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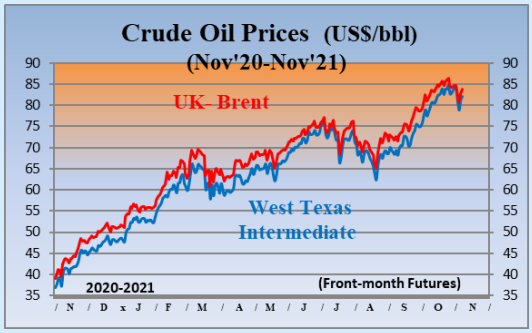
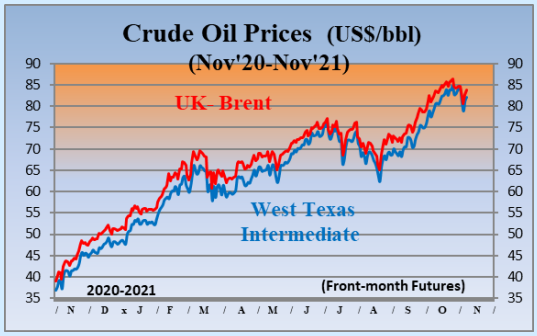
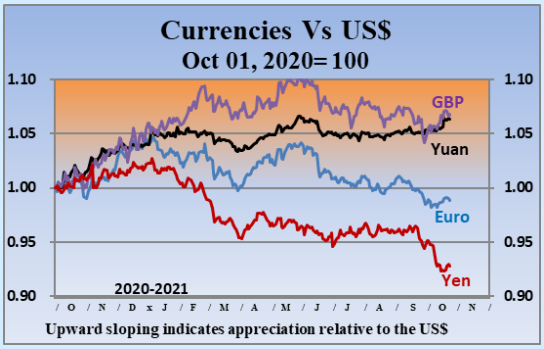


Sources:
(1) DOE-EIA
(2) Investing.com



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)



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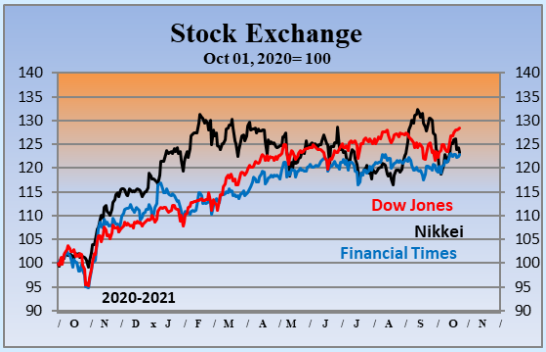

Sources:
(1) Finance. Yahoo.com
(2) Investing.com

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Summary

【Energy Market and Policy Trends】

1. Energy Policies

The newly-launched Kishida cabinet is following the energy and environmental policies of the Suga administration and has approved the Sixth Strategic Energy Plan. However, the outcome of the House of Representatives election may affect the course of basic energy policies.

2. Developments in Nuclear Energy

The special inspection necessary for applying for a lifetime extension license began at Sendai Unit 1. It is hoped that the inspection results will be reflected in the maintenance plan for the next 20 years and that the plants will be utilized to the maximum into the future.

3. Recent Developments in the Oil and LNG Markets

In addition to surging spot gas prices in Northeast Asia and Europe, rising crude oil prices are causing concern over higher retail electric and gas prices in the Northern Hemisphere winter. The global LNG trade grows further in 2021.

4. Update on Policies Related to Climate Change and Energy Conservation

In COP26, discussions on the international credit trading rules deserve attention. For COP26 to succeed, a package containing elements such as finance and adaptation, which developing countries demand, must be created.

5. Update on Renewable Energies

Work on e-fuel and e-gas is accelerating globally. Choosing between hydrogen and e-fuel/e-gas must be discussed in terms of not only fuel price but also the future of supply infrastructure and related industries.

1. Energy Policies

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On October 4, the cabinet of the new prime minister Fumio Kishida was formed. In his first policy speech on October 8, he named three key policy areas: fighting the pandemic, a new form of capitalism, and foreign relations and national security. He only touched briefly upon energy and environment policies, stating "In working to achieve carbon neutrality by 2050, we will also formulate a clean energy strategy that ties global warming mitigation into growth, and will vigorously promote that strategy" as part of a new form of capitalism. This compares with his predecessor and former prime minister Yoshihide Suga, who emphasized his determination to create a green society.

