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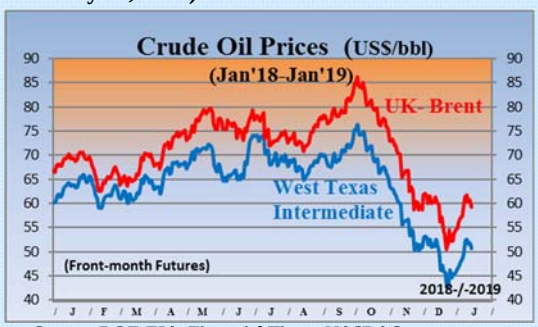
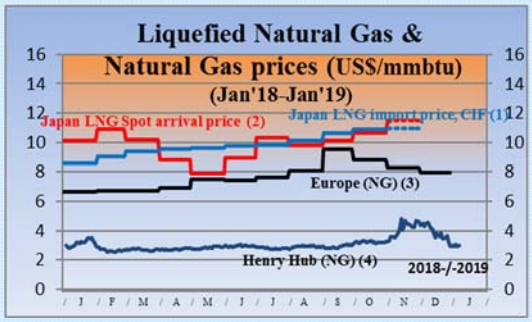


Source: DOE-EIA, Financial Times, NASDAQ



Sources:
(1) Ministry of Finance "Japan Trade Statistics"
(2) Ministry of Economy, Trade and Industry (arrival month basis)
(3) Estimated by World Bank (Netherland Title Transfer Facility)
(4) DOE-EIA, NYMEX (Front-month Futures)
(5) Investing.com

Source: x-rates.com

Source: Financial Times

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The international coal market will continue to be strongly influenced by China's situation in 2019. The spot price for steam coal is projected to fall to $80/tonne in the off season and the spot price for coking coal is projected to fall to $170/tonne for coking coal in 2019.

6. Nuclear Power

By the end of 2019 only 11 plants at most will have restarted. Meanwhile, operators' decisions on their plants that have been running for 30 years are awaited. The progress of China's and Russia's plans, both in and outside their countries, must also be watched.

7. Energy Efficiency

Energy Efficiency will continue to make progress in various countries as systems are built and regulations strengthened. Amid a growing interest in ESG investment, private-sector efforts including setting energy efficiency as a criterion for evaluating companies are expected.

8. Update on Policies Related to Climate Change

With the rulebook for the Paris Agreement now completed, the focus is expected to shift in 2019 to the update of the 2030 pledges. The climate policies of each country must be closely monitored.

III. Challenges of the Domestic Energy Industry

1. Oil Industry

While domestic oil demand continues to decline and pressure to import gasoline mounts, the response to the revised IMO shipping fuel regulations will be a major issue in 2019. Further challenges are enhancing disaster response capabilities and realigning the medium- to long-term management base.

2. Electricity and Gas Businesses

The shape of the new market created by the Reform Acceleration Subcommittee is emerging, while competition is coming under the spotlight in the gas business as well. How to enhance competition while securing supply stability is a challenge.

5. Coal

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In 2018, it is estimated that global coal demand increased slightly as it increased mainly in Asia including China, India, and ASEAN while it continued to decrease in Europe. Coal prices remained generally high for both steam coal and coking coal at around $100 and $170–260, respectively, though both with fluctuations.

The spot price for steam coal (FOB, shipped from Port of Newcastle, Australia) was over $100/tonne in early 2018, fell to nearer $90 in late March to April before rising to $120 in late July due to increased imports by China and India. The price then fell below $100 in late November and is just above $100 until the end of December.

Meanwhile, the spot price for coking coal (FOB, Australian premium hard coking coal) fell from $260/tonne at the beginning of 2018 to almost $170 in late April, climbed to $200/tonne in June with increased imports by China and India, then fell again to the lower $170 range. The price then rose on the back of India's robust imports and expected increase in China's demand toward the winter, remaining in the around $220 range between late October and the end of December.

