



IEEJ e-NEWSLETTER

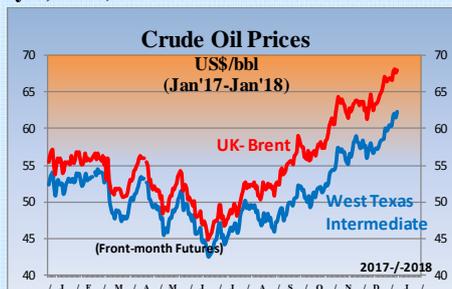
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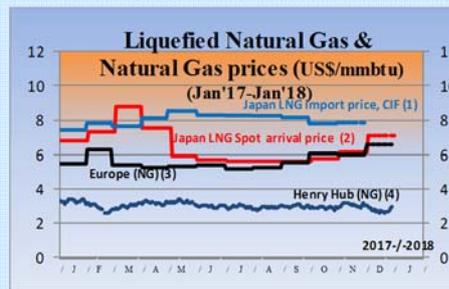
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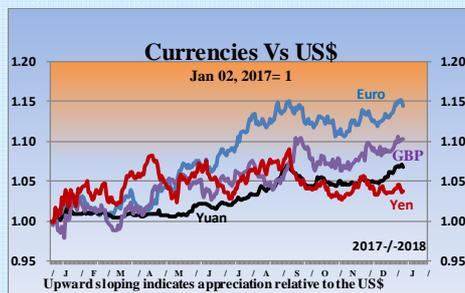


Source: DOE-EIA, Financial Times, NASDAQ



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)
- (5) Investing.com



Source: x-rates.com



Source: Financial Times

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2018 New Year Message
from
IEEJ Chairman & CEO Masakazu Toyoda

“Points to Consider in an Age of Energy Transformation”

Happy New Year.

The energy situation is becoming ever harder to predict. This trend has accelerated with the Trump administration which tends to be indifferent to maintaining world order. Under such circumstances, I would like to present four points that energy importer and exporter countries should both consider.

First is to identify the things that change and those that do not.

Amid the flood of changes, what has not changed? Global energy consumption will increase, particularly in emerging countries, as long as economic growth continues. The center of the increase is Asia, although within Asia, the center will shift from China to India and ASEAN in the long run.

How about oil prices? Unless the shale revolution expands to other countries, oil prices are likely to rise to \$100/bbl toward 2030. The reason behind this forecast is that if production from existing oil wells declines by about 1 to 2 million bbl /day each year, and consumption increases by at least 1 million bbl/day each year, the additional contribution from US shale oil will run out in about five years, inevitably causing the supply-demand balance to tighten. Thus, consumer countries should conserve more energy and increase alternative energies, and exporting countries should be mindful that an unnecessary price hike could cause another crash. Stable prices are what is important.

Second is to not forget the 3E+S principle.

The accident at the Fukushima nuclear power plant has taught us that there is no perfect energy in terms of the four factors of energy security, economic efficiency (cost), environmental sustainability, and safety, and has highlighted the risk of depending on certain energy sources. Japan's energy mix formulated in 2010 immediately before the Fukushima accident had set the share of nuclear power in the generation mix at 50% in 2030. Post-Fukushima, the keyword in the energy mix became balance, and the share of nuclear power was significantly reduced to 20-22%.

Many who urge the phasing-out of nuclear power seem to think that Japan should mainly use renewable energies as their cost decreases. However, they overlook the fact that electricity users will be shouldering 42 trillion yen(420bil\$) over the next 20 years for the renewable capacity installed and licensed so far. Electricity costs are due to increase by about 2.4 yen(2.4cent)/kWh, inevitably raising tariffs by around 10% for residential and 15% for industrial users. It is not clear how far renewable energy costs will fall in Japan. Land prices, system costs, capacity factor, the need for backups, and other costs differ by country, but the room for cost reductions is likely to be limited for Japan. The importance of balance can be applied to other countries as well.

Third is the importance of studying scenarios.

