

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

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## MONITORING REPORT

Version 2 22/03/2011

### Jinan Landfill Gas to Energy Project

Reference number: 0933

Monitoring period number: 5th

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

## SECTION A. General description of the project activity

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

>>

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.  
78,317 tCO<sub>2</sub>e

### A.2. Project Participants

>>

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;

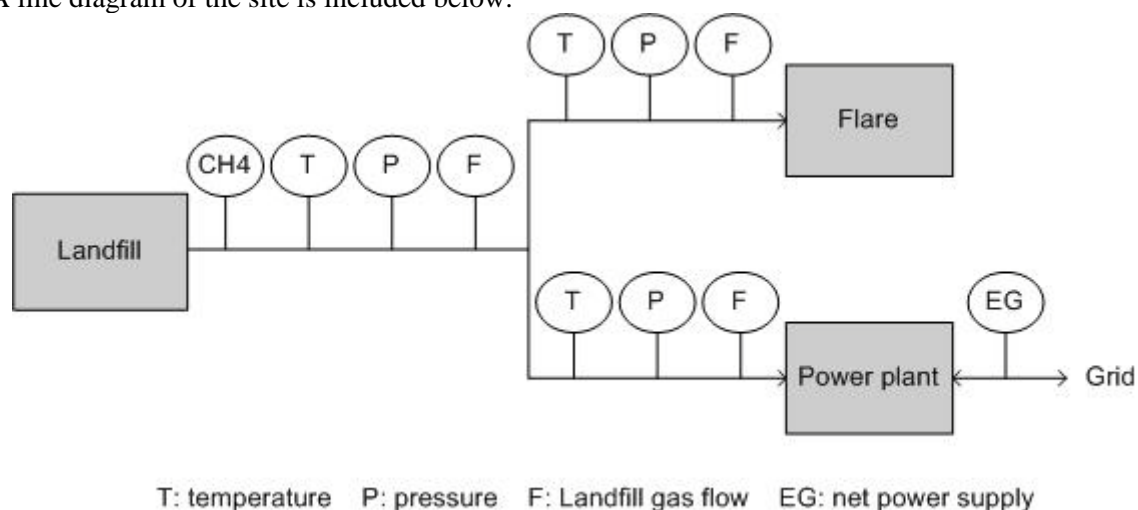
##### Flare technology:

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:

>>

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):**

&gt;&gt;

The monitoring report is compiled by EcoSecurities International Ltd.

|                    |               |                    |  |
|--------------------|---------------|--------------------|--|
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Email: Xuetao.Bai@ecosecurities.com

**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.

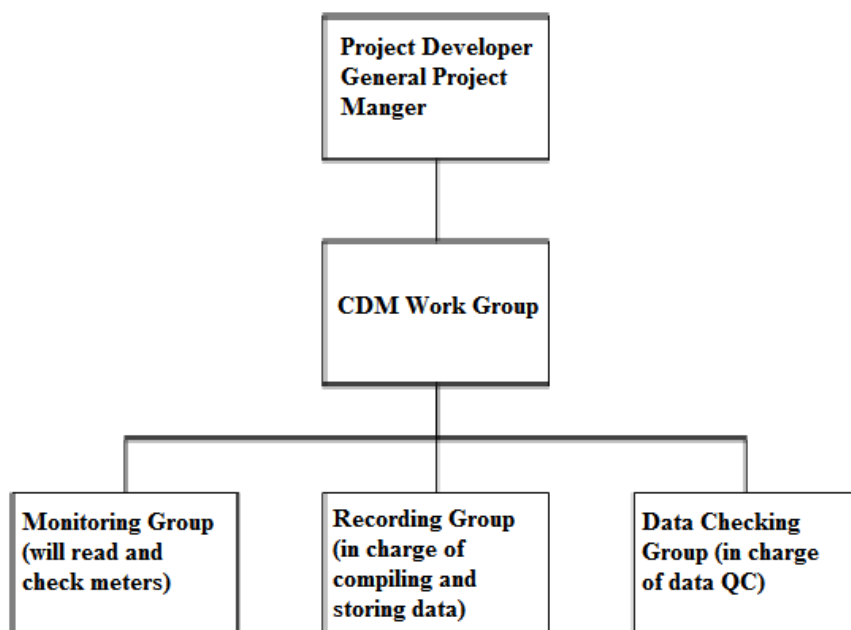
Data aggregation: The monitored landfill gas data and electricity supplied to the grid are respectively summed over the monitoring period.

