

CDM Monitoring Report

# Nanjing Tianjingwa Landfill Gas to Electricity Project

Project CDM ID: 0071

Project registration date: 18 December 2005

Monitoring period: 30/06/2008 - 31/07/2009

Date monitoring report and version nr. 07/08/2009 V1

## 1. Project background

Nanjing Tianjingwa 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 [China] and EcoSecurities Ltd [UK].

## 2. Project implementation in relation to registered PDD

The project is implemented and operated as per registered PDD.

### 2.1. Implementation status

The objective of the proposed project is to collect and utilize the landfill gas to produce electricity. The Project generates certified emission reductions (CERs) by displacing electricity generation from grid connected fossil fuel-fired power plants that would otherwise be generating electricity needed and destroying methane within the landfill gas that would otherwise have been vented directly into the atmosphere. The project started operation on 11/06/2005.

The current installed capacity of the Project is only 1.6 MW as due to insufficient gas production. The capacity is within the original 6 MW as specified within the PDD, this is in conformity with the PDD.

### 2.2. Operation of the project

Two sets of generation units with total capacity of 1.6MW are installed on site, CAT generator 1.1MW started operation on 11/06/2005, while Baoju Generator 0.5MW started operation on 09/03/2007. The project has been operating since this date. "Operational" in this context includes downtime due to maintenance or technical issues.

### 2.3. Forecasted emission reductions versus actual emission reductions

The forecasted emission reduction of 2009 in the PDD is 257,657 tCO<sub>2</sub>/year based on a methane destruction volume of around 10,657 tCH<sub>4</sub> and a power delivery to the grid of 38,425 MWh/year with a combined margin emission factor of 0.874 tCO<sub>2</sub>/MWh. The actual methane destruction volume and power output over this monitoring period [397 days] was 2,067 tCH<sub>4</sub> and 9,170 MWh respectively. The emission reductions in this monitoring period are much less than forecasted in the PDD, since the landfill gas production was much lower than forecasted at the time of writing of the PDD.

### 3. Compliance of the monitoring plan with the monitoring methodology

This project has been registered under methodology ACM0001 ver.1. The project has not sought revision or deviation to the monitoring plan in the previous monitoring period. The validated monitoring plan is therefore in accordance with the approved methodology applied to the CDM project activity.

### 4. Compliance of monitoring with the monitoring plan

Monitoring has been carried out in accordance with the monitoring plan contained in the registered PDD.

#### 4.1. Monitoring period

The monitoring period covers 30/06/2008 to 31/07/2009. The starting date is later than the registration date [18/12/2005] and the last day of the last monitoring period [29/06/2008]. The ending date is before the end of the crediting period [30/04/2012].

#### 4.2. Monitoring parameters

Data / Parameter:	LFG <sub>electricity,y</sub>
Data unit:	m <sup>3</sup>
Description:	Amount of landfill gas combusted in power plant
Source of data	Measured
Value of data applied for the purpose of calculating emission reductions	5,731,431
Description of measurement methods and procedures	Continuous measurement by flow meters before input to Generators Teject (Cat) and Baoju. The meters provide a cumulative flow reading. Recorded values are entered into a spreadsheet every hour. In case of breakdown or suspected problems, the manufacturer will be called in.
QA/QC procedures	The meters have been subject to maintenance and calibration according to manufacturer's recommendations.
Any comment:	

Data / Parameter:	$P_{\text{electricity,y}}$
Data unit:	Pa
Description:	Pressure of the landfill gas
Source of data	Measured
Value of data applied for the purpose of calculating emission reductions	
Description of measurement methods and procedures	Continuous measured. Recorded values are entered into a spreadsheet every hour. In case of breakdown or suspected problems, the manufacturer will be called in.
QA/QC procedures	The equipment has been subject to maintenance and calibration according to manufacturer's recommendations.
Any comment:	