There is both optimism and pessimism regarding the future of battery cells. The optimism is based on the recent rapid reductions in cost, while the pessimism is due to the fact that material costs now account for a majority of the overall cost, making further cost reductions difficult. Optimists claim that the rapid spread of electric vehicles (EVs) will make it easier to prepare backup renewable energy



sources.

When neither view seems correct, it is useful to study the scenarios. The IEEJ has announced its outlook up to 2050 in our IEEJ Outlook 2018. It predicts that oil demand will not peak until 2050, not only under the Reference Scenario which reflects the current energy policy, but also under the Advanced Technology Scenario in which maximum climate actions are taken. However, if the share of EVs and other zero emission vehicles (ZEVs) soars to 30% in 2030 and 100% in 2050, oil demand is estimated to peak at around 2030. Nevertheless, in 2050, oil consumption will remain at around the same level as now. These studies offer various insights, including the continuous need for upstream investment even after oil demand peaks.

Fourth is the need to be proactive when the situation is unforeseeable.

The greatest challenge for Japan in achieving its energy mix is regaining public trust in nuclear safety. In mid-December, the Hiroshima Upper Court ordered the suspension of Ikata Unit 3, ignoring the decision of the independent Nuclear Regulation Authority. In Western countries, the decisions of independent regulators are respected by the judiciary. Such facts should be actively shared with the public in Japan.

Since the Trump administration cannot be relied on to promote stability in the Middle East, Japan must be more proactive. Fortunately, the countries involved are beginning to realize that military power does not bring stability, and are starting to diversify their economies to achieve stable development. The Abe administration has set up a Japan-Saudi joint ministerial group led by METI Minister Seko to ramp up assistance for diversifying the Saudi economy, including expanding investment by Japanese companies. Regarding the confrontation between Saudi Arabia and Iran and the severing of diplomatic ties by Saudi Arabia and others with Qatar, it is essential for the parties themselves to overcome their differences, including historical background and religious differences, and strive toward a common goal of improving the investment environment, as desired by the public. I believe that Japan can help persuade the countries that peace is essential for expanding investment. Fortunately, Japan has ministers with outstanding abilities in economics and foreign affairs, particularly the prime minister. I strongly expect the Japanese government to embrace proactive economic and foreign policies.

The IEEJ, too, will actively make policy proposals based on objective research and analysis taking into account the four points outlined above.

Finally, I would like to take this opportunity to wish everyone a prosperous new year.



Summary

【Special Feature I: Key Points for 2018】

1. Overall Energy Policy

The revision of the Strategic Energy Policy has already reached the halfway point in time. Issues must be approached comprehensively and exhaustively, to ensure that all essential points are reviewed and discussed.

2. International Oil Situation

The key issues for the international oil situation in 2018 are the scale of increase in US shale oil production, the review of the OPEC/non-OPEC joint production cut in June, and the situation in the Middle East and Venezuela. Oil prices are estimated at an average of around \$65/bbl in 2018 for Brent.

3. Domestic Oil Situation

As domestic demand continues to decline, the domestic oil industry must establish a new earnings base for securing a stable oil supply and the sustainable growth of its companies, through efforts such as transforming into a comprehensive energy industry, exporting products, and expanding businesses overseas.

4. Challenges for the Electric Power Business

The expansion of renewable energy capacities will boost the supply and demand of electricity and raise the spot wholesale electricity price. Based on this trend, an in-depth, future-oriented discussion is required on the system reforms, based on the lessons learned from Europe and the US.

5. Challenges for the Gas Power Business

In the domestic market in 2018, post-liberalization competition is likely to increase, including across regions. The import price is estimated at \$9.7/mmbtu despite easing of the supply-demand balance in the global LNG market, as oil prices increase.



1. Overall Energy Policy

Akira Yanagisawa, Senior Economist, Manager
Energy and Economic Analysis Group
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The revision of the Strategic Energy Policy has already reached around the halfway point in time. The Strategic Policy Committee has held fewer meetings than for the previous revision, perhaps reflecting the organizers' stance that the structure of the Energy Policy does not require a major change. Needless to say, the quality of the meetings is more important than their number. However, issues must be approached comprehensively and exhaustively to ensure that all essential points are reviewed and discussed without omission.

