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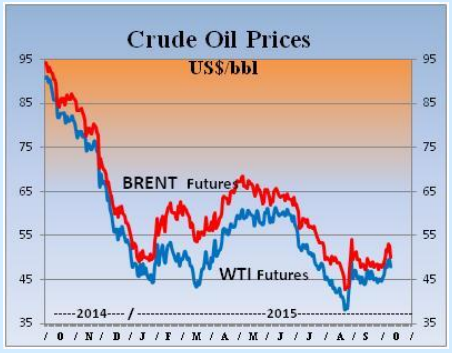
IEEJ e-NEWSLETTER

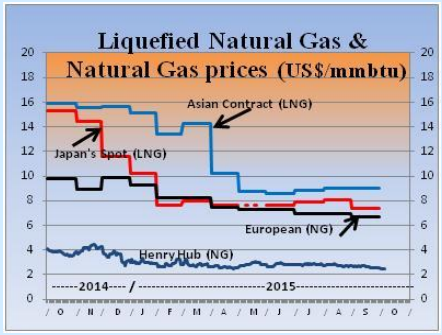
No. 71

(Based on Japanese No. 145)
Published: October 14, 2015
The Institute of Energy Economics, Japan

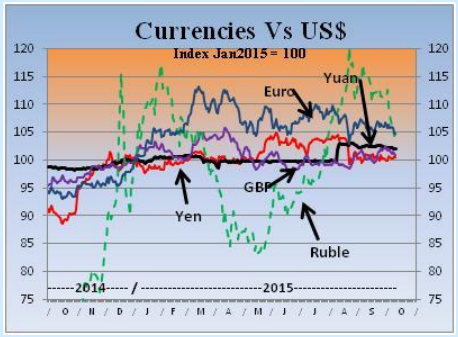
(As of October 12, 2015)



Source: Financial Times



Sources: Henry Hub NG/DOE-EIA, European NG/WB LNG spot/METI, LNG contract/WB



Source: x-rates.com

Source: Financial Times

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Shale oil is not as effective as Saudi Arabia for adjusting supply and demand in the international oil market. Thus, the oil market is likely to remain unstable unless Saudi Arabia changes its share-oriented policy.

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The fourth LNG Producer-Consumer Conference was held on September 16 in Tokyo. One of the key points is the increasing demand for more flexible supplies of LNG. Efforts from both producers and consumers are needed for the LNG market to further develop.

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Europe is launching efforts to use demand response to absorb the fluctuation of renewable generation output. Japan must conduct technological and economic verifications of the extent of demand response by consumers, learning from the experience of Europe.

1. COP21 and the Challenges of Japan's Coal Thermal Power

Akihiro Kuroki, Managing Director
Global Environment
& Sustainable Development Unit

With COP21 due to start at the end of November, there is increasing attention on the discussions on the emissions reduction target of each country beyond 2020. The officials involved in the negotiations are generally optimistic about reaching an agreement, as no one wants the Conference to fail, and as the diligent consensus-building efforts by the host country, France, are working. As the method of reducing emissions is up to each country, the final reduction goal is likely to be an aggregation of the targets of the member countries. Discussions on how to address the gap between the aggregated total and the actual overall reduction target appear to have been put off.

Japan has submitted a target of reducing GHG emissions by 26% from 2013 by 2030. There are many hurdles for meeting this target, such as achieving the same level of energy saving as was attained during the oil shocks, restarting the nuclear power plants, introducing renewable energies, and taking measures for the country's coal thermal power, all while lowering the generation cost, which is a key factor in the Energy Mix. For coal thermal power, discussions have started on new measures for meeting the reduction target. In Japan, there are currently many plans to build small coal thermal power plants, to circumvent the Act for Assessment of Environmental Impacts, as well as large ones. In response, the Ministry of Economy, Trade and Ministry has set up a working group on thermal power under the Committee on Energy Efficiency and Renewable Energy to study the issues involved with these two types of plants.

I) Small coal thermal power plants

The Act for Assessment of Environmental Impacts does not apply to power plants with an output of less than 110 MW. Currently, there are 23 plans for constructing coal thermal power plants each with an output of approximately 100 MW, producing about 2 GW in total. Small coal thermal plants are less efficient as they cannot adopt supercritical generation technology. As a solution, the thermal power WG has suggested introducing USC as a regulatory requirement, which the participants generally approved. For plants that burn biomass with coal, the WG is considering subtracting the calorific value of biofuels from the total calorific value when calculating plant efficiency. This, however, would make the efficiency of low-efficiency coal thermal plants that burn a lot of biofuel look higher than they actually are and thus able to meet the requirement. The WG will need to identify whether the CO_2 reduction was achieved indeed by improving efficiency or by introducing large amounts of renewable energies, and also define the relationship between the co-combustion operators and the FIT system, on which the operators rely.

