuclear plant construction and their countermeasures as perceived by the government, power companies, regulators, financial institutions, and vendors.

For instance, when an emerging country having a regulated electricity market introduces the country's first nuclear power plant by a state-run power company, it is essential for the government and the power company to have a solid financing plan and a scheme for ensuring profits from tariffs; to decide beforehand how to split the costs among the power company and vendors; and that the vendors are capable of providing reliable technology on time. Meanwhile, for a private power company considering investing in a new nuclear power plant in a developed country with carbon emission restrictions and a liberalized electricity market, the key for making a decision is whether the market is designed to fully exploit the ability of nuclear power to contribute to energy security and climate change prevention, and whether the government will shoulder the major risks at the start of the project but later allow the private sector to take over to promote healthy competition. It is significant that a role-play style of discussion was held on this topic at an open international meeting attended by various stakeholders. As a newcomer to electricity retail liberalization, Japan had much to learn.

On the 10th, the Steering Group meeting proposed establishing a new meeting between supplier and purchaser countries of commercial nuclear power to discuss nuclear financing. In the process, as a means of financing new nuclear construction projects, the meeting proposed leveraging the capital held by international investment institutions and funds, and many emerging countries agreed, albeit with comments regarding government-guaranteed financing. The proposal is to be approved at the Executive Committee meeting in October, after which the meeting is to be officially launched.

In Japan, a new nationwide symposium launched this month by NUMO, the Nuclear Waste Management Organization of Japan, to discuss geological disposal in earnest is receiving attention. The symposium is a joint effort by NUMO and the government based on the government's goal of designating "scientifically suitable areas" within this year, and aims to provide accurate information to the public on the issues involved in the final disposal of high-level radioactive wastes, and to listen to their concerns. In the past, the nuclear PR activities of the government and the power companies have been criticized as "almost forcing people to understand". Has the stance changed? It will be interesting to see the public's honest reaction.

## 2. Recent Developments in the Oil Market

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

At the meeting of oil producers on April 17, Saudi Arabia refused to agree to freeze its output without Iran. Subsequently, Petroleum and Mineral Resources Minister Ali al-Naimi resigned on May 7, and was succeeded by Khalid A. Al-Falih, former CEO of Saudi Aramco. This is part of an ongoing major realignment of the country's ministries and ministers. It is reasonable to assume that with this replacement, Deputy Crown Prince Mohammad bin Salman, who is already wielding influence on the overall national strategy and leads Saudi Vision 2030, the key strategy to lead the country out of its dependence on petroleum alone, has consolidated his grip over the entire petroleum policy.

In Tokyo, METI's Natural Resources and Fuel Committee of the Advisory Committee for Natural Resources and Energy held its 17th meeting on May 17. A wide-ranging agenda was discussed, including domestic resource development and procurement policies, midstream and downstream petroleum policies, and the response to the Kumamoto earthquakes. In the area of resource development, the measures and challenges in promoting domestic oil and natural gas exploration were discussed. The meeting noted various challenges including the large number of projects awaiting review for mining licenses (unprocessed mining applications) and those that have been licensed but are yet to be launched, while giving some good evaluation on the revised Mining Act of 2011. The status of methane hydrate development was also reported. Unprocessed mining applications as well as licensed but unstarted mining projects are a major lost opportunity that must be dealt with urgently. Further, considering the keen focus on methane hydrate overseas, it is not sufficient to simply commercialize the energy in the latter half of 2018; publicity efforts must also be made based on a global strategy.

International oil prices continue to rise. Both WTI and Brent had returned to over \$50/barrel as of late May, up from around \$40 in early April. In terms of demand, transportation demand in the US, China and India is driving the overall demand for oil. Demand is growing particularly in India, where demand for gasoline and diesel reportedly increased by as much as 270,000 barrels/day (up 6%) year-on-year in February alone, according to the IEA. The price hike in May, however, is largely associated with the spate of supply disruptions. On May 1, a forest fire hit Canada's oil production center of Alberta, causing many of the province's oil fields to shut down and resulting in lost output of 1.2 million barrels/day. Further, Nigeria has suffered a series of attacks on its production platform and pipelines, sustaining a loss of 600,000 barrels/day in output. Meanwhile, oil inventory levels remain at historic highs. Middle East oil producers Kuwait, Iran, and Iraq, not to mention Saudi Arabia, are likely to continue to pump at high levels. Some believe that rising oil prices could halt the decline in American oil output, but the consensus is that the growth in demand will generally outpace that of supply but reach equilibrium in the latter half of this year.

