

**MONITORING REPORT FORM (CDM-MR) \***  
**Version 01 - in effect as of: 28/09/2010**

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## MONITORING REPORT

Version ~~3.15~~/07/2011

Jinan Landfill Gas to Energy Project

Reference number: 0933

Monitoring period number: 5th

Monitoring period: 01/03/2010-31/01/2011

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### SECTION A. General description of the project activity

#### A.1. Brief description of the project activity: >>

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1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions;

The purpose of the proposed project is to utilize landfill gas to generate electricity, while excess landfill gas is flared. 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.

2. Brief description of the installed technology and equipments;

The project is chiefly comprised of a gas collection system, flare system and a modular power generation system. Seven 500 kW SD500 modular reciprocating engines are installed as part of the project. Small modular reciprocating engine generator units make it possible to adapt the equipment to the site-specific gas volumes.

3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.).

Construction completed: 01/05/2006

Equipment commissioned: 01/05/2006 (old generators and flare), 25/05/2008 (generators replaced)

Continued operation period started: 01/05/2006

4. Total emission reductions achieved in this monitoring period.

78,229 tCO<sub>2</sub>e

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#### A.2. Project Participants

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Host Parties **China**, involved indirectly; Authorized Participants: Shandong Shifang New Energy Co., Ltd

Other Parties Involved **United Kingdom of Great Britain and Northern Ireland**, involved Authorized Participants: EcoSecurities Ltd ; EcoSecurities Group Plc ; EDF Trading Ltd.

#### A.3. Location of the project activity:

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Jinan City, Jiyang County, Shandong Province, the People's Republic of China. The landfill itself is located in the central part of the province approximately 10 km north of the provincial capital city of Jinan, in the southeastern region of the Jiyang County.

#### A.4. Technical description of the project

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Description of the technology applied in the project activity and detailed technical process, including diagrams

##### Landfill Gas Collection System

The project activity involves the installation of LFG collection technology. This includes:

- Vertical wells used to extract gas;
- Blowers to draw the LFG into the flare and/or the energy generator;
- Landfill capped by soil to provide cover for the site;

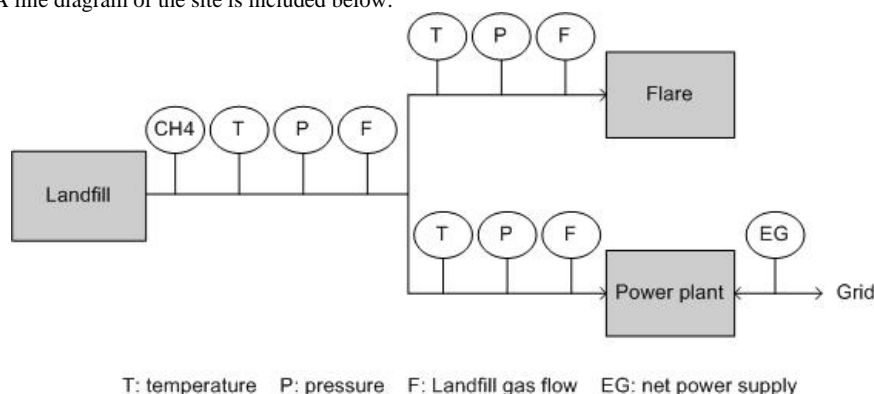
##### Flare technology:

The proposed project activity utilises a domestically manufactured flaring system to flare excess landfill gas.

##### Energy generation technology:

The project has seven 500 kW generators that combusts the methane in the landfill gas to produce electricity, total capacity of the project is 3.5 MW.

A line diagram of the site is included below:



#### A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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AMS-I.D. version. 9 - Grid connected renewable electricity generation dated 28 July 2006  
ACM0001 version. 4 - Consolidated methodology for landfill gas project activities dated 28 July 2006

#### A.6. Registration date of the project activity:

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13 May 2007

#### A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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13 May 07 - 12 May 14 (Renewable). There was no post-registration change to the start date of the crediting period.

#### A.8. Name of responsible person(s)/entity(ies):

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The monitoring report is compiled by EcoSecurities International Ltd.

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## **SECTION B. Implementation of the project activity**

### **B.1. Implementation status of the project activity**

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#### 1) Starting date of operation

Project started operation in 01/05/2006. The project consists of one site only and the implementation is not phased. However the old generators of the project were replaced with the new generators coming into operation from 25/05/2008, a subsequent revision of the PDD was made and has been approved on 09/04/2010. .

