Abstract

[Project Information]

Project Title :	Maximizing Environmental and Economic Effects Through Wide-area Carbon Neutral Circular Economy of Combustible Waste Including Plastics and Regional Circulation of Food Waste
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Toward the realization of carbon neutrality and the creation of a circular economy, we proposed a system called LCCN (Life Cycle Carbon Neutral), in which low-grade waste that is difficult to recycle is collected in a chemical complex, incinerated to supply steam to a chemical process, and plastics are manufactured from the resulting CO_2 by CCU (carbon capture and utilization). We also evaluated the environmental and economic effects of LCCN. We also assumed that some municipalities would carry out methane fermentation of food waste in conjunction with the wide-area transportation of waste for incineration. In sub-theme 1, we proposed a system to supply steam from incinerators to chemical plants on a large scale in accordance with demand, at temperatures and pressures that can also be used for cogeneration and demonstrated its effectiveness. We also demonstrated that the system of producing basic chemical raw material (methanol) via CO_2 using LCCN has high energy efficiency comparable to that of producing methanol through chemical recycling of plastics, because there is virtually no loss in steam supply from incineration. In sub-theme 2, we examined in detail the transition of municipal waste treatment systems and demonstrated that wide-area treatment using LCCN brings great economic benefits. In sub-theme 3, we investigated and proposed a system to transport waste for incineration to a chemical complex safely, hygienically, and efficiently through case studies both in Japan and abroad. In sub-theme 4, we evaluated the future waste generation situation of hydrocarbon materials and the potential for resource utilization. A comprehensive evaluation of the results of the four sub-themes showed that with the participation of approximately half of the municipalities in Japan, LCCN Ready (steam supply) can reduce emissions by 7 million t-CO_2/year and reduce economic costs, and that LCCN can achieve carbon negativity. Based on the

research results, we were able to vigorously carry out activities both domestically and overseas toward the social implementation of LCCN.

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