Recap of Waste Management/Handling CDM Project

8 July 2011

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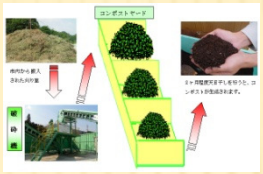
1. Waste Management and GHGs Emission



Waste Discharge at Sources → Collection and Transportation → Intermediate Treatment → Final Disposal at Landfills

CO_2

Fuel combustion by collection vehicles

CO_2

In the case of incinerating waste with the use of fossil fuels

CH_4

Anaerobic decomposition of organic wastes

2. Wastewater Management and GHGs Emission

CH_4

(Anaerobic Decomposition of organic matter)

Domestic Wastewater

Agricultural Wastewater

3. CDM Project Prototypes

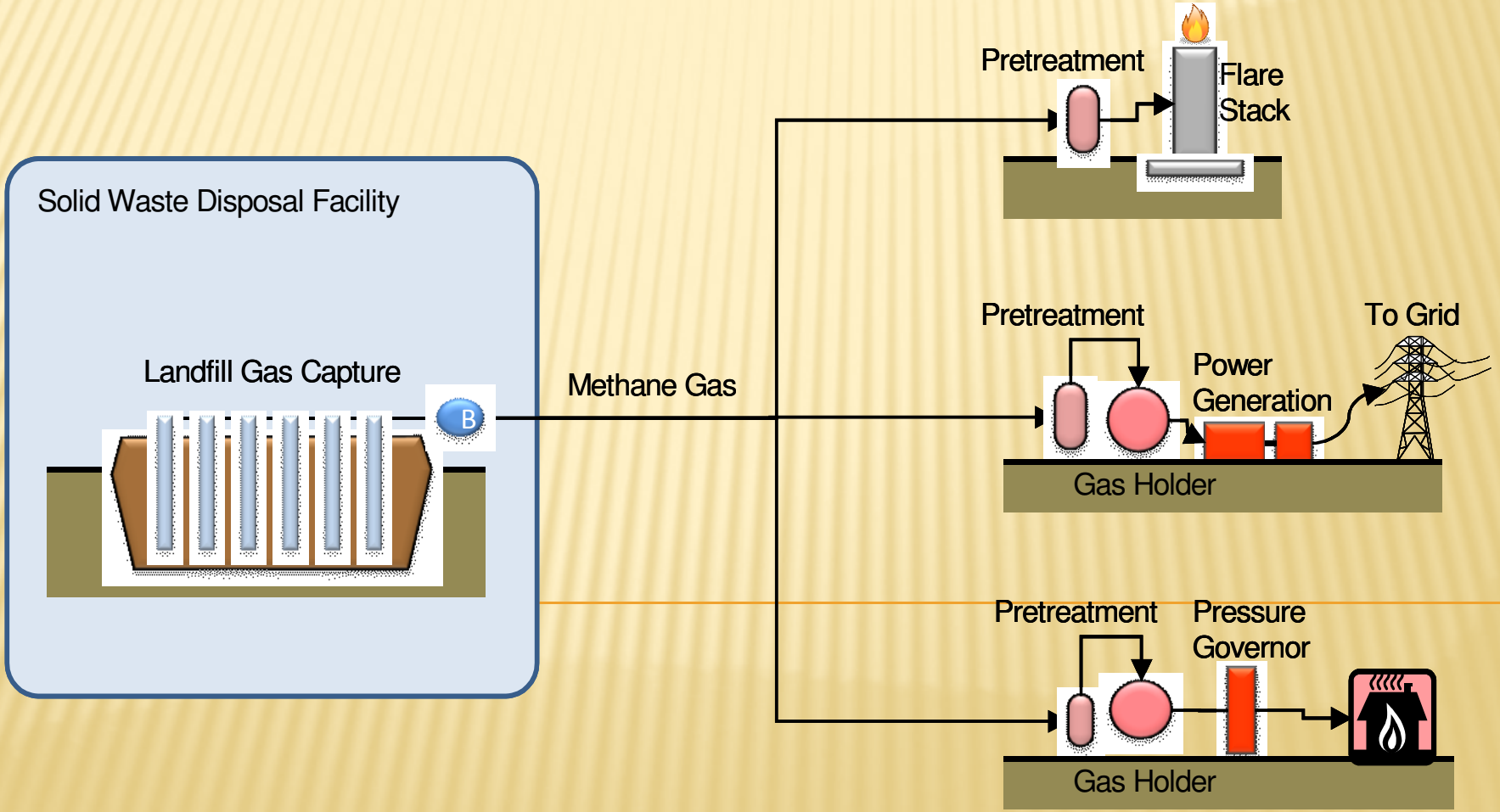
GHG emission source	Emission Reduction Methods	
Solid Waste/ Wastewater	CH_4 Capture	Flaring (Burning)
		Direct Heat Use
		Power Generation
	CH_4 Emission Avoidance/Reduction by Aerobic Treatment of Organic Matter	

Composting

Applicable GHGs emission reduction methods are basically same for solid waste and wastewater treatment.