A year-on-year comparison of coal imports of major countries in 2018 shows that steam coal imports for January-October increased by 21.7 million tonnes in India and 13.9 million tonnes in China and by 8.5 million tonnes for January-September for ASEAN countries (Vietnam, Thailand, and the Philippines combined). Imports remained generally unchanged for January-October in South Korea and Japan but dropped by 16 million tonnes for January-June for 15 EU countries combined. Coking coal imports increased by 5.2 million tonnes in India but decreased by 2.5 million tonnes in China, 1.8 million tonnes in Japan, and 0.8 million tonnes in South Korea for January-October. China's coking coal imports dropped by 8.8 million tonnes year-on-year for January-April but exceeded the previous year's levels from May.

Meanwhile, a year-on-year comparison of coal exports of major countries shows that Australia's exports increased by 4.3 million tonnes year-on-year for steam coal and by 2.8 million tonnes for coking coal for January-September. Exports were strong in the US where coal prices remained high, increasing by 6.4 million tonnes for coking coal and 11.6 million tonnes for steam coal for January-October. Exports decreased in Colombia by 9.7 million tonnes, increased by 17.5 million tonnes in Indonesia, and remained flat in South Africa.

In the coal market in 2019, demand for imports is likely to increase mainly in India and ASEAN but to settle down in China where economic growth is expected to ease. The market and prices are likely to follow a downward trend as they are affected significantly by China's situation. The spot price for steam coal will fall toward the spring off season and then fluctuate due to seasonal factors. Prices are projected to fall to almost $80/tonne in the off season as China's imports subside, at an annual average of $88/tonne. The spot price for coking coal is projected to fall to the $170/tonne range due to an expected increase in supply as closed mines are reopened and existing ones are expanded, with an annual average of $185/tonne.

6. Nuclear Power

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As of December 2018, nine nuclear power plants have resumed operation in Japan. Tokyo Electric obtained permission in December 2017 from the Nuclear Regulation Authority (NRA) to make changes to its Kashiwazaki-Kariwa Units 6 and 7, and the plants are in the final phase of review to restart operation. At Tokai Unit 2, for which the Japan Atomic Power Company (JAPC) obtained permission for lifetime extension in November 2018, JAPC will install additional safety facilities for which work permission has been received. It is not clear when the safety assessments currently under way will end for the ten other plants or when they will be able to restart. Thus, around 11 plants at most are expected to be back in operation by the end of FY2019.

As of December 2018, aside from TEPCO's Fukushima Daiichi and Daini Nuclear Power Plants, decisions have been made to decommission 10 plants in seven power stations since March 2015. Also, a decision will soon have to be made for six others that have been operating for 30 years as to whether they should apply for a lifetime extension permission or be decommissioned.

One of the reasons for the decommissioning decisions is the heavy burden of investment in safety measures. The expenses for additional safety measures estimated from utilities' PR information and media reports as of April 2018 for 35 plants (34 GW) exceed 4.4 trillion yen. This burden may increase further as assessments continue for many plants for which their specified major accident response facilities have not yet been designed in detail. Operators' decisions in light of the remaining life of plants described above are keenly awaited.

From the global perspective, China and Russia are still actively developing plants. In 2018, China started commercial operation of Tianwan Units 3 and 4, Yangjiang Unit 5, Sanmen Units 1 and 2, Haiyang Unit 1, and Taishan Unit 1 (seven plants in total) in quick succession, bringing the number of operating plants to 44 and putting the country third by number of plants, surpassing Japan with 38 (including those whose restart timings are not set). Russia, which had 31 operating plants as of January 2018, started commercial operation of Rostov Unit 4 in September and Leningrad II-1 in October (two plants in total). As both countries plan to put new plants in operation in 2019, Japan may be surpassed by Russia by 2020, and fall to fifth in the world.