#### 2) Actual operation of the project activity during this monitoring period.

The site was shut down from 1 October 2010 to 13 November 2010 for maintenance. No emission reductions are claimed during down time. The old aging flow meters measuring total LFG flow and total LFG flow to generators were replaced on 13 November 2010. As part of the normal site and industry practice some of the old pressure meters and temperature probes nearing their calibration period expiry date are swapped for new, calibrated replacements.

#### 3) Events affecting the applicability of the methodology

No events occurred that affected the applicability of the methodology.

### **B.2. Revision of the monitoring plan**

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The monitoring plan was not revised and no revision is pending.

### **B.3. Request for deviation applied to this monitoring period**

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No request for deviation was applied during this monitoring period.

### **B.4. Notification or request of approval of changes**

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Following the procedures Annex 66 of EB48 and "Guidelines on Assessment of Different Types of Changes from the Project Activity as Described in the Registered PDD" – Annex 67 of EB48, the PDD was revised and has been accepted by the EB on 9 April 2010. The capacity is within the original 3.5 MW, this is in conformity with the approved revised PDD version 05 completed on 31 July 2009.

## **SECTION C. Description of the monitoring system**

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### ***Data collection procedures***

Data generation: Quantity, temperature and pressure of total LFG captured, and LFG sent to generators and the flare were continuously measured by the flow meters, pressure and temperature probes mentioned in section D.2. Methane fraction in LFG was measured by a portable gas analyzer and electricity exported and imported was measured continuously by electricity meter (please see section D.2 for details)..

Data recording: Measurements of the quantity, temperature and pressure of total LFG captured, and LFG sent to generators and the flare were recorded electronically on an hourly basis, backed up with a manual recording every 8 hours. Methane fraction readings were manually recorded every 8 hours and electricity meter readings were recorded manually on a monthly basis. All manual recordings were subsequently entered into an excel sheet.

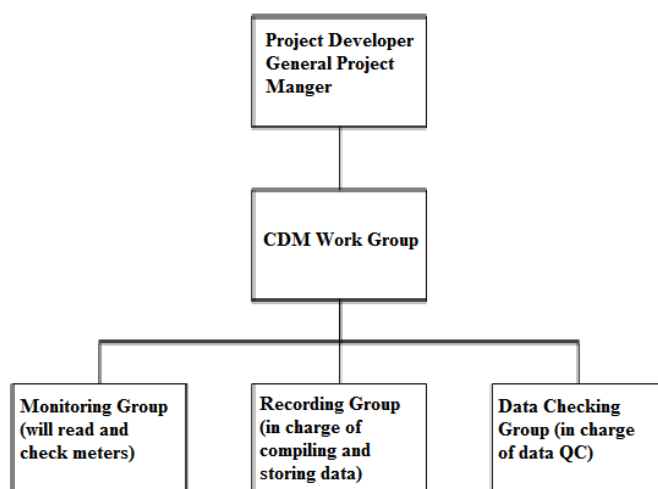
Data aggregation: The monitored landfill gas data and electricity supplied to the grid are respectively summed over the monitoring period.

Calculation: see section D.2. and section E.

Reporting: The calculated values are included in an Excel sheet and reported in the CDM-MR.

### ***Organizational structure, roles and responsibilities***

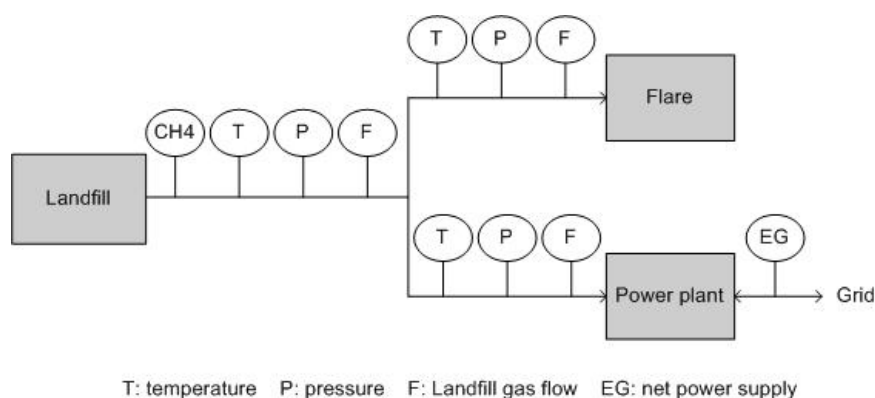
A CDM workgroup has been established and trained to be responsible for the CDM monitoring system. Under the CDM workgroup, three sub groups (Monitoring group, Recording group and Data Checking group) are set up. The roles and responsibilities of each group are shown in the organisational chart as below:



### ***Emergency procedures for the monitoring system***

In case there is doubt about the correct functioning of the electricity meters, the grid company and the site will check and where necessary replace the meter. No CERs are claimed for the period during the time when meter was not functioning correctly. In case there is malfunction of flow meters and Gas analyzer, the CERs of methane destroyed are not claimed for the period.

