

# IEEJ e-NEWSLETTER

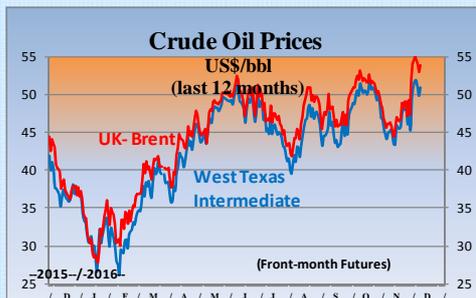
No. 99

(Based on Japanese No. 159)

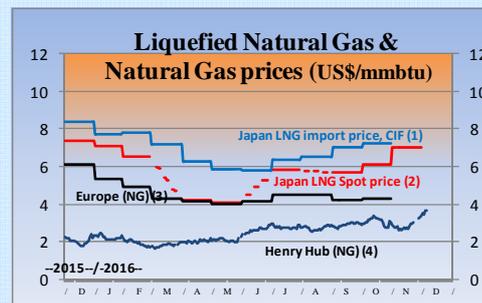
Published: December 9, 2016

The Institute of Energy Economics, Japan

(As of December 8, 2016)

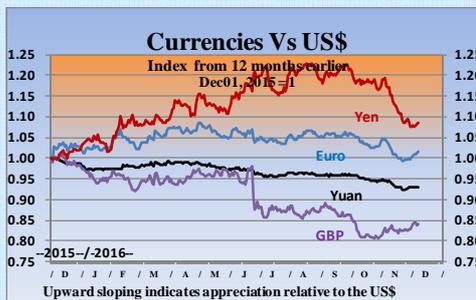


Source: DOE-EIA, Financial Times, NASDAQ



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

## Contents

### Summary

#### 【Energy Market and Policy Trends】

1. Developments in Nuclear Power
2. Developments in the Electricity Market
3. Recent Developments in the Oil and LNG Markets
4. Update on Climate Policies
5. Developments in Power to Gas (Renewables-derived Hydrogen)

## Summary

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

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

Mihama Unit 3 was licensed under the new regulation standards to become the third plant to operate up to 60 years. Vietnam's nuclear new build project, in which Japan was participating, was withdrawn. Japan needs to rebuild its business strategy for emerging countries.

#### **2. Developments in the Electricity Market**

Several very important system reforms affecting competition in the future wholesale electricity market are being considered through the policy subcommittee to complete the reforms of the electric power system. Ensuring consistency between the systems and easing the cost burden are challenges going forward.

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

Attention must be paid to how oil prices change after the decision of the November 30 OPEC meeting. Spot LNG prices are expected to fall. The LNG Producer-Consumer Conference discussed measures for promoting the use of LNG in Asia.

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

The 22nd Conference of the Parties to the UNFCCC (COP22) was held in Marrakech, Morocco, and decided to conclude the work programme under the Paris Agreement by COP24 in 2018.

#### **5. Developments in Power to Gas (Renewables-derived Hydrogen)**

Power to Gas (PtG), a technology to use hydrogen obtained from renewables and which has been tested actively in Germany, has been growing in Japan too. It will be interesting to see the results of the demonstration experiments for verifying technological feasibility.

## 1. Developments in Nuclear Power

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

On November 1, Russia's demonstration fast reactor BN-800 (880 MW) entered commercial operation under the management of the state-run nuclear power company Rosatom. It is the world's largest fast reactor as France's SuperPhenix (1240 MW) was taken out of operation in 1996. The world is watching whether Russia, and China as a user of its technology, will become leaders in the development of next-generation reactors.

In the nuclear industry, including fast reactor development, where Russia and China are gaining greater presence year by year, can France stage a comeback with its world-class technology? On November 15, Areva and Electricite de France (EDF) signed an official agreement to sell off all stocks of Areva's nuclear reactor business department, Areva NP, to EDF for 2.5 billion euros. With this sale, Areva can now focus on the Olkiluoto Unit 3 and other ongoing projects without financial concerns. However, it is not clear how much of Areva's management resources will be directed towards other projects including fast reactor development.