Nevertheless, PM Kishida's energy and environment policies follow those of the Suga administration. The LDP policy pamphlet echoes the draft Sixth Strategic Energy Plan and the Green Growth Strategy towards 2050 Carbon Neutrality, and makes the following promises: "mobilizing all possible policies including a two-trillion yen fund, tax systems for promoting investment, and regulatory reforms to support companies and individuals in taking new challenges, to meet the 2030 greenhouse gas reduction goal of 46% and the 2050 carbon neutrality goal" and "achieving a virtuous cycle of the environment and economy through carbon neutrality, by improving energy efficiency, restarting nuclear power plants whose safety has been assured, electrifying automobiles, and actively backing investments in clean energy including batteries, hydrogen, underground siting of small modular reactors (SMRs), and carbon recycling technologies such as synthetic fuels."

On October 19, the House of Representatives election was officially announced and campaigning began (with votes to be cast and counted on October 31). Covid-19 measures and economic policies are key agenda items, and debate is heating up, particularly on the latter around the keywords of "growth" and "distribution." Although there is less discussion on energy and environmental policies, all parties pursue the 2050 carbon neutrality goal and the policy direction is now fixed.

However, the campaign promises of the parties show that their 2050 visions are polarized. As with the draft Energy Plan, the Liberal Democratic Party (LDP), Komeito, National Democratic Party (NDP), and Japan Innovation Party (JIP) have not set specific numerical targets. Meanwhile, the Constitutional Democratic Party (CDP) aims for 100% natural energy sources for electricity, and the Japanese Communist Party (JCP), Reiwa Shinsengumi, and the Social Democratic Party (SDP) call for 100% natural energy sources, without mentioning electricity in particular. Similarly, while the LDP, Komeito, and JIP have set 2030 reduction targets at 46%, the CDP aims for a reduction of 55%, JCP 50–60%, and SDP 60%, raising targets yet further. Another major difference among the parties is their stance towards nuclear power plants. The LDP plans to push ahead with restarting the plants but says nothing about expanding existing plants or building new ones. Meanwhile, Komeito, the CDP, and NDP do not allow any new builds or expansions and intend to phase them out. Reiwa calls for immediate abolishment, and the JCP and SDP for abolishment by 2030.

On October 22, during the election campaign period, the Sixth Strategic Energy Plan was approved by the cabinet, in time for COP26, as had been expected. The Plan basically adopts the draft prepared in August. However, as described above, there are differences in direction among the parties. Depending on the outcome of the election, the basic energy policies may be overhauled yet again.

2. Developments in Nuclear Energy

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According to the campaign promises of parties published ahead of the House of Representatives election on October 31, the parties have different stances on nuclear power. The Constitutional Democratic Party (CDP), a long-term advocate of abandoning nuclear power, set a clear goal of achieving "carbon neutrality without depending on nuclear" as their third campaign promise on their 2021 House of Representatives election website, while the Liberal Democratic Party mentioned "restarting nuclear power plants that have been confirmed to be safe" and "underground siting of small modular reactors (SMRs)" as part of their second promise of "reconstructing a robust middle-class through a 'new form of capitalism'." This difference may be significant considering that both parties put "protecting lives and living from the pandemic" at the top of their list of campaign promises.

However, apart from the CDP, only the Japanese Communist Party, Komeito, and the National Democratic Party have explicitly included abandoning nuclear power in the future as a campaign promise. This may reflect weak voter interest in the future of nuclear power at this point, compared to Covid measures and economic initiatives that affect lives more directly. Even if a change of government does not occur and the Kishida administration remains in power, a major change in nuclear policy looks unlikely any time soon.

Nuclear operators are positive about extending the operating life of plants that have excellent records. On October 18, Kyushu Electric began the special inspection necessary for applying for a lifetime extension license for its Sendai Unit 1 (PWR, 890 MW, started operation in 1984). The company is also set to start the same inspection at Unit 2 from late February 2022. In the special inspection, the status of degradation of the reactor vessel and other important equipment is checked in detail, providing valuable input to the plant's integrity assessment and maintenance plan for the next 20 years. It is hoped that the plants will be utilized to the maximum in the future.

At Krsko Unit 1 in Slovenia (727 MW, started operation in 1983), a reactor of the same type and age as Sendai Unit 1, the International Atomic Energy Agency (IAEA) conducted a Preliminary Safety Aspects (review) of Long-Term Operation (pre-SALTO review) from October 4 to 14. The plant had already obtained a 20-year lifetime extension license from the Slovenian nuclear regulator in 2015, and the review was conducted at the operator's request. The review concluded that the plant has an excellent safety management program, gave a high evaluation for the aging management of key components, and suggested that the management plan continue to be improved heading toward a future lifetime extension.