The figure below shows a line diagram showing all relevant monitoring points.



#### SECTION D. Data and parameters

##### D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

<b>Data / Parameter:</b>	<b>Carbon Emission Factor (CEFelectricity,y)</b>
Data unit:	tCO <sub>2</sub> /MWh
Description:	CO <sub>2</sub> emissions intensity of the electricity displaced
Source of data used:	Official statistics from The China Electric Power Yearbook and the China Energy Statistical Yearbook 2005, 2004 and 2003
Value(s) :	0.9840
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Additional comment:	

<b>Data / Parameter:</b>	<b>GWP<sub>CH<sub>4</sub></sub></b>
Data unit:	tCO <sub>2e</sub> /tCH <sub>4</sub>
Description:	Global warming potential value for methane
Source of data used:	IPCC default value
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Additional comment:	

<b>Data / Parameter:</b>	<b>D<sub>CH<sub>4</sub></sub></b>
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Data unit:	tCH <sub>4</sub> /m <sup>3</sup> CH <sub>4</sub>
Description:	Methane Density
Source of data used:	ACM0001 ver. 4
Value(s) :	0.00067
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Additional comment:	Since LFG is expressed in Sm <sup>3</sup> [20 degree Celsius, 1 atmosphere], Methane density of 0.0007168 [0 degree Celsius and 1 atmosphere] from the methodology was converted to 0.00067 [20 degree Celsius, 1 atmosphere] as set by ACM0008.

## D.2. Data and parameters monitored

Data / Parameter:	LFG <sub>total,y</sub>		
Data unit:	Sm <sup>3</sup> [20 °C, 1 atmosphere]		
Description:	Total amount of LFG captured		
Measured /Calculated /Default:	Measured		
Source of data:	Project Developer		
Value(s) of monitored parameter:	8,705,895		
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculation		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The flow meter 8C004B18000 was replaced by D704EE18000 on 13/11/2010.		
	Type	Vortex meter (Model No. 72F1H-SB0BA1DAA4AW)	Vortex meter (Model No. 72F1F-SE0AA1DAA4AW)
	Serial nr.	8C004B18000	D704EE18000
	Accuracy	1.0	1.0
	Date of calibration	08/02/2010	08/10/2010
	Frequency of calibration	Yearly	Yearly
	Validity of calibration	08/02/2010-07/02/2011	08/10/2010-07/10/2011
Measuring/ Reading/ Recording frequency:	The meters provide a cumulative flow reading. Measurements of cumulative flow were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.		
Calculation method (if applicable):	-		
QA/QC procedures applied:	The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by a suitably qualified external company. Calibration and maintenance records were retained. Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by		

	someone other than the person entering the data.
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<b>Data / Parameter:</b>	<b>LFG<sub>flared,v</sub></b>												
Data unit:	Sm <sup>3</sup> [20 °C, 1 atmosphere]												
Description:	Amount of LFG flared												
Measured /Calculated /Default:	Measured												
Source of data:	Project Developer												
Value(s) of monitored parameter:	603,152												
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations												
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<table border="1"> <tr> <td>Type</td><td>Vortex meter (Model number 72F1H-SB0BA1DAA4AW)</td></tr> <tr> <td>Serial nr.</td><td>94021B18000</td></tr> <tr> <td>Accuracy</td><td>1.0</td></tr> <tr> <td>Date of calibration</td><td>08/02/2010</td></tr> <tr> <td>Frequency of calibration</td><td>Yearly</td></tr> <tr> <td>Validity of calibration</td><td>until 07/02/2011</td></tr> </table>	Type	Vortex meter (Model number 72F1H-SB0BA1DAA4AW)	Serial nr.	94021B18000	Accuracy	1.0	Date of calibration	08/02/2010	Frequency of calibration	Yearly	Validity of calibration	until 07/02/2011
Type	Vortex meter (Model number 72F1H-SB0BA1DAA4AW)												
Serial nr.	94021B18000												
Accuracy	1.0												
Date of calibration	08/02/2010												
Frequency of calibration	Yearly												
Validity of calibration	until 07/02/2011												
Measuring/ Reading/ Recording frequency:	The meters provide a cumulative flow reading. Measurements of cumulative flow were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.												
Calculation method (if applicable):	-												
QA/QC procedures applied:	<p>The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records are retained.</p> <p>Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data.</p>												

