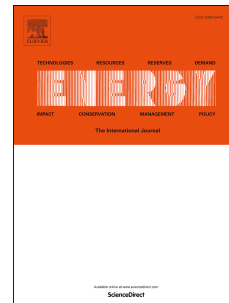


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# An emergy based sustainability evaluation on a combined landfill and LFG power generation system

Hengyu Pan<sup>1</sup> Yong Geng<sup>1,2</sup> Ping Jiang<sup>3</sup> Huijuan Dong<sup>1</sup> Lu

Sun<sup>4,5</sup> Rui Wu<sup>6</sup>

1. School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai 200240, PR China.
2. China Institute for Urban Governance, Shanghai Jiao Tong University, No. 800 Dongchuan Road, Minhang, Shanghai, 200240, China.
3. Department of Environmental Science and Engineering, Fudan University, Shanghai 200433, PR China.
4. Department of Environment Systems, Graduate School of Frontier Sciences, The University of Tokyo, 5-1-5 Kashiwanoha, 277-8563, Japan.
5. National Institute for Environmental Studies, Tsukuba, 305-8506, Japan
6. School of Business, Nanjing Normal University, No.1 Wenyuan Road, Qixia District, Nanjing 210023, PR China

**Abstract:** Recovering the landfill gas from municipal solid wastes for power generation is one feasible approach to respond both climate change and resource depletion issues. Under such a circumstance, it is important to evaluate the overall performance of its production process. This study proposes an integrated evaluation method by integrating emergy analysis and eco-indicator 99 method. Key impact factors influencing the sustainability are uncovered by adopting Kaya identity and index decomposition analysis (IDA). One MSW treatment plant in Yunnan province of China was selected as one case study site. The results indicate that the overall performance of the MSW treatment plant has been improved after operating a power generation system. The emissions' impact has been reduced by 56.85% and 2.44gCO<sub>2</sub>eq has been offset when generating 10<sup>9</sup>sej of electricity. However, the low economic benefit, the increase of nonrenewable empower density and the low investment effectiveness are still key factors that hinder its sustainability. In order to address these issues, several suggestions are raised by considering the local realities.

**Key words:** Landfill gas; Power generation; Emergy analysis; Sustainability; Kaya identity; Index decomposition analysis

## Nomenclature

DALY	disability adjusted life years
D <sub>i</sub>	impact factors of Eco-indicator 99 of pollutants
EA	emergy analysis

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