Meanwhile, Vietnam's nuclear new build project, in which Japan was also participating, was withdrawn on November 22 at the country's national assembly. The assembly cited "macroeconomic circumstances" as the reason for the cancellation, stating that there are other higher-priority investments such as highways and railroads. It also affirmed plans to continue efforts for a stable energy supply by developing renewable energies and energy conservation, replacing nuclear power with coal-fired thermal power for the time being and with renewable energies such as solar and wind power from 2030. Japan and its vendors and operators which are seeking to introduce nuclear power in Vietnam must seriously accept the fact that nuclear power, which is considered an important base load of electricity in Japan, is not a top priority in Vietnam under the market circumstances. Accordingly, they must rebuild their business strategy toward emerging countries based on higher overall competitiveness.

In Japan, on November 16, Kansai Electric's Mihama Unit 3 received a license from the Nuclear Regulation Authority to extend its operation period to 60 years. This is the third unit to be given such an extension under the new regulation standards following Takahama Units 1 and 2. To meet the policy objective of nuclear power accounting for 20-22% of the power mix in 2030, it is necessary to operate several plants that comply with the standards and have undergone appropriate technical evaluations of ageing management up to 60 years. This licensing is a valuable step toward achieving that goal. Coincidentally, on the same day, the safety analysis evaluation report for Switzerland's 46-year-old Beznau Unit 1 was submitted to the country's regulatory authority ENSI by its operator AXPO. AXPO states that according to the evaluation, the plant is able to operate until around 2030. As a similar evaluation is anticipated for many existing reactors in Japan, the operators' investment decisions must be respected and closely monitored.

## 2. Developments in the Electricity Market

**Junichi Ogasawara**, Senior Economist, Manager  
Electric Power Group  
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On September 27, the policy subcommittee to complete the reforms of the electric power system was established under the Strategic Policy Committee of METI's Advisory Committee for Natural Resources and Energy. Further, the working group for market development and the financial and accounting working group were established under the subcommittee, where various topics are discussed, including creating a base load electricity market, a non-fossil-fuel-value market, and a capacity market, and passing the nuclear back-end cost burden onto transmission fees.

The base load electricity market is planned to sell electricity generated by nuclear, hydro, and coal-fired thermal power without distinction by electricity source as a future delivery commodity by auction in units of years or months (the trade volume remains to be determined). The market will enable power producers and suppliers (PPSs) without base load power sources to readily purchase base load electricity.

Meanwhile, an initiative is being considered to securitize the FIT electricity and the entire amount of the non-fossil-fuel electricity including nuclear and hydropower as "non-fossil-fuel-value" certificates for purchase by electricity retailers through auction. The purpose of this scheme is to meet the non-fossil-fuel electricity ratio of 44% in 2030 required under the Act on Sophisticated Methods of Energy Supply Structures. While the scheme will increase the earnings of operators who already have non-fossil-fuel electricity sources, there is concern about the additional financial burden on the PPSs who purchase such base load electricity as they will have to buy the certificates to meet the target non-fossil-fuel electricity level, as described later.

Further, the WG generally agreed to establish a capacity market to address the concern that the increasing FIT electricity and the drop in wholesale electricity price caused by lower fossil fuel prices would squeeze the revenues of thermal power plants and make it difficult to maintain their facilities. At this point, the most promising model is the British capacity market in which the network department buys all supplies except those with guaranteed purchase such as FIT electricity, to be paid for by electricity retailers.

While the base load electricity market and other measures to energize the wholesale electricity market will enable PPSs to secure supplies inexpensively, they will have to bear greater financial burdens for "non-fossil-fuel-value" certificates, the capacity market, and back-end cost through transmission fees.