II) Large coal thermal power plants

Regarding large coal thermal power plants, the Environment Minister has indicated that they are unacceptable. However, the Ministry of Economy, Trade and Industry (METI) seeks to keep the overall CO_2 emissions within the target range by replacing aged coal power plants by large coal power plants, and has suggested setting an efficiency target for all the coal power plants of each electricity producer. METI has indicated that the target should, on average, be close to the level achieved by USC technology. However, introducing large amounts of renewable energies would lower the utilization rate and efficiency of coal power generation. Alternatively, METI has suggested applying the target as an average of all coal thermal plants in order to encourage the shift to the more efficient LNG power generation, but this is likely to disadvantage those electricity producers whose LNG ratio is low.

Japan's reduction target of 26% is expected to face many hurdles aside from coal as the individual discussions start, and new policies will inevitably be required.

2. Developments in Nuclear Power

Tomoko Murakami, Manager
Nuclear Energy Group, Strategy Research Unit

The General Conference of the International Atomic Energy Agency (IAEA) held from September 14 to 18 adopted on the final day a resolution further strengthening the IAEA's work in the areas of nuclear science and technology, safety, security, safeguards and technical cooperation. In addition to this key resolution, the General Conference also adopted various resolutions focusing on fundamental research and strengthened safeguards in the nuclear energy area, including the implementation of the safeguards agreement between the IAEA and North Korea, and the Nuclear Security Plan 2014-2017 which urges thorough implementation of safeguards. These resolutions reflect the recent rise in tensions concerning the international nuclear security situation.

On September 14, the IAEA announced the designation of two research centers of France's atomic energy and alternative energies commission (CEA) in Cadarache and Saclay as the first facilities of the International Centre based on Research Reactors (ICERR), which the IAEA launched last year. This would allow IAEA member countries to use facilities like the Jules Horowitz reactor (under construction in Cadarache, France) for nuclear training and joint R&D projects. Gaining access to advanced overseas facilities is good news for Japan, where many research facilities are struggling to survive the cuts in budget for fundamental nuclear research. It would also be desirable, for the long-term development of fundamental technology and human resources, that some Japanese facilities also obtain ICERR designation. The policy-makers concerned must identify the requirements for the designation, and make decisions based on accurate cost-benefit analysis and long-term strategy.

Meanwhile, the £2 billion loan guarantee for the Hinkley Point C construction project that the Chancellor of the Exchequer George Osborne announced in China on September 21 could be a promising solution for the critical issue of how to secure nuclear power as a base load of electricity in a liberalized market. However, it is not clear if the guarantee would have been made if China General Nuclear Power Group (CGN) and China National Nuclear Corporation (CNNC) had decided not to take a stake in this project. Thus, to determine whether the UK will offer a guarantee also to other projects, it is necessary to monitor various factors including the nationality of the stakeholders.

In Japan, on September 10, Sendai Unit 1 became the first plant to return to commercial operation under the new regulation standards after the Fukushima Daiichi accident. On September 14, Kyushu Electric completed loading fuel in Sendai Unit 2, and is currently preparing to restart the plant with safety as the top priority, as it did for Unit 1. No power company besides Kyushu Electric has announced a definite timing for restarting their nuclear power plants, including Takahama Units 3 and 4 and Ikata Unit 3 which completed the Nuclear Regulation Authority's safety assessment in February and July this year, respectively. Both the power companies and the regulators must continue making steady progress and rational efforts for the other plants to be restarted.

3. Recent Developments in the Oil and LNG Markets

Yoshikazu Kobayashi, Senior Economist, Manager
Oil Group, Oil Subunit
Fossil Fuels & Electric Power Industry Unit

The oil market remains unstable, with the price fluctuating in the high $40 range since August, with volatile swings of $2 or $3 in a day.

Non-OPEC production is finally starting to decline as a result of the fall in oil prices. At the same time, the global demand for oil is rising strongly, leading to the market-driven adjustment of the supply-demand gap that OPEC has been hoping for. Nevertheless, most believe that the market will remain weak for the time being as the current easing of supply and demand looks set to continue due to the uncertainty of emerging economies including China, production hikes by OPEC producers, and the unexpected durability of shale oil in the face of falling oil prices.

When shale oil production first began to expand, many thought that it would eventually replace Saudi Arabia as the adjuster of supply and demand for oil, based on the belief that oil prices are determined by the marginal production cost of oil wells. Consisting of numerous production wells with a rapid rate of decline, the supply of shale oil was expected to increase or decrease quickly and sharply in response to changes in oil prices.

However, at least at present, shale oil does not seem to be serving as a supply-demand adjuster. This is mainly because shale oil production has not dropped by as much as initially expected despite the continuing slump in oil prices. Shale oil has become much more cost-competitive as a result of ongoing improvements in the productivity of shale oil development and lower production costs as the falling oil prices cause upstream activities to shrink, resulting in lower equipment and service prices. The marginal production cost of oil wells is definitely a decisive factor affecting the oil price, but conversely, oil prices can also affect production cost.

There is another reason why Saudi Arabia is a more effective supply-demand adjuster than shale oil. Saudi oil production is effectively ruled single-handedly by state-owned Saudi Aramco, and this makes it possible to immediately adjust production once the decision is made. This is not true for US shale oil production, which consists of numerous private oil wells.