<b>Data / Parameter:</b>	<b>LFG<sub>electricity,v</sub></b>
Data unit:	Sm <sup>3</sup> [20 °C, 1 atmosphere]
Description:	Amount of LFG combusted in power plant
Measured /Calculated /Default:	Measured
Source of data:	Project Developer
Value(s) of monitored parameter:	7,732,718
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations



Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The flow meter 8C004A18000 was replaced by D704EF18000 on 13/11/2010.	
	Type	Vortex meter 72F1H- SB0BA1DAA4AW
	Serial nr.	8C004A18000
	Accuracy	1.0
	Date of calibration	08/02/2010
	Frequency of calibration	Yearly
	Validity of calibration	until 07/02/2011
Measuring/ Reading/ Recording frequency:	The meters provide a cumulative flow reading. Measurements of cumulative flow were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.	
Calculation method (if applicable):	-	
QA/QC procedures applied:	The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained. Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data.	

Data / Parameter:	P <sub>total,y</sub>		
Data unit:	Pa		
Description:	Pressure of the total amount of LFG captured		
Measured /Calculated /Default:	Measured		
Source of data:	Project Developer		
Value(s) of monitored parameter:	Flow meter reads directly in Sm <sup>3</sup> using measured P		
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The pressure meter 90206 was replaced by meter 850219 on 22/11/2010.		
	Type	721GKIC11-P	DPSY-AS
	Serial nr.	90206	850219
	Accuracy	0.5	0.5
	Date of calibration	07/12/2009	22/11/2010
	Frequency of calibration	Calibrate yearly in this project	Calibrate yearly in this project
	Validity of	06/12/2010	21/11/2011

	calibration		
Measuring/ Reading/ Recording frequency:	Continuous measurement by pressure meters. Measurements were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.		
Calculation method (if applicable):	-		
QA/QC procedures applied:	<p>The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained.</p> <p>Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data</p>		

<b>Data / Parameter:</b>	<b>P<sub>flared,v</sub></b>																										
Data unit:	Pa																										
Description:	Pressure of the amount of LFG flared																										
Measured /Calculated /Default:	Measured																										
Source of data:	Project Developer																										
Value(s) of monitored parameter:	Flow meter reads directly in Sm <sup>3</sup> using measured P																										
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations																										
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>The meter 90810 was replaced by the meter 850218 on 01/08/2010. The meter 850218 was replaced by 90206 on 22/12/2010.</p> <table> <tr> <td>Type</td><td>721GK2C11-P</td><td>DPSR-AS</td><td>721GK1C11-P</td></tr> <tr> <td>Serial nr.</td><td>90810</td><td>850218</td><td>90206</td></tr> <tr> <td>Accuracy</td><td>0.5</td><td>0.5</td><td>0.5</td></tr> <tr> <td>Date of calibration</td><td>13/08/2009</td><td>26/07/2010</td><td>21/12/2010</td></tr> <tr> <td>Frequency of calibration</td><td>Calibrate yearly in this project</td><td>Calibrate yearly in this project</td><td>yearly in this project</td></tr> <tr> <td>Validity of calibration</td><td>12/08/2010</td><td>25/07/2011</td><td>20/12/2011</td></tr> </table>			Type	721GK2C11-P	DPSR-AS	721GK1C11-P	Serial nr.	90810	850218	90206	Accuracy	0.5	0.5	0.5	Date of calibration	13/08/2009	26/07/2010	21/12/2010	Frequency of calibration	Calibrate yearly in this project	Calibrate yearly in this project	yearly in this project	Validity of calibration	12/08/2010	25/07/2011	20/12/2011
Type	721GK2C11-P	DPSR-AS	721GK1C11-P																								
Serial nr.	90810	850218	90206																								
Accuracy	0.5	0.5	0.5																								
Date of calibration	13/08/2009	26/07/2010	21/12/2010																								
Frequency of calibration	Calibrate yearly in this project	Calibrate yearly in this project	yearly in this project																								
Validity of calibration	12/08/2010	25/07/2011	20/12/2011																								
Measuring/ Reading/ Recording frequency:	Continuous measurement by pressure meters. Measurements were recorded electronically once per hour, backed up with a manual																										

	recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.
Calculation method (if applicable):	-
QA/QC procedures applied:	The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained. Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data.

