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Role of Material Recovery Facility in Minimizing the Final Disposal: Evidence from Anuradhapura Municipal Council

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Abstract

Improper solid waste management (SWM) remains a pressing environmental challenge in developing countries, leading to open dumping, and associated air, water, and soil pollution. In Sri Lanka, the increasing waste generation due to rapid urbanization has highlighted the need for sustainable solutions that minimize final disposal and promote resource recovery. The research adopted a mixed-method approach involving field observations, structured interviews with municipal officials and waste handlers, and secondary data from the Anuradhapura Municipal Council (AMC) SWM division were used to study the current status of SWM practices. Material Flow Analysis (MFA) was used to assess waste generation, composition, recovery rates, and residual disposal pathways to understand the role of MRF in minimizing the waste disposal. Results indicated that the AMC generates approximately 32.8 tons of waste per day, of which around 62.25% is collected, approximately 42% comprises non-compostable waste directed to the Material Recovery Facility (MRF) for sorting and recovery, and the compostable waste temporally stored in the MRF facility to send for composting. At the MRF facility, non-compostable waste is manually segregated into recyclable and non-recyclable fractions. Recyclable plastics, paper, and cardboard, averaging approximately 140 tons in 2024, are pressed and baled at MRF to optimize space utilization, and ensure convenient handling prior to dispatch to private recyclers. Non-recyclable but combustible waste fractions were baled and transported to cement manufacturing facilities for co-processing, contributing to energy recovery and waste to energy initiatives. Overall, AMC has achieved significant progress in managing MSW through composting, recycling, and energy recovery, thereby reducing dependency on disposal and achieving an impressive 99% of waste diversion rate in terms of collection while, 61.5% as per the generation. The findings emphasize that a well-managed MRF, coupled with effective source segregation and public private collaboration can substantially enhance waste minimization while this approach represents a replicable model for sustainable waste management for the local authorities of Sri Lanka. The MRF facility contributes to achieving Sri Lankan Waste Management Policy targets with respect to waste diversion and supports the United Nations Sustainable Development Goals particularly SDG 11; Sustainable Cities and Communities.

Keywords: *Material recovery facility, Municipal solid waste, Waste diversion, Recycling and energy recovery, Public-private partnerships*