

# Can the World Realize Carbon Neutrality?

Hiroki Kudo\*

## Introduction

The Paris Agreement, which was adopted in 2015 and ratified in 2016, aims to limit the rise in global average temperatures to well below 2°C above pre-industrial levels by the end of this century and for pursuing efforts to limit global warming to 1.5°C. It also sets out a target of reaching net-zero greenhouse gas (GHG) emissions, or carbon neutrality, in the second half of this century to achieve the temperature target. Under the Paris Agreement, parties to the pact are bound to set their respective long-term targets and policy measures. After the ratification of the Paris Agreement, the Intergovernmental Panel on Climate Change (IPCC) released the Special Report on Global Warming of 1.5°C and various stakeholders including the United Nations encouraged all countries to enhance global warming countermeasures. As a result, more than 100 countries in the world have vowed to pursue carbon neutrality. Particularly, major advanced countries including Europe, the United States under the new Biden administration and Japan have made political declarations to achieve carbon neutrality by 2050 and enhanced their GHG emission reduction targets for 2030 in consideration of the 2050 carbon neutrality target. China, the world's largest GHG emitting country, released a target of achieving carbon neutrality by 2060. The feasibility of and specific initiatives for the Chinese target have attracted global attention.

The carbon neutrality target has been set to avoid the serious impacts of climate change. It is not a quantitative target set through the accumulation of feasible measures. The challenging target requires innovative technologies to be commercialized and diffused globally through innovations. The achievement of the target includes numerous uncertainties including progress in the development of various technologies and the realization of their sufficient economic efficiency for commercialization. While scrutinizing the feasibility of the carbon neutrality target, technology development trends over time and the effects of policy measures, each country will be required to continuously take measures to improve the effectiveness of relevant initiatives.

At the 6th International Energy Symposium sponsored by the Institute of Energy Economics, Japan (IEEJ) and the Asia Pacific Energy Research Center (APEREC), U.S., Canadian, Chinese and Japanese experts discussed two issues: “How much is the seeming probability of achieving Carbon Neutral by mid-century?” and “What urgent actions are now required for key actors such as government and business to untangle bottlenecks on the way to Carbon Neutral?” Global carbon neutrality is a challenge that requires a dramatic structural transition from the present energy supply and demand system. These experts provided their respective views about the feasibility of the carbon neutrality target and government and business initiatives to realize the target. At a time

---

\* Board Member, Director, Charge of Electric Power Industry & New and Renewable Energy Unit, IEEJ

when less than 30 years remain until 2050, I would like to consider challenges to realize carbon neutrality in the future through discussions between the experts.

## **Key Points towards Realizing Carbon Neutrality**

Kenneth Medlock, senior director of the Center for Energy Studies at the U.S. Rice University's Baker Institute, pointed out that carbon neutrality initiatives should consider differences between economic, social and other national fundamentals. This means that as each country faces multiple turning points regarding economy, society or energy supply and demand, appropriate carbon neutrality initiatives differ by region or situation. While 1.3 billion people out of the global population at 7.8 billion live in advanced economies belonging to the Organization for Economic Cooperation and Development (OECD), 3.4 billion people reside in China, India and the members of the Association of Southeast Asian Nations (ASEAN) where energy consumption is increasing in line with economic growth. In Latin America, Africa and the Middle East where 3 billion people live, access to modern energy services has yet to be secured in the presence of haves and have-nots. Medlock noted that the facts should be recognized.

In non-OECD countries, particularly, economic and population expansion are leading energy demand to increase faster than in OECD countries. Non-OECD countries depend heavily on fossil fuels due to their economic efficiency and easy accessibility, resulting in a rapid increase in their CO<sub>2</sub> emissions. Therefore, Medlock pointed out that carbon dioxide capture and storage (CCS) technologies as well as hydrogen technologies would be important for realizing carbon neutrality in these countries, given that their dependence on fossil fuels is likely to remain heavy. He also noted that while renewable energy technologies attract attention as a key to decarbonization in non-OECD countries, power transmission networks and other infrastructure must be developed to meet an increase in solar and wind power generation capacity from the current levels.

## **Approaches to Carbon Neutrality**

Allan Fogwill, president and CEO of the Canadian Energy Research Institute, discussed current challenges and future approaches regarding global carbon neutrality initiatives.

While being optimistic that carbon neutrality would be technologically feasible, Fogwill pointed out a cost challenge. While GHG emission reduction initiatives are currently implemented under the jurisdiction of national government agencies, it is important that countries at an international level share what they pursue under their respective jurisdictions, according to Fogwill. The energy sector accounts for 73% of global GHG emissions. It must be recognized that not only energy supply-side emission sources, but also various demand-side sources should be subjected to emission reduction initiatives, with consideration given to complex economic and environmental spillover processes. Fogwill noted that the biggest challenge would be that economic growth, trade balance and social infrastructure should all be considered to reduce overall emissions.

The government sector's engagement in GHG emission cuts and its cooperation with the

business sector would be the key to realizing carbon neutrality within the 21st century. The problem is that CO<sub>2</sub> emission reduction initiatives are segmentalized in the absence of any international agreement on the compliance with the Paris Agreement or of integrated GHG emission reduction measures. To resolve the problem, various industries and governments should choose the most cost-effective measures in consideration of market forces, according to Fogwill.