### 3. Recent Developments in the LNG and Gas Markets

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

International oil prices have been rising since early May, but the LNG spot price for North East Asia is still around \$4/MMBtu. How will the spot LNG price change heading toward the summer demand period? In short, there is little possibility that the spot LNG price will rise from now to summer. Supply is likely to continue to increase, as three-fourths of the over 30 million tonnes of new projects due to be launched this year are expected to start production in the third quarter. Further, Australia's Gorgon Project, currently halted due to a cooling unit trouble, and Angola LNG, shutdown since 2014, may be restarted toward the summer; there is much attention on when they will be restarted.

On the demand side, demand is expected to rise toward summer in China and Taiwan but seasonal demand may not be so high in South Korea where economic recession continues, the high stock level since the beginning of the year remains unresolved, and nuclear and coal are given priority as fuels for electricity generation. LNG for generation has also been decreasing year-on-year in Japan due to the introduction of coal-fired thermal and renewable power sources, as well as the restarting of nuclear power stations. With a significant increase in production capacity expected on the supply side, the spot price is unlikely to rise even after the summer demand period starts.

At the G7 Energy Ministerial Meeting in Kitakyushu on May 1 and 2, Motoo Hayashi, Minister of Economy, Trade and Industry, announced Strategy for LNG Market Development. The strategy aims to achieve "inexpensive" and "stable" LNG procurement, and is based on the three basic principles of (1) ease of trading, (2) a price index that reflects supply and demand, and (3) an open and well-developed infrastructure. Specific actions include abolishing the destination clause and holding discussions with price information firms and financial institutions on establishing a new price index. Abolishing the destination clause in particular requires government involvement, as can be seen in Europe. Going forward, efforts must be made to connect with and share information with the EU and other like-minded Asian countries.

Japan's business environment for LNG procurement has been experiencing big changes for some time now, such as the start of LNG export from lower 48 states in the US amid the lingering oversupply of LNG, and domestically, the approaching completion of the detailed system design headed for full liberalization next April. While "inexpensive" and "stable" are not often compatible in LNG procurement, both the government and the companies concerned must continue to search for ways to capitalize on these changes as effectively as possible.

#### 4. Update on Climate Policies

**Takahiko Tagami**, Senior Coordinator, Manager  
Climate Change Policy Research Group  
Global Environment and Sustainable Development Unit

The Ad Hoc Working Group on the Paris Agreement (APA), which discusses the rules for implementing the Paris Agreement agreed last December, held its first meeting in Bonn, Germany from May 16 to 26. The meeting was held jointly with the meetings of the Subsidiary Bodies convened semiannually under the Conference of the Parties to the UNFCCC (COP) / Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

Based on the COP decision to adopt the Paris Agreement, the APA is required to develop: (1) further guidance relating to nationally determined contributions (NDCs, e.g. reduction targets) that the members submit every five years, (2) modalities, procedures and guidelines for the transparency framework for action and support, (3) matters relating to the five-yearly global stocktake towards achieving the long-term goals, and (4) modalities and procedures for the effective operation of the mechanism to facilitate implementation and promote compliance. Further, the Subsidiary Bodies are required to consider items, including the registry for recording the NDCs submitted by the countries, and guidelines on the cooperative approaches which form one of the market mechanisms beyond 2020.