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*

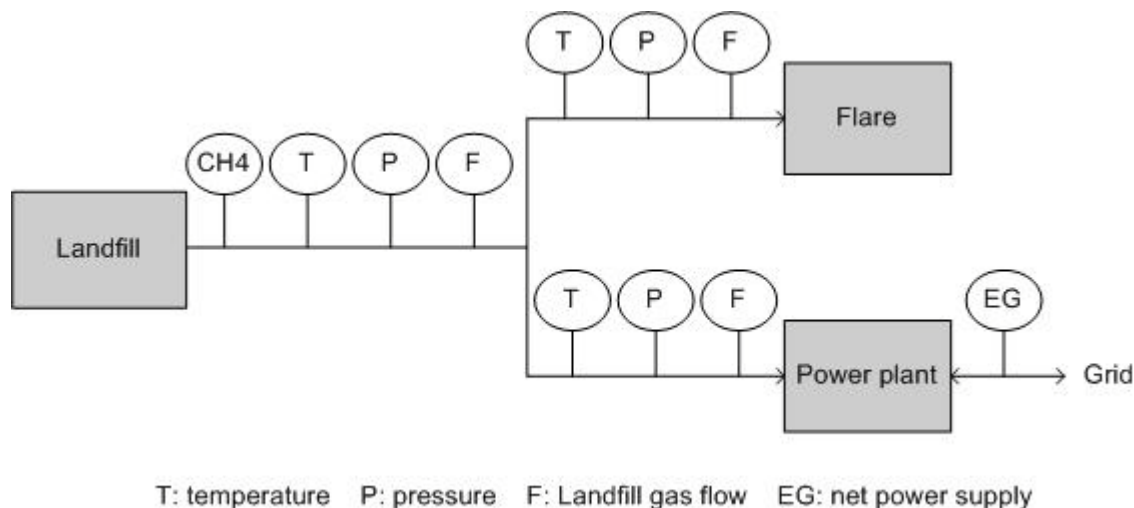
A CDM workgroup has been established and trained to be responsible for the CDM monitoring system. Under the CDM workgroup, three sub groups (Monitoring group, Recording group and Data Checking group) are set up. The roles and responsibilities of each group are shown in the organisational chart as below:



### 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

| Data / Parameter:  | Carbon Emission Factor (CEF <sub>electricity,y</sub> )   |
|--|--|
| 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:  |  |

| Data / Parameter:  | GWP <sub>CH<sub>4</sub></sub>              |
|--|--|
| 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>  |
| 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  |   |   |

|  |  |
|--|--|
|  | <p>meters. Calibrations were carried out by 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:   | LFG <sub>flared,v</sub>  |  |      |  |            |             |          |     |                     |            |                          |        |                         |                  |
| 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><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       | Baseline emissions calculations        |  |

|   |  |  |  |
|---|--|--|--|
| used for (Baseline/ Project/ Leakage emission 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<br>72F1H-<br>SB0BA1DAA4AW | Vortex meter<br>72F1F-<br>SE0AA1DAA4AW |
|   | Serial nr.   | 8C004A18000                            | D704EF18000                            |
|   | Accuracy   | 1.0                                    | 1.0                                    |
|   | Date of calibration  | 08/02/2010                             | 08/10/2010                             |
|   | Frequency of calibration   | Yearly                                 | yearly                                 |
|   | Validity of calibration  | until 07/02/2011                       | until 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 the manufacturer or a suitably qualified external company. Calibration and maintenance records were retained.<br>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>total,y</sub></b>                                    |
| 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) | <p>The pressure meter 90206 was replaced by meter 850219 on 22/11/2010.</p> <table><tr><td>Type</td><td>721GKIC11-P</td><td>DPSY-AS</td></tr><tr><td>Serial nr.</td><td>90206</td><td>850219</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><tr><td></td><td></td><td></td></tr></table> | 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 calibration | 06/12/2010 | 21/11/2011 |  |  |  |
| 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 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:   | <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:   | P <sub>flared,v</sub>  |                                  |                                  |                        |
| 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) | The meter 90810 was replaced by the meter 850218 on 01/08/2010.<br>The meter 850218 was replaced by 90206 on 22/12/2010. |                                  |                                  |                        |
|   | 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  | 12/08/2010                       | 25/07/2011                       | 20/12/2011             |

|  |   |  |  |  |
|--|---|--|--|--|
|  | 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> |  |  |  |

|   |   |                                  |                                    |
|---|---|----------------------------------|------------------------------------|
| Data / Parameter:   | P <sub>electricity,v</sub>  |                                  |                                    |
| 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) | The meter 91205 was replaced by 90810 on 22/11/2010.  |                                  |                                    |
|   | 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:           | <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>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   | 0.1                              | 0.2                              |
|   | 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.<br>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 1007657on 06/08/2010.   |                                  |                                  |
|   | Type   | WZPB-240SF                       | WZPB-240SF                       |
|   | Serial nr.   | 701001                           | 1007657                          |
|   | Accuracy   | 0.5                              | 0.2                              |
|   | Date of calibration  | 18/8/2009                        | 06/08/2010                       |
|   | Frequency of calibration   | Calibrate yearly in this project | Calibrate yearly in this project |
|   | Validity of calibration  | 17/8/2010                        | 05/08/2011                       |
| 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:   | 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.<br>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>electricity,v</sub></b>                              |
| 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  | 0.1                              | 0.2                              |
|   | 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> |                                  |                                  |

