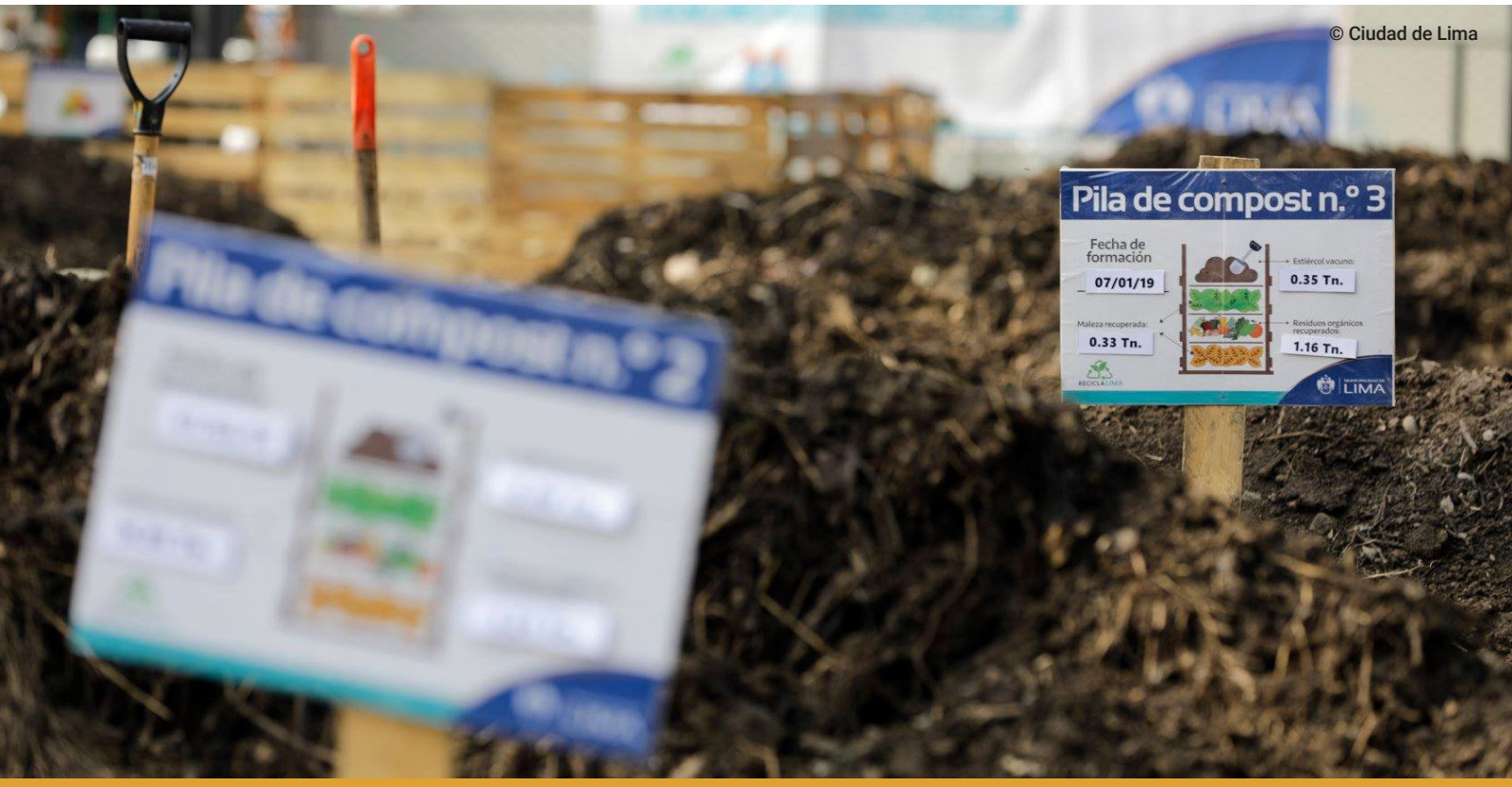
WASTE WISE CITIES

UN HABITAT
FOR A BETTER URBAN FUTURE

Waste Wise Cities Newsletter #9

February 2021- Organic Waste



© Ciudad de Lima

Contents

Organic Waste Management

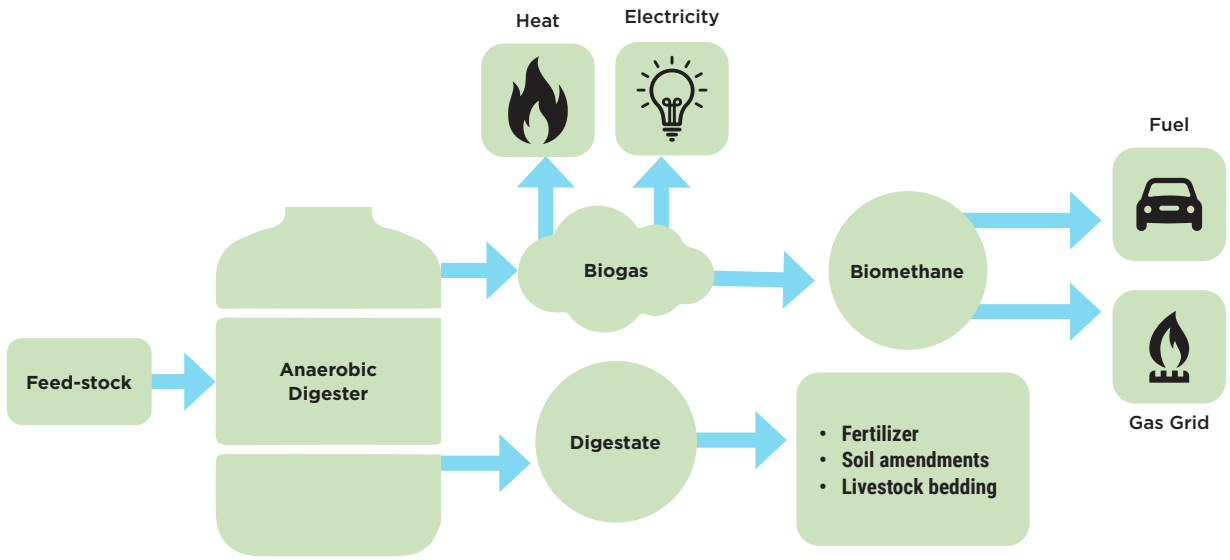
Organic waste is the biodegradable fraction of waste. Under the scope of municipal solid waste management, it typically includes green waste (leaves, grass, garden waste) and food or kitchen waste (food leftovers and bones, spoiled vegetables and fruits, and waste from food preparation such as peels, pits, etc.). Organic waste is one of the largest fractions of municipal solid waste globally (the proportion of total waste varies across income levels between 32% and up to 80%), with approximately 38 billion tons of organic waste generated annually across the world.

It is estimated that globally, less than 10% of organic waste is utilized as a resource - landfill and open dumps remain the dominant disposal means. When decomposed under anaerobic conditions (absence of oxygen) methane (CH_4) is generated, which is a greenhouse gas that when measured over two decades, is 84 times more potent than carbon dioxide (CO_2). Although methane from sources like fossil fuels and livestock is higher, mismanaged organic waste is thus contributing to climate change. Greenhouse gas emissions associated with organic waste disposed at landfills and dumpsites can be reduced by using recovery and recycling processes for organic waste including anaerobic digestion, vermicomposting, black soldier fly larvae composting, etc.

Inadequate management of organic waste also results in other direct and indirect negative impacts including increased risk of waterborne diseases, soil and water pollution through leachate, spread of diseases by serving as breeding ground for vectors and rodents, contamination of recyclable materials, and occupation of space at landfills, to name a few. Diversion of organic waste from landfills can save municipalities operational costs and prolong landfill lifespan. Likewise, utilizing preventive, recycling, or recovery methods to manage the organic fraction of waste can be beneficial: depending on the treatment method, it can bring nutrient and organic matter back to impoverished soils, improving soil quality, generate biogas and feedstock. Adequate organic waste management is therefore critical to sustainable waste management.

