Greenhouse gas reduction from composting process: case study in Thailand

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INTRODUCTION

In Thailand, manufacturing fertiliser or soil conditioners often uses models from foreign composting systems. However, MSW in Thailand is different from the MSW in other countries due to its higher moisture content and wet organic waste. Additionally, different weather conditions result in variable degradation rates. There is a lack of clarity regarding the emissions reduction and emission factor that results from the commercial-scale composting process in developing countries, which make uncertain opputunity of organic composting waste as an effective strategy to reducing greenhouse gas emissions. Composting and soil conditioning technologies for waste management were compared with the prevalent Thailand anaerobic landfill technique to identify the actual greenhouse gas reduction from composting process in two different sites.

METHODOLOGY

01 Site selection
(1) Bangkok province
(2) Buriram province

02 Data collection
- Historical data
- Interview data

03 Determine emission source
- BAU: CH_4 and N_2O from disposal site
- BE: CH_4 and N_2O from the composting process
- PE: CO_2 from electricity consumption and combustion of fossil fuel

04 GHG calculation
- 2006 IPCC
- T-VER methodology

CALCULATION METHOD

	Business as usual (BAU)	Baseline emission (BE)	Project emission (PE)
	$BE_{CH4,SWDS,y}$	BE = W x (composition percentage of waste type x factor of waste type) x CF x 0.1	$PE = PE_{COMP} + PE_{ELEC} + PE_{FUEL}$
Ref:	(2006 IPCC GL)	T-VER-METH-WM-03	T-VER-METH-WM-03

Emission reduction (ER) = BE - PE

ACTIVITY IN SELECTED SITE STUDY

The work area is divided into four parts:
1. composting area
2. composting and disinfection reception area.
3. sorting and size reduction area
4. nutrient improvement and bagging area.

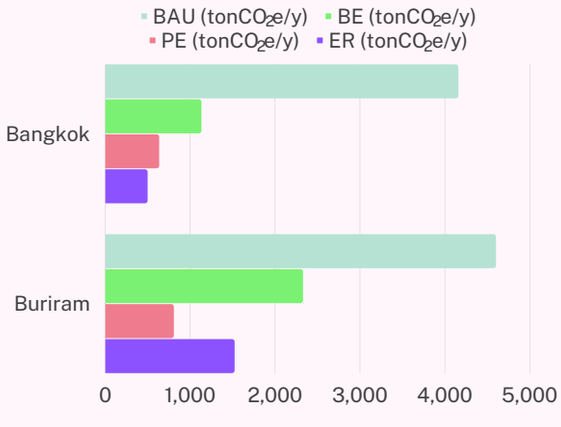
Bangkok province

The work area is divided into four parts:
1. hand sorting
2. mechanical sorting, where the waste is divided into two parts
3. composting area (first part)
4. landfilling (second part)

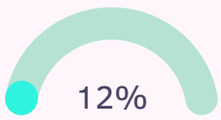
Buriram province

Both organic composting factories have a low daily capacity (approximately 6-10 ton/day)

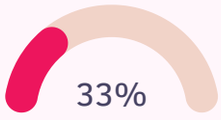
GREENHOUSE GAS EMISSION



GHG REDUCTION COMPARED TO BAU



Bangkok



Buriram

EMISSION FACTOR

Bangkok : 0.26 tCO_2e/t_{ww}

Buriram : 0.22 tCO_2e/t_{ww}

GREENHOUSE GAS REDUCTION

The results of the GHG reduction calculated using the parameters obtained from the selected reference sites show that the BMA composting plant and Buriram composting plant, were able to reduce GHG emissions by 11.99% and 33.09% compared with BAU.

The emission factors (EF) of the composting process were calculated and found at 0.26 tCO e/tww and 0.22 tCO_2e/t_{ww} according to the data retrieved from Bangkok and Buriram respectively. The average EF of the composting process was 0.24 tCO_2e/t_{ww} with a standard deviation of 0.17.

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