While the basic stance is that a significant change in the Energy Policy's structure is not necessary, there have been some changes since the Energy Policy was drawn up.

- Oil prices have risen recently, but are still far below \$100/bbl. The supply-demand balance is currently easing, but the declining investment in the supply side is a concern.
- Uncertainty is rapidly growing in the Middle East under the US Trump administration, with the worsening confrontation between Saudi Arabia and Iran and the severing of ties with Qatar by Saudi Arabia and others.
- The cost of renewable power generation remains high in Japan, but is quickly falling in some other countries.
- Five nuclear power plants have restarted while the decision to decommission has been made for a few others. The future remains uncertain.

Amidst such environmental changes, how can the targets in the Long-Term Energy Supply-Demand Outlook be achieved without making significant changes? To answer this question, some issues should be steadily addressed, although taking too long would not solve some of them and could even make them harder to solve. For the latter, a speedy response is critical. However, policies that affect many people and areas, such as tax and social security, are sometimes not addressed fast enough. These areas understandably require much time for coordination, but it is crucial to resolve issues and not procrastinate. It is always necessary to steadily take action for the future. This is true even when aiming beyond the Strategic Energy Plan toward 2050.

Either in contemplation or in action, we must distinguish between what may be attained and what is unattainable. Without this, little can be achieved, either in life or in knowledge.

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In order for completion, the opportunity is most essential aside from the ability.

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To blow is not to play on the flute; you must move the fingers.

—Proverbs of Johann Wolfgang von Goethe



2. International Oil Situation

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

The key issues for the international oil situation in 2018 are the scale of increase in US shale oil production, the review of the OPEC/non-OPEC joint production cut in June, and the situation in the Middle East and Venezuela.

US oil output recovered to as much as 9.48 million barrels per day (mb/d) in September 2017, with shale oil accounting for half the amount (4.76 mb/d). Since the summer of 2017, the number of operating rigs and the productivity of shale oil has begun to flatten out. However, the number of drilled but uncompleted (DUC) wells in shale oil fields reached a record 7,342 wells as of October 2017. Active hedging by producers in the WTI futures market is also a sign of their intention to increase output. Shale oil will undoubtedly remain the driver of rising oil production in 2018, and the US output could grow by around 1 mb/d from 2017 levels. Depending on the growth in the US production, inventory might rise again, putting downward pressure on prices.

On November 30, 2017, the parties to the OPEC/non-OPEC joint production cut decided to extend the joint reduction of approx. 1.8 mb/day to the end of 2018. Nigeria and Libya, which were excluded from the production cut agreement, will also set a production cap of 2.8 mb/day or lower. Meanwhile, a review of the progress of the joint production cut was set for June 2018, presumably reflecting wariness by Russia, which itself is participating. Nonetheless, the extension has made it more likely for supply and demand to remain roughly in equilibrium. However, the compliance rate may fall as the production cut continues. The decision to be made in June 2018 by those participating in the production cut must be monitored.

Even though IS has been defeated, the Middle East is becoming more unstable. There is no end in sight to the confrontation between Saudi Arabia and Iran, and in November and December 2017, Yemeni Houthis launched ballistic missiles at Riyadh and Abu Dhabi. Saudi Arabia also saw a mass arrest and detainment of its royals and ministers. Further, President Trump's official acknowledgement of Jerusalem as the capital of Israel has infuriated Middle Eastern countries. The market is once again recognizing the risks in the Middle East as a factor for higher prices. Facing chaos in society and imminent default, Venezuelan oil production dropped by as much as 7% (0.14 mb/d) between January and October 2017. The sanctions by the US that began in August 2017 have put further strain on the finances of PDVSA, the state oil company. If the debt problem cannot be resolved and PDVSA's assets are confiscated, Venezuelan oil output could plummet.