While nuclear new build projects are stalled in developed Western countries, plans are progressing in emerging countries. In 2018, Bangladesh and Turkey began to construct Russian nuclear reactors, the first nuclear plants in their countries. Russia is also in talks with Uzbekistan and Egypt to introduce nuclear power, and these plans may move forward in 2019, together with the start of operation of new plants currently under construction in Belarus and other countries.

In recent years, small modular reactors (SMRs) have attracted attention as a new technology that may solve the various challenges of large light water reactors (LWRs). In November 2018, the governments of the United Kingdom, Canada, and the United States each released a policy document on the development of SMRs. Their challenge going forward is how to ensure regulatory readiness and appropriate regulatory processes that do not cause unpredictability for operators, considering the differences between SMRs and large LWRs.

7. Energy Efficiency

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Promoting energy efficiency is a strategically important approach to energy security and mitigation of impacts of climate change, and various countries will continue to pursue cost-effective options this year. Further, there are high expectations for private-sector initiatives. This report discusses the energy conservation situation in the world in 2019 focusing on the residential/commercial and transportation sectors.

In the residential/commercial sector, private-sector initiatives to make buildings “green” will continue in 2019. For instance, as of 2018, 41% of the total floor area of office buildings in the US have obtained either LEED or Energy Star certification for environmental and energy conservation performance, a dramatic rise from 5% in 2005. Amid the growing interest in ESG investment which assesses companies in terms of their contribution to the environment, society and governance, LEED and Energy Star certifications are spreading quickly as indices for evaluating companies. This trend is likely to accelerate, particularly in developed countries.

As energy efficiency standards of buildings gradually rise, an emerging trend is the obligation to introduce renewable energies. In its 2019 energy efficiency standards for buildings, the state of California introduced a new rule requiring new houses (individual houses and apartment blocks up to three stories high) to install solar PV equipment. This year is a preparatory period before official implementation of the rules in January 2020. In India, the energy efficiency standards for buildings were revised in 2017, requiring new buildings to introduce renewable energies as well as passive designs that make use of natural light and ventilation. Such efforts will continue in each state this year, setting obligations and ensuring that they are observed.

In the transportation sector, new systems for expanding ZEVs including hybrids, EVs, and fuel cell vehicles will continue to be launched and lithium-ion battery costs will continue to fall. In China, under the NEV regulations, a mandatory target requiring the production and import of new energy vehicles (NEVs) to account for 10% of the total (in terms of the amount of credit acquired) will take effect in 2019. At the city level, Paris and Mexico City have eased regulations for access by electric vehicles, London has set exemptions to the Congestion Charge, while in nine German cities including Berlin, Bonn, and Munich the courts have issued orders banning the entry of diesel vehicles that do not meet the Euro5 regulation. As many of these regulations will take effect in 2019, the shift to ZEVs may accelerate.

In contrast to the expansion of ZEVs, the United States federal government announced a policy to ease auto fuel standards in 2018. The federal government is urging California and other states to withdraw the ZEV regulation that requires automakers to maintain ZEV credits equal to a set percentage of their sales. This may impact technology development; events must be closely monitored.

In June this year, the G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth will be held in Karuizawa. Japan is expected to lead the discussions as both its public and private sectors are actively involved in innovations in energy conservation, which is essential in shifting to cleaner energies.

8. Update on Policies Related to Climate Change

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The 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP24) in December 2018 completed the rulebook for the Paris Agreement, including a single/common modalities, procedures and guidelines applicable to all Parties for measuring their emissions and tracking their climate policies. Further, regarding the stocktake of the collective efforts of the Parties' nationally determined contributions (NDCs) up to 2030, the COP called on Parties to participate in the Climate Summit to be convened by the UN Secretary General in 2019 and to demonstrate their enhanced ambition.

With the completion of the rulebook, the focus is expected to shift in 2019 to updating NDCs up to 2030. Meanwhile, countries are facing various problems as described below and the situation must be closely watched.

