



Methodologies for calculating GHG reductions from co-mingled and non-manure waste

**Methane to Markets Workshop
January 28, 2009**



Overview of approved CDM methodologies



Approved CDM Methodologies

AM0025. Avoided emissions from organic waste through alternative waste treatment processes including:

- Composting, gasification, anaerobic digestion, refuse derived fuel production, incineration
- Applicable for flows of waste intended for landfilling

- **AM0039. Methane emission reductions from organic wastewater and bioorganic solid waste using co-composting**
- Applicable to projects co-composting sludge from WWTP and bioorganic solids that would otherwise be disposed in the landfill. Not applicable for manure.



Approved CDM methodologies

- **III.F. Avoidance of methane emissions through controlled biological treatment of biomass**
- Applicable to projects where emissions reduced through following measures:
 - (a) Aerobic treatment by composting and proper soil application of the compost;
 - (b) Anaerobic digestion in closed reactors equipped with biogas recovery and combustion/flaring system.
- This methodology is applicable to the treatment of the organic fraction of municipal solid waste and biomass waste from agricultural or agro-industrial activities. The treatment of manure is not eligible under this methodology.



Approved CDM methodologies

- **AMS.III.R Methane recovery in agricultural activities at household/small farm level**
- Applicable to projects with recovery and destruction of methane from manure and
- wastes from agricultural activities that would be decaying anaerobically. Methane emissions are prevented by:
 - (a) Installing methane recovery and combustion system to an existing source of methane emissions, or
 - (b) Changing the management practice of a biogenic waste or raw material in order to achieve the controlled anaerobic digestion equipped with methane recovery and combustion system.

The category is limited to measures at individual households or small farms (e.g. installation of a domestic biogas digester).



Approved CDM Methodologies

- **AM0057. Avoided emissions from biomass wastes through use as feedstock in pulp and paper production or in bio-oil production**
- Applicable to projects using agricultural wastes as feedstock for pulp and paper production. Agricultural wastes include by-products and residues or waste streams from food production and processing, but excludes wastes from wood production and processing and municipal solid waste.
- **ACM006. Methodology for electricity production from biomass residues**
- Applicable to projects that generate electricity from biomass residues.
- *Biomass residues* are defined as *biomass* that is a by-product, residue or waste stream from agriculture, forestry and related industries. This shall not include municipal waste or other wastes that contain fossilized and/or non-biodegradable material



Approved CDM methodologies

- **AM0069. Biogenic methane use as feedstock and fuel for town gas production**
- Applicable to projects where biogas captured at a wastewater treatment facility or a landfill is used to fully or partially substitute natural gas or other fossil fuels of higher carbon content.

- **ACM010. Methodology for GHG emission reductions from manure management systems**
- applicable generally to manure management on livestock farms where the existing
- anaerobic manure treatment system, within the project boundary, is replaced by animal waste management system that results in less GHG emissions.



Estimation of baseline emissions

- “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” based on IPCC First Order Decay Model, under the volume “Waste”
- IPCC tier 2 approach ‘Emissions from Livestock and Manure Management’ under the volume “Agriculture” Forestry and other Land use’ of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories



FOD Model Factors: k Value (Decay Constant)

Type of Waste		Climate Zone [±]							
		Boreal and Temperate (MAT ≤ 20°C)				Tropical ¹ (MAT > 20°C)			
		Dry (MAP/PET < 1)		Wet (MAP/PET > 1)		Dry (MAP < 1000 mm)		Moist and Wet (MAP ≥ 1000 mm)	
		Default	Range ²	Default	Range ²	Default	Range ²	Default	Range ²
Slowly degrading waste	Paper/textiles waste	0.04	0.03 ^{3,5} – 0.05 ^{3,4}	0.06	0.05 – 0.07 ^{3,3}	0.045	0.04 – 0.06	0.07	0.06 – 0.085
	Wood/ straw waste	0.02	0.01 ^{3,4} – 0.03 ^{6,7}	0.03	0.02 – 0.04	0.025	0.02 – 0.04	0.035	0.03 – 0.05
Moderately degrading waste	Other (non – food) organic putrescible/ Garden and park waste	0.05	0.04 – 0.06	0.1	0.06 – 0.1 ⁸	0.065	0.05 – 0.08	0.17	0.15 – 0.2
Rapidly degrading waste	Food waste/Sewage sludge	0.06	0.05 – 0.08	0.185 ⁴	0.1 ^{3,4} – 0.2 ⁹	0.085	0.07 – 0.1	0.4	0.17 – 0.7 ¹⁰
Bulk Waste		0.05	0.04 – 0.06	0.09	0.08 ⁸ – 0.1	0.065	0.05 – 0.08	0.17	0.15 ¹¹ – 0.2



FOD Model Factors: Methane Correction Factor

<u>Landfill Type</u>	<u>Methane Correction Factor (MCF)</u>
Managed – Anaerobic	1.0
Managed – Semi-aerobic	0.5
Unmanaged – Deep > 5m	0.8
Unmanaged – Shallow < 5 m	0.4
Unmanaged shallow stockpiles	0.28



Leakage

- Methane leakages from anaerobic digesters; a default value of 0.10 can be taken according to table 10A-8 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10.



Useful websites

- World Bank's Carbon Finance Unit: www.carbonfinance.org
- CDM methodologies website: <http://cdm.unfccc.int/methodologies/index.html>
- Carbon Finance Unit overview of CDM methodologies website
<http://wbcarbonfinance.org/Router.cfm?Page=Methodology&mt=Search>
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5: Waste:
<http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html>
- World Bank's Urban Solid Waste Management: <http://go.worldbank.org/A5tfx561.50>



Thank you !

For any questions, contact me on
zazizova@worldbank.org