EcoSecurities Group plc

Agricultural Biomass in LAC;

Measurement and Verification Issues of Emissions Reductions

31 October 2007

Methane to Markets, Beijing

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Company History

Oct 2005 La Esperanza project, structured by EcoSecurities, receives carbon credits from first-ever issuance

Nov 2005 EcoSecurities Consultancy Services is voted the world's leading greenhouse gas advisory firm for the 5th year in a row

Dec 2005 EcoSecurities successfully lists on AIM, raising € 80 million

July 2007 Credit Suisse strategic investment and institutional placing, raising € 100 million

Selected EcoSecurities clients

Governments: Denmark, Austria, Japan,

International organizations: UNDP, UNFCCC, FAO, UNEP, IUCN, WWF, FAO, IPCC

Financial institutions: Tokyo-Mitsubishi Securities, World Bank, International Finance Corporation, ADB, EIB

Private clients: Shell, Essent, Toyota Tsusho, Harza, Vallourec & Mannessmann, EnXco Windpower, CDC, Alkane Energy, Cargill, Eskom, SGS

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Proven track record in a new market

- Portfolio of 185 million tons CO2e
- More than CDM 450 projects underway in 36 countries, using 18 technologies
- Registered more than 70 projects registered with UNFCCC
- Market Cap 1 billion US

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Agricultural Biomass in Latin America

Agricultural biomass refers to biological material generated through agricultural activities which can be used as fuel or for industrial processes.

Examples of agricultural biomass in LAC:

> Empty Fruit Bunches (EFB)

> Bagasse

> Rice Husk

> Banana Waste

> Coffee Waste

Methane Avoidance Component

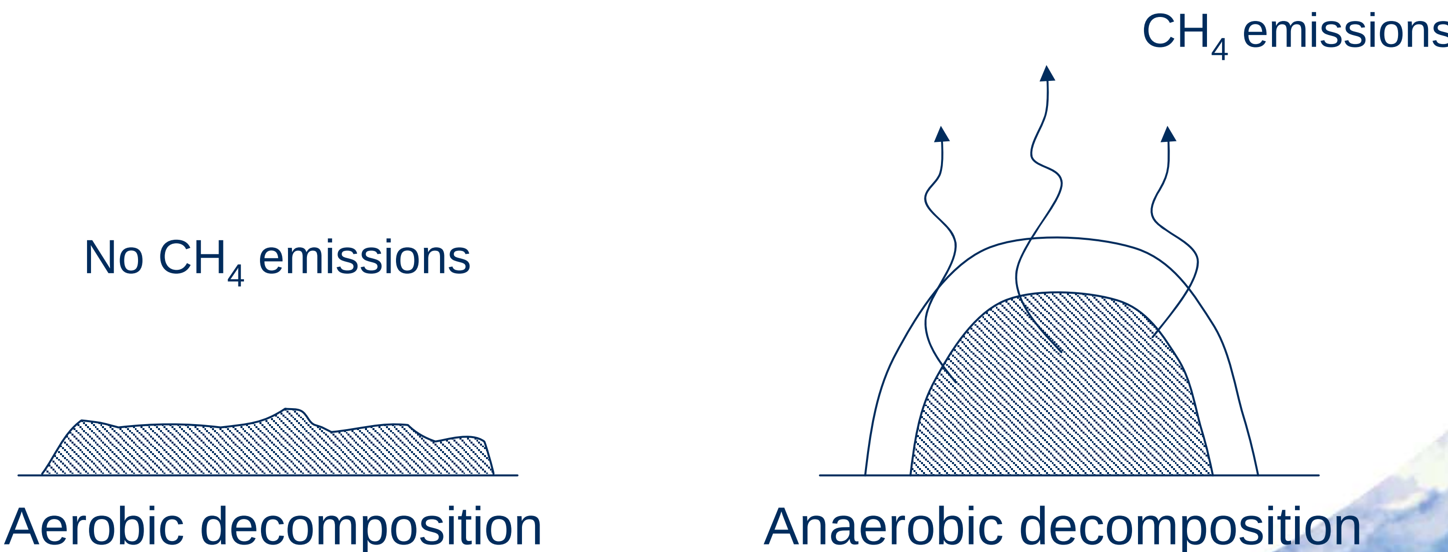
- Incorporating methane avoidance substantially increases project CERs

- Additional CERs can determine a CDM project's financial viability

Methane (CH_4)
GWP: 21

Methane Avoidance Component

Methane production conditions:



