



UNFCCC Clean Development Mechanism Monitoring Report

Nanjing Tiangjingwa Landfill Gas to Electricity Project

CDM registration number 0071

Monitoring period 11/6/5 – 29/5/6

Document ID: CDM0071-M1

Date: 7 June 2006

Project background

Nanjing Tiangjingwa Landfill Gas to Electricity Project has been registered as CDM project by the UNFCCC on 18 December 2005 under reference number 0071.

Further background on this project can be found in the PDD and associated documents, which are available on the UNFCCC website: <http://cdm.unfccc.int/Projects/DB/DNV-CUK1129289693.13/view.html>.

Parties involved are China (Host Country) and the United Kingdom of Great Britain and Northern Ireland (other Parties). The project participants are Nanjing Green Waste Recovery Engineering Co., Ltd (project developer and operator) and Ecosecurities (carbon buyer).

Monitoring background

Basis for the calculation of emission reductions is the monitoring plan in the Project Design Document. The calculation of emission reduction applies methodologies ACM0001 (version 02 of 30/9/5) and AMS-I-D (3/3/6). The validated monitoring plan has been made operational by the project developer in the Monitoring Protocol [CDM project management and operation manual, June 2005]. This document is necessary to make the monitoring plan operational, but is not an official document in the CDM project cycle.

There are no remaining open issues related to monitoring after completion of project validation.

Monitoring results

Emission reduction

The calculated emission reductions amount to **26921 ton CO₂eq.**

Monitoring period covered

This is the first monitoring report of this project. It covers the period 11/6/5 to 29/5/6.

Presentation of monitoring results - spreadsheet

All monitoring data have been included in an Excel workbook. This includes:

1. Summary. This worksheet contains an overview of the calculation of emission reductions and general notes [Annex 1].
2. Calculations. Shows the calculation of emission reductions on the basis of raw data. Missing values or corrected values have been color-coded (see section "processing of raw data" below).
3. Raw data. Contains the raw monitoring data submitted by the project developer.

No landfill gas flared

The project planned to flare part of the landfill gas. Due to the lower than expected flow of landfill gas, the flare has not been used during the monitoring period. The flare efficiency and landfill gas flow to flare have therefore not been measured.

Calculation methodology

The calculation methodology of emission reduction for this project is summarized in Annex 2. The resulting formula has been used as a cross-check.

Calculation took place in the following steps:

1. Calculate time difference between 2 observations of flow and methane. Flow of landfill gas and methane content of the landfill gas are normally recorded every hour.
2. Calculate the flow in landfill gas flow in m³/h under standard conditions;
3. Multiply time difference with calculated flow to get the LFG flow in m³
4. Multiply with vol% methane to get m³ of CH₄;
5. multiply with the density of CH₄ to get ton CH₄;
6. Apply the adjustment factor AF (5%) to calculate ton CH₄;
7. Multiply with 21 (global warming potential of CH₄) to get ton CO₂-equivalent;
8. Take net MWh delivered to the grid from the records of the power company and multiply with the emissions factor for displaced power (here: 0.874 tCO₂/MWh).
9. Add the totals of step 7 and 8.

Activity data				Notes
Landfill gas to power generation	LFGelectricity	3,329,342	Nm3	1
Landfill gas to flare	LFGflare	-	Nm3	2
Landfill gas to heat	LFGthermal	-	Nm3	3
Power displaced	EG	3,914	MWh	4

Calculations				Notes
Methane combusted	MDelectricity	1,178	tCH4	5
	MDflared	-	tCH4	6
	MDthermal	-	tCH4	7
	MDproject	1,178	tCH4	8
	AF	5%		9
	MDreg	1,119	tCH4	10
	MDreg	23,500	tCO2eq	11
Avoided CO2 emissions grid	EG	3,914	MWh	12
	CEFelectricity	0.874	tCO2/MWh	13
	Reduction	3,421	tCO2	14
Total emission reduction	ER	26,921	tCO2eq	15

Notes

- 1 Calculations worksheet cell R1
- 2 No flaring took place
- 3 Not applicable
- 4 Not in spreadsheet; from power company administration. Difference of 260 MWh between power meter and administration of power company. Power company administration figure has been used.
- 5 See sheet calculations cell Z1
- 6 The flare has not been used during the crediting period
- 7 Not applicable
- 8 Sum of 1 to 3
- 9 As agreed per PDD
- 10 MDproject * (1-AF)
- 11 MDproject * (1-AF)*21
- 12 See cell C10
- 13 As agreed per PDD
- 14 EG * EF
- 15 Sum of MDreg (tCO2eq) + avoided CO2 emissions grid

ACM0001, version 02
Landfills, consolidated

Monitoring method for CDM0071-M1
EcoSecurities, May 2006

$$\#1: \quad ER = (MD_{project} - MD_{reg}) \cdot GWP_{ch4} + EG \cdot CE_{electricity} + ET \cdot CE_{thermal}$$

ER = emission reduction [tCO₂e/year]
 MD_{project} = methane destruction [tCH₄/year]
 MD_{reg} = methane destruction in absence of project [tCH₄/year]
 GWP_{ch4} = global warming potential methane [-]
 EG = net quantity of electricity displaced [MWh/year]
 CE_{electricity} = emissions intensity [tCO₂e/MWh]
 ET = thermal energy displaced [TJ]
 CE_{thermal} = emissions intensity [tCO₂e/TJ]

$$\#2: \quad MD_{project} := MD_{flared} + MD_{electricity} + MD_{thermal}$$

MD_{project} = methane destruction [tCH₄/yr]
 MD_{flared} = methane destroyed by flaring [tCH₄/yr]
 MD_{electricity} = methane destroyed by using it as fuel input for power production [tCH₄/yr]
 MD_{thermal} = methane destroyed by using it as fuel input for thermal energy generation [tCH₄/yr]

$$\#3: \quad MD_{flared} := LFG_{flare} \cdot w_{CH4} \cdot d_{CH4} \cdot FE$$

LFG_{flare} = quantity of landfill gas flared [m³]
 w_{CH4} = fraction of methane in landfill gas [m³ CH₄/m³ LFG]
 d_{CH4} = methane density [t CH₄/m³ CH₄]
 FE = flare efficiency [-]

$$\#4: \quad MD_{electricity} := LFG_{electricity} \cdot w_{CH4} \cdot d_{CH4}$$

$$\#5: \quad MD_{thermal} := LFG_{thermal} \cdot w_{CH4} \cdot d_{CH4}$$

LFG_{electricity} and LFG_{thermal} = gas fed into thermal/power generation equipment [m³ CH₄/yr]

Substitute:

GWP_{ch4} = 21; d_{CH4} = 0.0007168 [standard conditions]

$$\#6: \quad GWP_{ch4} := 21$$

$$\#7: \quad d_{CH4} := 0.0007168$$

Specifics for Nanjing:

$$\#8: \quad CE_{electricity} := 0.874$$

$$\#9: \quad ET := 0$$

#10: LFGthermal := 0

#11: MDreg := MDproject·AF

#12: AF := 0.05

#13: FE := 0.97

#14: LFGflare := 0

#15: ER = 0.874·EG + 0.01430016·LFGelectricity·wCH4

Projection: 256 kt/yr

Deviations:

LFGflare is not applicable: there is no flaring
FE is therefore not applicable