

Energy Transformation and Sustainable Growth

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After COP26 in November 2021, actions on climate change countermeasures were expected to accelerate further in 2022. Unfortunately, the 2022 winter started with a concern for natural gas shortage around the world. Earlier in the 2021 summer/autumn season in Europe, demand for natural gas surged rapidly caused by a shortage of renewable electricity. Consequently, gas prices increased not only in Europe but around the world as well, raising concerns about the impact of fuel shortages on power supply. Meanwhile, Russia's invasion of Ukraine in February further increased the natural gas supply shortages, resulting in soaring energy prices. The 2022 shortage situation that suddenly emerged forced the world to realize the importance of energy security.

Natural gas, which is considered as the transitional energy source to future climate change countermeasures, is now becoming an issue as developing and emerging countries may continue to use cheap coal while the wealthier developed countries can secure the expensive gas (and lower their emissions). This may bring back the issue of divided world (i.e. North-South issue). To resolve climate change, it is essential for all countries to reduce emissions, including emerging and developing countries. Therefore, at this IEEJ/APERC symposium and as a follow up from the previous year, we discussed with Asian researchers the challenges of achieving carbon neutrality for the emerging and developing countries.

Introduction

This is a summary of Session 2 of the IEEJ/APERC Symposium, held in Tokyo in April 2022. It was entitled; "The Path to Achieving Carbon Neutrality in Emerging Asian Countries". Climate change is a challenge faced by humanity and it cannot be solved by some or a few countries alone. The current crusade toward carbon neutrality (CN) for all is not perfect because of the insufficiency of concrete measures suitable for the developing world, even under a Sustainable Development Philosophy. The key is whether the entire world, emerging and developing as well as developed countries, can tackle climate change and move in the same direction.

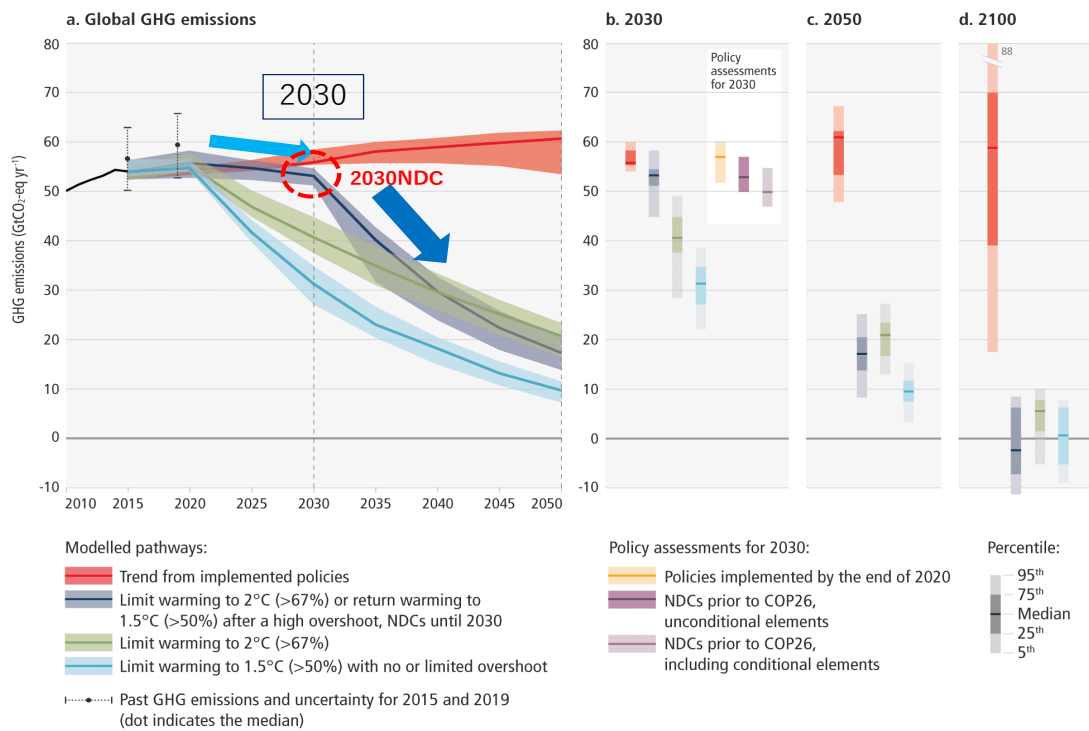
In early April, the IPCC Working Group III report was released, and it was once again pointed out that the summation of the countries' Nationally Determined Contributions (NDCs), that are targeting 2030, are significantly insufficient to be on the paths of either the 1.5°C target or the 2°C target for 2050. Substantial emission reductions from 2030 onward will be necessary (Fig. 1).¹ The movement toward decarbonization by the financial community and companies is rapidly gaining momentum, but the perspective of how to support the transition to decarbonization in emerging and

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¹ IPCC AR6 WG3 SPM Figure SPM.4

developing countries is often overlooked. In this session, we continued from last year and discussed the importance of transition.