Upon adopting the agenda for the Subsidiary Body on the 16th, developing countries requested that the agenda on the registry of NDCs deal with not only mitigation (reduction) but also adaptation. The adoption of the agenda was deferred, preventing further discussions until the adoption. Developing countries made a similar request at the APA on the 17th, demanding that the agenda handle both mitigation and adaptation in a balanced manner, rather than just mitigation. The adoption of the overall agenda was consequently postponed. Informal consultations on the agenda continued, until it was finally adopted on the 20th by adding, for the APA, a topic on the adaptation communication as a component of NDCs, and for the Subsidiary Body, by splitting the agenda related to the registry of NDCs into that on mitigation and that on adaptation.

Further, under the international consultation and analysis (ICA) process to promote the mitigation actions of developing countries up to 2020, peer reviews titled “the facilitative sharing of views (FSV)” was held for 13 countries including Brazil and South Africa for the first time as part of this event. The ICA was established under the Cancun Agreements of 2010. In total, 32 countries have submitted their biennial update report, out of these, 13 countries that had undergone a technical analysis by the team of experts were, this time, subjected to presentation and Q&A. Most of the questions from the other countries focused on the system for the measurement, reporting and verification (MRV) of emissions and its possible future improvement. The FSV for the 13 countries will be held again in two years time.

For the APA, informal consultations continued even after the agenda was adopted, this time on the organization of work, and there were only general discussions throughout all the agenda items after the weekend. Consequently, the APA ended by just deciding intercessional work, such as the submissions of countries’ views, and the organization of work at the next meeting. The next APA will be held in Marrakech, Morocco from November 7 to 18.

## 5. Developments in Energy Storage Technology

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

In the area of Kyushu Electric, where solar power is spreading faster than in other areas, solar power has a cumulative capacity of approximately 6,000 MW compared with a maximum electricity demand of 15,000 MW as of the end of December 2015, and thus grid optimization is becoming a pressing issue. The situation is particularly urgent in remote islands, where renewables were curtailed 18 times between the first time on Tanegashima Island in May 2015, and May 2016. As solar power generation expands further, curtailment may increase on mainland Kyushu, not just on islands.

Output Curtailment, while being a very effective means of grid stabilization, cause a net loss for electricity decarbonization as it discards renewable electricity that otherwise would have been generated. Thus, measures are being considered to absorb the output in battery cells rather than discarding it. Having a high response speed but also high equipment cost, battery cells are inherently more suitable for grid frequency adjustment and charging and discharging at short cycles of a few seconds to several hours. However, as equipment costs have fallen in recent years, for example, the price of lithium battery cells for vehicles has halved in the past four years, relatively long charge/discharge cycles of several days is becoming a promising option.

In other countries, auto manufacturers have started to enter the stationary battery market since last year. US's Tesla Motors and Germany's Daimler have begun to market civil and industrial stationary batteries for storing renewable electricity, leveraging the battery technology that they have developed for electric vehicles.

In Japan, a large-capacity NAS battery was put into operation in the Buzen area of Kyushu in March as part of METI's "Demonstration Project for Improving Supply-Demand Balance Using Large-Capacity Battery Systems". While the use of battery cells for grid stabilization is spreading also in the US and Europe, this battery system is among the largest in the world with an output of 50 MW and a capacity of 300 MWh. It is designed to improve the supply-demand balance of electricity by charging or discharging depending on solar power output, and also to demonstrate how to operate a battery system effectively.

Despite the increase in the use of battery cells for grid stabilization, challenges remain regarding operation and control. For energy storage technology, not only storing the energy but also how to use the stored energy is key. Batteries discharge stored electricity into the grid, but as more batteries are installed, the flow of electricity becomes complicated, as do the control and operation of each battery cell. The complexity of grid control can be avoided by storing electricity in other forms of energy and using it for purposes other than electricity. One example is thermal storage using either electric heaters or heat pumps: the stored heat can be used for supplying hot water and air-conditioning. In Japan, where heat pump water heaters and thermal storage equipment such as ice storage are spreading quickly, the total thermal storage capacity is estimated at 150 GWh as of 2014, and thus thermal storage has considerable potential. Studies on the options for grid stabilization should include not just battery cells but also thermal storage systems.

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