

Climate MRV for Africa – Phase 2 Development of National GHG Inventory Biological Treatment of Solid Waste



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Agenda

- Composting
- Anaerobic Digestion

Biological Treatment of Solid Waste

- Reduced volume in the waste material
- Stabilization of the waste
- Destruction of pathogens in the waste material
- Production of biogas for energy use

Biological Treatment of Solid Waste

➤ Composting

Organic waste: food waste, garden and park waste, sludge



Before



After

Biological Treatment of Solid Waste

➤ **Composting**

- Aerobic treatment of waste changes the carbon into CO_2
- Some CH_4 and N_2O are formed during the process



Emissions From Composting - Issues

- The estimated CH₄ released into the atmosphere ranges from < 1 % to a few per cent of the initial carbon content in the material
- The range of the estimated emissions varies from <0.5 % to 5 % of the initial nitrogen content of the material
- Poorly working composts are likely to produce more both of CH₄ and N₂O

Biological Treatment of Solid Waste

➤ **Anaerobic Digestion**

- Accelerates the natural decomposition of organic material without oxygen by maintaining the temperature, moisture content and pH close to their optimum values



Leakage From Anaerobic Digestion

- Unintentional leakages during process disturbances is generally between 0 and 10 percent of the amount of CH₄ generated
- In the absence of further information, 5 percent as a default value for the CH₄ emissions
- Where technical standards for biogas plants ensure that unintentional CH₄ emissions are flared, CH₄ emissions are likely to be close to zero
- N₂O emissions from the process are assumed to be negligible, however, the data on these emissions are very scarce

The Estimation of CH₄

$$CH_4 \text{ Emissions} = \sum_i (M_i * EF_i) * 10^{-3} - R$$

Where

CH₄ Emissions: total CH₄ emissions in inventory year, Gg

M_i: mass of organic waste treated by biological treatment I, Gg

EF: emission factor of treatment i, g CH₄/kg waste treated

i: composting or anaerobic digestion

R: total amount of CH₄ recovered in inventory year, Gg CH₄

If recovered gas is used for energy, then emission are reported under energy

The Estimation of N₂O

➤ Similarly :

$$N_2O \text{ Emissions} = \sum_i (M_i * EF_i) * 10^{-3}$$

➤ Where

N₂O Emissions: total N₂O emissions in inventory year, Gg

M_i: mass of organic waste treated by biological treatment I, Gg

EF: emission factor of treatment i, g CH₄/kg waste treated

i: composting or anaerobic digestion

Default Emission Factors

Type of biological treatment	CH ₄ emission factors (g CH ₄ /kg waste treated)		N ₂ O emission factors (g N ₂ O/kg waste treated)	
	On a dry weight basis	On a wet weight basis	On a dry weight basis	On a wet weight basis
Composting	10 (0.08 - 20)	4 (0.03 - 8)	0.6 (0.2 - 1.6)	0.24 (0.006-0.6)
Anaerobic digestion at biogas facilities	2 (0 - 20)	0.8 (0 - 8)	Assumed negligible	Assumed negligible

Thank you!

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