RITE's Contribution to Achieving Carbon Neutrality

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Over the past few years, the goals for mitigating global warming have changed significantly. The Paris Agreement adopted in 2015 proposed a previously unexplored goal of "pursuing effort to limit temperature increase to 1.5°C above preindustrial levels." In response, the IPCC released a Special Report on 1.5°C in 2018, setting out pathways to carbon neutrality by 2050 as scenarios for achieving the 1.5°C goal. Following this, the EU and other countries announced the aim of becoming carbon neutral by 2050. Japan in 2020 also declared its goal of achieving carbon neutrality by 2050, and in 2021 established the "Sixth Strategic Energy Plan" and revised the "Plan for Global Warming Countermeasures" and the "Long-Term Strategy under the Paris Agreement." In 2022, the IPCC published the Working Group III report of its Sixth Assessment Report.

Looking at these trends alone, it is tempting to assume that the 1.5°C target is easily achievable, but achieving it is not guaranteed, as suggested by the fact that there was intense debate in Japan before the carbon neutrality declaration about the feasibility of achieving a target of 80% reduction of greenhouse gases by 2050, which was largely in line with the 2°C target. Although there have been some positive developments in recent years, such as a decline in the price of renewable energy, there have not been major innovations leading to a significant reduction in greenhouse gas emissions. These moves to strengthen the mitigation targets have been driven by a strong sense of urgency in the international community about the increased risk of climate change due to the progression of global warming, and there is still a significant gap between the targets and viable solutions with current technology. To bridge this gap, there is an urgent need to create more innovation. In this regard, the situation is very different from that in the case of the Montreal Protocol, where the rapid spread of CFC substitutes was achieved to address the problem of ozone depletion.

I had seen the work of RITE for several years as a member of the Advisory Committee on Science and Technology, even before my appointment as director of the institute in June 2022. I found it remarkable the insight of those involved at the time of RITE's founding to devise innovative technology 30 years ago that would only be taken up later at such a significant turning point, and the steady efforts of RITE staff to develop that technology. The Working Group III report of the IPCC Sixth Assessment Report categorizes scenarios for significant reductions in greenhouse gas emissions. The distinctive ones are the IMP-Ren pathway, which heavily utilizes existing solar and wind power, the IMP-Neg pathway, which uses negative emission technology, and the IMP-LD pathway, which aims for a low demand for energy. In the IMP-Neg pathway, the CO_2 separation and capture technology nurtured by the Chemical Research Group and the Inorganic Membranes Research Center (integrated into the Chemical Research Group in April 2023) and the storage technology developed by the CO_2 Storage Research Group are important, while the LD pathway is a scenario addressed in the EDITS project conducted by the Systems Analysis Group. Research by the Molecular Microbiology and Biotechnology Group contributes Ren pathway as bioenergy, and also forms an

important part of the LD pathway as a manufacturing alternative to fossil fuel resources. Outside of research, RITE staff have also made significant contributions to our nation's policy-making and IPCC operations over the past few years.

For the time being, I believe that the work of steadily implementing the technology we have cultivated over the years into society and preparation for the challenge of the next innovative anti-global warming technology will be important tasks for RITE. I ask for the continued support of all those involved.