

Organic Waste-to-Energy in Southeast Asia: Pathways for Methane Reduction and Renewable Energy

Abstract

Organic waste represents a major fraction of municipal solid waste in Southeast Asia and is a significant source of methane emissions when disposed of in landfills. At the same time, this waste stream contains considerable potential as a feedstock for renewable energy production. Recovering energy from organic waste therefore offers a dual opportunity to reduce greenhouse gas emissions while contributing to the development of sustainable energy systems in rapidly urbanizing regions. However, the implementation of organic waste-to-energy systems in developing countries often faces multiple challenges, including limitations in waste separation infrastructure, institutional capacity, and public participation. These challenges indicate that technological solutions alone are insufficient and that successful implementation requires an understanding of the broader socio-technical system surrounding waste management. This presentation examines pathways for organic waste-to-energy development in Southeast Asia by integrating technological options with socio-institutional considerations. Drawing on regional case studies and spatial socio-economic assessments, the study explores how waste characteristics, governance arrangements, and stakeholder participation influence the feasibility of methane mitigation and renewable energy recovery from organic waste. The analysis highlights that effective methane reduction strategies require not only appropriate technologies but also enabling institutional environments and participatory waste management systems. The findings provide insights for designing context-appropriate pathways toward circular resource recovery and climate mitigation in Southeast Asia.

Keywords: Organic waste, Waste-to-energy, Methane mitigation, Renewable energy recovery, Southeast Asia