Data / Parameter:	$T_{\text{electricity,y}}$
Data unit:	°C
Description:	Temperature of the landfill gas
Source of data	Measured
Value of data applied for the purpose of calculating emission reductions	
Description of measurement methods and procedures	Continuous measured. Recorded values are entered into a spreadsheet every hour. In case of breakdown or suspected problems, the manufacturer will be called in.
QA/QC procedures	The equipment has been subject to maintenance and calibration according to manufacturer's recommendations.
Any comment:	

Data / Parameter:	W <sub>CH<sub>4</sub></sub>
Data unit:	m <sup>3</sup> CH <sub>4</sub> / m <sup>3</sup> LFG
Description:	Methane fraction in the landfill gas
Source of data	Measured
Value of data applied for the purpose of calculating emission reductions	
Description of measurement methods and procedures	Methane content is measured continuously. Recorded values are entered into a spreadsheet every hour. In case of breakdown or suspected problems of the equipment, the manufacturer will be called in.
QA/QC procedures	Equipment is calibrated as per manufacturer's requirement. Data are recorded in hard copy format and transferred to an electronic file. Checks of the data entry process are conducted by someone other than the person entering the data.
Any comment:	

Data / Parameter:	EG <sub>y</sub>
Data unit:	MWh
Description:	Net electricity supplied to the grid
Source of data	Hourly measured and monthly recording
Value of data applied for the purpose of calculating emission reductions	9,170
Description of the applied measurement methods and procedures	The operation data are manually recorded hourly and transferred it into an excel sheet which is then aggregated monthly. These data are confirmed with the grid company at end of every month.
QA/QC procedures	Electricity meter has been maintained and calibrated regularly to assure high levels of accuracy.

	The measured data are double-checked against the receipts of electricity sales.
Any comment:	

### 4.3. Management and operational system

The responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan on page 21-22 of the PDD.

### 4.4. Quality assurance and quality control

The accuracy of the monitoring results are in conformity with calibration requirements, recording frequency and quality assurance and quality control procedures stated in the monitoring plan.

#### 4.4.1. Calibration of monitoring equipment

All meters used for the calculation of emission reductions were duly calibrated by accredited agencies, using applicable national standards.

#### 4.4.2. Monitoring frequency

The parameters to be monitored were read with the frequency indicated in section 4.2 of this document. This corresponds with the requirements from the approved methodology and the validated monitoring plan.

#### 4.4.3. Monitoring system

##### **Monitoring organisation**

A monitoring organization has been set up. This involved setting up an organization and the development of procedures for

- a) CDM staff training
- b) CDM data and record keeping arrangements
- c) Data collection
- d) CDM data quality control and quality assurance
- e) Equipment maintenance
- f) Equipment calibration
- g) Equipment failure

CDM staff training has taken place and this can be proven by training records which are available on site. Procedures for data collection, archiving and data quality assurance and quality control were described in a monitoring manual. The monitoring manual has been signed off by the project developer and is available on site. Procedures for equipment maintenance, failure and calibration have been included in this monitoring manual.

### **Monitoring equipment and installation**

The meters were installed by qualified technicians and the proper functioning thereof has been proven during calibration.

Failure of meters is proven when zero readings occur when project activities take place or when cross checks show deviations from expected values. Meter failures and replacements are registered in the log book and the procedure for this has been described in the monitoring manual.

### **Data records and management**

Data records are filed electronically each month and kept for 2 years until the end of the crediting period. The procedures for data management are described in the monitoring manual.

### **Internal audits**

The implementation of the monitoring manual is checked regularly by EcoSecurities during field visits and/or the consistency and plausibility of the data which are processed each month.

#### **4.4.4. Forward Action Requests**

Forward action requests from previous verifications were closed.

## **5. Calculation of emission reductions**

Calculation of emission reductions took place on the basis of a complete set of cross checked data, applying the approved methodology. Calculations are summarized in Annex A.

### **5.1. Data completeness**

All data were monitored according to the frequency indicated in the validated monitoring plan. A complete set of data was used in the calculation of emission reductions. There was therefore no reason to apply a conservative scenario in view of partial data availability.