Slovenia has had a 10-year average national capacity factor of 92.2% between 2010 and 2019, second in the world following Romania's 93.1%. The list of 10-year average national capacity factor rankings includes other Eastern European countries, namely Hungary, Slovakia, and Bulgaria, where nuclear power plants over 30 years old continue to serve as main power sources for the countries. In decarbonizing the power sector, it is important to consider contributions from existing technologies with excellent records, as well as innovative technologies.

3. Recent Developments in the Oil and LNG Markets

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Unprecedented high levels of gas prices persist around the world. Assessed spot LNG prices in Northeast Asia and spot gas prices in Europe nearly doubled in September while those in the United States gained 30% in the month. They were as of the end of September 6.5, 7.3 and 2.3 times more expensive than a year earlier in Northeast Asia, Europe, and the United States, respectively. The spot gas prices in Northeast Asia and Europe have kept hefty premium against crude oil for three months. Meanwhile, oil-linked term-contract LNG prices are also expected to be higher in the coming winter following the higher levels of crude oil prices.

Although commercial crude oil inventories in OECD countries have been significantly below five-year averages, the OPEC-plus producers have not accelerated the pace of increases of production, driving up the Brent price to over USD 80 per barrel during October. The surge of gas prices has resulted in unusual gas-to-oil switching by some end-users mainly in the power generation sector.

The average inventory level of European underground gas storage, which has been referred as one of the causes of the global gas price rally, stood at 77% as of the end of October being lower than the 10-year average. However, it should not be automatically interpreted as too low on the European Continent where multiple pipeline connections have been established between national markets. The balance of the market in the coming winter is highly dependent on temperatures.

China's vibrant purchasing appetite has been the main driver of growth of the LNG market and rising spot prices in 2021 while term-contract purchasing activities have also been geared up. In October, Shenzhen Gas Group signed a contract with bp to purchase up to 300,000 tonnes of regasified LNG per year for 10 years from 2023, while ENN signed another contract with Cheniere to purchase 900,000 tonnes per year of LNG for 13 years from July 2022. In late September, CNOOC concluded a long-term purchase contract with QatarEnergy for 3.5 million tonnes per year of LNG for 15 years from January 2022.

On the new LNG production project development front, the LNG Canada project announced in early October that its work had surpassed the 50% completion mark. However, the project company remained concerned about schedules the connecting Coastal GasLink pipeline. Meanwhile, it was confirmed that the Mozambique LNG's liquefaction plant would be completed only in 2026 or thereafter.

The world traded 277 million tonnes of LNG during the first nine months of 2021, increasing by 4.6% or 12 million tonnes year-on-year. Asia's LNG import increased by 20 million tonnes, including China's increase of 11 million tonnes. The European Union and the United Kingdom decreased their combined LNG imports by 11 million tonnes. On the supply side, Australia and Qatar exported just shy of 58 million tonnes apiece, similar to their volumes a year earlier. The United States increased LNG export by 60% or 19 million tonnes year-on-year to 50 million tonnes during the nine-month period.

4. Update on Policies Related to Climate Change and Energy Conservation

Takahiko Tagami, Senior Coordinator, Manager
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On October 5, it was announced that the Nobel Prize in Physics would be awarded to Dr. Syukuro Manabe "for the physical modelling of Earth's climate, quantifying variability and reliably predicting global warming." Dr. Manabe developed a "coupled atmosphere-ocean model," which combines a general circulation model (GCM) of the atmosphere and that of ocean, by dividing up the Earth's atmosphere and ocean into grids, and applying thermodynamic and fluid dynamic to them. This "atmosphere-ocean model" has become the standard method for simulating climate change on computers.

On October 6 and 7, Innovation for Cool Earth Forum (ICEF) 2021 was convened, in which the draft roadmap for carbon mineralization was unveiled. ICEF roadmaps have so far been developed for including CO_2 utilization, direct air capture (DAC), industrial heat decarbonization, and biomass carbon removal and storage (BiCRS). Carbon mineralization is a process in which CO_2 becomes bound in rocks as a solid mineral. One of its strengths is that the chemical reactions that mineralize CO_2 do not require energy input. There are two approaches to mineralize CO_2: injecting CO_2-rich fluids into rock formations deep underground, and exposing crushed rocks on the Earth's surface such as farmland to CO_2 bearing gases. It was estimated that carbon mineralization could remove 1 Gt CO_2 per year by 2035 and 10 Gt CO_2 per year by 2050. The roadmap recommends launching dozens of pilot projects worldwide.