<b>Data / Parameter:</b>	<b>P<sub>electricity,v</sub></b>																			
Data unit:	Pa																			
Description:	Pressure of the amount of LFG combusted in the power plant																			
Measured /Calculated /Default:	Measured																			
Source of data:	Project Developer																			
Value(s) of monitored parameter:	Flow meter reads directly in Sm <sup>3</sup> using measured P																			
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations																			
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>The meter 91205 was replaced by 90810 on 22/11/2010.</p> <table border="1"> <tr> <td>Type</td><td>721GK1C11-P</td><td>721GK2C11-P</td></tr> <tr> <td>Serial nr.</td><td>91205</td><td>90810</td></tr> <tr> <td>Accuracy</td><td>0.5</td><td>0.5</td></tr> <tr> <td>Date of calibration</td><td>07/12/2009</td><td>22/11/2010</td></tr> <tr> <td>Frequency of calibration</td><td>Calibrate yearly in this project</td><td>. Calibrate yearly in this project</td></tr> <tr> <td>Validity of calibration</td><td>06/12/2010</td><td>21/11/2011</td></tr> </table>		Type	721GK1C11-P	721GK2C11-P	Serial nr.	91205	90810	Accuracy	0.5	0.5	Date of calibration	07/12/2009	22/11/2010	Frequency of calibration	Calibrate yearly in this project	. Calibrate yearly in this project	Validity of calibration	06/12/2010	21/11/2011
Type	721GK1C11-P	721GK2C11-P																		
Serial nr.	91205	90810																		
Accuracy	0.5	0.5																		
Date of calibration	07/12/2009	22/11/2010																		
Frequency of calibration	Calibrate yearly in this project	. Calibrate yearly in this project																		
Validity of calibration	06/12/2010	21/11/2011																		
Measuring/ Reading/ Recording frequency:	Continuous measurement by pressure meters. Measurements were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in..																			
Calculation method (if applicable):	-																			
QA/QC procedures applied:	The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained. Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data																			

Data / Parameter:	T <sub>total,y</sub>		
Data unit:	°C		
Description:	Temperature of the total amount of LFG captured		
Measured /Calculated /Default:	Measured		
Source of data:	Project Developer		
Value(s) of monitored parameter:	Flow meter reads directly in Sm <sup>3</sup> using measured T		
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The meter 701002 was replaced by 701003 on 23/11/2010.		
	Type	WZPB-240SF	WZPB-240SF
	Serial nr.	701002	701003
	Accuracy	-	-
	Date of calibration	7/12/2009	23/11/2010
	Frequency of calibration	Calibrate yearly in this project	Calibrate yearly in this project
	Validity of calibration	6/12/2010	22/11/2011
Measuring/ Reading/ Recording frequency:	Continuous measurement by thermometers. Measurements were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.		
Calculation method (if applicable):	-		
QA/QC procedures applied:	The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained.  Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data.		

<b>Data / Parameter:</b>	<b>T<sub>flared,y</sub></b>
Data unit:	°C
Description:	Temperature of the amount of LFG flared
Measured /Calculated /Default:	Measured
Source of data:	Project Developer
Value(s) of monitored parameter:	Flow meter reads directly in Sm <sup>3</sup> using measured T
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The meter 701001 was replaced by 1007657 on 06/08/2010.		
	Type	WZPB-240SF	WZPB-240SF
	Serial nr.	701001	1007657
	Accuracy	-	-
	Date of calibration	18/8/2009	06/08/2010
	Frequency of calibration	Calibrate yearly in this project	Calibrate yearly in this project
Measuring/ Reading/ Recording frequency:	Validity of calibration	17/8/2010	05/08/2011
	Continuous measurement by temperature sensors. Measurements were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.		
Calculation method (if applicable):	-		
QA/QC procedures applied:	<p>The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained.</p> <p>Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data.</p>		

Data / Parameter:	T <sub>electricity,v</sub>		
Data unit:	°C		
Description:	Temperature of the amount of LFG combusted in the power plant		
Measured /Calculated /Default:	Measured		
Source of data:	Project Developer		
Value(s) of monitored parameter:	Flow meter reads directly in Sm <sup>3</sup> using measured T		
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The meter 606098 was replaced by 810265 on 23/11/2010.		
	Type	WZPB-240SF	WZPB-240SF
	Serial nr.	606098	810265
	Accuracy	-	-
	Date of calibration	7/12/2009	23/11/2010
	Frequency of calibration	Calibrate yearly in this project	Calibrate yearly in this project
	Validity of calibration	6/12/2010	22/11/2011
Measuring/ Reading/ Recording frequency:	Continuous measurement by temperature sensors. Measurements were recorded electronically once per hour, backed up with a manual recording every 8 hours, these recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the		

	manufacturer would have been called in.
Calculation method (if applicable):	-
QA/QC procedures applied:	<p>The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained.</p> <p>Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data.</p>