Accordingly, shale oil is unlikely to replace Saudi Arabia and become the new supply-demand adjuster of the international oil market, and so the oil market is likely to remain volatile in the near term unless Saudi Arabia changes its production policy.

4. The Fourth LNG Producer-Consumer Conference

Tetsuo Morikawa, Gas Group Manager
Fossil Fuels & Electric Power Industry Unit

On September 16, the fourth LNG Producer-Consumer Conference was held in Tokyo, attended by the event sponsor, METI Minister Yoichi Miyazawa, Qatari Minister of Energy and Industry Mohamed bin Saleh Al Sada, and more than 1,000 people from more than 50 countries and regions. The key points of the conference were as follows.

First, buyers are seeking more flexible supplies of LNG in the Asian market. The falling coal prices and government policy-driven expansion of renewable energies are threatening the competitiveness of natural gas in the power generation sector. In other words, the gas situation in Asia could be more like the one in Europe. Further, competition is intensifying in Japan towards full market liberalization of electricity and gas, and it is still uncertain when and to what extent the nuclear power plants will be restarted. Furthermore, China, which was believed to generate the biggest demand growth for LNG, is now hardly able to lift the full amount it has contracted to purchase due to weaker gas demand. Great uncertainties like these are urging LNG importers to purchase LNG not just cheaply but also more flexibly.

Second, despite the easing demand and falling prices, governments and companies of the producer and consumer countries are fully aware of the need to collaborate to ensure the supply security of LNG. Specifically, METI Minister Miyazawa stressed the need to strengthen an international system to respond LNG emergency situations, and said that he intends to raise this issue for discussion at the G7 Energy Minister Meeting planned to be held in Kita-Kyushu in May 2016. IEA Executive Director Fatih Birol indicated his willingness to cooperate. Energy Minister Al Sada pointed out the importance of long-term contracts to realize new LNG projects, and JOGMEC president Hirobumi Kawano said that the company will continue its current upstream investment and support for technological development. IEEJ Chairman and CEO Masakazu Toyoda shared the finding of the Multilateral Joint Study Group on LNG that improving market liquidity is the key to achieve flexible LNG supply as well as medium/ long-term supply security.

Third, there is great potential demand for LNG in the transportation sector. Shell indicated potential new demand of 80 to 100 million tonnes for bunkers and trucks. Further, Nippon Yusen and Isuzu Motors described their efforts with LNG fuel ships and natural gas trucks. However, it was also pointed out that to fully exploit this potential, improved infrastructure, policy support and economic efficiency will be needed.

In this round of the Producer-Consumer Conference which was held amid easing demand for LNG and falling oil prices, the companies and governments of both the producers and consumers agreed that it is critical to respond to the various changes in the market, and to actively pursue new demand areas. It is desirable for both producers and consumers make efforts for the healthy development of the LNG market.

5. Europe's Efforts to Control Renewable Output Fluctuation through Demand Response

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Demand response is a mechanism whereby the supply-demand balance of electricity is adjusted by changing the demand pattern of consumers, and is performed at peak periods and in emergency situations such as grid accidents. In Europe, it is used increasingly for absorbing the output fluctuation of renewable generation.

In August, the start of a demonstration experiment was announced in Portugal on using demand response to absorb the output fluctuation of renewable generation. The experiment is being implemented with the support of NEDO. As more renewable capacity is introduced, curtailed electricity must be increased as more electricity spills over from the grid. Demand response, which proactively changes the electricity usage pattern of consumers, is seen as a promising way to reduce such curtailment.

The experiment aims to reduce curtailment, but without inconveniencing consumers, by absorbing the output of renewable generation by automatically shifting and expanding the demand of consumers during periods when the output of wind and other renewable power is high. The consumers participating in this experiment are from various sectors, including industry, commercial and residential. The main source of demand response in the experiment is air-conditioning.

A similar effort is underway in France. With the support of the Agency for Environment and Energy Management (ADEME), demand response service firms Energy Pool and Schneider are jointly performing a demonstration experiment called EnR-Pool. As the output of variable renewables is highly irregular, demand response must have broad responsiveness. Thus, the experiment is trying to represent the overall demand response capacity of all consumers and ensure flexibility in the speed of demand response by gathering consumers from various sectors including steel, chemicals, cement, food and warehousing (refrigerating and freezing). The demonstration has been completed, and currently, technical and economic assessments of the results are underway, prior to commercialization.

In Europe, under the EU's 2012 Energy Efficiency Directive, the regulators and grid operators of each country are urged to introduce demand response as a means to adjust the supply-demand balance of electricity. Accordingly, the technology is being increasingly commercialized, particularly in Western Europe. Demand response has also been highlighted in the recommendation on the new electricity market framework released in July 2015 to deal with the increase in renewable generation. Thus, it is also expected to be used for dealing with the output fluctuation of renewable power generation.

Demand response could also become a promising option for Japan in dealing with the output fluctuation of renewable power generation. The first step would be to test the mechanism based on the experience in Europe. Such work has just started, and the possible initial challenges include verification of technology for predicting power generation by renewable energies, the ability of demand to respond without affecting consumer convenience, and economic efficiency.

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