The United States is calling for the promoted use of nuclear, natural gas and fossil fuel with CCS in and outside the country. Within the US, the Department of Energy has been demanding preferential cost treatment for coal-fired and nuclear power plants or measures to require grid operators to purchase electricity from those plants for energy security reasons, while the Federal Energy Regulatory Commission objected, arguing that such measures would not lead to energy security. The DOE's plan is facing difficulties.

China achieved its 2020 target to reduce its CO_2 emissions intensity per GDP by 45% below 2005 levels three years ahead of schedule, while its emissions for 2018 are expected to increase, as happened in 2017. Under such circumstances, attention must be paid to whether China may consider raising the target. Further, the Chinese government announced a reduction of the subsidy for and purchase price of renewable energy due to a shortage of funds, and from January 2019 will require electricity retailers to buy renewable electricity up to a certain percentage of their sales. These policy changes by the Chinese government may have an impact not only on China but also on other countries where PV facilities are constructed by importing Chinese solar panels.

In the EU, the European Commission has revealed a plan to raise its 2030 emissions reduction target from 40% to 45% compared to 1990 levels, to which Germany has objected. The discussions on raising the 2030 reduction target are likely to face difficulties and its development deserves attention. In Germany, the Commission on Growth, Structural Change and Employment (the Coal Commission) was established to consider measures for the social and structural development of brown coal regions and for financial security, and measures to enable the energy sector to achieve its 2030 emissions reduction target (including a plan to phase out coal-fired power plants). The Commission is scheduled to adopt the final recommendation by February 2019; it will be interesting to see the kind of recommendation adopted and how it is implemented.

India is said to be on track to achieve its 2030 target to reduce its GHG emissions intensity per GDP by 33 - 35% and to switch 40% of its power generation capacity to non-fossil fuels (35.9% in total as of the end of November 2018, with hydro at 13.1%, wind at 10.0%, solar at 6.9%, biomass at 2.5%, and nuclear at 2.0%) both ahead of schedule. Attention must be paid to whether these targets will be raised.

III. Challenges of the Domestic Energy Industry

1. Oil Industry

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Japan's fuel oil demand for January-October 2018 was 139.38 million kl, down 2.6% year-on-year. Further, the oil demand outlook for FY2022 released in April 2018 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 1.7% each fiscal year.

In 2018, the price of domestic retail gasoline reached 150 yen/liter at the end of May as oil prices rose, and reached 160 yen/liter on October 22 for the first time in almost four years. The price dropped thereafter as oil prices declined and fell below 150 yen/liter on December 10. Idemitsu and Showa Shell are scheduled to merge in April 2019 to form one of the two giants alongside JXTG. Refineries and major oil companies have successfully passed on most of the costs associated with oil price fluctuations through the reorganization of the domestic oil industry and disposal of excess refining capacity. The domestic gasoline price is expected to continue to follow the trend of import prices of crude oil in 2019.

Meanwhile, in the Singapore market, gasoline supply became excessive as China’s growth slowed while demand for aviation increased since the start of 2018, resulting in low gasoline and naphtha prices and high heating oil and gas oil prices, widening the price gaps between the products. The low gasoline price in the Singapore market increased the pressure in Japan to import gasoline, resulting in imports of 1.17 million kl in the first half of FY2018 (4.5% of gasoline consumption), almost reaching the full-year import volume for FY2017 of 1.22 million kl. Such pressure to import is expected to remain and expand the influence of overseas markets of these products on product prices in Japan.

One of the challenges for the oil industry in 2019 is responding to the marine fuel regulations of the International Maritime Organization due to start in 2020. The sulfur content of marine fuel in general sea areas will be lowered from the current 3.5% to 0.5% or less in 2020. Ships are expected to start shifting to low-sulfur fuel from the second half of 2019 starting with larger ships, and oil refining companies will respond by lowering the sulfur content of the oil that they purchase (refine) and using export gas oil as the blending base for low-sulfur fuel oil. This is expected to cause significant impacts such as a surplus of high-sulfur Type C fuel oil, widened price gap between heavy and light crudes, and a rise in light oil prices. While marine fuel prices will be determined by the international market, how to share the additional cost for environmental improvements fairly among stakeholders, including freight owners, will be a challenge.

