



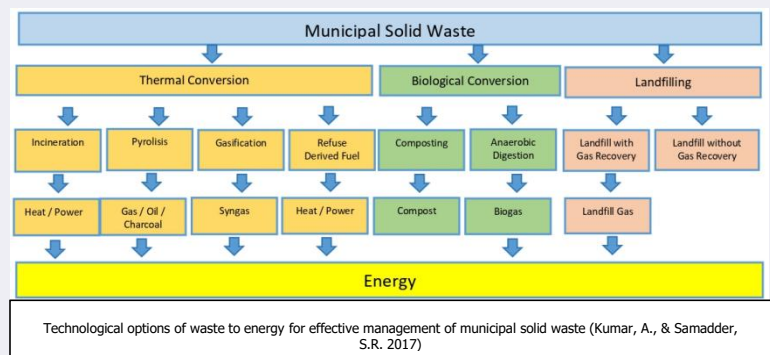
## Biogas Systems for Waste Management

### Waste in Sri Lanka:

Sri Lanka generates about 9,810 metric tons (MT) of municipal solid waste daily of which 3,760 MT are collected (March 2021). Country's Local Government Authorities are responsible for collection, segregation, treatment, & disposal of waste generated by residents. Rapid urbanization, industrialization & higher per-capita consumption exacerbate waste management issues often resulting in their sub-optimal treatment & unregulated dumping (Tennakoon et, 2025), leading to social issues, bad odour, methane emissions, water contamination & posing health hazards. Among technical options for waste management, Biogas Systems are suitable for treating organic wastes with high moisture content & biodegradability.

### Anaerobic Digestion (AD) Technology & Biogas Systems:

Organic wastes can naturally decompose, generating methane that escapes into atmosphere when the appropriate conditions prevail. Methane has a Global Warming Potential (GWP) of  $\approx 84-87$  over 20 years (IPCC 5<sup>th</sup> Assessment). Biogas systems are so designed to convert organic matter (municipal garbage, animal manure, food processing by-products, crop residues & wastewater etc) into useful energy & agricultural input products, where organic matter is broken down by biochemical decomposition by methanogenic bacteria under oxygen-free (anaerobic) conditions. This process, called anaerobic digestion (AD), generate biogas, a mix of methane (CH<sub>4</sub>) dominant gaseous fuel being a renewable energy source which can be used to generate heat or electricity, while leaving a digestate, which is a bio-fertilizer, a key agricultural input. This process usually occurs in a specialized tank or vessel called the



anaerobic digesters. Landfills gas generated at landfills are also generated due to the AD process. Purified & upgraded biogas (bio-methane) can also be cylinderised & be used as a substitute for Liquefied Petroleum Gas (LPG) or injected into natural gas grids if available.

### Benefits of Treating Solid Waste by Biogas Systems

Reduce landfill volumes, related tipping costs, methane (a greenhouse gas) emissions (compared to un-managed waste); repurpose waste into valuable bio-fertilizer & biogas (renewable energy); support nutrient recycling & circular bioeconomy principles along the waste value chain while providing green jobs & contributing to national commitments.

- Decreases demand for landfills (land is expensive & scarce to get in urban settings with high population densities).
- Reduce expenses on collection, transportation & temporary storage.
- Produce biogas, a renewable source of energy, that can generate electricity & heat & used for cooking etc.,.
- Produce nutrient-rich digestate being a bio-fertilizer, recycling nutrients back to the soil; improve soil health, fertility & crop yields; enhance soil moisture retention, being a solid amendment, contributing to agriculture sector.
- Make income from electricity, heat & bio-fertilizer sales; reduce costs of LPG.
- Reduce pollution - minimize runoff, leaching & groundwater contamination; reduce odour (smells) & control pests.
- Translate or create green employment in waste collection, sorting, plant operation.

### Policy Recommendations

- Implement legislature, policies & plans (Sri Lanka has legislative & institutional framework to convert organic waste from a liability into an asset (Ex. By-laws, Provincial Statutes, Parliamentary Acts, National Policies, Strategies, NDCs).
- Setup industry & quality standards, eco-labels, application guidelines & certification for digestate (bio-fertilizer) produced from municipal solid waste; train & develop personnel as necessary.
- Share success stories & demonstrate pilots on effective municipal solid waste biogas systems by local government authorities, with sound financing models, tax incentives, prices, feed-in-tariffs, connected to power or gas grids.
- Make biogas systems a part of integrated solid waste management programmes, also handling waste locally eliminating transport (trucking) & tipping & transferring stations costs.
- Have vibrant waste avoidance, re-use, reduction, sorting & source separation campaigns, as organic waste mixed with general waste makes resource recovery difficult, expensive & time consuming.
- Implement technology-driven waste collection, screening, contaminant (plastic, glass & metal etc) removal, per-treatment & then processing organic waste by biogas systems.