There are various uncertainties, but assuming that the supply-demand balance remains even or tightens slightly, and that no major disruptions occur in producer countries, average international oil prices are estimated at around \$65/bbl in 2018 for Brent.



3. Domestic Oil Situation

Yoshihiro Hashizume
Researcher
The Oil Information Center

Japan's fuel oil demand for January-October 2017 was 133.04 million kl, down 1.5% year-on-year. Further, the oil demand outlook for 2021 released in April by the Agency for Natural Resources and Energy projected that the decrease in domestic fuel oil consumption will continue in the medium to long term, predicting an average decline of 1.5% each fiscal year.

In 2017, the price of domestic retail gasoline was in the 130-134 yen/liter range in the first half as oil prices remained low, but rose to the 135-139 yen/liter range in the second half in response to the recovery of oil prices and also propped up by the cheap yen. It climbed for 12 consecutive weeks from September to November, reaching 141.5 yen on December 11, the highest in two years and five months. If oil prices remain strong in 2018, domestic petroleum product prices are likely to follow suit.

Amidst the medium- to long-term structural decline in domestic demand for petroleum products, by the end of March 2017, the disposal of excess refining capacity based on the second stage public notice of the Act on Sophisticated Methods of Energy Supply Structures was completed, achieving a capacity reduction of 1.37 million BD from the end of FY2008 (approx. 30% of the entire refining capacity). Industrial reorganization also progressed, with the establishment of JXTG Nippon Oil & Energy Corporation in April and the business alliance between Idemitsu Kosan and Showa Shell in May headed for a merger. Consequently, the financial results of all major oil companies for FY2017 are expected improve significantly thanks to higher refining margins and rationalization.

Based on the lessons of the Great East Japan Earthquake, petroleum products, which are easy to store, transport, and handle, are designated as the "energy supply of last resort" in case of disaster. Accordingly, it is necessary to strengthen the emergency supply system for petroleum products, while maintaining and ramping up the supply chain to gas stations, including those in depopulated areas and remote islands, compared with normal times. Thus, even as the domestic market shrinks, the industry must establish a new earnings base and grow sustainably, by securing income in the core businesses of refining and wholesaling and investing in new markets.

As a commitment to new business development, oil companies are required to enter the deregulated electricity and city gas businesses and the high value-added petrochemicals business in a bid to become a "comprehensive energy industry." International expansion is also important, including by promoting the export of petroleum products by enhancing international competitiveness and by expanding business in the growth markets in Asia. Many companies are already engaged in lubricants business and petrochemical business such as paraxylene overseas, but more companies should start new overseas businesses that involve refining and distribution. In this respect, attention must be paid to Idemitsu's new JV refinery in Vietnam which is planned to start operation in spring 2018.

Facing greater environmental pressures, the oil industry must comply with the International Maritime Organization's (IMO's) low sulfur marine fuel oil requirement in 2020 in the short term, and respond to the electrification of vehicles in the long term. Efforts to mitigate global warming by hydrogen energy infrastructure and renewable energy businesses are also a major challenge.



4. Challenges for the Electric Power Business

Junichi Ogasawara, Senior Economist, Manager
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Electric Power Industry & Smart Community Research Subunit
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With the expansion of renewable power capacities, the ratio of oil-fired thermal power, which has so far served as peak supply capacity, is decreasing. The day-ahead spot price of the Japan Electric Power Exchange, which is determined by the marginal supply capacity, has been determined by oil-fired thermal power, which is the peak supply capacity, in most time slots. However, in FY2018, LNG thermal and coal thermal will be increasingly responsible for these time slots.

In terms of retail competition, the day-ahead spot price was around 8 yen/kWh in many months in 2017. In 2018, that price is likely to remain unchanged as the marginal supply capacity will gradually shift to LNG and coal thermal power even though oil prices are expected to rise. As more PPSs procure supplies in the day-ahead spot market, the unchanged spot price will help PPSs become competitive, although the benefit may be offset by the shrinking margin of electricity tariffs, particularly for high voltage users.