For COP26, which will commence in Glasgow, UK on October 31, increasing the NDC for 2030 is becoming a political issue. On October 28, China submitted its updated NDC which contains the already announced pledges, and it is still possible that India may update its NDC to reflect the increase in its renewable target. The United States is also seeing its policy measures for meeting its 2030 emission reduction target of 50–52% stuck in Congress, and is unlikely to be able to take the lead at COP26. On October 7, the UAE announced a strategic initiative to achieve net-zero carbon emissions by 2050, followed by an announcement by Saudi Arabia on October 23 to do the same by 2060. Furthermore, on October 26, Australia also decided on a long-term emission reduction plan to achieve net-zero emissions by 2050.

On the subject of the Paris Agreement "rulebook," attention must be paid to the discussions on the outstanding agenda related to Article 6 of the Paris Agreement, namely guidance on the use of internationally transferred mitigation outcomes, and the rules, modalities, and procedures for the mechanism for mitigation activities, as well as whether the CDM should be continued or halted. Other challenges include deciding common target years beyond 2030 (common time frames) and common tabular formats for ex-post review of the progress of each country (transparency).

Meanwhile, on the subject of climate finance, developed countries committed to a goal of mobilizing jointly USD 100 billion a year by 2020 to address the needs of developing countries under the 2009 Copenhagen Accord. At COP26, deliberations will be initiated on setting a new collective quantified goal from a floor of USD 100 billion per year. However, according to the OECD report presented on September 17, the amount of climate finance provided and mobilized by developed countries remained at 79.6 billion dollars as of 2019. Developing countries are becoming increasingly distrustful claiming that the COP26 agenda is skewed to the subject toward emissions reduction (mitigation), and that the 100 billion dollar goal has not been reached. To be successful, COP26 will need a package that includes crucial elements for developing countries, such as finance and adaptation.

5. Update on Renewable Energies

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Work on e-fuel is accelerating globally. E-fuel is a collective name for fuels such as ethanol and diesel produced from renewable electricity-based hydrogen; methane is called an e-gas. Cases of commercialization include efforts by Carbon Recycling International launched in 2012 in Iceland, in which methanol is produced by synthesizing the hydrogen produced by electrolysis using zero-emission geothermal and hydropower with the CO_2 in steam from underground used for geothermal power generation. Audi of Germany is also conducting research and development and social implementation of e-diesel, e-ethanol, and e-gas as auto fuels.

Last year, a consortium named Norsk-e-Fuel was launched in Norway, aiming to supply 10 million liters of aviation e-fuel within three years. The consortium comprises Germany's Sunfire known for its SOEC co-electrolysis technology (electrolysis of water and CO_2 using a solid oxide electrolysis cell) and Switzerland's Climeworks with its direct air capture (DAC) technology. Siemens Energy, Enel, ExxonMobil, and Porsche have also jointly announced a plan for the production of e-fuels for automobiles using inexpensive wind power from Chile. Announcements on the start of e-fuel development have continued this year by overseas companies, including Finland's shipping engine company Wärtsilä, Rolls-Royce, Finnish research institute VTT (jointly with Finland's energy firm Neste), and Swedish renewable energy development company Liquid Wind (jointly with Siemens Energy). Aviation fuel, which has high added-value, is considered to be a promising initial market for e-fuel; the German government formulated a roadmap for aviation e-fuel in April that sets a goal of producing 200,000 tonnes of e-kerosene by 2030. In September, major Danish wind power firm Ørsted and US gas company Williams signed an MOU on the joint development of e-gas.

E-fuel and e-gas are one of the options for using hydrogen. They can be used in existing infrastructure and equipment, which is an advantage, but their production costs will always be higher than that of hydrogen. Take passenger cars as an example. Since the car price is the dominant factor for users when judging a car's economic efficiency, inexpensive conventional internal combustion engine (ICE) vehicles may have an advantage over expensive fuel-cell vehicles, even though e-fuel price is expensive. However, at a car race in May, Toyota Motor successfully burned hydrogen fuel in a car combustion engine, which had been considered extremely difficult technically. If hydrogen ICE cars become available at the same price levels as existing ICE cars, the advantage of e-fuel over hydrogen would shrink.

Naturally, the choice between hydrogen and e-fuel/e-gas must take into account not only economic efficiency as perceived by users but also the existence and availability of fuel supply infrastructure. The impact on related industries is also a crucial factor. Whether to use e-fuel and e-gas to maintain existing infrastructure and technologies, and in turn, the businesses and industries that rely on them, or to build new infrastructure and technologies around hydrogen to create transformative new industries—this is a key question that requires in-depth discussion from various standpoints, as well as decarbonization.

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