

# Actions and Scenarios for the Carbon Neutral Society

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## ■Abstract

Japanese Prime Minister Suga declared the goal of realizing a carbon neutral, decarbonized society by 2050 in October 2020, and efforts toward a carbon neutral society are moving forward. The Green Innovation Strategy Council was initiated in July 2020 to implement the Progressive Environment Innovation Strategy announced in January last year, and the Committee on the Growth Strategy formulated a primary plan of the Green Growth Strategy toward a positive cycle of economic growth and environmental protection in December. Full-scale actions to realize a carbon neutral society that mobilize all possible solutions from innovations, such as electrification and greening electricity, realization of hydrogen society, and CO<sub>2</sub> sequestration and reuse, to social implementation of those measures as well as existing technologies have begun. With two trillion yen of Green Innovation Fund created as a supplementary budget, concrete actions are now being undertaken in each field.

A decarbonized society, or a carbon neutral society, is a society where the CO<sub>2</sub> emission is net zero. This situation was maintained in the pre-industrial era when CO<sub>2</sub> absorption by photosynthesis and by ocean, etc. were enough to offset the amount of CO<sub>2</sub> emission as a natural process. Deforestation and large-scale use of fossil fuels, being accelerated rapidly since the Industrial Revolution, have disrupted this natural balance, leading to the increase of atmospheric GHG concentration and eventually global warming. A carbon neutral society where net zero CO<sub>2</sub> emission is achieved artificially through innovation, although it is debatable by what time it should be realized, is appropriate as a long-term goal for global warming mitigation. Furthermore, the fulfillment of 3E + S (energy security, economic efficiency, and environmental preservation on the premise of safety as the basis of Japan's energy policy) and SDGs are also required in order to make the response to climate change sustainable.

In the context of these basic understanding, this presentation examines the outlook of a carbon neutral society and the scenarios leading to its realization. As the measures toward a carbon neutral society, the reduction of atmospheric CO<sub>2</sub> will be necessary in addition to conventional measures such as energy saving, non-fossil energy, and CO<sub>2</sub> capture and storage (CCS). Many of the studies describing scenarios up to the end of this century have shown that CO<sub>2</sub> emissions from power supply will be negative at earlier timing.

There are various uncertainties around the global warming issue. A scenario for a carbon neutral society that is valid under such uncertainties is important. The reduction of CO<sub>2</sub> emissions in the baseline scenario is noteworthy although this has not been much

considered in the discussions of climate change mitigation so far. A scenario for climate stabilization can be possible without relying on high-cost CO<sub>2</sub> reduction measures if the decarbonization led by private sectors through ESG investment emphasizing environment, society, and governance advances along with the development of a digital society (Society 5.0) being promoted by the countermeasures against COVID-19. Long-term climate change measures require technological and social innovation. Social innovation to achieve the SDGs (United Nations Sustainable Development Goals) lowers the baseline of CO<sub>2</sub> emissions, and technology innovation produces clean secondary energy such as electricity and hydrogen without CO<sub>2</sub> emissions and builds a more energy efficient system, which will open up the prospect for the realization of a carbon neutral society.

### ■Biography

Dr. Kenji Yamaji, Emeritus Professor of the University of Tokyo, is Senior Vice President of the Research Institute of Innovative Technology for the Earth (RITE) since July 2019 and Director-General of the research institute since April 2010. He served as President of the Japan Institute of Energy and as President of the Japan Society of Energy and Resources. Dr. Yamaji's immediate past position was a Professor of Electrical Engineering and Information Systems at the University of Tokyo. He obtained B.S., M.S., and Dr. of Engineering degrees in nuclear engineering from the University of Tokyo in 1972, 1974, 1977 respectively. During the earlier part of his career, Dr. Yamaji had been extensively involved in the analysis of energy technology assessment, mainly at the Central Research Institute of Electric Power Industry (CRIEPI) in Japan. He has published more than 80 books as well as many research papers on energy systems, and he is also serving in many advisory bodies on energy and environmental policy for Japanese government. Dr. Yamaji contributed to Intergovernmental Panel on Climate Change (IPCC) as a lead author for 3rd and 4th Assessment Reports of WG3.