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IEEJ Outlook 2022 as Seen from Oil-producing Countries

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This week, I had online discussions with energy market analysts in oil-producing countries on the future international energy situation and relevant challenges. We then referred to various long-term energy outlooks including the IEEJ Outlook 2022 released by the Institute of Energy Economics, Japan, in October. In the online discussions, I first reported an overview and features of the IEEJ Outlook and highlights of the analyses in the latest outlook. Based on my report, we had vigorous discussions. (See A Japanese Perspective on the International Energy Landscape (555) for key points of the IEEJ Outlook.) In the following, I would like to comment on some impressive points of the online discussions.

First, we discussed the significance of the bottom-up approach that characterizes the IEEJ Outlook. Analyzed in the IEEJ Outlook are three scenarios: (1) the Reference Scenario in which the current trends will continue, (2) the Advanced Technologies Scenario in which advanced technologies for climate change and energy security countermeasures will be introduced to the maximum extent, and (3) the Circular Carbon Economy Scenario in which CO_2-free hydrogen will be introduced on a large scale through the decarbonization of fossil fuels and others with the use of the Advanced Technologies Scenario as a baseline. The three scenarios project future pictures of energy in the world under various technology assumptions based on expert judgment by IEEJ researchers. The bottom-up approach contrasts with the top-down, or backcasting, approach for the net-zero emission scenario in the International Energy Agency's World Energy Outlook released almost at the same time as the IEEJ Outlook. The backcasting analysis projects future energy supply and demand for the goal of net-zero emissions.

As pointed out in the online discussions, the backcasting analysis provides significant implications for policymakers and strategists by indicating how the world would change toward a goal or what should be done when for reaching the goal, but it bears the risk of being misunderstood as an outlook. When the IEA's NZE scenario was published for the first time in May 2021, misleading reports stated that new upstream oil and gas investment would no longer be required according to the NZE scenario. In this respect, it was noted that the bottom-up analysis that indicates how the world would change under technology and other assumptions is important for depicting a future world, finding challenges emerging in the future and considering solutions, as well as for making up for problems and weaknesses of the backcasting analysis. Participants in the online discussions highly appreciated the IEEJ Outlook as providing a significant analysis using the bottom-up approach.

As a matter of course, the bottom-up approach has some challenges. The future picture would change depending on concepts or grounds for technology and other assumptions. Technological and other changes are too discontinuous to predict. How to incorporate dynamic and discontinuous changes into a scenario has remained a key challenge for bottom-up outlooks.

Second, online discussion participants demonstrated their high interest in and high ratings for the Circular Carbon Economy Scenario and the potential and impact of the decarbonization of fossil fuels in the scenario. This scenario pursues a comprehensive circular carbon initiative to address climate change. Based on the fact that fossil fuels account for most of global energy supply, the scenario depicts a world that would substantially reduce CO_2 emissions while decarbonizing and consuming fossil fuels. The IEEJ Outlook indicates quantitative data regarding the decarbonization of fossil fuels and the decarbonization's impacts and significance, while other papers have conceptually described fossil carbon decarbonization and its potential to reduce CO_2 emissions. In this sense, some online discussion participants appreciated the scenario analysis as contributing to knowledge regarding energy issues.

As a matter of course, the future picture in the Circular Carbon Economy Scenario and its key components such as the fossil fuel decarbonization and the contribution of blue hydrogen entail a mountain of challenges, including the development and diffusion of relevant technologies, thorough cost cuts and the development of international supply chains and relevant infrastructure. Regarding the use of CO_2-free hydrogen, how to measure, report and verify CO_2 footprints for green, blue and yellow hydrogen/ammonia options and individual projects will become important along with rulemaking for assessing their environmental sustainability. There are many problems to be overcome before CO_2-free hydrogen begins to play a key role in decarbonization. Through the online discussions, however, I felt that it was significant for the Circular Carbon Economy Scenario in the IEEJ Outlook to emphasize the importance of comprehensive initiatives to address climate change and that the scenario analysis should be detailed and developed further.

Third, the IEEJ Outlook attracted great interest by comprehensively compiling key points about challenges and issues toward global carbon neutrality. The compilation did not necessarily include any quantitative analysis on each challenge or issue. Some online discussion participants noted that it was significant for the IEEJ Outlook to comprehensively compile points to consider in promoting carbon neutrality initiatives in regard to carbon neutrality's economic impacts, the generation and expansion of gaps, impacts on energy security, the repercussion of upstream investment shortages as part of such impacts, and geopolitical impacts.

No global consensus has been formed about what positive and negative impacts on economic growth and employment would emerge in the world going in the direction of carbon neutrality. The online discussions highlighted issues including if any impact would become positive or negative depending on conditions for individual countries or entities and if gaps would eventually widen. Participants in the discussions indicated great interest in the potential expansion of gaps through the generation of great economic burdens in developing economies, as noted in a CO_2 emission reduction and electricity cost analysis for the Association of Southeast Asian Nations in the IEEJ Outlook. Regarding energy security, some discussion participants pointed out that it was significant for the IEEJ Outlook to analyze complex, multi-layered security issues in the world going toward carbon neutrality under the recognition that stable supply and security are realistically a top energy policy priority as acknowledged through the current simultaneous energy price hikes. Particularly, the IEEJ Outlook attracted high interest by estimating how fast spare oil and gas production capacity would be lost to plunge the world into supply shortages in the absence of upstream oil and gas investment. Stable energy supply would be important for the world going toward carbon neutrality. Stable fossil fuel supply would be a key challenge during a long transition to carbon neutrality. Online discussion participants pointed to the significance of the IEEJ Outlook

that clarified this point.

Inclusive initiatives that fully consider various national conditions are required to address climate change as a challenge common to all humans. Lastly, I would like to note that the importance of inclusive initiatives clarified in the conclusion of the IEEJ Outlook was cited again in the sum-up of the online discussions and became a keyword in the discussions.

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