3. CDM Project Prototypes

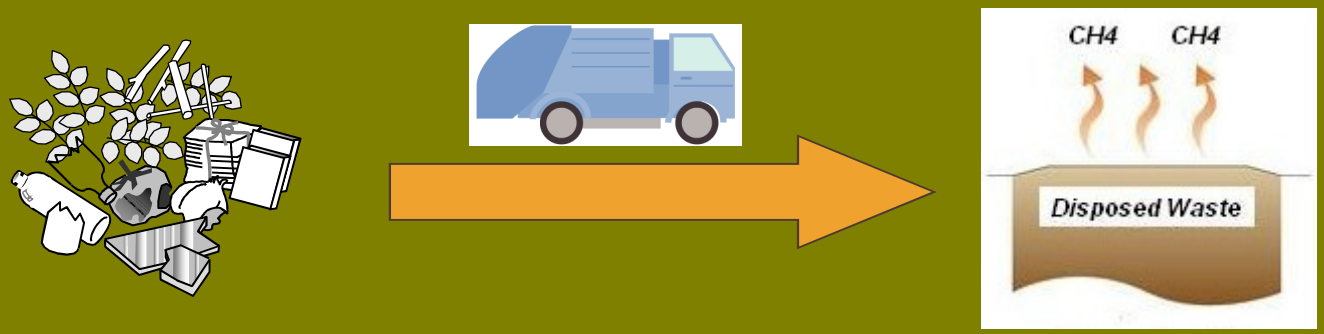
(1) Methane capture from waste landfill



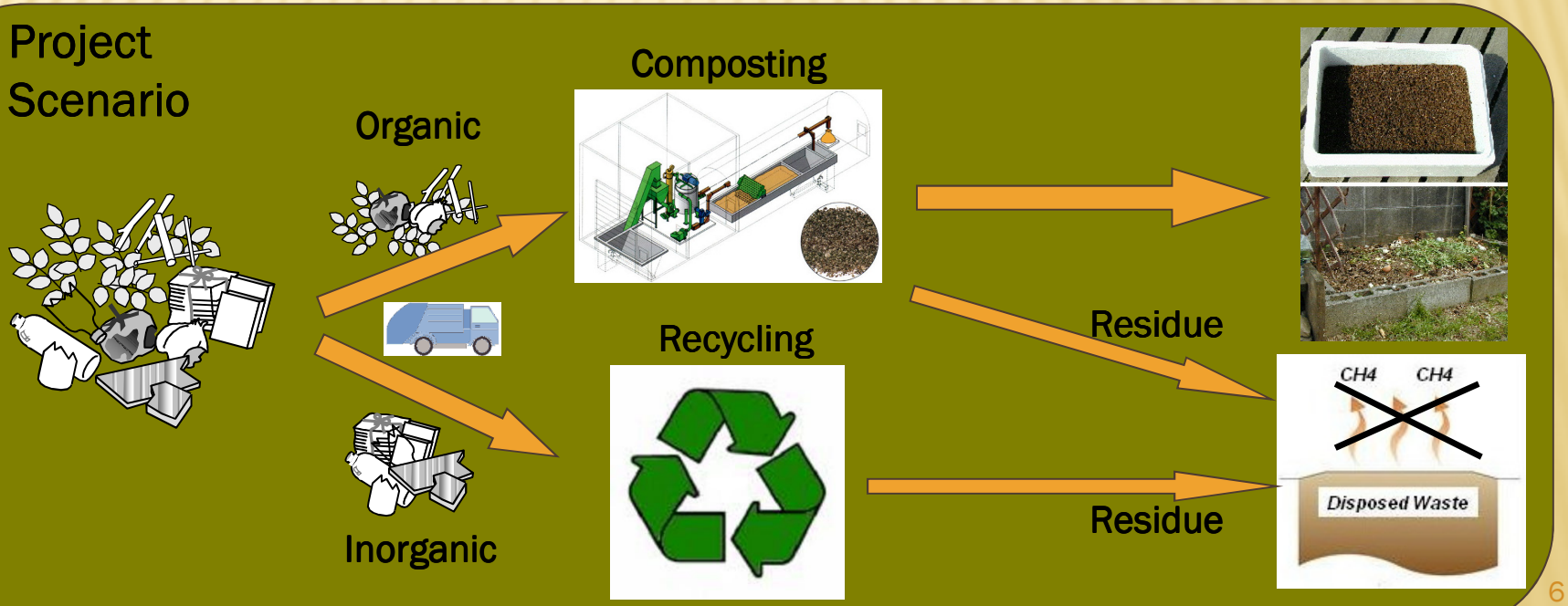
3. CDM Project Prototypes

(2) Methane avoidance by composting of organic matter in solid waste

Current Practice (before CDM Project)



Project Scenario



4. Key parameters in CH_4 emission from waste

CH_4 emission from waste

- CH_4 is generated as a result of **degradation of** ① organic materials under ② anaerobic **conditions**.
- **The time required for the waste to decay (half-life) is different among the types of waste**.
- **Part of CH_4 generated is oxidized** in the cover of solid waste disposal (CH_4 oxidation by methanotrophic micro-organisms in cover soils).

Key Parameter in CH_4 emission

- Degradable ① organic materials (Degradable Organic Carbon: DOC) in waste.
- Degree of ② anaerobic condition in waste (Methane Correction Factor: MCF).
- The time required for the waste to decay (decay rate)

5. Exercise: Estimation CH_4 emission from SWDS

Question	Estimate the amount of CH_4 emission from the solid waste disposal site in accordance with the steps below.

STEP 1: Estimate the amount of waste disposed by types of waste based on the data given below.

Waste amount and composition

Items	Preconditions	
The amount of waste disposed		100,000 tons/year
Waste composition by types (% by weight)	Paper/Cardboard	15%
	Textiles	3%
	Food waste	25%
	Wood	5%
	Garden and park waste	15%
	Inert waste	37%

5. Exercise: Estimation CH_4 emission from SWDS

STEP 1: Estimate the amount of waste disposed by types of waste based on the data given below.

Answer (Amount of Waste by Types)

Type of Waste	Amount (tonnes/year)
Paper/Cardboard	15,000
Textiles	3,000
Food Waste	25,000
Wood	5,000
Garden and Park Waste	15,000
Inert Waste	37,000

5. Exercise: Estimation CH_4 emission from SWDS

