

# Comparative Waste-to-Energy Assessment for Municipal Solid Waste Treatment in Two Southeast Asian Cities

Students: Francis Darwin EUGENIO<sup>1,\*</sup>, Alicia Therese DUMLAO<sup>1</sup>, Fredriech Martin REGALO<sup>2</sup>, Rou-Yu ZHU<sup>3</sup>, Yoshihiro TAKAHASHI<sup>4</sup>, Kah Huat TAN<sup>5</sup>, Jenaiza CAWALING<sup>2</sup>, Mary Jude CONTE<sup>2</sup>

Advisors: Satoko FUJIOKA<sup>6</sup>, Noorashrina HAMID<sup>5</sup>, Heng Yi TEAH<sup>7,\*</sup>

<sup>1</sup>University of the Philippines Diliman, Quezon City, Philippines <sup>2</sup>University of the Philippines Visayas, Miag-ao, Iloilo, Philippines, <sup>3</sup>Taipei Medical University, Taiwan, <sup>4</sup>Waseda University, Japan, <sup>5</sup>Universiti Sains Malaysia, Malaysia, <sup>6</sup>Keio University, Japan, <sup>7</sup>University of Tokyo, Japan

\*E-mails: fteugenio@up.edu.ph, teah@platinum.u-tokyo.ac.jp

**Abstract:** A rapid increase in waste generation challenges the management of municipal solid waste (MSW) in developing cities due to urbanization. Limited waste management in these areas results in wastes being disposed of in open waterways and unsanitary dumpsites. Moreover, urbanization also means a growth in energy demand. Emerging waste-to-energy (WtE) technologies offer an alternative solid waste management pathway and the potential to address cities' rising energy demands without using fossil fuel resources. This research involves a survey of municipal waste characteristics in two developing Southeast Asian cities — Penang in Malaysia and Metro Manila in the Philippines — to determine the appropriate WtE technologies (incineration, pyrolysis, plasma gasification, anaerobic digestion) to be applied in the respective cities. Furthermore, life cycle assessment (LCA) will be employed to compare the greenhouse gas emissions potential of waste-to-energy technologies in these developing Southeast Asian cities. Moreover, the proponents propose a Social-LCA model to gauge the social impacts of waste-to-energy on communities, local government units, recyclers, and other stakeholders in the two cities. This comparison would help the proponents highlight the effects of different social contexts on the adoption of technology. In general, this study provides insights into how WtE technologies can be integrated to improve waste management practices and lower fossil-based electricity in developing cities.

## Implementing Waste-to-Energy Municipal Waste Treatment in Developing Regions

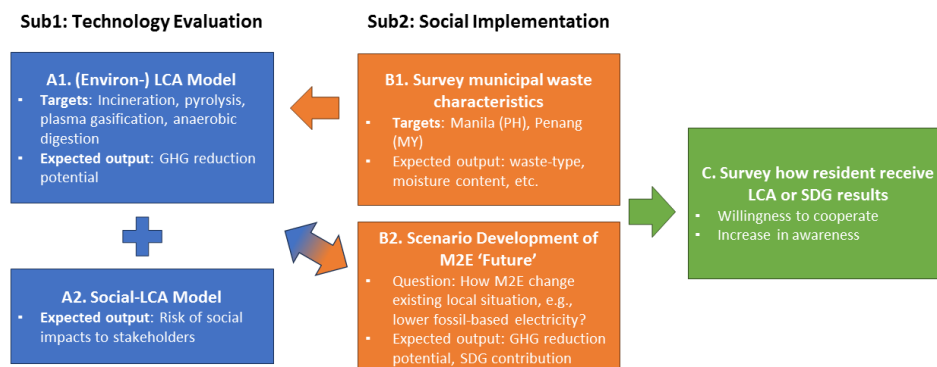


Fig. 1. Conceptual image of this proposal.

**Keywords:** renewable energy, social impacts, sustainability, waste management, waste-to-energy

**Related SDG Goals:** SDG7, SDG11