### **5.2. Cross checks of monitoring data**

Electricity output to the grid is cross checked with invoices from the grid operator.. Events like meter failure or shut down of the project activity are registered in the log book, and no emission reduction is claimed. All procedures are documented in the monitoring manual referred to in section 4.4.3. Implementation of the monitoring manual is regularly checked by EcoSecurities. Cross checks applied during this period showed that the data used in the calculation of emission reductions are reliable.

### **5.3. Calculation of emission reductions**

Emission reductions have been calculated on the basis of the formulas provided by the validated PDD and the approved methodology. The calculations are shown in Annex A of this document.

#### 5.4. Assumptions in emission calculations

No assumptions were required when calculating the emission reductions over the monitoring period.

#### 5.5. Application of emission factors, IPCC default values and other reference values

The emission factor used in the calculation of the emission reductions is the combined margin grid emission factor. This has been calculated in the PDD and validated. The methane density used can be found in footnote 5 of the meth and on page 32 of the PDD. These values are shown in Annex A and it is valid throughout the crediting period. No IPCC default values or other reference values were required in the calculation of emission reductions of this project.

### 6. Summary

The CDM project activity Nanjing Tianjingwa Landfill Gas to Electricity Project, CDM reference 0071 has reduced **51,431 tCO<sub>2</sub>eq** in the period from 30/06/2008 to 31/07/2009. The emission reduction has been calculated as set out in the validated PDD and the approved methodology. The project activity is implemented as set out in the validated PDD. The validated monitoring plan is in accordance with the approved methodology. Monitoring has been carried out as per validated monitoring plan.

## ANNEX A

CDM 0071-M5  
EcoSecurities, 7 Aug 2009

From 2008-6-29 23:30  
To 2009-7-31 23:30  
days 397

Activity data			Notes
Landfill gas to power generation	LFGelectricity	5,731,431 Nm3	1
Landfill gas to flare	LFGflare	- Nm3	2
Landfill gas to heat	LFGthermal	- Nm3	3
Power displaced	EG	9,170 MWh	4

Calculations			Notes
Methane combusted	MDelectricity	2,176 tCH4	5
	MDflared	- tCH4	6
	MDthermal	- tCH4	7
	MDproject	2,176 tCH4	8
	AF	5%	9
	MDreg	109 tCH4	10
Avoided CO2 emissions grid	EG	9,170 MWh	11
	CEFelectricity	0.874 tCO2/MWh	12
	Displaced emissions from grid	8,015 tCO2	13
Total emission reduction	ER	51,431 tCO2eq	14

### Notes

- 1 LFGelectricity = LFGtotal
- 2 The flare has not been used during the crediting period
- 3 Not applicable
- 4 measured, from power company bills
- 5 LFGelectricity \* %CH4 \* density CH4 tCH4/Nm3
- 6 The flare has not been used during the crediting period
- 7 Not applicable
- 8 MDelectricity = MDproject
- 9 Adjustment factor, as validated PDD
- 10 MDproject \* AF
- 11 measured, from power company bills
- 12 As validated PDD
- 13 EG \* CEFelectricity
- 14 MDproject - MDreg)\*21 + displaced emissions from grid

### Power revised from bills:

	Power supply [invoice]		Power production	
2008				
July	650,000	kWh	650	MWh
Aug	580,000	kWh	580	MWh
Sep	670,000	kWh	670	MWh
Oct	840,000	kWh	840	MWh
Nov	790,000	kWh	790	MWh
Dec	850,000	kWh	850	MWh
2009				
January	830,000	kWh	830	MWh
February	710,000	kWh	710	MWh
March	830,000	kWh	830	MWh
April	730,000	kWh	730	MWh
May	650,000	kWh	650	MWh
June	520,000	kWh	520	MWh
July	520,000	kWh	520	MWh
<b>Total</b>			<b>9,170</b>	<b>MWh</b>