Further, the Organization for Cross-regional Coordination of Transmission Operators, Japan (OCCTO) is also exploring trading the use of inter-regional connection lines at the power exchange. If this scheme materializes, both the trade volume and the traders across the connection lines will be unspecified, and it is not clear how to evaluate the external supply capacity in the capacity market or who will receive the capacity's value. Difficult discussions loom toward the end of the year as the working groups seek to ensure consistency between the different systems, ease the higher burden, and strike the right overall balance.

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

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

After returning to the \$50/barrel level in September following OPEC's announcement of its plan to cut production, international oil prices have dropped back to the \$40/barrel range since the end of October. One of the main reasons is that the production cuts by OPEC have not materialized and the prospects remain unclear. The market has been unpredictable since mid November toward the month end amid mixed views on the impact of Donald Trump's win on the future of the global economy and the US's energy and environmental policies, and on the impact of the OPEC decision on November 30.

OPEC's output was 33.64 million barrels/day for October (according to OPEC), with marked growth by African oil producers Libya and Nigeria which had been cutting production due to domestic woes, despite agreeing at the meeting in September to limit output to 33 million barrels/day. Meanwhile, the output of Saudi Arabia, which traditionally functions as OPEC's swing supplier, remains mostly flat at 50,000 barrels/day lower than the previous month, and the country does not seem inclined to lead the reduction effort, though it has not raised production either. While OPEC could reach the decision to reduce its production to 32.50 million barrels/day, the market will closely watch whether the group will effectively cut its production as agreed.

The impact of Mr. Trump's election win on oil prices is likely to be "positive (upward) in the short term and negative (downward) in the medium to long term", as is currently said about the US macro economy. In the short term, public spending and economic stimulus packages such as infrastructure construction are likely to boost oil demand, but in the medium to long term, emphasis on domestic shale development and infrastructure construction including the Keystone XL Pipeline could ease the supply-demand balance in the US and increase supplies to the international market.

In the international LNG market, since October, the spot price in Northeast Asia has risen to above \$7/mmbtu due to a spate of spot purchases by Pakistan, Egypt, and other emerging importing countries. The spot price normally rises at this time of the year due to seasonal factors, but it should gradually fall towards the beginning of next year as production has recently restarted in Angola and Australia's Gorgon.

On November 24, the Fifth LNG Producer-Consumer Conference was held in Tokyo. Various topics concerning the current international LNG market were discussed including measures for promoting the use of LNG in Asia. They involved the need to simultaneously pursue the three factors, namely, LNG procurement, construction of infrastructure and generating demand. Other topics discussed included the importance of major operators' decisions and government support for the decisions, further cost reductions by producers, and a comprehensive investment model in the downstream value chain.

#### 4. Update on Climate Policies

**Takahiko Tagami**, Senior Coordinator, Manager  
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Global Environment and Sustainable Development Unit

The 22nd session of the Conference of the Parties to the UNFCCC (COP22) was held from November 7 to 18 in Marrakech, Morocco. With the entry into force of the Paris Agreement on November 4, the first session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA1) was also held from November 15 during the term of COP22.

The COP decided to convene a joint meeting with the CMA at the time of COP23 in 2017 to review progress on the implementation of the work programme under the Paris Agreement, and to conclude the work programme by COP24 in 2018.

At the Ad Hoc Working Group on the Paris Agreement (APA), the following are being considered in order to implement the Agreement: (1) regarding target-setting, matters relating to the global stocktake to be conducted at five-year intervals towards achieving the long-term goals, and (2) regarding checking on progress in achievement, modalities, procedures and guidelines for the transparency framework for action and support, and modalities and procedures for the effective operation of the committee to facilitate implementation and promote compliance. Informal meetings were held on each agenda item for the first time, although just one week of the two-week period was spent for these meetings due to the ministerial events scheduled for the second week.

