Special Bulletin

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International Energy Symposium on IEA World Energy Outlook 2024

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On October 24, the Institute of Energy Economics, Japan, held an international energy symposium titled “IEA World Energy Outlook 2024” on a webinar basis. At the symposium, Laura Cozzi, Director of Sustainability, Technology and Outlooks at the International Energy Agency, served as a presenter to discuss the key points of the latest flagship IEA report that was released on October 16.

About 600 people participated in the webinar on a registration basis, demonstrating that there is a great deal of interest in Japan in the IEA WEO, known as the world's most famous and authoritative long-term energy outlook. Although the presentation at the webinar lasted for only 30 minutes, the WEO 2024 is nearly 400 pages long, representing the IEA's all-out effort to provide a comprehensive analysis of global energy supply and demand up to 2050 based on the latest international situation.

It is impossible to present all the contents of such a massive report in this essay. In the following, as the first step, I would like to explain the key points of the long-term energy supply and demand analysis up to 2050, extracting only the essence of the report.

As in the previous year, the IEA WEO analyzes energy supply and demand for three scenarios: the Stated Policy Scenario (STEPS), the Announced Pledge Scenario (APS), and the Net Zero Emissions by 2050 Scenario (NZE). The STEPS is a scenario that attempts to depict future global energy market changes while referring to energy and climate change policies announced by each country. The APS is a scenario in which it is assumed that decarbonization and other policy targets announced by each country will be implemented and achieved as they are. The NZE, which has attracted the most attention in the world since its first announcement in 2021, is a backcast scenario that sets the goal of net zero emissions by 2050 for the entire world and indicates how the world should change to reach the goal. While the three scenarios remain the main points in the latest IEA WEO, it interestingly provides a “sensitivity analysis” of potential demand changes for fossil fuels and other energy sources for the first time, taking into account various uncertainties surrounding the energy market with regard to the STEPS scenario.

In the STEPS scenario, the global primary energy supply will gradually increase from 642 exajoules (EJ: 10^{18} joules) in 2023 to 722 EJ in 2050. Leading the increase will be Asian and other emerging and developing countries. However, the global primary energy supply in 2050 will be limited to 635 EJ, close to the 2023 level in the APS scenario, and decrease by 12% from 2023 to 564 EJ in the NZE scenario. This is because energy efficiency is expected to be greater in the APS and NZE scenarios. Among primary energy supply components, natural gas will retain the current level despite declines in oil and coal towards 2050 in the STEPS scenario. Nevertheless, fossil fuels will still account for 55% of primary energy supply in 2050, maintaining their overwhelming position. However, the fossil fuel share in 2050 will drop dramatically to 34% in the APS scenario and 13% in the NZE

scenario. Oil demand in 2050 in the NZE scenario will be 80% lower than the current level. On the other hand, demand and shares for non-fossil energy sources will increase substantially. The expansion of renewable energy will be particularly remarkable. Renewable energy's share of primary energy supply will expand dramatically from 12% in 2023 to 33% in the STEPS scenario, 53% in the APS scenario, and 71% in the NZE scenario. Through such energy supply and demand changes, global CO_2 emissions in 2050 will decrease from 37.7 billion tons in 2023 to 25.6 billion tons in the STEPS scenario, 11.7 billion tons in the APS scenario, and net zero in the NZE scenario. As mentioned above, however, it should be noted that the APS is a scenario in which all policies committed by each country will be realized, while the NZE is a scenario in which the goal of net zero GHG emissions by 2050 is set out first.

Although the WEO 2024 report provides a very comprehensive supply and demand analysis and has details to support the analysis, the webinar featured an interesting presentation to highlight the important points for deciphering the WEO 2024, instead of explaining the numerical data as cited above. Since the contents of the presentation are the same as the Executive Summary of the report, I would like to encourage interested readers to read the Executive Summary.

What impressed me most in the webinar presentation was that it displayed a strong awareness of the importance of energy security. The author paid attention to the point that the presentation highlighted the importance of energy security as a diverse and increasingly complex issue from the perspective of geopolitical risks, global fragmentation, and economic security, while taking into account the energy supply-demand balance. "Fragility in today's energy markets is a reminder of the abiding importance of energy security – the foundational and central mission of the International Energy Agency," says the Executive Summary on its first page. I felt that the importance of energy security served as basso continuo throughout the presentation on the key points of the WEO 2024.

The second point that impressed me in the webinar was that the WEO 2024 analysis includes a sensitivity analysis of future demand changes for major energy sources at a time when the world is filled with uncertainties. The report devotes the entire fourth chapter, titled "Exploring Uncertainties in the Outlooks: Considering Potential Variations from STEPS," to the sensitivity analysis and its implications. Although the webinar presentation exemplified potential fluctuations in oil demand, the WEO 2024 analyzes how uncertainties about key factors such as electric vehicle penetration, renewable energy expansion, potential LNG oversupply, and future electricity demand would affect oil, natural gas, coal, and other energy demand and how such demand would vary from the STEPS scenario. The sensitivity analysis considers potential variations while taking into account influential factors for each energy source specifically, such as switching from oil to gas in the case of oil demand sensitivity analysis. It is important to note that as far as I can remember, there seems to be no precedent for devoting an entire chapter to a sensitivity analysis in which demand fluctuates up or down. This apparently indicates that the IEA attaches importance to the possibility and significance of such fluctuations.

Another interesting point is that the STEPS scenario is adopted as the base for exploring potential energy demand fluctuations. The sensitivity analysis indicates how energy demand would fluctuate up or down from STEPS forecasts due to various factors and builds on the indication to consider implications for energy policy. This apparently suggests that the STEPS scenario serves as a key reference for future analysis. Pointing out uncertainties about future demand for oil, gas, coal, electricity, and other energy sources and the importance of responding to such uncertainties is in harmony with the aforementioned stance of emphasizing energy security. This sensitivity analysis is considered to be extremely meaningful and interesting for any analysis based on the current

international energy situation. Apparently, due to the fact that the emphasis is placed on sensitivity analysis, another impressive point for me is that the latest IEA WEO makes no prominent mention of the NZE scenario that has attracted global attention over the past several years.

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