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Biomass Waste Practice

Methane avoidance component

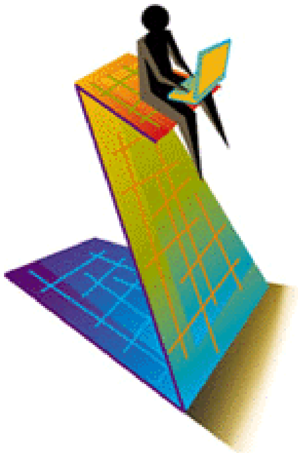
Examples:

No methane is produced

Methane is produced

Challenges in Measurement & Verification of Methane Avoidance

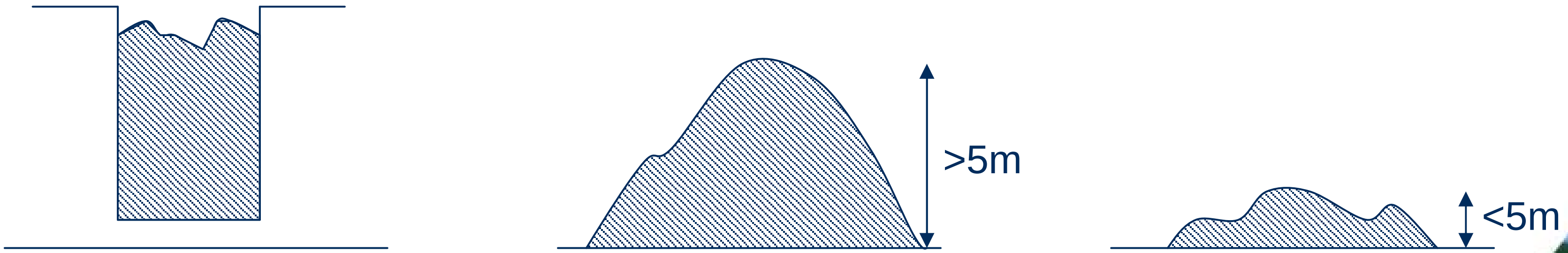
1. Calculating Emission Reduction Baseline
   - > Solid Waste Disposal Site vs Stockpiles
   - > Biomass Leakage: Usage vs Availability (+25%)
   - > Type of biomass definition
   - > Evolution of methodologies
2. Monitoring & Verification
   - > Baseline verification
   - > Biomass monitoring (Weighbridge vs Conveyor belt)



$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1-e^{-k_j}\right)$$

Biomass Waste Disposal

Type of disposal site



Managed site	Deep unmanaged site	Shallow unmanaged site
MCF=1	MCF=0.8	MCF=0.4

MCF: Methane Correction Factor

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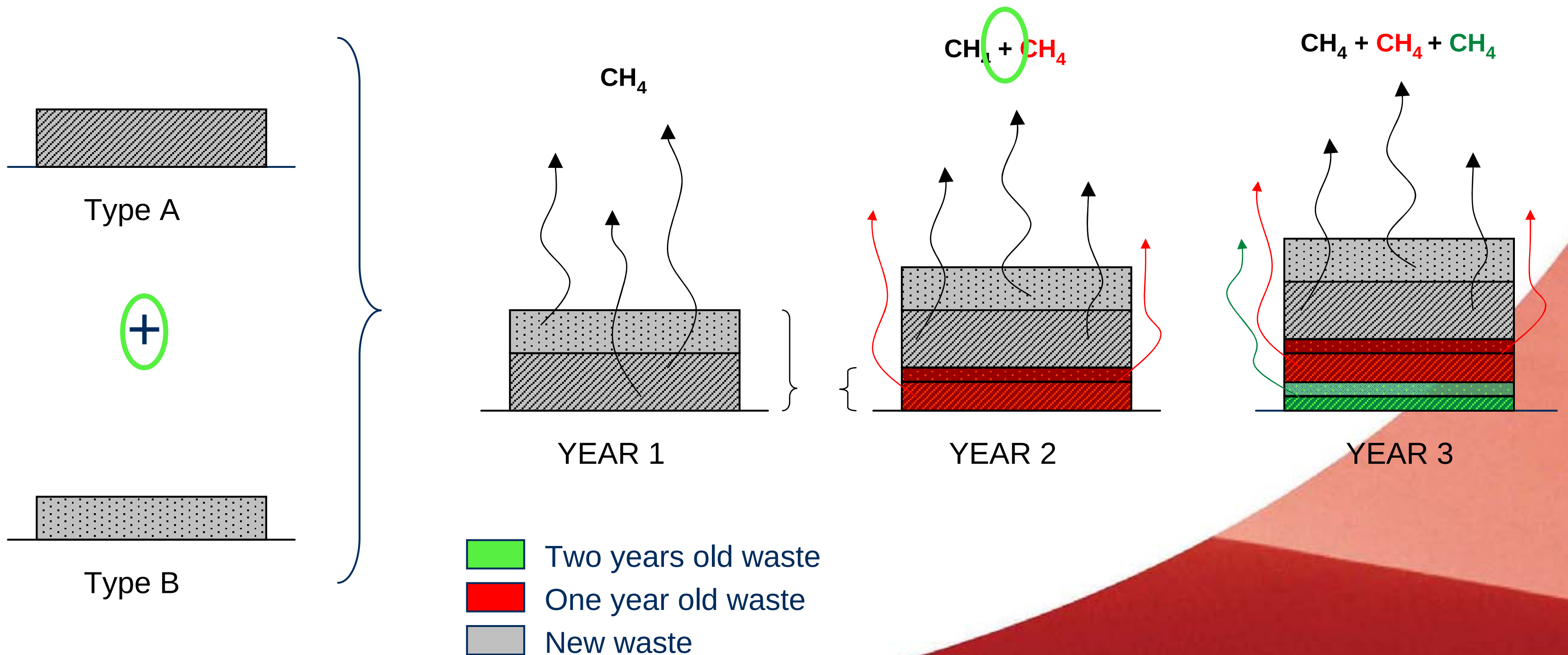
Methane Avoidance Tool

