Renewable energy production from municipal solid waste: a spatial explicit assessment for Malaysia
SieTing Tan(1), (2), Sylvain Leduc(2), Florian Kraxner(2)
(1) Faculty of Chemical Engineering, Universiti Teknologi Malaysia, UTM Skudai, 81310 Johor Bahru, Johor, Malaysia
(2) Ecosystems Services and Management Program, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria

Motivation of Study
- Improvement of waste management in developing country:
  » Rapid increase of MSW with the population growth and development.
  » 95% of waste in Malaysia is dumped in landfill site without further treatment.
  » Uncontrolled landfill amplifies the share of total global anthropogenic greenhouse gas (GHG) emission.
- Potential of waste-to-energy (WTE) in Malaysia:
  » Technologies for WTE production have been rapidly evolving and yielding dual benefits from effective solid waste management practices.
  » Trade-off in waste-to-energy practices: cost, efficiency, CO₂ emission, location, & transportation.

Research Objectives & Methodology
- To optimise the WTE supply chain network and evaluate the energy and climate change mitigation potential of MSW in Malaysia.
- The model optimizes the scale and location of waste treatment plants with potential energy and fertilizer co-generation, given the locations of feedstock and energy demand.
- Applied BeWhere Model:
  » Techno-Economic Optimization Model,
  » Geographic explicit,
  » Mixed integer linear program (GAMS),
  » Determines the available potential and suitable areas for renewable energy (RE) production sites.

Results

Conclusions
- WTE may substitute about 12% of the Malaysian power production, following an optimal scenario.
- BeWhere for MSW provides a robust spatial explicit solution for WTE with assessment on the energy production and CO₂ mitigation potential.

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