Data / Parameter:	w <sub>CH4</sub>																		
Data unit:	m <sup>3</sup> CH <sub>4</sub> / m <sup>3</sup> LFG																		
Description:	Methane fraction in the LFG																		
Measured /Calculated /Default:	Measured																		
Source of data:	Project Developer																		
Value(s) of monitored parameter:	Portable Gas Analyzer meter reads directly in %. Please refer to CER calculation sheet for measured values.																		
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations.																		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<div>The meter G3822106 was replaced by G3840106 on 01/07/2010.</div> <table><tr><td>Type</td><td>GA25</td><td>GA25</td></tr><tr><td>Serial nr.</td><td>G3822106</td><td>G3840106</td></tr><tr><td>Accuracy</td><td>3%</td><td>3%</td></tr><tr><td>Date of calibration</td><td>04/08/2009</td><td>30/06/2010</td></tr><tr><td>Frequency of calibration</td><td>Yearly</td><td>Yearly</td></tr><tr><td>Validity of calibration</td><td>03/08/2010</td><td>29/06/2011</td></tr></table>	Type	GA25	GA25	Serial nr.	G3822106	G3840106	Accuracy	3%	3%	Date of calibration	04/08/2009	30/06/2010	Frequency of calibration	Yearly	Yearly	Validity of calibration	03/08/2010	29/06/2011
Type	GA25	GA25																	
Serial nr.	G3822106	G3840106																	
Accuracy	3%	3%																	
Date of calibration	04/08/2009	30/06/2010																	
Frequency of calibration	Yearly	Yearly																	
Validity of calibration	03/08/2010	29/06/2011																	
Measuring/ Reading/ Recording frequency:	Methane content was measured with a portable gas analyser by the project developer once every 8 hours. Recorded values were entered into a spreadsheet. In case of breakdown or suspected problems, the manufacturer would have been called in.																		
Calculation method (if applicable):	<u>The confidence interval of 95% confidence level with periodically recorded CH4% is from 58.06% to 58.17%. Since the quantity of methane generated (lower 95% confidence interval) is more conservative than the periodically recorded data, lower 95% confidence interval was used for the calculation of emission reduction.</u>																		
QA/QC procedures applied:	<div>The meters were subject to maintenance and calibration according to manufacturer's recommendations. On site staff received training in CDM monitoring and the maintenance requirements of the flow meters. Calibrations were carried out by the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained.</div> <div>Data were recorded in hard copy format and transferred to an electronic file. Checks of the data entry process were conducted by someone other than the person entering the data.</div>																		

削除: -

<b>Data / Parameter:</b>	<b>FE</b>
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Data unit:	%
Description:	Flare/combustion efficiency and the operation hours
Measured /Calculated /Default:	Default setting
Source of data:	ACM0001 version 4
Value(s) of monitored parameter:	Default Flare efficiency of 90% Operation hours of flare: 5005:02:09 (hours:mins:secs).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-
Measuring/ Reading/ Recording frequency:	<p>1) The enclosed flare operation was continuously monitored by continuous measurement of operation time of flare using a run time meter connected to a flame detector.</p> <p>2) When there was no flaring, or the flare's flame did not reach the height that is detectable by the flame detector, gas flow volume to flare during that time period was discounted automatically by the data collection system software, ensuring that this volume is not accounted as flared.</p> <p>Default efficiency of 90% was used, when the flame was detected</p>
Calculation method (if applicable):	-
QA/QC procedures applied:	<p>The flare was operated and maintained as per manufacturers' specifications, as part of the daily operation. Regular maintenance in accordance to manufacturers' recommendations revealed no faults with the system</p> <p>An initial flare test involving methane concentration analysis of inflow and flue gas of flare was conducted on 25 September 2006, giving a result of 53% in inflow and 0.05 % in flue gas.</p> <p>A second comprehensive flare efficiency testing was carried out on 25 April 2008. This revealed that the flare efficiency is 95.1%, therefore the conservative default flare efficiency value of 90% is used.</p>