Fig. 1 Relationship between Emission Pathways and NDC Targets Depending on Future Temperature Rise Levels



(Source) IPCC AR6 WG3 SPM Figure SPM.4

What is Necessary for the Energy Transition of Emerging and Developing Countries

At the beginning of the session, Asian experts talked about their own perspectives on what would be required by the emerging and developing countries to transition towards carbon neutrality.

Dr. Han Phoumin, Senior Energy Economist, ASEAN-East Asian Research Centre (ERIA), collaborated with the Institute of Energy Economics, Japan (IEEJ) in a study on electrification toward decarbonization in ASEAN². He emphasized that the strategy should first utilize as much as possible zero carbon power sources, including conventional hydropower, geothermal, biomass, etc. By 2060, ASEAN should achieve a well-balanced use of low-carbon technologies for various fossil fuels, including hydrogen, ammonia, CCS, etc., which would lead to effective CO₂ emissions reductions. He emphasized the importance of reducing the technology costs and increasing the

² ERIA and IEEJ, Decarbonisation of ASEAN Energy Systems: Optimum Technology Selection Model Analysis up to 2060 (July, 2022) [Decarbonisation of ASEAN Energy Systems: Optimum Technology Selection Model Analysis up to 2060 \(eria.org\)](https://www.eria.org)

international cooperation in overcoming the economic challenges toward achieving carbon neutrality. A scenario based on carbon neutrality will result in higher costs for the emissions reductions and higher energy prices.

Dr. Leana Srivastava, then deputy director of the International Institute for Applied Systems Analysis (IIASA), pointed out that as of November 2021, countries that accounted for 90% of global greenhouse gas emissions had agreed to net-zero targets. Unfortunately, countries accounting for 73% of those emissions have not announced nor released their concrete plans to achieve such objective. She stressed the need to significantly reduce fossil fuel consumption if we want to achieve the goals of the Paris Agreement.

Based on various scenario analyses for carbon neutrality, it was pointed out that power demand will increase in the future due to electrification in the transport sector and population growth. The amount of power generated by renewable energy will increase significantly and become one of the major power sources. However, it is also estimated that in South and Southeast Asia, at least 50% of the electricity by 2030 and 100% by 2050 will need to be supplied by decarbonized power sources. Coal-fired power should decline sharply by 2030 and need to be phased out by 2040. Global coal-fired power generation doubled since 2000, primarily because of a rapid economic growth in China and India. As both countries are still planning for significant coal generation expansion in the future, various supports, such as investments in clean energy and infrastructure, the formulation of quantitative frameworks, and governance are needed.

Dr. Dina Azagalieva, Research Fellow at the Asian Development Bank Institute (ADBI), noted the potential of green bonds in Asia, which Europe and the United States introduced ahead of Asia. Green bonds, which surged since 2021, are a means of financing infrastructure investment in the Asia-Pacific region. She also stressed three related issues with green bonds. First, she cited the cost of certification, etc., to indicate that projects are “being green.” One solution to this is government support for green bonds, as has already been done in Hong Kong, China, Japan, Malaysia and Singapore. The second challenge is the risk of fluctuations in foreign exchange relative to local currencies that arises when green bonds are issued in foreign currencies. On the other hand, if the fluctuation is severe, repayment in local currency is one of the options, as has been the case in Malaysia. The third issue is related to the demand uncertainty for publishers with low credit rating (such as Moody’s). One solution to this is for government and pension funds to guarantee the purchase.

The Asian Development Bank’s (ADB) Energy Transition Mechanism (ETM) aims to accelerate the transition from fossil fuels to clean energy based on market forces. As a mechanism, she explained that pilot projects were being carried out in Indonesia, the Philippines, and Vietnam, and that these projects were contributing to the early phase-out of coal-fired power plants in the three countries. She emphasized that there was no single one-size-fits-all solution to long-term climate action, and that it was necessary to take multiple measures.