Formula Description

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot (1-e^{-k_j})$$



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Leakage & Availability Assessment

Projects must address the following:

> **Shifts of pre-project activities.** Decreases of carbon stocks, for example as a result of deforestation, outside the land area where the biomass is grown, due to shifts of pre-project activities.

> **Emissions** related to the production of the biomass.

> **Competing uses for the biomass.** The biomass may in the absence of the project activity be used elsewhere, for the same or a different purpose.

These emission sources may be project emissions (if under the control of project participants, i.e. if the land area where the biomass is grown is included in the project boundary) or sources of leakage (if the source is not under control of project participants).

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Leakage & Availability Assessment

Table 1. Emission source per type of biomass

Biomass type	Activity / source	Shift of pre-project activities	Emissions from biomass generation / cultivation	Competing use of biomass
Biomass from forests	Existing forests	-	-	x
	New forests	x	x	-
Biomass from croplands or grasslands (woody or non-woody)	In the absence of the project the land would be used as cropland / wetland	x	x	-
	In the absence of the project the land would be abandoned	-	x	-
Biomass residues or wastes	Biomass residues or wastes are collected and used	-	-	x

Types of Biomass

Kj: Decay Rate for the Waste type j

Waste type *j*		Boreal and Temperate (MAT≤20°C)		Tropical (MAT>20°C)	
		Dry (MAP/PET <1)	Wet (MAP/PET >1)	Dry (MAP< 1000mm)	Wet (MAP> 1000mm)
Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07
Slowly degrading	Wood, wood products and straw	0.02	0.03	0.025	0.035
Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05	0.10	0.065	0.17
Rapidly degrading	Food, food waste, beverages and tobacco (other than sludge)	0.06	0.185	0.085	0.40

NB: MAT – mean annual temperature, MAP – Mean annual precipitation, PET – potential evapotranspiration. MAP/PET is the ratio between the mean annual precipitation and the potential evapotranspiration.

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Biomass Monitoring and Measurement

> Projects receiving biomass wastes from numerous sources must account for the variance in methane production

> Sophisticated equipment and monitoring plans are necessary to verify emission reductions

Evolving Methodologies

First Methane Avoidance Calculation:

$$BE_y = Q_{biomass} * CH_4\_IPCC_{decay} * GWP\_CH_4$$

Most Recent Methane Avoidance Calculation:

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} \sum_{j} W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot \left(1-e^{-k_j}\right)$$

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Lessons Learned & Recommendations

- Biomass availability assessment limits the number of viable projects under the CDM.
- Projects receiving biomass from numerous sources must develop monitoring systems for biomass delivery including a detailed sample plan.
- Biomass projects claiming methane avoidance require meticulous attention to detail and extensive planning in order to succeed in correctly monitoring emission reductions and verifying those reductions.
- The scope of verification should be limited to factors affecting emission reductions and those considered by the version of the methodology applied at project registration.

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