<b>Data / Parameter:</b>	<b>EG<sub>EX,LFG</sub></b>
Data unit:	MWh
Description:	Electricity exported to grid
Measured /Calculated /Default:	Measured
Source of data:	Grid operator
Value(s) of monitored parameter:	10,950
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<table border="1"> <tr><td>Type</td><td>DSSD5(A)</td></tr> <tr><td>Location</td><td>Substation</td></tr> <tr><td>Serial nr.</td><td>100711000384</td></tr> <tr><td>Accuracy</td><td>0.5s</td></tr> <tr><td>Date of calibration</td><td>24/03/2009</td></tr> <tr><td>Frequency of calibration</td><td>Every 3 years</td></tr> <tr><td>Validity of calibration</td><td>until 23/3/2012</td></tr> </table>	Type	DSSD5(A)	Location	Substation	Serial nr.	100711000384	Accuracy	0.5s	Date of calibration	24/03/2009	Frequency of calibration	Every 3 years	Validity of calibration	until 23/3/2012
Type	DSSD5(A)														
Location	Substation														
Serial nr.	100711000384														
Accuracy	0.5s														
Date of calibration	24/03/2009														
Frequency of calibration	Every 3 years														
Validity of calibration	until 23/3/2012														
Measuring/ Reading/ Recording frequency:	Electricity measured continuously using an electricity meter which was maintained and calibrated regularly to assure high levels of accuracy. Net electricity = Export electricity – import electricity														
Calculation method (if applicable):	-														
QA/QC procedures applied:	Electricity meter maintained and calibrated regularly to assure high levels of accuracy. Readings crossed check with sales invoices and other meters.														

<b>Data / Parameter:</b>	<b>EL<sub>IMP</sub></b>														
Data unit:	MWh														
Description:	Electricity imported from grid														
Measured /Calculated /Default:	Measured														
Source of data:	Grid operator														
Value(s) of monitored parameter:	0														
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions														
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<table border="1"> <tr><td>Type</td><td>DSSD5(A)</td></tr> <tr><td>Location</td><td>Substation</td></tr> <tr><td>Serial nr.</td><td>100711000384</td></tr> <tr><td>Accuracy</td><td>0.5s</td></tr> <tr><td>Date of calibration</td><td>24/03/2009</td></tr> <tr><td>Frequency of calibration</td><td>Every 3 years</td></tr> <tr><td>Validity of calibration</td><td>until 23/3/2012</td></tr> </table>	Type	DSSD5(A)	Location	Substation	Serial nr.	100711000384	Accuracy	0.5s	Date of calibration	24/03/2009	Frequency of calibration	Every 3 years	Validity of calibration	until 23/3/2012
Type	DSSD5(A)														
Location	Substation														
Serial nr.	100711000384														
Accuracy	0.5s														
Date of calibration	24/03/2009														
Frequency of calibration	Every 3 years														
Validity of calibration	until 23/3/2012														
Measuring/ Reading/ Recording frequency:	Electricity measured continuously using an electricity meter which was maintained and calibrated regularly to assure high levels of accuracy. Net electricity = Export electricity – import electricity														
Calculation method (if applicable):	-														
QA/QC procedures applied:	Electricity meter maintained and calibrated regularly to assure high levels of accuracy. Readings crossed check with sales invoices and other meters.														

<b>Data / Parameter:</b>	<b>Operation of the power plant</b>
Data unit:	hour
Description:	This is monitored to ensure methane destruction is claimed for methane used in electricity plant when it is operational.
Measured /Calculated	Measured



/Default:	
Source of data:	Project developer
Value(s) of monitored parameter:	26,697 Total hours of operation for 7 generators, since at periods more than 1 generator may be operational at the same time, the total hours of operation may be larger than the total hours in a year
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-
Measuring/ Reading/ Recording frequency:	Data measured by the project developer. Data is monitored to ensure methane destruction is claimed for methane used in electricity plant when it is operational. .
Calculation method (if applicable):	-
QA/QC procedures applied:	-

## SECTION E. Emission reductions calculation

### E.1. Baseline emissions calculation

The calculation of baseline emissions applying actual values and including formulae used is shown as follows. See the CER spreadsheet for details.