STEP 2: Estimate the total amount of DOCs (Degradable Organic Carbons) decayed in the first year by using the estimation results made in STEP 1 and the data given below.

Type of Waste	Content of DOCs in the Waste (% on weight basis)	Decay rate of DOCs in the first year (%)
Paper/cardboard	40%	6.8%
Textiles	24%	6.8%
Food Waste	15%	33.0%
Wood	43%	3.4%
Garden/park waste	20%	15.6%
Inert waste	0%	0%

5. Exercise: Estimation CH_4 emission from SWDS

STEP 2: Estimate the total amount of DOCs (Degradable Organic Carbons) decayed in the first year by using the estimation results made in STEP 1 and the data given below.

Answer (Total Amount of DOCs decayed in the first year

Type of Waste	Amount of DOCs decayed in the first year (tonnes/year)
Paper/Cardboard	408
Textiles	48
Food Waste	1,237
Wood	73
Garden and Park Waste	468
Inert Waste	0
Total amount of DOCs decayed in the first year	2,234

(Round down at decimal point.)

5. Exercise: Estimation CH_4 emission from SWDS

STEP 3: Estimate the amount of CH_4 released to the atmosphere in the first year if all the waste above is disposed at the unmanaged landfill with 7m depth, using the estimation result above and the data given below.

Equation for estimating the CH_4 emission (in CO_2 equivalent) from waste landfill

CH_4 emission (in tonneCO_2e)
= 5.67×MCF×(Total amount of DOCs decayed in the first year)

MCF: Methane correction factor (to determine the fraction of methane that are actually released to the atmosphere without oxidization, depending upon the type of landfills)

Type waste landfill	MCF
Managed- anaerobic	1.0
Managed-semi-aerobic	0.5
Unmanaged-deep (>5m waste) and/or high waste table	0.8
Unmanaged shallow (<5 m waste)	0.4
Uncategorized waste disposal	0.6

5. Exercise: Estimation CH_4 emission from SWDS

ANSWER	10,133 Tonnes CO_2e

(Round down at decimal point.)