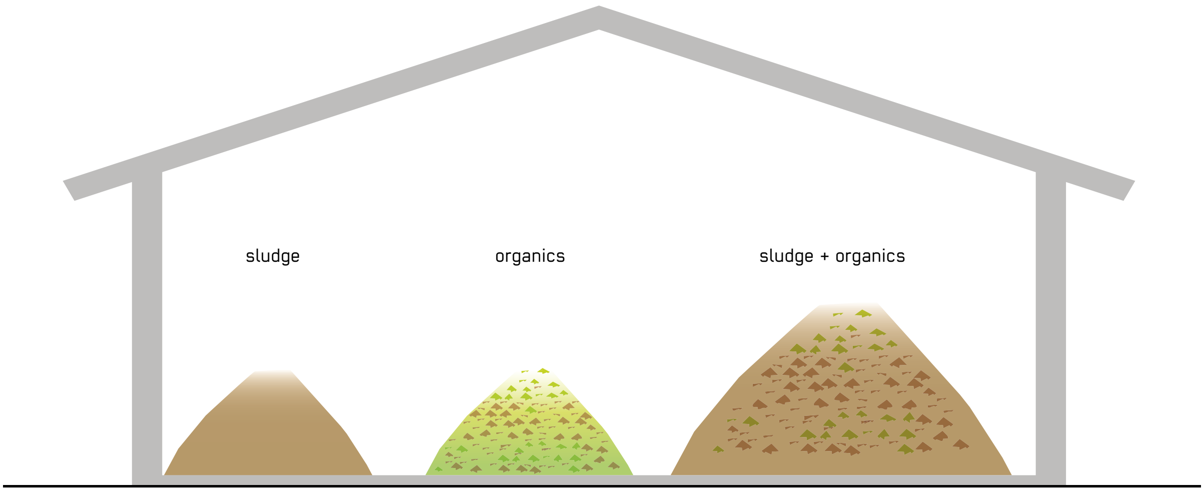
Co-Composting

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
* Acute Response * Stabilisation ** Recovery	Household ** Neighbourhood ** City	Household * Shared ** Public	Compost production, Pathogen removal
Space Required	**Technical Complexity**	**Inputs**	**Outputs**
*** High	** Medium	● Organics, ● Sludge	● Compost



Co-Composting is the controlled aerobic degradation of organics, using more than one feedstock (faecal sludge and organic solid waste). Thermophilic conditions, marked by temperatures that exceed 60 °C, are achieved when certain basic parameters (moisture, carbon-nitrogen (C:N) ratio, aeration) are met that result in the elimination of pathogens and rapid decomposition of the waste material. The process produces a safe, stable end product that can be used as a compost or soil amendment.

Faecal sludge has a high moisture and nitrogen content, while organic solid waste (from food or agricultural waste) is high in organic carbon and has good bulking properties which promotes aeration. By combining the two, the benefits of each can be used to optimise process and product. Three commonly used methods of Co-Composting are (1) open windrow, (2) in-vessel and (3) a combination of open-windrow and passively-aerated static pile. In open windrow Co-Composting, the mixed material (sludge and organic waste) is piled into long heaps called windrows and left to decompose. In-vessel Co-Composting requires controlled moisture, air supply and mechanical mixing. The third method uses a combination of static-pile and open-windrow. Waste sits in a static-pile for around two to three months and then it is moved to windrows for further decomposition.

Design Considerations: Key components in the design of a Co-Composting facility include space for sorting and waste separation, drying beds, composting units, screening, storage of compost and discards, hygiene and disinfection infrastructure, on-site wastewater treatment system, staff facilities and a buffer zone. Depending on the climate and available space, the facility may need to be covered. The facility should be located close to sources of organic waste and faecal sludge to minimise transport costs, but still a distance away from living areas to minimise any perceived or real health risks. Windrow piles should be at least 1 m high and insulated with a 30 cm layer of compost, soil, or grass soil to promote an even distribution of heat. In colder climates heaps work best at 2.5 m high and 5 m wide. Sludge must be dewatered in Unplanted Drying Beds **(T.9)** prior to mixing with organic waste. A sealed or impervious composting pad (the surface where the heaps are located) must be constructed to collect the leachate which can then be reintegrated into the piles or treated.

Materials: Co-Composting facilities can be constructed using locally available material. The compost pad can be made out of concrete, or well-compressed clay. If required, a cover/roof can be made from local materials such as bamboo, grass matting, or wood, plastic or metal sheeting. Water may be a required additive, depending on the climate. Prefabricated composting vessels of different sizes are available on the market.

Applicability: Because of the high level of organisation and labour needed to sort organic waste, manage the facility and monitor treatment efficiency, this technology is unlikely to be practical in the acute response phase. However, it can be considered a viable option in the stabilisation and recovery phases of an emergency. Experience has shown that Co-Composting facilities operate best when they are established as a business with compost as the marketable product that can generate revenue to support cost recovery. However, compost sales cannot be expected to cover the full cost of the service.

Operation and Maintenance: The operation requirements for Co-Composting facilities are high. Well-trained maintenance staff must carefully monitor quality and quantity of input material, the C:N ratio, and manage moisture and oxygen content. Staff should also carefully track turning schedules, temperature, and maturing times to ensure high-quality treatment. Organic waste must first be sorted so it is free from non-organic materials. Turning must be periodically done with either a front-end loader or by hand using a pitch fork or shovel. Robust grinders for shredding large pieces of organic solid waste (i.e., small branches and coconut shells) and pile turners help to optimise the process, reduce manual labour, and ensure a more homogenous end product.

Health and Safety: Health risks can be minimised if workers adopt basic precautions and hygienic practices and wear personal protective equipment. If material is found to be dusty, proper ventilation should be provided and workers should wear masks. To ensure pathogens are removed to a safe level, the World Health Organization (WHO) recommends that compost temperature should be maintained between 55–60 °C for at least one week. If there is any doubt, compost should be stored for at least a year before use. If resources exist, helminth egg inactivation should be monitored as a proxy measure of sterilisation. WHO guidelines should be consulted for detailed information.

Costs: Costs of building a Co-Composting facility vary depending on the method chosen and the cost of local materials and if machinery such as aerators and grinders are included in the design. The main costs to consider are the overall operation requirements including transport and supply of faecal sludge and organic solid waste and disposal of compost.

Social Considerations: Before considering a Co-Composting system, the concept should be discussed with the affected community. If the community has experience of separating their organic waste and composting, this can be an enabling factor. Identifying that compost made from human waste is an acceptable product for potential users (market survey) and ensuring that the compost product conforms to local guidelines/standards are necessary prerequisites. Without these, different treatment processes should be identified.

Strengths and Weaknesses:

(+) Sustainable management of organic waste
(+) Proven, effective treatment method
(+) Can be built and maintained with locally available materials
(+) Valuable end-product available for many uses and can be sold to defray operational costs

(−) Requires a large, well located land area
(−) Long treatment times
(−) Transport of input products can be costly
(−) Control over input quality is required

→ **References and further reading material for this technology can be found on page 194**