Japan was struck by numerous disasters in 2018, including heavy snowfall in Fukui in February, torrential rains in Western Japan in July, and the Hokkaido Eastern Iburi Earthquake in September. The oil industry strived to maintain supplies based on the lessons of the Great East Japan Earthquake, but gas stations closed or ran out of stock in some areas due to transportation issues and speculative demand. The supply networks must be strengthened further as oil is the energy of last resort in a disaster.

In November 2018, Idemitsu Kosan’s joint venture refinery in Nghi Son, Vietnam started commercial operation. As stated in the Fifth Strategic Energy Plan, oil refiners and oil companies undergoing reorganization are required to realign their corporate bases to boost their international competitiveness, expand their business overseas, and transform into a comprehensive energy industry. Simultaneously, they must fully engage in long-term efforts including expanding renewable energy-related business, developing technologies in hydrogen and high-performance materials, and adjusting to next-generation vehicles, heading toward 2050 by when a drastic energy transition and decarbonization will be absolutely mandatory.

2. Electricity and Gas Businesses

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In February 2017, the Policy Subcommittee for Acceleration of the Electricity System Reform published an interim report. As planned in the report, efforts including revising the rules for the base load electricity market and inter-area connection lines and establishing new frameworks such as the capacity mechanism and the non-fossil-fuel-value trading market, are now approaching completion. On the other hand, the restart of nuclear power plants remains delayed, affecting the future of the base load electricity market and the non-fossil-fuel-value trading market. This is making it difficult for electricity producers to establish their future business strategies.

In particular, in the capacity market where capacity contracts will become effective and delivery will start in FY2024, there is concern that some power producers may not be able to recover fixed and O&M costs sufficiently and may choose to stop or close their power facilities, causing a supply shortage. Accordingly, options such as moving up the delivery year to FY2023 and using an electricity bidding system are being considered. As this issue affects predictability for both power producers and retailers and places new burdens on them, it is difficult to find a middle ground. There are doubts about whether the system will actually benefit existing facilities and suggestions that prices should be guided lower in the capacity market, and so new LNG-fired thermal power plants may be built only by power producers who already have several power plants.

In the gas business, the difference in competitive conditions between the gas and electricity businesses is becoming a challenge. There is a considerable difference in market structure between the electricity business, which spans the nation with various regions interconnected, and the gas business which only covers limited areas in cities (gas mains covering just 6% of the total land area) and which has few main pipelines between regions. Further, compared to the electricity business which is relatively easy for new power producers and suppliers (PPSs) to enter, it is difficult for players other than major companies to enter the gas business because smaller companies cannot easily manage security and procure gas on their own. As a result, it was decided to study a system design that is more open to newcomers.

Regarding gas wholesaling, some point out the need to build a market such as an exchange that can provide a price index; Europe and the United States use the spot gas price as the index. One of the reasons is the interaction between the wholesale electricity market and the gas market, because gas is used to meet peak electricity load, and it is necessary to compare the prices and share their difference and time-based value in the actual market as prices change.

On the other hand, few gas-fired power plants use commercial gas mains in Japan and there is limited correlation between the electricity and gas businesses. Thus, unlike in Europe and the US where gas supply networks are well-developed, there is little need to share the time-based value of gas. For the time being, it is reasonable to discuss how to enable operators that purchase LNG to supply gas more flexibly. Ways to boost competition in the gas business will be discussed, but since it has neither a capacity mechanism nor a stockpiling system, competition could result in supply disruptions unless measures to secure liquidity in short-term purchasing of LNG are simultaneously considered.

In 2019, both the electricity and gas businesses will face the issue of how to promote competition while securing stable supplies.

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