

Impacts of Enhanced 3Rs and Circular Economy on the Waste-to-Energy Systems in Thailand *(align middle, Times New Roman 14)*

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(align middle, bold, Times New Roman 11)

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Keywords MSW generation forecasting; Waste management policies; Material flow analysis; Waste-to-energy; Climate mitigation *(Times New Roman 11, maximum no. of keywords 5)*

INTRODUCTION *(Times New Roman 11)*

Thailand has adopted the 2030 Agenda of the United Nations (UN) for Sustainable Development and the Paris Agreement for climate targets, integrating them into national development plans and policies to promote sustainable consumption and production, alternative and clean energy, and climate change mitigation and adaptation.....

MATERIALS AND METHODS

Waste management policy review and Scenario analysis

Governmental plans and policies were selected based on their relevance to Municipal solid waste (MSW) management and categorized into four groups: (1) waste management policies and plans, (2) 3Rs and Circular Economy (CE) policies, (3) alternative energy plans, and (4) climate mitigation policies.....

Mass flow analysis (MFA)

In this study, the software "STAN 2.7.101" were used to analyse and construct the material flow of MSW management in a year

Table 1 Data source for the MFA

Waste management process	Flow	Data	Type of data	Source
Waste generation	A1	Total waste generated	Official report	Thailand state of pollution report
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RESULTS AND DISCUSSION

The MFA and scenario analysis of MSW management in the year 2030, 2040, and 2050

Figure 1 shows MSW flow of Thailand in 2030 under the policy-implemented scenario

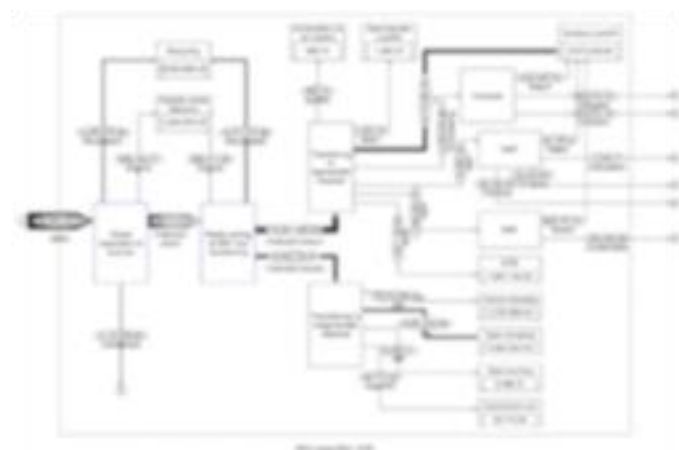


Figure 1 The MSW flow of Thailand in 2030 under the policy-implemented scenario

CONCLUSIONS

This study forecasted the impacts of Thailand's waste management policies promoting CE and WTE on MSW generation and management using forecasting models and material flow analysis (MFA) for scenario analysis. Overall, enhanced 3Rs and CE measures significantly influence waste composition and flow, improving environmental outcomes but potentially limiting energy recovery potential from MSW.

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REFERENCES

- Ishigaki, T., Yamada, M. et al., Estimation of methane emission from whole waste landfill site using correlation between flux and ground temperature, *Environmental Geology*, 48, 7, 845-853, 2005.
- USEPA, U.S. Environmental Protection Agency, Overview of greenhouse gases. Retrieved from: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane>, 2025.

References should be included in the text using Authors' surnames followed by the year of publication (Pivato and Ferguson, 2008). If there are more than two authors, the surname of the first two authors could be mentioned, followed by "et al" (ex: Cossu R., Raga R. et al., 2008). Please use Normal style (not Italic). !!Do not put page number in the abstract by yourself!!