Calculation of baseline emissions	Symbol	Amount	Unit
Electricity exported to the grid	EG <sub>EX,LFG</sub>	10,950	MWh
Electricity imported from the grid	EL <sub>IMP</sub>	0	MWh
Net quantity of electricity exported to the grid	EL <sub>y</sub>	10,950	MWh
Emission factor	CEF <sub>electricity</sub>	0.9840	tCO <sub>2</sub> e/MWh
Landfill gas to power generation	LFG <sub>electricity</sub>	7,732,718	Sm <sup>3</sup>
Landfill gas to flare	LFG <sub>flared</sub>	603,152	Sm <sup>3</sup>
Landfill gas to heat	LFG <sub>thermal</sub>	-	Sm <sup>3</sup>
Landfill gas generated	LFG <sub>total</sub>	8,705,895	Sm <sup>3</sup>
Methane density	D <sub>CH<sub>4</sub></sub>	0.00067	tCH <sub>4</sub> /Sm <sup>3</sup>
Flare Efficiency	FE	0.9	
Quantity of methane used to generate electricity	MD <sub>electricity</sub>	3,013	tCH <sub>4</sub>
Quantity of methane flared	MD <sub>flared</sub>	235	tCH <sub>4</sub>
Quantity of methane generated (crosschecked)	MD <sub>project(crosschecked)</sub>	3,216	tCH <sub>4</sub>
Quantity of methane generated (lower 95% confidence interval)	MD <sub>project(lower 95% CL)</sub>	3,212	tCH <sub>4</sub>
Adjustment Factor	AF	0	%
Quantity of methane would have been destroyed before project	MD <sub>reg</sub>	0	tCH <sub>4</sub>
Global Warming Potential value of methane	GWP <sub>CH<sub>4</sub></sub>	21	CO <sub>2</sub> e/tCH <sub>4</sub>
Total baseline emissions	BE <sub>y</sub>	78,229	tCO <sub>2</sub> e

#### Calculation of baseline emissions

Electricity exported to the grid  
Electricity imported from the grid  
Net quantity of electricity exported to the grid  
Emission factor

Landfill gas to power generation  
Landfill gas to flare  
Landfill gas to heat  
Landfill gas generated

Methane density  
Flare Efficiency  
Quantity of methane used to generate electricity  
Quantity of methane flared  
Quantity of methane generated (crosschecked)

Adjustment Factor  
Quantity of methane would have been destroyed before project

Global Warming Potential value of methane  
Total baseline emissions

删除:

$$BE_y = (EG_{EX,LFG} - EL_{IMP}) * CEF_{electricity} + (MD_{project(crosschecked)} - MD_{reg})GWP_{CH4}$$

## E.2. Project emissions calculation

>>

Calculation of project emissions	Symbol	Amount	Unit
Total project emissions	PE <sub>y</sub>	0	tCO <sub>2</sub> e

削除: Total project emissions

The calculation of project emissions applying actual values and including formulae used is shown as follows. See the CER spreadsheet for details.

$$PE_y = 0$$

## E.3. Leakage calculation

>>

Calculation of leakage emissions	Symbol	Amount	Unit
Total leakage emissions	L <sub>y</sub>	0	tCO <sub>2</sub> e

削除: Total leakage emissions

The calculation of leakage emissions applying actual values and including formulae used is shown as follows. See the CER spreadsheet for details.

$$L_y = 0$$

## E.4. Emission reductions calculation / table

>>

Calculation of emission reductions	Symbol	Amount	Unit
Total baseline emissions	BE <sub>y</sub>	78,229	tCO <sub>2</sub> e
Total project emissions	PE <sub>y</sub>	0	tCO <sub>2</sub> e
Total leakage emissions	L <sub>y</sub>	0	tCO <sub>2</sub> e
Total emission reductions	ER <sub>y</sub>	78,229	tCO <sub>2</sub> e
*Installed capacity		3.5	MW
*Operating hours of generators		26,697	hours
*Operating hours of the flare		5005:02:09	hours:mins:secs

### Calculation of emission reductions

Total baseline emissions  
Total project emissions  
Total leakage emissions  
Total emission reductions  
\*Installed capacity  
\*Operating hours of generators  
\*Operating hours of the flare

削除: \*Operating hours of the flare

The calculation of emission reductions applying actual values and including formulae used is shown as follows. See the CER spreadsheet for details.

$$ER_y = BE_y - PE_y - L_y$$

## E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO <sub>2</sub> e)	103,499 <sup>1</sup>	78,229

削除: 317

## E.6. Remarks on difference from estimated value in the PDD

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<sup>1</sup> The value is calculated as 11/12 of the ex-ante estimation of annual average emission reductions (112,908 tCO<sub>2</sub>e) in the PDD, which is corresponding to the monitoring period of 11 months.

There was not any **increase** in the actual emission reductions achieved during the current monitoring period.

ER PDD:  $112,908 \text{ tCO}_2\text{e} / 365 \text{ days} = 309 \text{ tCO}_2\text{e/day}$  average.

ER monitoring period:  $78,229 \text{ tCO}_2\text{e} / 337 \text{ days} = 232 \text{ tCO}_2\text{e/day}$  average.

ER PDD > ER monitoring period; there was no increase in the actual emission reductions achieved during the monitoring period compared to the registered CDM-PDD.

削除: 317