|   |   |            |            |
|---|---|------------|------------|
| <b>Data / Parameter:</b>  | <b>w<sub>CH4</sub></b>  |            |            |
| 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) | The meter G3822106 was replaced by G3840106 on 01/07/2010.  |            |            |
|   | 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): | -   |
| 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>FE</b>   |
| 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:  | <p>Default Flare efficiency of 90%</p> <p>Operation hours of flare: 5005:02:09 (hours:mins:secs).</p>   |
| 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/   | Electricity measured continuously using an electricity meter which   |      |          |          |            |            |              |          |      |                     |            |                          |               |                         |                 |

|                                     |   |
|-------------------------------------|---|
| Recording frequency:                | 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>  | Operation of the power plant   |
| 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 /Default:  | Measured   |
| Source of data:   | Project developer  |
| Value(s) of monitored parameter:  | 26,697<br>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.<br>.                                      |
| 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                             | $EG_{EX,LFG}$                | 10,950    | MWh                                |
| Electricity imported from the grid                           | $EL_{IMP}$                   | 0         | MWh                                |
| Net quantity of electricity exported to the grid             | $EL_y$                       | 10,950    | MWh                                |
| Emission factor  | $CEF_{electricity}$          | 0.9840    | tCO <sub>2</sub> e/MWh             |
| Landfill gas to power generation                             | $LFG_{electricity}$          | 7,732,718 | Sm <sup>3</sup>                    |
| Landfill gas to flare  | $LFG_{flared}$               | 603,152   | Sm <sup>3</sup>                    |
| Landfill gas to heat   | $LFG_{thermal}$              | -         | Sm <sup>3</sup>                    |
| Landfill gas generated                                       | $LFG_{total}$                | 8,705,895 | Sm <sup>3</sup>                    |
| Methane density  | $D_{CH_4}$                   | 0.00067   | tCH <sub>4</sub> /Sm <sup>3</sup>  |
| Flare Efficiency   | FE                           | 0.9       |                                    |
| Quantity of methane used to generate electricity             | $MD_{electricity}$           | 3,013     | tCH <sub>4</sub>                   |
| Quantity of methane flared                                   | $MD_{flared}$                | 235       | tCH <sub>4</sub>                   |
| Quantity of methane generated (crosschecked)                 | $MD_{project(crosschecked)}$ | 3,216     | tCH <sub>4</sub>                   |
| Adjustment Factor  | AF                           | 0         | %                                  |
| Quantity of methane would have been destroyed before project | $MD_{reg}$                   | 0         | tCH <sub>4</sub>                   |
| Global Warming Potential value of methane                    | $GWP_{CH_4}$                 | 21        | CO <sub>2</sub> e/tCH <sub>4</sub> |
| Total baseline emissions                                     | $BE_y$                       | 78,317    | tCO <sub>2</sub> e                 |

$$BE_y = (EG_{EX,LFG} - EL_{IMP}) * CEF_{electricity} + (MD_{project(crosschecked)} - MD_{reg})GWP_{CH_4}$$

## E.2. Project emissions calculation

>>

|                         |                 |   |                    |
|-------------------------|-----------------|---|--------------------|
| Total project emissions | PE <sub>y</sub> | 0 | tCO <sub>2</sub> e |
|-------------------------|-----------------|---|--------------------|

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

>>

|                         |                |   |                    |
|-------------------------|----------------|---|--------------------|
| Total leakage emissions | L <sub>y</sub> | 0 | tCO <sub>2</sub> e |
|-------------------------|----------------|---|--------------------|

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               | Remarks |
|------------------------------------|-----------------|------------|--------------------|---------|
| Total baseline emissions           | BE <sub>y</sub> | 78,317     | tCO <sub>2</sub> e | 1       |
| Total project emissions            | PE <sub>y</sub> | 0          | tCO <sub>2</sub> e | 2       |
| Total leakage emissions            | L <sub>y</sub>  | 0          | tCO <sub>2</sub> e | 3       |
| Total emission reductions          | ER <sub>y</sub> | 78,317     | tCO <sub>2</sub> e | 4       |
| *Installed capacity                |                 | 3.5        | MW                 |         |
| *Operating hours of generators     |                 | 26,697     | hours              | 5       |
| *Operating hours of the flare      |                 | 5005:02:09 | hours:mins:secs    | 6       |

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

$$ER_y = BE_y - PE_y - L_y$$

|  |
|--|
| <b>E.5. Comparison of actual emission reductions with estimates in the CDM-PDD</b> |
|--|

>>

| 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>  | 78,317   |

|   |
|---|
| <b>E.6. Remarks on difference from estimated value in the PDD</b> |
|---|

>>

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

ER PDD: 112,908tCO<sub>2</sub>e/365 days = 309 tCO<sub>2</sub>e/day average.

ER monitoring period: 78,317 tCO<sub>2</sub>e / 337 days = 232 tCO<sub>2</sub>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.

---

<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.