Energy Security and Asia

The panel discussion first addressed energy security and the dangers of dependence on a single energy source, which have become a concern around the world since the Ukraine crisis.

ADB's Dr. Azagalieva pointed out the implications of a power supply shortage, such as the one that Japan faced in January 2022. The more important message is to first improve energy efficiency (lower demand) because supplies from renewable energy may not increase as fast as demand for electricity will increase in Asian countries. For example, in Malaysia and Singapore, there are examples of green buildings promoting cooling with low-carbon energy using green bonds.

Dr. Srivastava emphasized that achieving carbon neutrality by 2050 will not be easy. She also reminded the audience that each country's path would be different due to issues such as biodiversity, air pollution, as well as energy access in developing countries. Progress toward achieving the SDGs goals is also not rapid and she emphasized the importance of responding with a sense of urgency going forward.

Dr. Phoumin emphasized that carbon neutrality could not be achieved with a single energy source and that decarbonization needed to be considered across all sectors and a wide range of technologies. To achieve carbon neutrality, existing mature technologies that do not rely on fossil fuels such as solar, wind, and biomass must be first utilized, but it is important for government agencies and financial institutions to understand the need for each technology and invest in each of them. He also pointed out the energy transition must rely not only on important technologies such as renewable energy, but on CCS, ammonia, and DACS (direct air capture and storage) as well. In the medium term, he emphasized that the early phase-out of coal-fired power generation would be required, and that the formulation of policies (roadmaps) for the transition from coal-fired power generation to renewable energy would be a challenge in Southeast Asian countries.

It was emphasized that energy security is a top priority for Asian countries and that cooperation among countries is necessary. Amid the current high fossil fuel prices, the need for the immediate introduction and acceleration of renewable energy was pointed out. Dr. Srivastava emphasized that this required a shift in both our own mindset and behavior.

Expectations for Technologies for Carbon Neutrality

The government of Japan is providing for various assistance in technologies such as hydrogen, ammonia, and CCUS. According to Dr. Phoumin, it is important for Southeast Asia, which is currently highly dependent on fossil fuels, to combine and consider other options including hydrogen, ammonia and CCUS. He pointed out that there is a growing need for co-firing technologies and that hydrogen is particularly important for the transportation and power generation sectors, while ammonia is more for the power generation sector.

ADB's Dr. Azagarjeva mentioned that the costs for hydrogen, CCUS and energy storage are rapidly declining, but they are still expensive. She expressed her hope that the use of these

technologies would reduce the needs for fossil fuels. To attract investment, it is important to be green meaning that it is important to use renewable energy for hydrogen production and for storing energy. On the other hand, she said that fossil fuels could not attract investors unless they were used to produce hydrogen (with CCS). She emphasized the need for a “green” definition that was accepted by investors.

Dr. Srivastava, on the other hand, emphasized that technology was one solution, but not the only solution. Since many technologies are still in development and not readily available, the problem is to not get too caught up with high expectations for innovations. It is necessary to recognize that there are risks in new technologies.

Conclusion

Energy security has long been an important issue and often served as the basis of energy policies for countries that heavily rely on imports for most of their energy needs, such as Japan and emerging Asian economies. In the discussion on Japan’s Strategic Energy Plan, securing a stable supply of energy is as high a priority as simultaneously achieving economic efficiency and environmental compatibility (*and nuclear safety (S)*). Energy security is among the 3Es (stable supply, economic efficiency, and environmental compatibility). Since the entry into force of the Paris Agreement, response to climate change has been given top priority, mainly in Europe, and the importance of energy security has been set aside while declaring carbon neutrality captured the center of attention. Issues during the energy transition period have quickly become apparent, calling for the review of the role of nuclear power, the importance of ensuring a stable supply of electricity and the need for securing fuel despite a substantial increase in renewable electricity. The importance of sharing the challenges faced by emerging and developing countries is rising and an increasing international cooperation in energy and environmental measures is required.

Writer’s Profile

Yukari Yamashita

Ms. Yamashita is responsible for quantitative and qualitative analyses on energy policy issues. Her team’s analyses and recommendations contribute greatly to the debate and policy making for Japan and international communities such as ERIA, APEC and IEA. The annual IEEJ’s Outlook is globally recognized for its timely analyses and pragmatic approach towards climate change. She has been serving as a member of various government councils and committees in the fields of energy and science & technologies. She also led miscellaneous international and regional energy cooperation programs through IEA, APEC, ERIA and IPEEC. She served as the 2020 President of the International Association for Energy Economics (IAEE).