



EEA methodology for Municipal solid waste management system design and sustainability analysis under uncertainty

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Abstract ▶▶▶▶▶

In this study, Extended Exergy Accounting was firstly adopted to develop an accounting model to evaluate the performance of a Municipal Solid Waste Management System. Furthermore, a WTE facilities deployment model is proposed based on the EEA methodology.

Relevant case studies are conducted in Singapore and Shanghai respectively.

A detailed analysis of wood and horticultural waste treatment scenarios in Singapore was done as a case study to illustrate the accounting model. It was found that the gasification scenario performs significantly better than the incineration scenario, in terms of energy carrier consumption, emissions, thermodynamic efficiency and sustainability. Analysis results show that, if extrapolated to Singapore's total wood and horticultural waste, gasification technology has potential to reduce energy consumption and increase electricity output.

A case study for food waste management in Shanghai using publicly available information is tested to verify the WTE facilities deployment model. WTE Facility deployment plan in different scenarios for worst-case food waste assignment planning. As a result, government is better to build biogas plants for food waste disposal as much food waste as possible. It not only alleviates the operating pressure of the current MSWMS, but also greatly increases the sustainability of MSWMSs.