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Biomass energy recovery by linkage of waste incinerators and sewage treatment plants

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Waste-related biomass is one of stably procurable renewable energy resources. Energy recovery from environmental infrastructure such as waste incinerator and sewage system is one of the key issues for considering eco-industrial development. Therefore, this study aims at maximization of biomass energy recovery from the waste by collaboration of sewage sludge treatment plants and municipal waste incinerators under future society constraints such as low-carbon society and population decline in Japan. In this study, nationwide nearly 1800 sewage sludge plants and nearly 900 municipal waste incinerators were firstly categorized in the context of location, scale, construction year, installed energy recovery equipment etc. Secondly, available technological and societal inventories were extracted including combustion of sewage sludge with municipal waste incinerator and newly developed dry-type methane fermentation with respect to material and energy exchanges, mutual exploitation of equipment, integration of processes and sectors etc. Finally possible energy recovery amount and carbon dioxide reduction were examined through various collaboration scenarios in consideration of difficulty of alternative technology and social systems with short-term, mid-term and long-term scales. As a result of the analysis, we clarified that strategic expansion of surrounding intensive energy demand as well as technology innovation were effective to improve efficiency of energy recovery both in urban and rural areas with respect to dynamics of target population for environmental infrastructures especially in Japan where significant population decline were concerned in the long term.

Biography

Noboru Yoshida is a Professor at Department of Environmental Systems in Faculty of Systems Engineering, Wakayama University. He received his PhD degree in Environmental Engineering at Osaka University in 1997. He served as a specially appointed professor of the Research Institute for Sustainability Science, Osaka University in 2007-2009. His research interests include industrial ecology, energy and material flow analysis, etc.

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