Mandate Spotlight: 046 UTHM Malaysia

Knowledge Transfer on the Application of Waste to Energy Technologies

Location: Malaysia
Beneficiaries: University of Tun Hussein Onn Malaysia, National University of Lao, and Unverisitas Riau Kepulauan (Indonesia)
Consultant: GHD

Start: Oct. 2021
End: Aug. 2022
CTIF Contribution: CAD $270,145

Context

Global solid waste is expected to grow to 3.40 billion tonnes annually by 2050, more than doubling population growth over the same period. East Asia and the Pacific currently generate 23 percent of the world's waste and will, therefore, contribute substantially to the above figure should current practices continue. Among countries linked to this mandate, Indonesia produces 4,000 tonnes of solid waste per day, Malaysia 1,500 tonnes, and Lao PDR 800 tonnes. Growing volumes of solid waste underline the need for innovative waste management approaches. One such approach is using waste-to-energy (WTE) conversion technology, which can reduce pressure on landfills, contribute to growing demands for renewable energy, and minimise greenhouse gas emissions when applied effectively.

The limited implementation and enforcement capabilities among policymakers, regulators, and industry currently limit their effectiveness and inhibit the selection of the most appropriate WTE technologies for any given location. Similarly, while some ASEAN member states have adopted small or medium-scale WTE technologies designed in developed countries, these technologies often do not align with existing SWM systems. Finally, even when appropriate capabilities are in place, developing a WTE project can still be a lengthy and expensive process that requires making decisions with long-term consequences. In this context, standardizing step-by-step processes and tools for evaluating the feasibility of selected WTE technologies, and sharing information on associated legal, technical, and financial issues that must be addressed when considering a WTE system, are becoming increasingly important next steps.

Brief Description of the Mandate

Working with officials in Indonesia, Lao PDR and Malaysia, this mandate facilitated the knowledge transfer and sharing of best practices related to the effective and contextually appropriate application of WTE technologies. The rationale for this support stems from the recognized need amongst participating countries to divert waste from landfills and increase sustainable energy production to facilitate low-carbon economic growth in ASEAN. By enabling knowledge transfer between countries and stakeholders within them, the mandate helped strengthen and enhance decision-making regarding WTE policy development and implementation.

Selected Key Findings and Recommendations

- ***Waste to Energy Management Site Visits***: WTE sites were visited in Indonesia, Lao PDR and Malaysia for participants to increase their awareness of successful facilities' operations and management practices as well as their understanding of the potential suitability of associated technologies to their local contexts; learned how each facility was developed; and increased their understanding of the role played by WTE technologies in a localities SWM regime and strategy.
- ***Waste to Energy Management and Developments:*** Through the WTE site visits in Indonesia, Lao PDR, and Malaysia, participants witnessed firsthand some of the key challenges of WTE developments in each country, including insufficiently trained and experienced operators, public acceptance of WTE being low due to potential pollutants, and the technical challenges with developing a WTE plant. However, the exposure to these challenges also allowed participants to learn how each of the challenges is being addressed and overcome in each country. Based on the knowledge gained through this mandate, government officials were confident to propose WTE technology as an option for future solid waste management in their respective cities.

- ***Training Course focused on Waste to Energy Developed:*** Following an extensive training needs assessment, an eight-module training curriculum was developed under this mandate. Through this training curriculum, participants are introduced to the key principles of waste-to-energy, environmental and social safeguards, how to better integrate gender and more about global waste-to-energy technologies.
- ***Application of Gender-based Analysis Plus (GBA+):*** This mandate was essential in identifying key challenges and areas for improvement in gender diversity and women's economic empowerment. Through a review of existing WTE Frameworks and the application of GBA+, this mandate addressed many of the embedded inequalities and norms in many aspects of SWM, specifically those leading to a gender division in labour; the lack of sector-wide and sex-disaggregated data to allow clear visibility of the many issues facing women; and the consequences of poor waste management not being experienced equally by both genders.

Environment & Climate Change

CTIF's consultant developed an environmental sustainability strategy for the mandate to provide a vision, shared objective, and pathway to advance SWM and WTE technologies. This strategy included an analysis of the socioeconomic and environmental impacts of different WTE solutions and Environmental and Social Safeguards aimed at avoiding, minimising and/or compensating for adverse impacts on the environment and affected people.

Along with the strategy, capacity building was delivered to increase the knowledge and awareness around the current environment and sustainability considerations for deploying SWM and WTE technologies, including a module on Environmental and Social Safeguards. Through this capacity, building participants were engaged to identify potential environmental impacts from WTE developments as well as environmental by-products, including gaseous emissions, threats to the circular economy, and risks from waste transportation. Overall, through the knowledge transfer in this mandate, WTE capability gaps in implementation and enforcement were further improved.

Gender and Social Inclusion

Through the desk research, CTIF's consultant identified key challenges and potential areas of improvement in the areas of gender diversity and women's economic empowerment based on local context and international best practices, including the use of the Gender-based Analysis Plus (GBA+) framework. This mandate applied the GBA+ framework to address issues of gender inequality and norms embedded within all aspects of SWM, including the lack of sex-disaggregated data preventing the visibility of many issues and further exacerbating the lack of gender diversity. Through the consultants' findings, measures were formulated to minimize the disproportionate negative impacts on women and create an environment to enable them to benefit proportionally from WTE technologies. This entailed the development of training material where gender inclusion and diversity were key themes, including modules dedicated to gender awareness and the benefits of women's economic empowerment for society and the SWM sector.

Follow-up Support

UTHM is planning to formalize partnerships with other universities in Indonesia and Lao PDR, particularly those that participated in this mandate, so they can continue to transfer knowledge and advocate for the adoption of WTE technologies in local communities in their respective countries. There was a discussion with UTHM on the possibility of publishing the project results as a book on Waste to Energy Technologies for small to medium size cities.

Testimonials

Figure 1: Participants visiting the Bukit Tagar Sanitary Landfill

"The mandate was a very positive experience and provided learnings on many areas of solid waste management and waste to energy. It was great to achieve insights into the technical, environmental, and social components of WTE through the training and then see some theory in practice with site visits…Overall we are very grateful for the mandate and opportunity it has provided for our team members and fellow beneficiaries in Malaysia."

- Dr. Seow Ta Wee, UTHM, Centre of Sustainable Infrastructure and Environmental Management