Renewable energy production from municipal solid waste: a spatial explicit assessment for Malaysia

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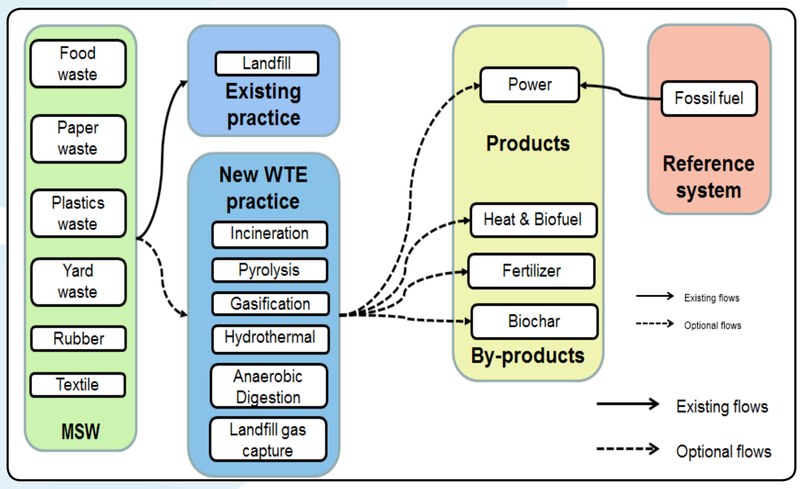
Motivation of Study

- 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, CO_2 emission, location, & transportation.

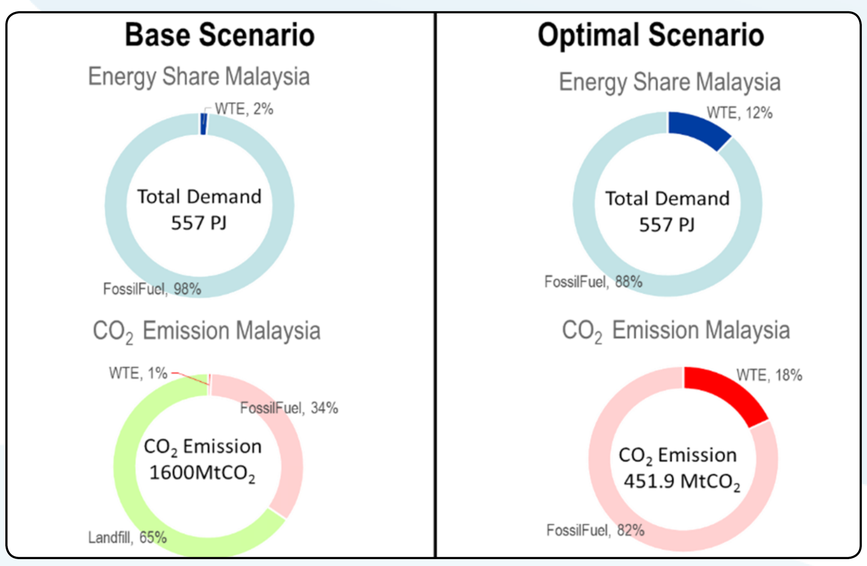
Research Objectives & Methodology

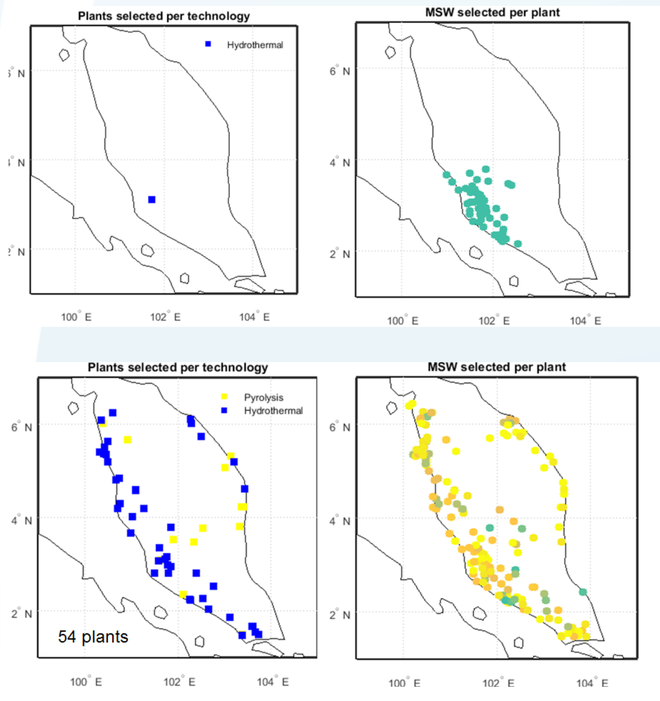
- To optimise the WTE supply chain network and evaluate the energy and climate change mitigation potential of MSW in Malaysia.
- The model optimizes the scale and location of waste treatment plants with potential energy and fertilizer co-generation, given the locations of feedstock and energy demand.
- 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.



BeWhere MSW

Results





The first plant - Petaling City

The full potential under optimal scenario

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 CO_2 mitigation potential.

Acknowledgement

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More information

www.iiasa.ac.at/bewhere

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