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Update on the Decarbonization of Fossil Fuel Utilization
Can we achieve the dual goals of stable supply and emission reduction?
<Summary>

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1. International efforts for reducing greenhouse gases are quickly gathering steam. Unforeseen forms of pressure and calls for action are emerging, including governments setting net-zero emission targets and moving up their interim reduction targets, institutional investors demanding the adoption of bolder climate measures, and court rulings on the responsibility for reducing emission. The environment surrounding fossil fuels is becoming harsher than ever.
2. Under these circumstances, energy industries in and outside Japan are exploring a wide range of decarbonization measures. The US, the Middle East, and some countries in Europe are preparing for the full-scale introduction of carbon capture and storage (CCS) as an essential technology for achieving net-zero emissions. The CO₂ storage potential is known to be sufficient, but it will be necessary to study and prepare an institutional system to accelerate the actual adoption of CCS, alongside addressing any technological challenges (including the sustainability of storage) and economic issues (cost reduction).
3. In the downstream oil industry in Europe and the US, conventional refineries that process crude oil are starting to be converted into bio refineries that produce petroleum products from plant-based oil and animal fat. Decarbonization projects for the future are also under way, including producing sustainable aviation fuel, making synthetic fuel from captured CO₂, and replacing the hydrogen used in the refining process with green hydrogen.
4. In Europe, which is the forerunner in gas projects, initiatives to decarbonize the gas industry such as utilizing biogas, synthetic methane (methanation), and clean hydrogen are being studied. Decarbonization of LNG is also under way, as shown by the expansion of carbon-neutral LNG trade. Plans for introducing CCS at liquefaction plants are also in progress.

5. Methane emissions are receiving attention as a new GHG emission issue, and several international bodies are collecting data and formulating rules on the way to establishing guidelines. The EU and the US are also considering legislating and implementing new regulations regarding methane.
6. For ammonia, a new clean fuel attracting much attention, studies are under way in Japan toward practical application. Going forward, it will be important to secure supplies from a wide variety of locations and feedstocks. Alongside the use in Japan, ammonia is expected to see growing demand in other countries that rely heavily on thermal power, particularly Asian countries.
7. Due to the long lifecycle of infrastructure, it is difficult to switch energy sources quickly. This makes it necessary to maintain existing supply capabilities and supply chains and continue to invest in them, at least during the transition period. In the area of oil supply, upstream investment for oil is expected to remain at just 60% of the 2010–2019 average in 2021, even though oil demand is recovering globally. It is important to make appropriate investments to avoid supply-demand imbalances in the future.
8. Under the basic principles of the 3E+S policy, giving up fossil fuels, with their unique resilience, is not an option. The essence of climate action is to reduce GHG emissions. Fossil fuel is not inherently a “problem”; rather, it is the GHG emissions from using fossil fuels that cause problems. If fossil fuels can be decarbonized before use, it would be possible to reduce emissions while using fossil fuels. Development of new technologies, reduction of costs, and construction of infrastructure must continue to be pursued for fossil fuel decarbonization technologies, mainly CCUS, hydrogen, and ammonia, to enable the continued use of fossil fuels and to ensure supply stability and reduce emissions at the same time.

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