As noted in the IPCC report, global cooperation and collaboration would be indispensable for achieving zero emissions through the introduction of various zero-emission technologies and social and economic transformation. In considering zero-emission initiatives, countries or regions occasionally focus on how to maintain and increase their respective competitiveness. However, the entire international community would have to consider how international or intersectoral cooperation and markets should be for realizing global zero emissions.

### **Trend of China as Key Player**

The direction and effectiveness of initiatives in China as the world's largest GHG emitter are important for realizing global carbon neutrality. Fuqiang Yang, senior advisor for the Climate Change and Energy Transition Program at the Beijing University Institute of Energy, introduced China's current initiatives to achieve net-zero emissions.

China accounts for the world's largest share at 28% of global CO<sub>2</sub> emissions, being the largest coal producer and consumer in the world. In an address to the 75th session of the United Nations General Assembly in September 2020, Chinese President Xi Jinping declared that China would pursue carbon neutrality by 2060 after CO<sub>2</sub> emissions peak out by 2030. China's 14th five-year plan set out milestones to become the most affluent, resilient country by 2050. Its Coal Cap Plan calls for reducing coal's share of total energy consumption to 48%, for setting strict emission standards, for raising non-fossil fuels' share of energy consumption to 21.5% and for cutting the CO<sub>2</sub> emission intensity by 20%. China plans to promote electrification and switch from natural gas to renewable energy in the power generation sector to allow emissions to peak out by 2030.

China has set an ambitious CO<sub>2</sub> emission reduction target for 2023, with the next milestone given for 2028. It sees a 70% cut in the CO<sub>2</sub> emission intensity as feasible and plans to raise renewable energy's share of energy consumption by 2030. To realize carbon neutrality, non-CO<sub>2</sub> GHG emissions including methane, black carbon and chlorofluorocarbon alternatives are planned to peak out around 2025. It was pointed out that south-south cooperation and the Belt and Road Initiative would play key roles in this respect.

China's carbon neutrality target for 2060 represents a political declaration attracting international attention and has exerted great influence on the attitude of Japan and other major countries. However, it must be noted that long-term policies from 2030 and onward and the probability of carbon neutrality are left uncertain. On the other hand, China has set out strategic national initiatives such as electric vehicle technology and market development, as well as the enhancement of its competitiveness in the renewable energy market. We would have to closely watch if such Chinese initiatives would work consistently with the international carbon neutrality

cooperation cited by Fogwill.

## **Roles Government and Market Sectors Would Play in Realizing Global Carbon Neutrality**

Finally, I would like to introduce experts' views about the roles government and market sectors would play in realizing global carbon neutrality.

Medlock noted that the market sector would play extremely important roles. Market-type approaches would be required for serious efforts to realize carbon neutrality by 2050. Government roles would be important, but the government sector alone would not be able to realize carbon neutrality. Government and other various sectors should consider and manage market systems that would play decisive roles in realizing carbon neutrality, according to Medlock.

Fogwill as well pointed out the need for a market in which government and other various sectors would participate. More government interventions in the market would be required. Then, social and economic prioritization would be important, but the market would not necessarily set any priority order. Fogwill noted that the government sector should (1) take advantage of policies, various incentives and tax measures to lower investment risks, (2) keep policies consistent and (3) create an international carbon market and develop governance for the creation.

Yang also pointed to the significance of market roles. The government sector would invest in the market while business administrators and other decision-makers efficiently implement investment and the distribution of resources through the market. While carbon pricing has yet to diffuse among companies, information about desirable investment destinations would allow them to raise investment efficiency to cut CO<sub>2</sub> emissions more rapidly. Carbon neutrality initiatives would drive economic development. The development of technologies for realizing carbon neutrality would lead to new businesses. Carbon neutrality could bring about a new economy and should be taken as a business opportunity as well as a cost, according to Yang.

These experts thus agreed that the world should take maximum advantage of market functions to realize carbon neutrality. As noted by Medlock, however, international differences regarding energy supply and demand, and economic and social conditions should be considered along with different time schedules when initiatives are developed and implemented. Over a short term, it would not be easy to develop a market through integrated carbon pricing amid international differences regarding energy supply and demand conditions, policies and technological strategies. Governments are required not only to develop their respective national initiatives but also to cooperate in building market and other governance mechanisms to simultaneously achieve sustainable national economic growth and carbon neutrality. We would have to closely watch national policies and negotiation stances to check how an economy-friendly cooperative framework would be developed for realizing carbon neutrality under the Paris Agreement.

#### Writer's Profile

##### Hiroki Kudo

Mr. Kudo has served as ISO/TC207/SC7/WG5 (ISO 14064-2: Guidance for the GHG project) Convener, ISO/TC17(Steel)/WG24(ISO 20915) Convener (Life Cycle Inventory Calculation Methodology for steel products), and a committee member/working group members related to climate change policy (including emissions trading scheme) and renewable energy policy organized by central and local governments. Former UNFCCC, The Joint Implementation Supervisory Committee (JISC) member. He is an expert in Global Warming, Energy Conservation and Renewable Energy Policy, Standardization for GHG related activities and Sustainable Finance (ISO).