Overview Anaerobic Digestion

Figure 1: Anaerobic digestion process (Graphic by Sara Tanigawa, EESI)



Credits: https://www.eesi.org/papers/view/fact-sheet-biogasconverting-waste-to-energy

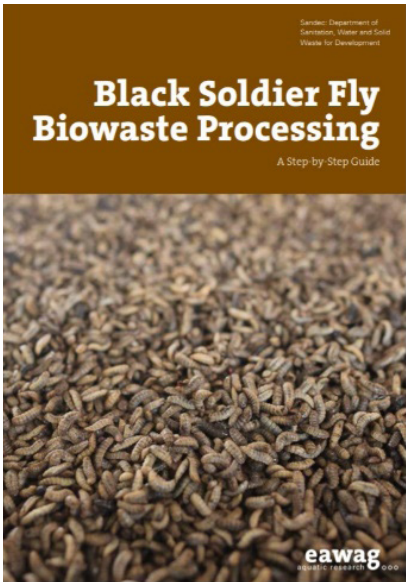
This article was provided by Max Grau, Expert at Eawag, Department of Sanitation, Water and Solid Waste for Development (Sandec).

Anaerobic digestion (AD) is an organic waste treatment technology that reduces the amount of waste and generates valuable products, such as biogas and nutrient-rich digestate. AD can be applied in various scales from household level to mediums size installations at farms and large-scale industrial biogas plants, producing thousands of cubic meter biogas per day. The energy rich biogas can be used for cooking in small installations, to producing electricity at medium and large installations, or be purified to natural gas. The nutrient rich digestate is often used as soil enhancer and is a valuable product for regenerative agriculture. While there are already many AD installations around the world, it is crucial that factors like feedstock security, final use of the biogas and off-take agreements for the digestate are looked at in detail to create a successful project. Good maintenance and taking ownership of the installations are important to achieve a well performing digester in the long term, especially in household installations. AD is a well-studied and widely applied technology to treat biowaste and other organic feedstocks. It is an important process, among other established and emerging waste treatment technologies, to create a circular economy. Read more about AD application in developing countries here.

Overview: Black Soldier Fly Larvae Composting

This article was provided by Moritz Gold, Post-Doctoral researcher at ETH Zurich & Eawag.

Biowaste treatment with black soldier fly larvae (BSFL) is an emerging treatment technology. BSFL grow on a variety of biowastes (e.g., manures, food waste, agri-food byproducts) and convert it into insect biomass and a compost-like reside. The larval biomass has a higher market value as raw material for production of animal feeds, typically higher as those of other biowaste treatment products such as composting or anaerobic digestion. This has the potential to contribute to partially offset waste management costs. In recent decades, the natural BSFL life cycle has been translated into insect-based waste management facilities, treating between less than one ton, to several hundred tons of biowaste per day. One challenge of operating such facilities are variable bioconversion rates because of the intrinsically variable biowaste nutrient composition. This can be partially addressed by formulation of biowaste into mixtures with more similar nutrient contents. Use of bacterial inoculants and other substrate pre-treatments (e.g., mechanical, thermal, alkaline) are also current research areas. Careful safety assessments of the entire treatment processes are needed, since biowaste typically contain chemical and microbial hazards, and the insect-based feeds are used for food production. For practical knowledge and research visit the Sandec and ETH Zurich websites.



Safe and cost-effective waste management solutions for today's cities a Case Study from Sanergy, Kenya

This article was prepared by Sheila Kibuthu, External Relations Manager at Sanergy, Nairobi, Kenya.

Sanergy cleans up today's cities by converting organic waste streams into valuable products that enhance economic growth, improve people's livelihoods, and safeguard our environment.

Launched in 2011, Sanergy uses a closed loop circular economy approach for waste management where they design, build, and operate safe organic waste collection networks that professionally remove sanitation, kitchen, market, and agricultural waste streams. Every year, they collect more than 12,000 tons of waste that is treated and upcycled at their organics recycling factory.