Regarding target setting, a COP decision had been made with the Paris Agreement to convene a "facilitative dialogue" among Parties in 2018 to take stock of the collective efforts of Parties in relation to progress towards the long-term mitigation goal, which would be a prototype for the global stocktake in 2023. CMA1 requested the Presidents of COP22 and COP23 to undertake consultations with Parties on the organization of the facilitative dialogue, and report back to COP23. Further, regarding finance, the COP decision adopting the Paris Agreement had decided that prior to 2025 the CMA should set a new collective quantified goal from a floor of USD 100 billion per year, but it had not decided which body would conduct the discussion. The COP took note of the invitation by the CMA to request the APA to continue its consideration of possible additional matters relating to the implementation of the Paris Agreement such as the finance issue.

Further, regarding the mid-century, long-term low greenhouse gas emission development strategies, which the Paris Agreement said all Parties should strive to formulate and communicate, Germany submitted its strategy ahead of all other countries on November 14 (down 80-95% from 1990 by 2050), followed by the US (down 80% from 2005 levels by 2050), Mexico (down 50% from 2000 by 2050), and Canada (down 80% from 2005 by 2050) by November 17.

In Japan, METI's Task Force for the Expansion of Domestic Investment and the Task Force for Overseas Expansion Strategies were in recess in November, but the Environment Ministry's Long-Term Low Carbon Vision Subcommittee met twice in November to conduct hearings on Germany's 2050 long-term strategy, innovation, and the efforts of companies, and to hear the opinions of environmental NGOs.

## 5. Developments in Power to Gas (Renewables-derived Hydrogen)

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

Power to Gas (PtG), a technology to produce hydrogen from renewable energies, has been tested actively in Germany since around 2010, and similar efforts have grown in Japan too in recent years. Five projects were adopted last year as NEDO's demonstration projects and are currently ongoing, and at the end of September, six new projects were newly adopted.

The purpose of these pilots is to develop technology for converting renewable energies whose output fluctuates into hydrogen, and transporting, storing, and using the gas, thus helping to stabilize the grid. The goal is to evaluate the economic efficiency and feasibility of the technologies and verify their effectiveness in practice, and to eventually introduce them into society. Many of the technologies attempt to stabilize the grid by producing hydrogen from variable renewables, generating electricity from the hydrogen, and eventually feeding the electricity back into the grid. Meanwhile, some groups have different approaches: utilizing renewables-derived hydrogen in cities, and utilizing the city gas network by synthesizing methane.

The first idea, utilizing renewables-derived hydrogen in cities, uses an energy management system (EMS) to optimally operate the entire hydrogen system to meet a building's electricity and heat demands, from production of hydrogen from renewable energies to power generation and exhaust heat supply from a stationary fuel cell. The idea is inspired by the hydrogen town concept, and is a new approach that aims to stabilize the grid indirectly by increasing the use of hydrogen in the residential and commercial sector, rather than directly feeding the hydrogen-generated electricity back into the grid.

The next idea is utilizing the city gas network by synthesizing methane by reacting the hydrogen generated from variable renewables with carbon dioxide separated from the exhaust gas from factories, power stations, and sewage treatment plants, and mixing the methane into city gas pipelines. This naturally requires adjustment of the heat quantity, but is still much easier than mixing hydrogen directly. Using the city gas network would lessen the burden of grid stabilization on the power grid. There are many such pilots ongoing in Germany, but this is the first in Japan.

The general approach for grid stabilization is to temporarily store excess renewable electricity, convert it back into electricity and feed it into the grid, but as described above, there are many ways to approach PtG. The generated hydrogen can also be used for feedstock of city gas, for heat supply and also for fuel cell vehicles. It is not easy to decide which system for renewables-derived hydrogen is best, as it depends not only on economic efficiency and technical feasibility but also on many complex factors such as the renewable energy introduction policy and comparison with other energy storage technologies. The progress of pilots on technological feasibility must be closely monitored.

**Past IEEJ Events**

**Energy Indicators of Japan**

**IEEJ Homepage Top**

**Back Numbers of *IEEJ e-Newsletter***

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