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How to Read IEA's "Net Zero by 2050" Report

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On May 18, the International Energy Agency released a report titled "Net Zero by 2050: A Roadmap for the Global Energy Sector." As indicated by the title, the report analyzes and considers a scenario for global net-zero greenhouse gas emissions in 2050, comprising a summary for policymakers and four chapters. It provides quantitative analyses and detailed arguments regarding future energy supply and demand toward achieving net-zero emissions and the achievement's impacts on economy and employment.

Chapter 1 analyzes the effects of climate change policies including major countries' targets for achieving net zero emissions or carbon neutrality, which have been announced one after another since last year. Chapter 2 discusses energy supply and demand in the Net-Zero Emissions by 2050 Scenario (NZE), relevant investment and uncertainties about key technologies and consumer behavior. Chapter 3 describes future supply of fossil fuels and low-emission fuels such as hydrogen and ammonia, as well as the future pictures of power, transportation, industry, buildings and other sectors. Chapter 4 considers the NZE's wide-ranging implications including those for the global economy, employment and the energy industry.

At a time when carbon neutral and decarbonization initiatives are attracting global interests, the report has become a focus of attention among energy policy and industry stakeholders and experts in the world and has been extensively covered by major mass media. In this bulletin, I would like to make a few comments on how to read the report, based on my personal understanding, refraining from explaining details of the 223-page report under a space constraint. (The IEA report can be downloaded from https://www.iea.org/reports/net-zero-by-2050)

First, the IEA report adopted the so-called backcasting approach for analyzing the NZE. This means that the report indicates how global energy supply and demand would be restructured if the world reaches net-zero emissions in 2050. The IEA sets the future goal for the world first for an analytical purpose and reckons backward from the future goal to work out how to reach the goal. The back-cast approach is one of effective and powerful tools for developing and analyzing future scenarios. The IEA has also used the backcasting approach to provide the sustainable development scenario to achieve the United Nations sustainable development goals in its flagship long-term energy supply and demand outlook, "World Energy Outlook." One of the approach's advantages is that it can indicate what should be done, what challenges should be resolved and what should be overcome to reach a goal. In the NZE analysis, the IEA report cites key milestones for the entire world including (1) an immediate end to investment in new oil and gas development, (2) a ban on new internal combustion engine vehicle sales in 2035 and (3) a zero-emission global power sector in 2040.

These milestones are sensational, leading many mass media to cover the IEA report. In fact, each milestone mentioned above needs to face major challenges regarding feasibility and energy security. As described above, however, the IEA analysis is based on the backcasting approach,

indicating how the world should be transformed to reach net-zero emissions by 2050.

The concern to me is that the future scenario given by the IEA known as the authority for forecasting future global energy supply and demand could be taken as a “forecast”. In the report, the IEA does not necessarily forecast that the world would reach net-zero emissions by 2050 or that the abovementioned three milestones would be achieved or conclude that the world should reach net-zero emissions by 2050, as far as I understand. As the IEA analysis becomes widely used by and known to policy planners, industry circles and citizens in the world in the future, it would be important to accurately understand the characteristics of this analysis and scenario.

Second, it must be noted that the IEA analysis does not indicate the NZE as a natural development or a forecast that the world would matter-of-factly go in the NZE direction. Rather, it reminds us of how challenging the NZE would be or how great reforms or innovations required for the NZE would be. This is because the NZE envisages the three critical conditions that “the entire world” would “reach net-zero emissions” “by 2050”, as noted above. Surely, more than 120 countries including such major countries as Japan, the United States, European Union members, China and South Korea have announced their targets of achieving carbon neutrality by 2050 (2060 for China). Pragmatically, however, it is well known that it would not be easy even for advanced economies like Japan, the United States and the European Union to achieve the goal. As indicated by Prime Minister Yoshihide Suga and discussions on the revision of the Strategic Energy Plan in Japan, it would be a great challenge for Japan to accomplish carbon neutrality by 2050. This is the same for the United States and Europe. Given economic, social and energy supply/demand conditions in emerging and developing economies that have yet to announce carbon neutrality targets, it would be unimaginably challenging for the world to reach net-zero emissions by 2050. Technologically, innovations including CO_2-free hydrogen, direct air capture, bioenergy with carbon capture and storage, and other negative emission technologies would have to be introduced and diffused to realize the NZE. These innovations would have to make rapid progress with costs being drastically reduced. We must remember that the NZE would be accompanied by great challenges.

Third, I would like to point out that NZE implications can be considered more in detail from various angles in the world. In the NZE, rapidly progressing investment in clean energy sources and technology would create 14 million jobs by 2030 and the oil, gas and coal sectors would lose five million jobs due to peaking demand, resulting in a net employment increase. Global GDP in the scenario would be more than in the Stated Policies Scenario. The NZE indicates a view that efforts to reach net-zero emissions would work positively for the global economy and employment. In this sense, the NZE represents a rosy and bright future scenario. There would be no problem if the world goes in the direction of the rosy and bright future. Whether the world would really go in that direction is a matter of concern. If achieving net-zero emissions contributes to economic growth and employment, the world would naturally go in that direction. India, the Association of Southeast Asian Nations and other developing economies would choose to seek net-zero emissions in “business as usual manner”. Realistically, however, mainly advanced economies would conduct interventions in the form of strong climate change and energy policies to address environmental externalities for the sake of climate change prevention serving global interests, leading the world to deviate from a business-as-usual future. This may be a path to the NZE. The path would include not only positive factors for economic growth and employment but also high costs for transition to the NZE and economic dislocations that would exert downside pressure on the economy. The NZE’s implications for the global economy and employment may continue to attract attention as global challenges.

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