In Europe and the US, as renewable power capacities expand, there is a debate on how the wholesale electricity market price should be formed and how to pass it on to retail tariffs, and on the direction of power distribution charges. In these countries, revisions of wholesale price formation are underway, reflecting a supply-demand crunch in price formation and incorporating supply capacities that cannot meet load-dispatch instructions, such as must-run power (power sources operating irrespective of profitability to meet grid constraints), into wholesale pricing, as renewable power capacities expand and make it difficult to recoup the fixed costs of thermal power. As power suppliers grow inflexible with the increase in renewable electricity, there is a growing need for a mechanism to ensure that power consumption responds to the supply-demand situation, and hence growing calls to strengthen the link between retail tariffs and the wholesale spot price. For leased transmission fees, the focus is on how to set incentives to avoid enhancements to the distribution system that result in higher electricity tariffs, even as more dispersed supply capacities connect to the distribution system.

Regarding system reforms, the trading of use of inter-regional connection lines at the power exchange and the sale of non-fossil-fuel-value certificates for the FIT portion are scheduled to start in FY2018. With the planned launch of the base load electricity market, which provides PPSs access to nuclear and hydropower generation sources, and indirect transmission rights, which hedge inter-regional price differences, and the sale of non-fossil-fuel-value certificates for the FIT portion in FY 2019, it will also be necessary to draw up the detailed design of these schemes and develop necessary systems. The detailed design must make progress in FY2018 in order for the capacity market to start trading in FY2020. With a fundamental review of conventional electric power systems underway in Europe and the US as described above, Japan must conduct such reforms after determining the future direction of the electric power system. The discussion on system reforms in FY2018 must be firmly based on such vision of the future.



5. Challenges for the Gas Power Business

Yoshikazu Kobayashi, Senior Economist, Manager
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Regarding the gas business in 2018, attention will be focused on the impact of the gas system reform in April 2017. The supply rate by new retailers in the residential sector remains low at only 1.2% as of August 2017. This is because to enter the domestic gas market at present, a supplier must be capable of purchasing a certain amount of economical LNG and must possess the marketing capability to sell the purchased LNG on its own. Hence, there have been new entrants in only four areas: Kanto, Chubu, Kansai, and Kyushu. Meanwhile, in those areas which did have new players, price competition has started with existing suppliers not only within the same area but also increasingly with those from other areas, showing that the effects of full liberalization are gradually kicking in.

In FY2018, the third-party access system of LNG terminals will effectively start. This is because under the current system, many of the LNG terminals available for third-party access announced their plans for usage and the availability of facilities and signed contracts with users during the previous fiscal year. As with new players in the residential gas market, only a limited number of third-party suppliers are expected to use the LNG terminals. However, the effective launch of the system may generate renewed attention on how this system will actually function. In the industrial gas market which was liberated before 2017, the share of supply by new players is growing, reaching 15% as of August 2017. The focus is now on the impact of the regulation prohibiting the installation of “dual pipeline”, which was eased in the gas system reform.

In 2018, the supply-demand balance will continue to ease overall in the international LNG market as new projects begin to operate. However, as global demand expands, the rate of seasonal change will increase, causing temporary supply-demand mismatches to drive up LNG prices, such as when the spot LNG price of Northeast Asia soared to more than \$10 in December 2017. In 2018, the price of LNG arriving in Japan is estimated at an annual average of \$9.7/mmbtu (\$8.1 for January-October 2017) considering the rise in the ratio of purchases based on long-term contracts as LNG projects funded by Japanese companies start to operate, and oil prices are likely to be higher than in 2017. The spot LNG price for Northeast Asia is estimated at an annual average of \$6.4/mmbtu (\$6.5 for January-October 2017) reflecting the easing supply-demand balance, but its impact on import prices will be limited as its ratio in Japan's LNG import will fall.

There are no significant supply-side risks in sight in the international LNG market in 2018. However, factors such as operational troubles in new projects, China's accelerating LNG demand, and diplomatic confrontation between Saudi Arabia and other Middle East countries and Qatar could cause the supply-demand balance to tighten depending on how such factors develop, and thus close attention is required.



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