Sanergy uses modern technologies developed in-house with robust proven equipment, layered to extract multiple products from each ton of waste collected. To date, Sanergy has developed 3 key product lines. The first one is an insect-based protein for animal feed that is manufactured through rearing of black soldier fly larvae, which feeds on waste and converts it into high protein content and residue.

The second is environmentally friendly biomass fuel that is manufactured through drying and compressing the black soldier fly residue at high temperature and pressure to create a high-calorie briquette for use in any industrial biomass boiler. Finally, the third product is organic fertilizer manufactured through co-composting the residue from black soldier flies and agricultural inputs in mechanically aerated windrows, which are then sieved and packaged for sale. Read more about Sanergy here.

Organic waste management through anaerobic treatments in Kochi, India

This article was prepared by Simmi Sasha, Project Coordinator at Centre for Heritage, Environment and Development (C-HED), Kochi, India.

Rise in population, rapid urbanization, booming economy, and the rise in community standards have greatly accelerated the municipal waste generation rate in developing countries like India. Though several waste management techniques are in place, interest in bio-gas technology is increasing in the city of Kochi with growing awareness on renewable energy and increase in organic farming and gardening activities.

With a noticeable percentage of the community installing and successfully using bio-gas plants at home as an alternative for waste disposal, the demand for bio-gas plants are increasing. So far 414 households, and six schools have installed bio-gas plants of different sizes with great success. In Kochi, over the course of time the technology has proven itself and is now socially acceptable, economically viable, environmentally friendly, technically feasible and institutionally very stable keeping aside some very minor issues.

The bio-gas technology is slowly gaining momentum in the city serving the 3Rs – reduce, reuse, and recycle thereby effectively contributing to the triple function: waste removal, sustainable management of the environment, and energy production. Looking ahead, it will be important to spread awareness about the importance of self-resilient waste management, and to further develop the bio-gas plants to ensure that more people and institutions will install them.


© C-HED

Get to know our Affiliates

In this section we give our Waste Wise Cities Affiliates the possibility to introduce themselves

Wildlife Clubs Kenya

"Can you imagine a world of well empowered youthful population, who are skilful and able to make informed decisions on waste management practices?" asks Gabriel Ngale from Wildlife Clubs of Kenya.

"Well as a proud affiliate of the Waste Wise Cities, the Wildlife Clubs of Kenya strive to build, influence and guide our young people in achieving the circular economy goal. We integrate environmental education, sustainable solid waste management practices and innovations in training our youth. In collaboration with the Kenya Association of Manufacturers, our Project Shule PET take back scheme has transformed 19 learning institutions in Nairobi city into waste management action learning centres for over 25000 school children and 60 teachers. We have designed a plastic collection and recycling process that complements the youth empowerment initiative while promoting sustainable consumption and production patterns in line with the Sustainable Development Goals.

Currently 1625kgs of waste plastics has undergone recycling through Mr Green Africa partnership. Our initiative has ameliorated countries and cities, especially in rapidly growing Asian nations, through the main three pillars of activities; 1. Strengthening waste management policy and implementation (e.g. Plastic Waste Management Strategy for Hyderabad, India), 2. Developing tools and guidelines for capacity development (e.g. Guideline Waste to Energy), and 3. Generating large impact through extended partnership (e.g. CCET event on COVID19).

CCET also contributes to knowledge and information sharing on urgently emerging issues including COVID-19 which has drastically affected the global economy since the beginning of 2020. A sudden change in consumption and disposal pattern has created additional challenges in infectious waste management especially in developing countries. To quickly support them through knowledge sharing, CCET together with UNEP produced a report (the COVID-19 Waste report) which identifies various approaches, best practices and technologies and provides recommendations for policy-makers and practitioners worldwide based on a rapid survey which was conducted over 14 developing countries in the world. Plastic waste management is another focus area where CCET provides policy advice and support for national and local authorities. (e.g. Strategies to Reduce Marine Plastic Pollution)".

Waste Wise Cities Affiliates